Post-socialist urban infrastructures

Tuvikene, Tauri (Ed.); Sgibnev, Wladimir (Ed.); Neugebauer, Carola S. (Ed.)

Veröffentlichungsversion / Published Version
Sammelwerk / collection

Die Publikation wurde durch den Open-Access-Publikationsfonds für Monografien der Leibniz-Gemeinschaft gefördert. / The publication was supported by the Open Access Publishing Fund of the Leibniz Association.

Empfohlene Zitierung / Suggested Citation:
Tuvikene, T., Sgibnev, W., & Neugebauer, C. S. (Eds.). (2019). *Post-socialist urban infrastructures* (Routledge Research in Planning and Urban Design). London: Routledge. https://doi.org/10.4324/9781351190350

EDITED BY TAURI TUVIKENE, WLADIMIR SGIBNEV, CAROLA S. NEUGEBAUER

Post-Socialist Urban Infrastructures

ROUTLEDGE RESEARCH IN PLANNING AND URBAN DESIGN

ROUTLEDGE

Post-Socialist Urban Infrastructures

Post-Socialist Urban Infrastructures critically elaborates on often forgotten, but some of the most essential, aspects of contemporary urban life, namely infrastructures, and links them to a discussion of post-socialist transformation.

As the skeletons of cities, infrastructures capture the ways in which urban environments are assembled and urban lives unfold. Focusing on post-socialist cities, marked by neoliberalisation, polarisation and hybridity, this book offers new and enriching perspectives on urban infrastructures by centering on the often marginalised aspects of urban research – transport, green spaces, and water and heating provision.

Featuring cases from West and East alike, the book covers examples from Azerbaijan, Bulgaria, Serbia, Croatia, Germany, Russia, Georgia, Lithuania, Poland, the Czech Republic, Tajikistan, and India. It provides original insights into the infrastructural back end of post-socialist cities for scholars, planners, and activists interested in urban geography, cultural and social anthropology, and urban studies.

Tauri Tuvikene is an urban geographer at Tallinn University. His research deals with comparative urbanism in relation to post-socialist cities. He has published on conceptualizations of post-socialism, garage areas in (post-) Soviet urban spaces and urban (transport) infrastructures, including the politics of parking and walking in an urban environment.

Wladimir Sgibnev defended his PhD degree at Humboldt University's Central Asian studies department addressing the social production of space in urban Tajikistan. Currently, he is Senior Researcher at the Leibniz Institute for Regional Geography (Leipzig), working on urban processes in post-Soviet countries, particularly urban development and mobility in peripheralised locations.

Carola S. Neugebauer studied landscape architecture and urban design in Germany and France. She is Associate Professor at the RWTH Aachen University. Taking up an interdisciplinary and comparative stance on cities, her research has been focused on urban transformations, planning, and cultural heritage in Central Eastern Europe and the post-Soviet space.

Routledge Research in Planning and Urban Design

Routledge Research in Planning and Urban Design is a series of academic monographs for scholars working in these disciplines and the overlaps between them. Building on Routledge's history of academic rigour and cutting-edge research, the series contributes to the rapidly expanding literature in all areas of planning and urban design.

www.routledge.com/Routledge-Research-in-Planning-and-Urban-Design/book-series/RRPUD

Participatory Design Theory
Using Technology and Social Media to Foster Civic Engagement
Edited by Oswald Devisch, Liesbeth Huybrechts, Roel De Ridder

Evolving Public Space in South Africa
Towards Regenerative Space in the Post-Apartheid City
Karina Landman

Post-Socialist Urban Infrastructures
Edited by Tauri Tuvikene, Wladimir Sgibnev, Carola S. Neugebauer

The Metaphysical City
Six Ways of Understanding the Urban Milieu
Rob Sullivan

The City in Geography
Renaturing the Built Environment
Benedict Anderson

Post-Socialist Urban Infrastructures

Edited by Tauri Tuvikene,
Wladimir Sgibnev and
Carola S. Neugebauer

Routledge
Taylor & Francis Group
LONDON AND NEW YORK

First published 2019
by Routledge
2 Park Square, Milton Park, Abingdon, Oxon OX14 4RN

and by Routledge
52 Vanderbilt Avenue, New York, NY 10017

Routledge is an imprint of the Taylor & Francis Group, an informa business

British Library Cataloguing-in-Publication Data
A catalogue record for this book is available from the British Library

Library of Congress Cataloging-in-Publication Data
Names: Tuvikene, Tauri, editor. |
Sgibnev, Wladimir, 1983– editor. | Neugebauer, Carola S., 1980– editor.
Title: Post socialist urban infrastructures / edited by Tauri Tuvikene, Wladimir Sgibnev, Carola S. Neugebauer.
Description: Abingdon, Oxon ; New York, NY : Routledge, 2019. |
Series: Routledge research in planning and urban design |
Includes bibliographical references and index.
Identifiers: LCCN 2018044581 | ISBN 9780815392651 (hardback) |
ISBN 9781351190343 (adobe pdf reader) | ISBN 9781351190336 (epub) |
ISBN 9781351190329 (mobipocket)
Subjects: LCSH: City planning–Former communist countries. |
Municipal services–Former communist countries. |
Infrastructure (Economics)–Former communist countries.
Classification: LCC HT169.E82 P67 2019 | DDC 307.1/216091717–dc23
LC record available at https://lccn.loc.gov/2018044581

ISBN: 978-0-8153-9265-1 (hbk)
ISBN: 978-1-351-19035-0 (ebk)

Typeset in Sabon
by Newgen Publishing UK

Supported by the Leibniz Association's Open Access Monograph Publishing Fund

This publication has been printed with kind support from RWTH Aachen University

Contents

Illustrations

Figures

Tables

Contributors

Stefan Bouzarovski is Professor at the Department of Geography, University of Manchester, and director of the Collaboratory for Urban Resilience and Energy within the Manchester Urban Institute. He chairs the European Union Energy Poverty Observatory and the ENGAGER network. His work is embodied in several books including *Energy Poverty* (2018).

Mirjam Büdenbender is a political economist and economic geographer. She holds a PhD in Geography from KU Leuven. Her dissertation examined the development of real estate markets in Russia and Poland. Currently Mirjam advises a member of the German Bundestag on housing policies and co-founded 'b/urban', bringing urban education into schools.

Diana Dushkova holds a PhD in Geography from the Lomonosov Moscow State University. Her research foci are urban landscape ecology and spatio-temporal modelling of human-environment interfaces in urban areas. Currently Diana is a Senior Researcher at the Humboldt University of Berlin with a special focus on urban ecosystem services and green infrastructure.

Annegret Haase is an urban sociologist and works at the Helmholtz Centre for Environmental Research – UFZ in Leipzig, Germany, at the Department of Urban and Environmental Sociology. Her research foci are comparative urban research, sustainable urban development, socio-environmental processes in cities, urban inequalities and injustices, reurbanization and urban shrinkage, urban governance and policymaking.

Dagmar Haase is a geographer and urban ecologist with a focus on green infrastructure and ecosystem services in cities, and an interest in global and local urbanization research. She is based at the Humboldt University, Berlin, and guest scientist at the Helmholtz Centre for Environmental Research – UFZ in Leipzig, Germany.

Sergio Tirado Herrero is a Marie Curie Research Fellow at Universitat Autònoma de Barcelona. His current research explores the link between low-carbon transitions and existing energy-related inequalities in the

European Union. He coordinates working group 'Dialogues' of the ENGAGER network and is additionally lead author on energy-impact reports in Spain.

Deana Jovanović is a Leibniz-DAAD Postdoctoral Fellow at the Leibniz Institute for East and Southeast European Studies (IOS) in Regensburg. With a PhD from Manchester University, she researches urban, political, and environmental anthropology. She was previously the Sociological Review Fellow for 2017/2018 (Keele University), a Visiting Fellow at Manchester University and a Postdoctoral Fellow at the Centre for Advanced Studies (University of Rijeka).

Jakub Kronenberg's research focuses on economy-society-environment interactions, in particular from the perspective of ecological economics. He works at the University of Lodz, Faculty of Economics and Sociology, where he leads the Social-Ecological Systems Analysis Lab. He is on the board of the Sendzimir Foundation that promotes sustainable development in Poland.

Siarhei Liubimau is Associate Professor at the Department of Social Sciences and a co-founder of the Laboratory of Critical Urbanism at the European Humanities University in Vilnius. Previously he was a Fellow at the Central European University (Budapest), Institute for Human Sciences (Vienna) and Helsinki Collegium for Advanced Studies.

Chandrima Mukhopadhyay was recently a Visiting Scholar at MIT-UTM Malaysia Sustainable Cities Program. She graduated with a Doctorate degree from the School of Architecture, Planning and Landscape at Newcastle University, UK. She worked as an Assistant Professor at the Faculty of Planning, CEPT University, India. She is the editor-in-chief of the 'Conversations in Planning' booklet project, an AESOP-YA project.

Ondřej Mulíček is Assistant Professor at the Department of Geography, Masaryk University in Brno. His primary research interests are in urban rhythms, spatiotemporal tactics, strategies and politics as well as in everyday mobilities. He is currently conducting research into lived spaces of routine everyday activities.

Carola S. Neugebauer studied landscape architecture and urban design in Germany and France. She is Associate Professor at the RWTH Aachen University. Taking up an interdisciplinary and comparative stance on cities, her research has been focused on urban transformations, planning and cultural heritage in Central Eastern Europe and the post-Soviet space.

Anna Plyushteva is Marie Sklodowska-Curie Postdoctoral Fellow at Cosmopolis Centre for Urban Research, Vrije Universiteit Brussel (VUB). Her current research focuses on urban transport, everyday and night mobilities, and shift work. Anna holds a doctorate in Human Geography from University College London.

Sascha Roth earned his PhD in anthropology from Halle University with a thesis on housing in Soviet and contemporary Baku. His areas of interest are politics of representation, housing, anthropology of the state, ideologies and utopias. Currently he is scientific coordinator at the Max Planck Institute for Social Anthropology.

Joseph Salukvadze is Professor at Tbilisi State University and a Visiting Professor at TU Munich. He was a Swedish Institute Research Fellow and Fulbright scholar at MIT. As an expert in urban issues and land policies, he cooperates with the World Bank, Asian Development Bank, UN Habitat, FAO and others.

Daniel Seidenglanz is Assistant Professor at the Department of Geography, Masaryk University in Brno. His primary research interests involve various issues in transport geography, and he is currently conducting research on everyday mobilities and public transport and car use in everyday life. He is interested also in the research of railway transport liberalization.

Wladimir Sgibnev defended his PhD degree at Humboldt University's Central Asian studies department addressing the social production of space in urban Tajikistan. Currently, he is Senior Researcher at the Leibniz Institute for Regional Geography (Leipzig), working on urban processes in post-Soviet countries, particularly urban development and mobility in peripheralized locations.

David Sichinava is a human geographer primarily interested in urban political geography and geographic peculiarities of inequality. He works as Assistant Professor of Human Geography at Tbilisi State University, Georgia, and also serves as a Senior Policy Analyst at CRRC-Georgia, a Tbilisi-based think tank.

Tauri Tuvikene is an urban geographer at Tallinn University. His research deals with comparative urbanism in relation to post-socialist cities. He has published on conceptualizations of post-socialism, garage areas in (post-) Soviet urban spaces and urban (transport) infrastructures, including the politics of parking and walking in urban environments.

Tonio Weicker is a Research Associate at Technische Universität Berlin. His PhD thesis addressed marshrutka minibuses as a target of transition processes and political reforms in the everyday life of Russian cities. After his graduation in East-European studies, he worked as a lecturer at the State University of Volgograd in Southern Russia.

Daniela Zupan is a postdoctoral fellow at National Research University Higher School of Economics in Moscow. She holds a doctoral degree in urban design and planning theory from Stuttgart University. Her research interests include transformation processes in Central and Eastern European cities, urban planning and design, as well as housing.

Acknowledgements

This book dates back to the 2015 Cities After Transition conference in Prague where the idea of the collection was first put forward in a session organized by the editors. Many papers originate from this session but many others joined in later. Such books always owe their existence to a number of people. Of course, chapter authors are the ones who make the core of the book and we are grateful to all of them, willing to peer-review, revise and re-think the papers after our Tallinn workshop in 2017 and over the course of polishing the book in the later stages. But there are also many who do not feature directly in the book. We would like to forward our thanks to the discussants at the book workshop in Tallinn, Raili Nugin, Tarmo Pikner and Liis Ojamäe from Tallinn University who agreed to read through the paper drafts and gave invaluable feedback. We also owe thanks to two student assistants from RWTH Aachen, Janina Marie Nieper and Maximilian Bierholz, who provided excellent support by handling the final stages of the manuscript preparation. Of course, there are many others we owe our thanks to, including Niranjana Ramesh, Jason Spike, Lela Rekhviashvili and Merlin Rehema.

Financial support for the book project was generously provided by the Leibniz Institute for Regional Geography, the RWTH Aachen University, the Estonian Research Council grants IUT3-2, PUTJD580 and PRG398, and the COST CA16232 ENGAGER network. We are particularly grateful to the Baltic-German University Liaison Office and the Tallinn University School of Humanities for contributing to the edited volume authors' workshop. The open access publication of this volume has received additional support from the Leibniz Association's Open Access Monograph Publishing Fund, the Volkswagen Foundation, the Tallinn University School of Humanities and the RWTH Aachen, chair for Cultural Heritage and Urban planning (SKE). This sheer amount of financial contributors is only a small indicator of the vast number of institutions and individuals we are deeply indebted to for making this edited volume possible.

1 Introduction

Linking post-socialist and urban infrastructures

Tauri Tuvikene, Wladimir Sgibnev and Carola S. Neugebauer

Infrastructural vignettes

As in many microrayons of the Soviet Union, a large-diameter pipe coming from the district heating plant, whose large exhaust chimney is visible from afar, meanders between the five-storey blocks of the 'Sadriddin Ayni' housing estate at the northern gates of Dushanbe, capital of Tajikistan. High-rise residential buildings form the mainstay of Soviet-era housing provision in Taijkistan and elsewhere in the former Soviet Union (FSU), as well as in Central and Eastern Europe (CEE). Today, they are still the backbone of the housing stock. Yet, in this housing estate, the district heating has not been working since the years of the civil war (1992–1997). Electricity is scarce and expensive, so residents have resorted to do-it-yourself solutions, installing their own wood-fired stoves with pipes peeking out of the windows. In wintertime, many families seal off all rooms but the living room and spend their days around the stove. This shift from a centralized infrastructural regime to an individualized and fragmented system has led to a definite loss of trust in the state, in Dushanbe as elsewhere in the formerly socialist bloc.

Several minibuses wait for passengers at the 'Vodonasos' terminal stop by the 'Sadriddin Ayni' housing estate. These minibuses, known as *marshrutkas*, were never thought of as means of mass transportation in Soviet urban planning, yet were particularly suited for the 'wild 1990s' in various parts of the post-socialist realm. New needs and possibilities, a new legal framework and new struggles for livelihood drastically transformed urban transport. Municipal operators were unable to meet the basic mobility needs of the population and an ever-growing fleet of *marshrutkas* filled the gap. At the same time, defunct industrial plants released thousands of people into unemployment, many of whom became absorbed by the *marshrutka* sector. The emergence of privately run transport options and the soaring increase in private car use signalled an individualization of mobility. Today, *marshrutkas* are banned on Dushanbe's main thoroughfare: the administration considers them not to be presentable enough. Dushanbe, like many other cities, is looking for more modern and 'world city' alternatives, and aims to ban *marshrutkas* from its streets altogether.

Ambition and scope

The topic of these vignettes – collapse and deficiency, as well as ways of overcoming them – formed the primary common ground for infrastructure-related publications after the fall of communism. Indeed, the 'continuing flow within the pipes […] literally and metaphorically [constitutes] the body politic' (Alexander et al., 2007, p. 23). Consequently, the people affected may see the end of infrastructure provision as a sign of societal disintegration. Unsurprisingly, unstable utilities has become the most important single factor in a prevailing admiration of the Soviet forms of infrastructural governance, and also a source of numerous contentions. The academic interest of this present volume thus builds upon the societal salience of the topic.

Most publications on the topic, however, did not emerge from academia but from major international donors such as the World Bank, the European Bank for Reconstruction and Development (EBRD) and the Asian Development Bank, and their (Western) consultants involved in project implementation. In these publications, the transitological paradigm prevailed, addressing infrastructure development as a tool for fostering competitiveness and enabling access to markets (see also Kaminski, 2000; Shepherd and Wilson, 2006). For many cities and regions, this literature provides the sole source of statistics and analyses of infrastructures so far. Regarding public transport, several studies have delved into major cities of European Union (EU) accession countries such as Poland (Pucher, 1995), the Czech Republic (Pucher, 1999) and Hungary (Hook, 1999). For the FSU, country- and city-specific studies exist, among others, on Uzbekistan (Gwilliam et al., 1999), Kazakhstan (Finn, 2008; Gwilliam, 2000; Gwilliam, 2001) and Georgia (Finn, 2008), as well as some comparative overview papers (Kominek, 2005). Several authors have delved into the utilities sector – from digital infrastructures (Clarke, 2001) to water, electricity and heating, both with an urban focus (Kennedy, 1999; Lampietti and Meyer, 2002; World Bank, 2010) and dealing with regional water and energy conflicts, particularly in Central Asia (International Crisis Group, 2007; International Crisis Group, 2014) or 'transition economies' in general terms (Zhang, 2013). These publications are also a valuable source for understanding why urban infrastructures in our region of concern look as they do today – both in positive and negative terms. Yet the bulk of these publications are either based on policy reviews or on data provided by national statistical agencies. Their data quality is often doubtful and rarely detailed. Moreover, such studies are not interested in theoretical and conceptual debates, nor do they pay attention to the everyday experience of infrastructures.

This book, *Post-Socialist Urban Infrastructures*, takes a different path. Over the past decade, many scientists in geography, urban studies and planning, and more recently in anthropology, have made infrastructures a central part of their research – empirically but also conceptually. This 'infrastructural turn' (Graham, 2010) has investigated infrastructures as linking

technologies and socio-material means with products of urban and societal change, which in turn shape the daily lives of individuals and societies. The 'infrastructural turn' has also drawn attention to 'infrastructural lives' – that is, the ways in which infrastructures are used and made usable in everyday practice (Graham and McFarlane, 2014). Infrastructures in this sense constitute a valuable conceptual lens for critical social research, particularly in urban contexts where infrastructures are dense and prominently visible, for example when they collapse in unstable institutional settings.

Infrastructure scholars have paid attention to the different ways in which infrastructures and their relations with cities have developed in the global North and South. The post-socialist context has remained largely excluded from the global North mainstream, but also from critical perspectives emanating from the global South (Tuvikene, 2016). The differences between materialities, practices, institutions and normative discourses should not be seen as definite: there are different accents brought forward through different assemblages of infrastructures. While the global North stresses the smooth operation and invisibility of infrastructures, the global South has highlighted the struggle for and lack of infrastructures, also highlighting colonial divides (Coutard and Rutherford, 2016). Departing from the global North and South, 'post-socialism' brings the hybridization of different infrastructural regimes to the fore. The legacies of socialist regimes are still present in aspects both material (such as housing stock, pipes and tramlines) and non-material (such as governing bodies and public discourses), now embedded in diversified paths of neoliberalism or paternalism. Thus, the adaptation of infrastructures to shrinking cities, downsized industries and shifted residential patterns has constituted a major post-socialist challenge, on top of challenges linked to the enormous concentration and growth of capital cities. This occurred simultaneously with different processes of democratization, as well as (new) exclusions, nation-building and dependencies, new modernization agendas and infrastructural setbacks. Post-socialism thus manifests a hybridity that constitutes an interesting field for critical reflection and mutual scholarly exchange between both the global North and global South, combining concerns from the infrastructural turn with emerging post-colonial theory-inspired comparative urbanism literature (e.g. Jacobs, 2012; Robinson, 2006, 2011; Tuvikene, 2016).

Henceforth, taking up the practical and theoretical value of infrastructural research, and the current ignorance of the interplay between infrastructure and post-socialist urban change, this volume positions post-socialism alongside the existing North and South literatures on infrastructure, drawing from previous studies and elaborating on how this literature informs what happens in contexts usually characterized as post-socialist, and how such contexts might help to reveal the production and consumption of infrastructures more generally, as well as to provide conceptual and practical insights. Therefore, the three terms in the book's title constitute the starting points of discussion:

1) How do urban features shape infrastructures, and how do infrastructures constitute urbanity?
2) How may we grasp the interrelation between research on infrastructures and post-socialist urban change?
3) Which lessons should we draw from post-socialism about urban infrastructures, and how do infrastructures help to understand post-socialist urban change?

Conceptualizing urban infrastructures

Over the past decade or so, infrastructures have gained a central position for research in social sciences, no longer subsumed under other processes (Rao, 2014). Inspired by the idea of studying the unstudied (Star, 1999), a number of researchers have focused on infrastructures, leading to declarations of an 'infrastructural turn' (Graham, 2010). We can thus observe the emergence of 'a new genre of thinking that narrates the social life of a city through its material infrastructure' (Amin, 2014, p. 137). A change of perspective from assuming infrastructures to be in the background to shifting them to the fore of thinking about cities and societies is on the way (Amin and Thrift, 2017; Coutard and Rutherford, 2016; Guy et al., 2001, 2011). According to Latham and Wood (2015), there are at least three reasons for such a rise in interest in infrastructures: first, new infrastructural elements (such as bicycle infrastructure and new public transit systems) have become important in contemporary cities. Second, cities and states have changed the ways in which they deal with established infrastructures (such as privatization and financialization). Third, infrastructures are seen as not purely technical phenomena, as they tended to be understood previously, but as incorporated into social practices. Additionally, a recent upsurge in assemblage studies, actor-network theory and science, and technology studies in urban studies and beyond (Farías and Bender, 2010; Graham and Marvin, 2001) has changed the focus of social research: it has become much more attentive to technical aspects that were previously considered to be merely the concerns of engineers. This emerging set of literature, as will be discussed later, has shown how urban infrastructures are linking technologies: they highlight ways in which cities and societies are socio-material, and how infrastructures are entangled within symbolic meanings.

Urban infrastructures as linking technologies

Infrastructures link processes on various scales (Furlong, 2010): while they always involve specific locations, being thus local, they also link political and economic processes, including authorities on various scales (McFarlane and Rutherford, 2008). Airports, ports and motorways are all in different ways localized, but their functions involve far more than their immediate locality. Discussing a pipeline from Baku to Ceyhan via Tbilisi, Barry (2013) shows how the international project is rooted in local power structures and

struggles for political recognition. Similarly, human bodies and the urban level meet at the scale of the home. While in modern cities infrastructures tend to be hidden from the residents' eyes – as the often unnoticed and taken for granted access to water in modern homes vividly shows (Kaika, 2004) – they do the work of linking citizens to one another and to the state. Infrastructures connect society more tightly than does, for instance, the process of voting (Tonkiss, 2013). Infrastructures are thus arteries of cities (Joyce, 2003; Tonkiss, 2013) as well as of societies in general. They are socio-technologies that link objects and technologies, and enable other objects – human and non-human – to operate (Larkin, 2013).

While the key characteristic of infrastructures is their capacity to link, hence not being scalar, the 'urban' aspect of infrastructures brings about some specificities. Of course, cities are not isolated entities. But while cities rely on a high concentration of technical networks extending far from the dense urban cores (Brenner, 2014; Graham, 2010), they are, at the same time, interlinked with various presences of 'natural' features including green spaces, parks, urban agriculture, rivers, lakes and wastelands. Combined with cities' particular exposure to vulnerabilities, the complex concentrations of the technical and the 'natural', and the human and non-human (Amin and Thrift, 2017), cities pose particular challenges for understanding and coping with infrastructures. Many of these challenges are related to how infrastructures can and should be developed in order to balance the conflicting interests of life quality, economic attractiveness, ecological sustainability and political representation: interests and developments can also mean the displacement of some social groups in order to provide space for others (Rao, 2014). Moreover, while associated with dynamics and future progress, infrastructures often make cities obdurate in terms of material stability: once they are built, they are resource heavy, time-consuming and expensive to change (Hommels, 2005).

Finally, there are various types of infrastructural hardware concentrated and interlinked in cities, among them transport infrastructures, green infrastructures and housing infrastructures. As characteristic and relatively well-researched urban features, they are key for the cities' economic, social, ecological and cultural well-being.

'Transport infrastructure' refers to nodes and networks that facilitate flows of people, goods and ideas between and within places (Alff et al., 2014; Kreutzmann, 1991; Reeves, 2011). But money laundering and diseases also travel the world via the same routes and nodes (Curtis and Riva, 2010). Transport infrastructures resonate with modernity, globalization and economic development, and have produced a vast and expanding literature. It ranges from studies noting the impressive character of transport hubs and networks forming part of the cultural heritage of cities and societies (Merriman, 2007) to studies concerned with sustainable transport systems designed for growing metropolitan regions (Banister, 2008). A further set of literature is inspired by the 'mobility turn' and focuses on the 'constructed fact of moving' (Cresswell, 2011, p. 550), the everyday practices of mobility,

and the ways in which transport infrastructures are inhabited, lived with and reproduced (Latham and Wood, 2015; Merriman, 2016).

'Green infrastructures' might be understood in a narrow way as gardens, cemeteries, pocket parks, green roofs and green walls in cities, but can also be seen as all kinds of green and blue spaces in urban regions, including forests, lakes and wetlands, parks, rural areas and brownfield sites. Indeed, the concept of green infrastructure has recently experienced a revival (Benedict and McMahon, 2006; Czechowski et al., 2015). For more than a century, this has constituted a key element of urban development and planning in industrialized societies in the global North (e.g. Benedict and McMahon, 2006; Hennebo and Schmidt, 1976; Howard, 1944) with the purpose of protecting 'open spaces for recreation, reflection and relaxation' (Benedict and McMahon, 2006, p. xiii), as well as providing economic subsistence and health care. Scholars and practitioners test the potential and implementation of green infrastructures for ecological, social and economic sustainability in increasingly polarized urban contexts, namely in shrinking cities (Rößler, 2010) – of particular relevance for cities in the post-socialist realm – as well as in growing urban regions (Momm-Schult et al., 2013). Moreover, these strands are linked to current debates on urban public space in general (Madanipour, 2003; Madanipour et al., 2014) and to forms of bottom-up appropriation such as urban gardening or temporary uses (see also Zupan and Büdenbender, this issue).

'Housing as infrastructure' refers to two aspects: first, to the technical equipment of housing with utilities involving energy, heating, water, sewage and telecommunication, and, second, to the wider residential area, including parking lots, playgrounds and waste management (Edwards and Turrent, 2000). Indeed, housing issues have received wide scholarly attention regarding the technical, institutional and financial challenges and solutions for modernizing and adapting various types of housing stocks, for example in terms of energy efficiency (Högberg et al., 2009) but also social and political aspects of retrofitting (Bouzarovski, 2015). Increasingly linked to questions of socio-spatial segregation (Bouzarovski et al., 2012, dealing with energy poverty and housing in the UK and Europe; Healy and Clinch, 2004), these approaches are discussed and tested in polarizing urban contexts, involving questions of infrastructural retreat (Moss, 2008) or the needs of growing urban regions (Libbe et al., 2010). Housing has been a prominent theme in cities in the post-socialist realm but the ways in which shifts in infrastructures have been interlinked with shifts in housing planning and governing deserves more attention (as elaborated in various chapters in this collection).

Infrastructures as socio-material: the force of the technical and its social production

The emphasis on the socio-material constructedness of infrastructure points out that materiality is not passive: hardware has manifold effects on the

individuals and institutions associated with it. Infrastructural obduracy is not simply 'there', but is achieved via *practices* (Geels, 2002) of repair and maintenance (Graham and Thrift, 2007) taking place in specific institutional settings. The persistence of, and change in, infrastructures may occur through many 'small-scale, localised, or incremental processes' (Latham and Wood, 2015, p. 303). Infrastructures are relational, in process and emerging in interactions (Cass et al., 2018, Coutard and Rutherford, 2016). At the same time, infrastructures are also produced, changed or maintained via strategically planned, complex interventions of state authorities and/or private enterprises, being the opposite of incremental, localized practices and having high potential for symbolism and normative settings. These practices are linked to institutions, in particular to legislative and executive public and political bodies and instruments. Lacking institutional structure, stability and effectiveness, however, may lead infrastructures to collapse. While institutional settings may foster the invisibility and obduracy of infrastructures (Furlong, 2010), given that universal access may be considered a civic entitlement, a lack of welfare-oriented institutional effectiveness might lead to the vulnerability of infrastructures, as has happened in many post-socialist cases.

So, one of the *effects* of infrastructures and related practices and institutions is their divisive character: infrastructures not only connect but also divide, both in planned and unplanned ways (Coutard and Rutherford, 2016; Högselius et al., 2013). While infrastructures become invisible (as Star, 1999 argues) to the better-off, they become painfully visible to those excluded from such urban amenities (Broto and Bulkeley, 2015). Infrastructures are always marred by inequalities in terms of access or proximity to harmful utilities for those with less money or political power (Tonkiss, 2013). These inequalities are increased by the fragmentation of infrastructural systems into premium services for some and regular services for the masses (Graham and Marvin, 2001). Infrastructures can be polarizing, between states and regions, within urban regions, and even globally between better-connected places and sidelined ones, particularly in the global South.

The building of socialism was in many ways a technological endeavour – demonstrated famously by Lenin's dictum that Communism is Soviet power plus the electrification of the whole country. Technological potentials and limits deeply structured the Soviet society. Urban heating systems served workplaces and homes, and housing estates were built and connected by investment-heavy electric public transport lines – bearing significant consequences and causing new inequalities once the system collapsed.

Normative-symbolic significance of infrastructures

Apart from linking and socio-material effects, further social significance of infrastructures lies in their *symbolic and normative importance*. Not only are the material forms of infrastructures ideological – such as the grand

design of train stations in the heyday of rail travel – they also involve a wider set of ideas regarding society and the role of infrastructures within them. Modernization stands out as a process of infrastructural development, such as the provision of water utilities from the mid-19th century onwards. Besides providing running water, the aim was to develop clean and modern citizenship (Joyce, 2003). Today, as Dalakoglou and Harvey (2012) and Harvey and Knox (2015) show, such symbolic, ideological aspects of infrastructures prominently feature in road constructions. The powerful dream of tapping into Peru's tropical forests or connecting oceans by cross-continental roads were about new technological innovations and the capacities of government rather than technical questions of engineering (Harvey and Knox, 2015). Also in post-socialism, modernization and Europeanization have been conflated with road building, railway development and other large infrastructural projects (see also Plyushteva, this issue).

As one consequence, researchers have been interested in 'the affective and aesthetic qualities of the urban infrastructure' (Amin, 2014, p. 138) wherein 'public sentiments of progress, modernity and well-being' might become linked with buildings even if their functionality or material impact is not that important. Following Larkin, we can note 'the senses of awe and fascination' that infrastructures emanate, leading to various political effects. Instead of being 'merely functional', infrastructures are also enchanted (Harvey and Knox, 2012; see also Jovanović, this issue). We thus can apprehend the normative-symbolic significance of planned yet unbuilt infrastructures. They can have important effects on contemporary and future cities and their inhabitants. Motorways or railway projects may create new visions of cities and open up potential growth areas even before infrastructures physically appear (Thomas, 2013). Sometimes, infrastructure development is not about the technical aspects but about other spheres connected with government, such as companies acquiring access to political networks (Mbembe, 2001, cited in Larkin, 2013). Larkin claims that infrastructures are not merely 'infrastructures', but also 'as if…' they are infrastructures: 'material form' does not merely exist in itself but is 'transposed from a hollow tube to digits on a budget and words on a page' (Larkin, 2013, p. 335).

Consequently, infrastructures are not just things but reverberate in various other spheres of society. Infrastructure is thus a valuable conceptual lens for critical social research, in particular in urban contexts, because infrastructures are produced by and shape social practices and institutions, norms and discourses, and so reveal immaterial as well as material cleavages that emerge in societal transformations (Moss, 2014). Infrastructures are not background but formative, particularly so in the socio-spatial settings where they are most dense – that is, in cities (Amin and Thrift, 2017). Considering the interlinkages between continuity and changes in CEE and the FSU, post-socialism is a particularly prescient empirical and conceptual ground for thinking about urban infrastructures.

Urban infrastructures and (post-socialist) urban transformations

Changing infrastructures in changing cities across the globe

While the literature from both the global North and global South highlight influences of neoliberal ideology on governing practices, studies drawing on the global North underline the continuous and contingent nature of infrastructures, invisible to many urban actors. Materiality (e.g. state of repair, distribution or access), practices and discourses may seem unproblematic in terms of normative ideas such as social and ecological sustainability and economic competitiveness – although with evident and growing inequalities, e.g. in terms of post-crisis energy disparities (Bouzarovski, 2014; Thomson and Snell, 2013).

Literature based on urban contexts of the global South draws inspiration from post-colonial literature, stressing long-term divides, disparities and polarizations, and thus questions 'Northern' notions of infrastructure as easily manageable socio-technical phenomena. Infrastructure in the South is painfully visible to many because of their exclusion from access and use (Morales, 2016). 'Southern' infrastructures may have primarily served elites – initially the colonial ones, while nowadays well-off upper classes (Silver, 2015; Speer, 2016). Such a differentiated infrastructural model, which Graham and Marvin (2001) have termed 'splintering urbanism', exists globally, although different in scale and history.

The post-socialist context shares various forms of splintering urbanism with those two forms of infrastructural development (Hirt, 2012). Yet the lingering presence of socialist forms of infrastructure built for and by a paternalistic socio-economic regime brings about a somewhat different dimension. Currently, post-socialism tends to be conceptually excluded from the mainstream of both the global North and the global South, and thus is rarely included in the discussion of infrastructures. Yet, by attending to infrastructures in a post-socialist context, we can highlight the intersections between socialist and capitalist urban processes and their modes of governing. Nevertheless, we need to go further than merely studying the post-socialist context by engaging in discussions with theories emerging from empirical settings that also have value outside the post-socialist realm. This desire to find alternative logics of urban development beyond what has been established in usual centres of theorization and urban thinking has become a major topic in comparative urbanist literature (Jacobs, 2012; Robinson, 2006). These voices challenge common narratives and tools of urban studies, encouraging new ways of thinking more conceptually and based on insights from often understudied contexts.

Yet, the question remains: what are the key characteristics that post-socialist urban contexts and infrastructures provide? And which empirical findings and conceptual ideas does research on post-socialist urban infrastructures offer?

Legacies of (post-)socialism in urban infrastructures and their hybridization with changes

Believing in the value of a post-socialist perspective on urban infrastructures for critical research, in the following we approach the potential specificities and commonalities relative to their global North and South counterparts. The features of post-socialist infrastructure and urban change may link up to both socialist legacies and early post-socialist experiences, characterized by the depth and abruptness of societal change, and steered by neoliberalization and nation-building ideologies.

One peculiarity of the post-socialist urban context involves aspects of *normative discourses and concepts* in general, and regarding infrastructure in particular. For Soviet authorities, 'the policy of a concerted regulation of space was the key to domination and re-creation of the social body' (Gestwa, 2004, p. 43). Thus, Soviet discourses on the domestication of nature and the creation of the Socialist Man through labour were implemented through great construction sites beginning in the early 1920s, such as hydroelectric dams, canals and railway projects. Both forced labour and voluntary-compulsory activism played major roles in infrastructure construction and maintenance (regarding Albania, see also Dalakoglou, 2017). However, in the urban context, infrastructure remained auxiliary to industrialization rather than a value in itself. Electric plants, roads and railways served industrial needs and urban transport networks connected housing estates to mines and factories, providing access to workers, while social and consumer service infrastructures were often the last to be provided, with rural areas remaining underserved in all aspects (Gentile and Sjöberg, 2006). Yet, combined with mass housing construction, literacy campaigns and health care expansion, major sectors of the population profited from Soviet infrastructure investments. Based on the socialist ideology of equality, these included an exclusively state-sponsored provision of services and particular cost-calculation regimes. This led to less polarized spatial coverage of services, and relatively equal access to diverse forms of infrastructure such as transport, housing-related infrastructures and urban greenery. This went beyond the immediate functions of material objects. Larkin (2013), for instance, refers to Todorov, who claimed that Soviet symbolic production (e.g. in infrastructures, was more effective than economic construction (Todorov, 1994). Thus, the socialist system's care for the masses left material and immaterial traces.

The collapse of the socialist system brought about new normative narratives of neoliberalization linked to privatization and deregulation, cost-effectiveness, decentralization and democratization, as well as new nation-building projects and, in some cases, Europeanization. Consequences included the closure of state enterprises and new legislation that transferred the financial burdens of infrastructural maintenance to municipalities. But, while being granted new rights and responsibilities, local bodies

lacked money for reform and implementation, sometimes resulting in infrastructural hardship or even collapse. In this vein, Golubchikov et al. (2014, p. 617) argue that 'the socialist legacy, rather than being an independent carrier of history, has been alienated from its history to become an infrastructure of neoliberalization, conducive to capitalist process'. State provision has increasingly been replaced with user-pay schemes and the privatization of services (in the transport sector, for instance, see also Akimov and Banister, 2011; Gwilliam et al., 1999), which has resulted in a growing inequality in access and levels of service (Vozyanov, 2014). While some inhabitants still may feel attached to the socialist ideal of universal, equal and free provision, others may have adopted differentiated practices with regard to repair, maintenance, planning and governance, and civil and economic uses. At the same time, post-socialist authorities continue the tradition of using infrastructures for state production, whether as large-scale building projects, for example in Tbilisi (Salukvadze and Golubchikov, 2016) and Astana, or projects funded by EU infrastructure grants in recent member states. We may also detect post-socialist legacies in public institutions and social practices. These legacies are the reason why the promotion of (new) normative ideas of democracy, transparency and competitiveness do not always suit new realities. Narratives of legacies are also contested, raising questions regarding how to conceptualize municipal or state ownership of infrastructures vis-à-vis similar forms in history (Beveridge and Naumann, 2016). This hybrid normativity of post-socialist infrastructures combines elements of socialist ideology with new and/or domesticated post-1990 sets of norms.

Normative discourses, however, are always intertwined with materiality – that is, urban topographies and physical conditions of infrastructures. In this respect, the relatively equal spatial distribution of infrastructure in the Soviet era contrasts with ongoing spatial polarization (Lang et al., 2015) at all levels, due to urban shrinkage or growth, modernization or neglect. Most problematic, inherited and/or newly produced spatial inequalities in infrastructural provision are considered to be the hardest to change (Sykora and Bouzarovski, 2012). In this regard, Bouzarovski et al. (2015) point out the 'infrastructural difficulties' in building a physically unified European gas market, since pipelines follow the Cold War geographies of the era of their construction. Other examples of inherited infrastructural inequalities include different railway gauges that divide Eastern, Western and Southern Europe, or the electricity networks that still strongly connect Estonia to the Soviet energy grid (Barry, 2001; Högselius et al., 2013). Moreover, Collier (2011) highlighted how the legacy of the socialist heating infrastructure limited the implementation of neoliberal economic reforms. Because apartments were still attached to the factory via heating pipes and the factory's boiler functioned as the central heating source for the town, no textbook neoliberal reform could be carried out. Post-socialist experiences also provide important examples of newly produced infrastructural polarization, like when neglected or abandoned housing in shrinking, peripheral cities

contrasts with efforts towards energy-efficient retrofitting in metropolitan areas, or when orbital motorways and bike-sharing systems are installed in metropolitan cores but not in smaller cities. Infrastructures in post-socialist cities are typically in poor physical condition due to a general backlog in maintenance inherited from socialist times, as well as a lack of funding and deferred maintenance after 1990. After the demise of the socialist bloc, its populations experienced a severe backlash involving urban infrastructures at all scales (e.g. International Crisis Group, 2011). With severe funding cuts, mismanaged privatization, inadequate maintenance and widespread depopulation, transport, water, heating, electricity and gas infrastructures failed throughout the 1990s revealing a new – and in many ways weaker – relationship between the state and citizens (Alexander et al., 2007). As a consequence, the materiality of infrastructure has a power that both enables and constrains economic and social urban processes.

The growing inequality is reflected in diminished livelihoods, practices of 'informal' access to infrastructure (Humphrey, 2005; Neugebauer and Rekhviashvili, 2015; Sgibnev and Vozyanov, 2016) and practices of performing 'remont' as a mode of maintenance and mode of life (Gerasimova and Čujkina, 2004; Sgibnev, 2015). These practices may reflect socialist as well as pre-socialist intangible legacies. Without directly referring to it, these studies recall the notion of 'people as infrastructure', which emerged from global South literature (Simone, 2004). However, coping practices show steps toward successful infrastructural modernization, particularly in Central-Eastern European EU member states that benefit from EU funding and governance arrangements. Infrastructural realities and related practices become strongly dependent on increasingly diversified institutional settings (e.g. legislation and public financing), governance arrangements and power relations that exhibit a wide range of local varieties of neoliberalism or capitalism. These may recede from previous regulatory regimes and normativities, and display different speeds and intensities of post-socialist change (Neugebauer et al., 2014; Neugebauer and Kovacs, 2015; Sykora and Bouzarovski, 2012).

But while authors describe the diversified institutional settings of cities in the post-socialist realm, and local practices of incremental changes to urban space receive increasing attention, the concept of (urban) infrastructure as related to post-socialism still remains marginal. The same is true for the ways in which socialist legacies affect current practices of infrastructural use and planning.

Contributions of this book: the hybridity of post-socialist urban infrastructures

Taking these discussions on board, the empirical chapters of this book elaborate on the hybridity of post-socialist urban infrastructures. Through a variety of cases from (East) Germany to Tajikistan and from Bulgaria to

Russia, and with a step into India, the book illustrates and analyses post-socialist urban infrastructures. Material and normative legacies of paternalist regimes meet new hybrid normativities with consequent tensions and inequalities, but also with new hopes and imaginations. The chapters are loosely grouped into three clusters dealing with infrastructures of housing, greenery and transport, respectively. They discuss issues ranging from the basic need for warmth to questions of transport infrastructures and the ways in which a state is enacted through infrastructure projects to post-socialism beyond the usual 'post-socialist context'.

Bouzarovski and Tirado Herrero take an internationally comparative perspective within the EU to outline socio-political and economic effects in terms of energy poverty, drawing out an energy core-periphery divide with Western and Northern Europe on the one side and Southern and Eastern Europe on the other, where the post-socialist continuities play an important role for the latter. Taking a more micro-scale approach, Jovanović examines the various mundane day-to-day engagements with the modernization and privatization of the Yugoslavian-era district heating system in Bor (Serbia) and Rijeka (Croatia), showing the thermodynamics of social contract as an interrelation between heat and the physical and social aspects of heat provision. Even when becoming conscious consumers from subjects of state delivery, residents expect the socialist ideal of universal, equal provision, even under the conditions of privatization of services. Turning to housing as an infrastructure phenomenon, Roth contrasts the Soviet and post-Soviet state processes of modernization through infrastructure in Baku (Azerbaijan). In so doing, he enriches the argument of Jovanović's case study by emphasizing informal practices of gaining access to infrastructure as a common element of both Soviet and post-Soviet housing practices. Building on this conceptualization, Salukvadze and Sichinava compare Tbilisi (Georgia) and Yerevan (Armenia) in the south Caucasus through a broad understanding of housing as infrastructured by studying the link between a complex set of technical utilities, social and environmental services within individual houses and their close surroundings, and social inequality – that is, the differentiated access to resources based on class and/or other social markers. In the following chapter, Liubimau discusses rescaled sovereignty and shifting understandings of what constitutes urban life, taking up the example of the rise and fall of nuclear power in Visaginas (Lithuania). Being a new town built in the 1970s to service the nearby Ignalina nuclear power plant, the town lost much of its economic and symbolic power when the plant closed down following imposition of EU requirements, but the closure itself is an industrial project still providing jobs for many residents.

The next chapters focus specifically on the topic of green infrastructures. The contribution of Haase et al. discusses the development of green urban infrastructures, their current state, transformations and future prospects, governance and ambiguous implementation under post-socialist conditions, including everyday practices, by discussing case studies from Leipzig

(Germany), Łódź (Poland) and Arkhangelsk (Russia). Enriching the broad approach of Haase et al. with an in-depth case study in Moscow, Zupan and Büdenbender focus on the ways in which green infrastructures have become a fundamental trope among urban planners and within market-driven urbanism and neo-authoritarian politics ('hipster Stalinism'). Their chapter highlights the *normativity* of Moscow's green infrastructure rebalancing the post-socialist prevalence of neoliberalism in Moscow with the idea of a 'socially just' city. Finally, Mukhopadhyay and Tuvikene, in their turn, address post-socialism outside the usual context by using the case of the Bengaluru (India) water sector to analyse the intersection of formal and informal water supply in relation to the ways in which post-socialism has been defined. Discussing post-socialism in a context that has never experienced state socialism, they offer a valuable perspective for discussion on the concept of post-socialism in general, and highlight the intersection of post-socialism and infrastructure. Post-socialism highlights the post-collective nature of infrastructure governance in privatized, unequal circumstances, but also the hybridity and different ways of overcoming collapse of infrastructural systems.

The following set of chapters unites issues of mobility, transport infrastructure and urban transformation. Mulíček and Seidenglanz concentrate on changing time-space relations in Brno (Czech Republic) and their implications for the socio-material phenomenon of public transport infrastructure. After the formerly tight link between urban-spatial functions of housing and economic production dissolved and was reconfigured after the collapse of state socialism, the city faced a conflict between new daily mobility necessities and the material obduracy of socialist transport infrastructures. Plyushteva, however, describes the immaterial obduracy of planned infrastructural projects through the case of the Sofia Metro project, which originated in the 1960s but was implemented only in the late 1990s. The Sofia Metro is characterized by both disruptions and continuities of everyday life in a post-1989 city in terms of predictability and propinquity as they evolved in relation to automobility. The last chapter on the topic of transport infrastructures by Weicker and Sgibnev takes on the phenomenon of informal public transport solutions (*marshrutkas*) known internationally primarily from the global South, bringing together empirical material from Tajikistan and southern Russia, and arguing for a 'fluidities'-based re-conceptualization of mobility infrastructures instead of static and dichotomous approaches.

The concluding chapter revisits the case studies and highlights how using the infrastructural lens helps to sharpen our understanding of post-socialist urban transformation, thanks to the juxtaposition of current infrastructural literature from the global North and South with empirical findings and literature from the FSU and CEE, and well beyond the often 'encapsulated' conceptual post-socialist context. The lessons that emerge from post-socialist developments relate not only to material *obduracy*, which indeed is one of the most significant aspects of post-socialist infrastructures, but also the relevance and persistence of normative concepts and practices. The concluding

chapter also draws links between post-socialist infrastructural discussions and those of transition, highlighting that there is much to learn between those two sets of thinking and practice, and suggesting conceptualizations of transition as one way to globalize thinking on post-socialism.

References

Akimov, A. and Banister, D. (2011) 'Urban public transport in post-communist transition: The case of Tashkent, Uzbekistan', *Comparative Economic Studies*, 53:4, 721–755.

Alexander, C., Buchli, V. and Humphrey, C. (2007) *Urban Life in Post-Soviet Asia*, London: UCL Press.

Alff, H., Benz A. and Schmidt M. (2014) 'Mobilities in Asian contexts', *Internationales Asienforum*, 45:1–2, 7–23.

Amin, A. (2014) 'Lively infrastructure', *Theory Culture & Society*, 31:7–8, 137–161.

Amin, A. and Thrift, N. (2017) *Seeing Like a City*, Cambridge, UK, Malden, MA: Polity.

Banister, D. (2008) 'The sustainable mobility paradigm', *Transport Policy*, 15, 73–80.

Barry, A. (2001) *Political Machines: Governing a Technological Society*, London and New York: The Athlone Press.

Barry, A. (2013) *Material Politics: Disputes along the Pipeline*, Chichester: Wiley-Blackwell.

Benedict, M. A. and McMahon, E. T. (2006) *Green Infrastructure – Linking Landscape and Communities,* Washington, Covelo and London: Island Press.

Beveridge, R. and Naumann, R. (2016) 'Another urban infrastructure is possible: Contesting energy and water networks in Berlin', in Coutard, O. and Rutherford, J. (eds) *Beyond the Networked City: Infrastructure Reconfigurations and Urban Change in the North and South*, London and New York: Routledge.

Bouzarovski, S. (2014) 'Energy poverty in the European Union: Landscapes of vulnerability', Wiley Interdisciplinary Reviews: Energy and Environment, 3:3, 276–289.

Bouzarovski, S. (2015) *Retrofitting the City: Residential Flexibility, Resilience and the Built Environment*, London and New York: I.B. Tauris.

Bouzarovski, S., Bradshaw, M. and Wochnik, A. (2015) 'Making territory through infrastructure: The governance of natural gas transit in Europe', *Geoforum,* 64, 217–228.

Bouzarovski, S., Petrova, S. and Sarlamanov R. (2012) 'Energy poverty policies in the EU: A critical perspective', *Energy Policy,* 49, 76–82.

Brenner, N. (ed.) (2014) *Implosions/Explosions: Towards a Study of Planetary Urbanization,* Berlin: Jovis.

Broto, V. C. and Bulkeley, H. (2015) 'Maintaining experiments and the material agency of the urban', in Graham, S. and McFarlane C. (eds) *Infrastructural Lives: Urban Infrastructure in Context*, Oxon: Routledge.

Cass, N., Schwanen, T. and Shove, E. (2018) 'Infrastructures, intersections and societal transformations', *Technological Forecasting and Social Change*, in press.

Clarke, G. R. (2001) *Bridging the Digital Divide – How Enterprise Ownership and Foreign Competition Affect Internet Access in Eastern Europe and Central Asia*, No. WPS2629, Washington, DC: The World Bank.

Collier, S. J. (2011) *Post-Soviet Social: Neoliberalism, Social Modernity, Biopolitics,* Princeton and Oxford: Princeton University Press.

Coutard, O. and Rutherford, J. (2016) *Beyond the Networked City: Infrastructure Reconfigurations and Urban Change in the North and South*, London and New York: Routledge.

Cresswell, T. (2011) 'Mobilities I. Catching up', *Progress in Human Geography,* 35:4, 550–558.

Czechowski, D., Hauck, T. and Hausladen, G. (eds) (2015) *Revisiting Green Infrastructure. Concepts between Nature and Design,* London: CRC Press.

Curtis, S. and Riva, M. (2010) Health geographies I: Complexity theory and human health. *Progress in Human Geography,* 34:2, 215–223.

Dalakoglou, D. (2017) *The Road: An Ethnography of (Im)mobility, Space, and Cross-Border Infrastructures in the Balkans*, Manchester: Manchester University Press.

Dalakoglou, D. and Harvey, P. (2012) 'Roads and anthropology: Ethnographic perspectives on space, time and (im)mobility', *Mobilities,* 7:4, 459–465.

Edwards, B. and Turrent, D. (eds) (2000) *Sustainable Housing: Principles and Practice,* London: E and FN Spon.

Farías, I. and Bender, T. (eds) (2010) *Urban Assemblages: How Actor-Network Theory Changes Urban Studies,* London: Routledge.

Finn, B. (2008) 'Market role and regulation of extensive urban minibus services as large bus service capacity is restored – case studies from Ghana, Georgia and Kazakhstan: Reforms in public transportation', *Research in Transportation Economics*, 22:1, 118–125.

Furlong, K. (2010) 'Small technologies, big change: Rethinking infrastructure through STS and geography', *Progress in Human Geography,* 35:4, 460–482.

Geels, F. W. (2002) 'Technological transitions as evolutionary reconfiguration processes: A multi-level perspective and a case-study', *Research Policy,* 31:8–9, 1257–1274.

Gentile, M. and Sjöberg, Ö. (2006) 'Intra-urban landscapes of priority: The Soviet legacy', *Europe-Asia Studies*, 58:5, 701–729.

Gerasimova, E. and Čujkina, S. (2004) 'Obŝestvo remonta', *Neprikosnovennyj zapas,* 2:34.

Gestwa, K. (2004) 'Technik als Kultur der Zukunft. Der Kult um die "Stalinschen Großbauten des Kommunismus"', Geschichte und Gesellschaft, 30:1, 37–73.

Golubchikov, O., Badyina, A. and Makhrova, A. (2014) 'The hybrid spatialities of transition: Capitalism, legacy and uneven urban economic restructuring', *Urban Studies,* 51:4, 617–633.

Graham, S. (2010) 'When infrastructures fail', in Graham, S. (ed.) *Disrupted Cities: When Infrastructure Fails*, New York: Routledge.

Graham, S. and Marvin, S. (2001) *Splintering Urbanism: Networked Infrastructures, Technological Mobilities and the Urban Condition,* London and New York: Routledge.

Graham, S. and McFarlane, C. (eds) (2014) *Infrastructural Lives: Urban Infrastructure in Context,* Abingdon: Routledge.

Graham, S. and Thrift, N. (2007) 'Out of order: Understanding repair and maintenance', *Theory, Culture & Society,* 24:1, 1–25.

Guy, S., Marvin, S. and Moss. T. (eds) (2001) *Urban Infrastructure in Transition: Networks, Buildings, Plans*, Abingdon and New York: Earthscan (Routledge).

Guy, S., Marvin, S., Medd, W. and Moss, T. (eds) (2011) *Shaping Urban Infrastructures: Intermediaries and the Governance of Socio-technical Networks*, Abingdon and New York: Earthscan (Routledge).

Gwilliam, K. M. (2000) 'Private participation in public transport in the FSU', *TWU Papers TWU-40*, Washington, DC: World Bank; Transport, Water and Urban Development Department.

Gwilliam, K. M. (2001) 'Competition in urban passenger transport in the developing world', *Journal of Transport Economics and Policy*, 35:1, 99–118.

Gwilliam, K. M., Meakin, R. T. and Kumar, A. (1999) 'Designing competition in urban bus passenger transport? Lessons from Uzbekistan', 6th International Conference on Competition and Ownership in Land Passenger Transport, Cape Town.

Harvey, P. and Knox, H. (2012) 'The enchantments of infrastructure', *Mobilities,* 7:4, 521–536.

Harvey, P. and Knox, H. (2015) *Roads: An Anthropology of Infrastructure and Expertise,* New York: Cornell University Press.

Healy, J. D. and Clinch, J. P. (2004) 'Quantifying the severity of fuel poverty, its relationship with poor housing and reasons for non-investment in energy-saving measures in Ireland', *Energy Policy,* 32:2, 207–220.

Hennebo, D. and Schmidt, E. (1976) *Entwicklung des Stadtgrüns in England von den frühen Volkswiesen bis zu den öffentlichen Parks im 19. Jahrhundert,* Hannover and Berlin: Patzer.

Hirt, S. (2012) *Iron Curtains: Gates, Suburbs and Privatization of Space in the Post-socialist City*, Malden: Wiley-Blackwell.

Hommels, A. (2005) *Unbuilding Cities: Obduracy in Urban Socio-Technical Change,* Cambridge and London: The MIT Press.

Hook, W. (1999) 'The political economy of post-transition transportation policy in Hungary', *Transport Policy*, 6:4, 207–224.

Howard, E. (1944) *Garden Cities of Tomorrow,* London: Faber.

Humphrey, C. (2005) 'Ideology in infrastructure: Architecture and Soviet imagination', *Journal of the Royal Anthropological Institute*, 11:1, 39–58.

Högberg, L., Hans, L. and Grange, K. (2009) 'Incentives for improving energy efficiency when renovating large-scale housing estates: a case study of the Swedish Million Homes Programme', *Sustainability*, 1:4, 1349–1365.

Högselius, P., Hommels, A., Kaijser, A. and van der Vleuten, E. (eds) (2013) *The Making of Europe's Critical Infrastructure,* London: Palgrave Macmillan.

International Crisis Group (2007), 'Central Asia's energy crisis', *Europe and Central Asia,* Report No. 133.

International Crisis Group (2011) 'Central Asia. Decay and decline', *Europe and Central Asia*, Report No. 201.

International Crisis Group (2014) 'Water pressures in Central Asia', *Europe and Central Asia*, Report No. 233.

Jacobs, J. M. (2012) 'Commentary – comparing comparative urbanisms', *Urban Geography,* 33:6, 904–914.

Joyce, P. (2003) *The Rule of Freedom: Liberalism and the Modern City,* London and New York: Verso.

Kaika, M. (2004) 'Interrogating the geographies of the familiar: domesticating nature and constructing the autonomy of the modern home', *International Journal of Urban and Regional Research,* 28:2, 265–286.

Kaminski, B. (2000) 'The "EU factor" in transition: credibility of commitment, institutional change and integration', in Antohi, S. and Tismaneanu, V. (eds) *Between Past and Future: The Revolutions of 1989 and the Struggle for Democracy in Central and Eastern Europe*, Budapest: Central European University Press.

Kennedy, D. (1999) 'Competition in the power sectors of transition economies', *EBRD Working Paper,* No. 41, London: European Bank for Reconstruction and Development (EBRD)

Kominek, Z. (2005) 'Filling the gap in urban transport: private sector participation in transition countries', *EBRD Working paper,* No. 93, London: EBRD.

Kreutzmann, H. (1991) 'The Karakoram Highway: the impact of road construction on mountain societies', *Modern Asian Studies,* 25:4, 711–736.

Lampietti, J. A. and Meyer, A. S. (2002) *Coping with the Cold: Heating Strategies for Eastern Europe and Central Asia's Urban Poor,* World Bank Technical Paper, No. 529, Washington, DC: World Bank.

Lang, T., Henn, S., Ehrlich, K. and Sgibnev, W. (eds) (2015) *Understanding Geographies of Polarization and Peripheralization: Perspectives from Central and Eastern Europe and Beyond,* Basingstoke: Palgrave Macmillan.

Larkin, B. (2013) 'The politics and poetics of infrastructure', *Annual Review of Anthropology,* 42, Palo Alto: Annual Reviews.

Latham, A. and Wood, P. R. H. (2015) 'Inhabiting infrastructure: exploring the interactional spaces of urban cycling', *Environment and Planning A,* 47:2, 300–319.

Libbe, J., Köhler, H. and Beckmann, K. J. (2010) *Infrastruktur und Stadtentwicklung: technische und soziale Infrastrukturen – Herausforderungen und Handlungsoptionen für Infrastruktur- und Stadtplanung,* bd. 10, Berlin: Praxis.

Madanipour, A. (2003) *Public and Private Spaces of the City,* London: Routledge.

Madanipour, A., Knierbein, S. and Degros, A. (2014) *Public Space and the Challenge of Urban Transformation in Europe,* London: Routledge.

Mbembe, A. (2001) *On the Postcolony,* Berkeley: University of California Press.

McFarlane, C. and Rutherford, J. (2008) 'Political infrastructures: governing and experiencing the fabric of the city', *International Journal of Urban and Regional Research,* 32:2, 363–374.

Merriman, P. (2007) *Driving Spaces: A Cultural-Historical Geography of England's M1 Motorway*, Malden, MA, Oxford and Carlton, Victoria: Blackwell Publishing.

Merriman, P. (2016) 'Mobility infrastructures: modern visions, affective environments and the problem of car parking', *Mobilities*, 11:1, 83–98.

Momm-Schult, S. I., Piper, J., Denaldi, R., Freitas, S. R., de Lourdes Pereira Fonseca, M. and de Oliveira, V. E. (2013) 'Integration of urban and environmental policies in the metropolitan area of São Paulo and in Greater London: the value of establishing and protecting green open spaces', *International Journal of Urban and Sustainable Development,* 5:1, 89–104.

Morales, M. C. (2016) 'My pipes say I am powerful: belonging and class as constructed through our sewers', *Wiley Interdisciplinary Reviews: Water*, 3, 63–73.

Moss, T. (2008) '" Cold spots" of urban infrastructure: "shrinking" processes in eastern Germany and the modern infrastructural ideal', *International Journal of Urban and Regional Research,* 32:2, 436–451.

Moss, T. (2014) 'Socio-technical change and the politics of urban infrastructure: managing energy in Berlin between dictatorship and democracy', *Urban Studies*, 51:7, 1432–1448.

Neugebauer, C. and Kovacs, Z. (2015) 'Paths of socio-spatial change in post-socialist cities – insights from five city regions in Central and Eastern Europe', in Lang, T., Henn, S., Ehrlich, K. and Sgibnev, W. (eds) *New Geographies of Central and Eastern Europe. Patterns of Polarization and Peripherialization.* Basingstoke: Palgrave.

Neugebauer, C. and Rekhviashvili, L. (2015) 'Loss and (re-)construction of public space in post-Soviet cities', *International Journal of Sociology and Social Policy,* 35:7/8.

Neugebauer, C., Herfert, G. and Brade, I. (2014) 'Sozialräumliche Entwicklungspfade in der postsozialistischen Stadt. Empirisch-konzeptionelle Reflektionen zum sozialräumlichen Wandel in mittel- und osteuropäischen Großstadtregionen nach 1990', *Europa Regional,* 19:3/4.

Pucher, J. (1995) 'The road to ruin? Impacts of economic shock therapy on urban transport in Poland', *Transport Policy,* 2:1, 5–13.

Pucher, J. (1999) 'The transformation of urban transport in the Czech Republic, 1988–1998', *Transport Policy*, 6, 225–236.

Rao, V. (2014) 'Infra-city: speculations on flux and history in infrastructure-making', in Graham, S. and McFarlane, C. (eds) *Infrastructural Lives: Urban Infrastructure in Context,* Abingdon: Routledge.

Reeves, M. (2011) 'Staying put? Towards a relational politics of mobility at a time of migration', *Central Asian Survey,* 30:3–4, 555–576.

Robinson, J. (2006) *Ordinary Cities: Between Modernity and Development,* London and New York: Routledge.

Robinson, J. (2011) 'Cities in a world of cities: the comparative gesture', *International Journal of Urban and Regional Research,* 35:1, 1–23.

Rößler, S. (2010) *Freiräume in schrumpfenden Städten: Chancen und Grenzen der Freiraumplanung im Stadtumbau,* Berlin: Rhombos-Verlag.

Salukvadze, G. and Golubchikov, O. (2016) 'City as a geopolitics: Tbilisi, Georgia – a globalizing metropolis in a turbulent region', *Cities,* 52, 39–54.

Sgibnev, W. (2015) 'Remont: housing adaptation as meaningful practice of space production in post-Soviet Tajikistan', *Europa Regional*, 22.2014 (2015) 1/2, 53–64.

Sgibnev, W. and Vozyanov, A. (2016) 'Assemblages of mobility: the marshrutkas of Central Asia', *Central Asian Survey,* 35:2, 276–291.

Shepherd, B. and Wilson J. S. (2006) *Road Infrastructure in Europe and Central Asia: Does Network Quality Affect Trade?*, No. WPS4104, Washington, DC: The World Bank.

Silver, J. (2015) 'Disrupted infrastructures: an urban political ecology of interrupted electricity in Accra', *International Journal of Urban and Regional Research*, 39:5, 984–1003.

Simone, A. (2004) 'People as infrastructure: intersecting fragments in Johannesburg', *Public Culture,* 16:3, 407–429.

Speer, J. (2016) 'The right to infrastructure: a struggle for sanitation in Fresno, California homeless encampments', *Urban Geography*, 37:7, 1049–1069.

Star, S. L. (1999) 'The ethnography of infrastructure', *American Behavioral Scientist,* 43:3, 377–391.

Sykora, L. and Bouzarovski, S. (2012) 'Multiple transformations: conceptualising the post-communist urban transition', *Urban Studies,* 49:1, 43–60.

Thomas, P. (2013) 'Railways', in Adey, P., Bissell, D., Hannam, K., Merriman, P. and Sheller, M. (eds) *The Routledge Handbook of Mobilities*, London and New York: Routledge.

Thomson, H. and Snell, C. (2013) 'Quantifying the prevalence of fuel poverty across the European Union', *Energy Policy,* 52, 563–572.

Todorov, V. (1994) *Red Square, Black Square: Organon for Revolutionary Imagination*, Albany: State University New York Press.

Tonkiss, F. (2013) *Cities by Design. The Social Life of Urban Form,* Cambridge: Polity Press.

Tuvikene, T. (2016) 'Strategies for comparative urbanism: post-socialism as a de-territorialized concept', *International Journal of Urban and Regional Research,* 40:1, 132–146.

Vozyanov, A. (2014) 'Lgotniki in the city: elderly passengers and ethics of mobility in Ukrainian public transit infrastructure', *Sociology of Power,* special issue No. 3.

World Bank (2010) *Lights Out? The Outlook for Energy in Eastern Europe and the Former Soviet Union*. Washington, DC: The World Bank.

Zhang, F. (2013) 'The energy transition of the transition economies: an empirical analysis', *Policy Research Working Paper,* No. 6387, Washington, DC: World Bank.

2 Energy poverty in Central and Eastern Europe

Understanding the European Union's core-periphery divide[1]

Stefan Bouzarovski and Sergio Tirado Herrero

Introduction

The inability of many European households to access or afford an adequate level of energy services in the home is gaining increasing academic and policy attention across the continent as demonstrated by the rapidly growing body of relevant academic and grey literature on these issues in the European Union (EU) and its member states. This condition, described as either energy or fuel poverty – and widely predicated upon the interplay between housing conditions, infrastructural supply patterns and energy end-use practices (Boardman, 2009; Bouzarovski et al., 2012; Li et al., 2014) – is now being identified as a policy priority by a number of EU institutions, including the Energy Union framework. In particular, there has been growing integration of energy poverty analysis and policy in the activities of the European Commission in the recent period (Bouzarovski and Petrova, 2015; Pye et al., 2015; Rademaekers et al., 2016).

Efforts to study the dynamics of energy poverty at the scale of the EU have been making an important contribution to such debates (Bouzarovski, 2014; Braubach and Ferrand, 2013; Healy, 2004; Healy and Clinch, 2004; Thomson and Snell, 2013). Work in this vein has identified a number of household-level factors that influence the likelihood of experiencing domestic energy deprivation, including income, socio-demographic characteristics, dwelling typology and age, tenure status and rural versus urban location.

These are all vulnerability factors relevant from an urban perspective that create the possibility to see energy poverty through an urban lens. This way, city dwellers often have access to more and better paid jobs but they are also subject to higher prices for housing and other goods and services, which in turn are connected to global trends of capital accumulation in the urban real estate sector. The energy performance of urban buildings tends also to be higher thanks to favourable volume-to-surface ratios in multi-family buildings, where on the other hand interventions to improve the quality of building fabric is more difficult given the need to reach consensus among more numerous co-residents. Cities are also command and control centres, and consequently spaces for resistance, solidarity and protests (Nicholls,

2008; Uitermark et al., 2012) – also around domestic energy affordability and deprivation. This said, it must be noted that cities are not the main focus of this chapter, which primarily looks at the national scale, even if the evidence and findings presented potentially enable subsequent explorations of energy poverty 'in the grain of the city' (Bouzarovski and Thomson, 2017).

Policy debates and scientific research on energy poverty have indicated that CEE states generally report a higher incidence of energy poverty as compared to North-Western EU member states. This points to the existence of a social and geographical 'energy divide' across the EU, thanks to which a greater proportion of households in less-developed member states are unable to meet their basic energy needs. They are particularly penalized by high and increasing energy costs due to a combination of rising prices and energy-inefficient properties (Bouzarovski, 2015; National Energy Action, 2014).

Energy poverty research has been enabled by the Eurostat agency's compilation of a rich body of statistics on poverty and social exclusion, including data on the inability to keep one's home adequately warm, arrears in utility bills and other objective housing indicators of domestic energy deprivation. Data gathering in this domain began in 1994 with the European Community Household Panel (ECHP), and has been developed further since 2003 via the Survey on Income and Living Conditions (EU-SILC).

This chapter explores the relationship between spatial and temporal variations in the incidence of energy poverty across the EU, while emphasizing the vulnerabilities faced by CEE countries in this context. We argue that European energy transitions – understood as processes of systemic change in the energy sector (Bridge et al., 2013) – have deepened existing regional inequalities at the macro-scale because they relate to energy poverty and similar forms of deprivation through the embeddedness of such processes in incumbent spatial and institutional systems.

In this chapter, we explore macro-regional differences across the EU as they relate to existing regional inequalities. The chapter formulates an 'energy poverty index' that incorporates various dimensions of material deprivation. These are subsequently cross-referenced with monetary deprivation measures. Then the chapter examines the relationship between the evolution of domestic energy prices on the one hand, and income and energy poverty rates on the other, with the aim of shedding light on the impact of the post-2008 economic crisis on households' well-being from the perspective of domestic energy deprivation, while investigating some of the complexities that underpin the expansion of inadequate residential energy services in Southern and Eastern European states in particular.

In doing so, the chapter addresses the need for understanding how macro-scale spatial patterns of energy poverty relate to wider economic disparities within the European realm (Petrakos et al., 2011), and carries out an exploration of the traditional notion of a core-periphery distinction (Amin, 1974; Copus, 2001) in Europe for the case of domestic energy deprivation. A main contribution of the chapter is therefore the concept of an energy

core-periphery divide that is expanded from its original, predominantly socially orientated meaning (as described in National Energy Action, 2014) to encapsulate existing inequalities in access to infrastructure services at the scale of cities, regions and countries in the EU.

Additionally, a key conceptual linchpin lies in theorizations of post-socialist infrastructural change as a driver of parallel processes of socio-technical transformation in the energy sector, on the one hand, and a rising incidence of household-level vulnerability on the other (Bouzarovski et al., 2017). Energy poverty in CEE has a special significance in this context because it is primarily a post-socialist phenomenon, attributable to a combination of circumstances arising after 1990 – particularly structural reforms in the energy sector, and changes in the regulation and use of socio-technical infrastructure more widely. In this chapter, therefore, post-socialism provides a binding agent for understanding how some commonalities continue to exist in the CEE region despite the economic and political divergence of its constituent states; in a broader sense, we argue that the post-socialist heuristic holds continued relevance in the context of infrastructural transformations (Bouzarovski et al., 2016a).

The evidence presented in the text that follows is based on a comprehensive review of Eurostat datasets. We undertook the work in order to produce a descriptive statistical analysis of the spatial disparities and temporal patterns of indicators that have conventionally been seen as indicators of energy poverty, including domestic energy prices, welfare, and deprivation in monetary and material terms. Descriptive statistics were complemented with a bivariate analysis aimed at identifying factors that exhibit a linear correlation with incidence rates of energy poverty across the EU.

A few weaknesses in this data source need to be taken into consideration. Unlike other similar studies that have relied on household-level microdata for the quantification of energy poverty levels in the EU (Thomson and Snell, 2013), our descriptive and correlation analyses have been conducted using individual member states as a sampling unit, and thus the maximum yearly sample size is 28. This approach is nevertheless consistent with the scale of our analysis, which is aimed at establishing patterns across member states as a whole. Also, the EU-SILC consensual energy poverty indicators rely on households' self-reported assessments of their domestic energy affordability strain, which has received some criticism (Healy, 2004; Petrova et al., 2013; Thomson and Snell, 2013).

At the same time, our analysis is limited to electricity and gas prices because Eurostat statistical information is not widely available with respect to less conventional energy carriers such as district heating, firewood or coal. Nevertheless, gas and electricity were jointly responsible for more than two thirds of household energy consumption in the EU-28 as measured by the weights that constituted the Harmonized Index of Consumer Prices (HICP) in 2012 (European Commission, 2014). With the exception of Greece, Lithuania and Latvia, electricity and gas accounted for more than

half of the HICP in all EU countries (ibid.). And even though our analysis is limited by the availability of data, we do not ignore the specific energy poverty dynamics linked to other energy carriers, such as the lock-in effects documented for urban district heating networks in Central and Eastern Europe (Bouzarovski et al., 2016a; Tirado Herrero and Ürge-Vorsatz, 2010).

Energy poverty 'regions' in the European Union

In the relevant literature, it is now widely accepted that energy poverty is not merely a subset of general income poverty. As a form of material deprivation, it extends beyond issues of affordability and earnings to encompass the state of the housing stock as well as energy-related practices and policy regulation. This is because the manner in which energy flows through the boundaries of the home and is used by its occupants has a crucial influence on the ability of households to access adequate levels of domestic energy services. For example, if the building fabric is energy inefficient, or does not allow for switching to a cheaper or more convenient heating or cooling system for technical or legal reasons, this will push its occupants into a more precarious position (Buzar, 2007; Petrova, 2017).

Empirically grounded research has established significant differences in the incidence and characteristics of energy poverty across the EU. CEE states have recorded Europe's highest energy poverty levels. The vulnerability of citizens in countries such as Estonia, Lithuania, Latvia, Poland, Czech Republic, Slovakia, Hungary, Slovenia, Croatia, Romania and Bulgaria can be attributed to the legacies of the centrally planned economy, such as the poor thermal insulation properties of the housing stock, the presence of historically low energy prices and the predominance of an unsustainable supply mix (Bouzarovski et al., 2016b). The transition to a market economy in the 1990s added to these issues by bringing about the upward rebalancing of energy tariffs without the development of adequate social welfare and energy efficiency mechanisms. Institutional inertia exacerbated antecedent difficulties, alongside the dependence on Russian energy imports and associated infrastructural lock-ins (Bouzarovski, 2010, 2014; Hiteva, 2013; Kovačević, 2004; Ürge-Vorsatz et al., 2006).

Higher levels of self-reported indoor thermal discomfort were also found for Southern member states in the 1990s (Healy, 2004) and the 2000s (Thomson and Snell, 2013) as a result of the poor efficiency and lack of adequate heating systems in the housing stock of these countries. Later work has confirmed the paradox involving EU members in the Mediterranean basin: even though winters are milder in countries like Portugal (Simoes et al., 2016), Spain, Italy (Miniaci et al., 2014), Malta (Formosa, 2015), Greece (Dagoumas and Kitsios, 2014) and Cyprus (Pye et al., 2015), these countries recurrently report high percentages of people who are unable to keep their home warm. Such states have consistently found themselves above the EU average of key domestic energy deprivation indicators. The

euro crisis, with its attendant rapid increase in unemployment and income inequality, has further exacerbated this situation.

Energy poverty is also present in Western and Northern European member states – in Ireland, the UK, France, Belgium, Germany and Austria – as well as (to a much lesser extent) in the Netherlands, Luxembourg, Denmark, Sweden and Finland. In such countries, the issue tends to be restricted to specific demographic groups or types of housing. It is thus principally linked to the inability to purchase 'affordable warmth' (Boardman, 2010) among low-income households living in energy-inefficient homes. While energy poverty rates have been shown to be significant in the UK, Ireland, France and Belgium, the problem is less pervasive in other countries within this geographic grouping.

Existing knowledge thus suggests a macro-regionalization of the EU in three clusters of countries with different energy poverty levels and dynamics. In order to explore the consistency of this categorization with respect to the correlation analysis presented in the previous section, we plotted the average value of Eurostat's monetary deprivation indicator, the 'at-risk-of-poverty' rate (percentage of the population with an income below 60 per cent of the national median, after social transfers), against an ad hoc composite energy poverty index for each member state. The energy poverty index took into account the EU-SILC population percentages of people who have reported i) being unable to keep their homes adequately warm (*inability*); ii) having arrears in utility bills (*arrears*); and iii) living in a home with a leaking roof or the presence of dampness and rot (*housing faults*):

$$\text{Energy poverty index} = (0.5 \times \%\ \textit{inability} + 0.25 \times \%\ \textit{arrears} + 0.25 \times \%\ \textit{housing faults}) \times 100$$

In the index, the indicator *inability* receives a higher weight in order to reflect the greater importance that our assessment gives to self-reported thermal discomfort levels in comparison with the indicator *arrears*, which keeps track of late payment levels in energy and other utility bills. At the same time, *housing faults* is closely related to, but not necessarily a direct indicator of, energy poverty. Our weighted values approach is based on previously developed energy poverty indices and weight values (Healy, 2004; Thomson and Snell, 2013).[2] It is based on the premise that consensual measures (such as the self-reported inability to keep warm) are insufficient to capture the complex economic and material underpinnings of energy poverty, and should be combined with indicators describing the housing and financial conditions of the population in order to obtain a fuller picture (Bouzarovski, 2014; Dubois, 2012).

The results of the bivariate comparison (Table 2.1) show a low degree of positive linear correlation between the energy poverty index and the at-risk-of-poverty rate, even though relatively high levels of positive and statistically significant linear correlations exist on an indicator-by-indicator basis. In

Table 2.1 Correlation matrix: Pearson's r coefficients of linear correlation between the Survey on Income and Living Conditions energy poverty indicators and index (columns) and the at-risk-of-poverty rate (rows), calculated upon average values of the 28 European Union member states for the period 2003–2013 (own calculations based on Eurostat data)

	Inability	*Arrears*	*Housing faults*	*Energy poverty index*
At-risk-of-poverty rate (after social transfers)	.523**	.574**	.480**	.264

** p <0.01; * p <0.05 level

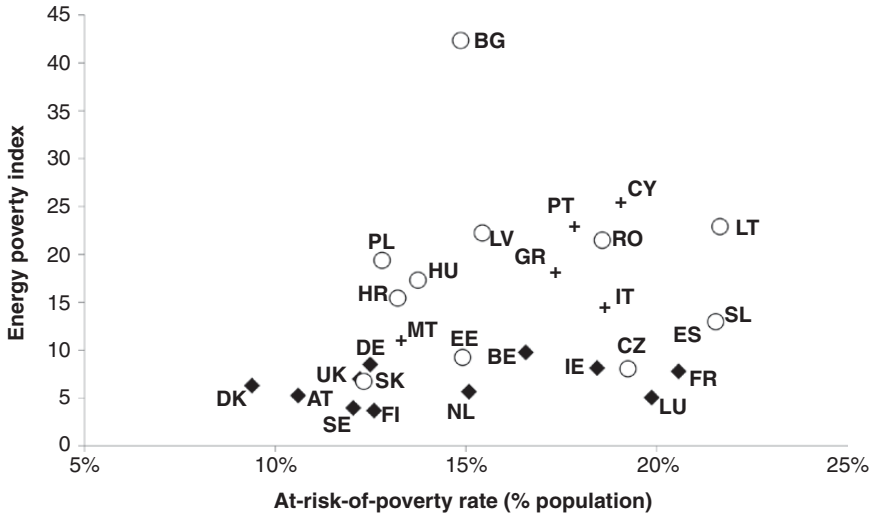

Figure 2.1 Percentage of people at risk of poverty versus the energy poverty index. Average for European Union member states 2003–2013 for both variables

Source: Bouzarovski and Tirado Herrero, 2017

terms of the three regions identified for the spatial analysis of energy poverty trends in the EU (Figure 2.1), Western and Northern countries (noted in black diamonds) belong to a compact cluster reporting low energy poverty levels in relation to the at-risk-of-poverty rate. At the same time, Southern (crosses) and CEE member states (circles) form a more heterogeneous group. They are characterized by energy poverty index values that are higher in relation to their at-risk-of-poverty-rates. With respect to the measurement of poverty and social exclusion, these results highlight the importance

of material and housing deprivation dimensions, such as the inability to keep the home adequately warm. They emphasize the need to move beyond purely monetary indicators, such as the at-risk-of-poverty rate.

Thus, it can be argued that a core *versus* periphery distribution is a better descriptor of the spatial disparities in energy poverty rates across the EU than the traditional 'three-region' model. Western and Northern member states have generally fared far better than CEE and Southern member states in terms of domestic energy deprivation. This can principally be attributed to the higher macro-economic performance and income levels among the former group of states, as well as their higher-quality housing stock and more effective targeting of vulnerable groups. Overall, the principal differences between core and periphery countries are reflected in the degree of public recognition received by energy poverty, its socio-demographic extent, and the structural drivers of the condition (see Table 2.2).

At this point, it should be emphasized that the core-periphery distinction should not be seen in binary terms: substantial differences can be found among individual member states of the periphery, suggesting that national, regional and local conditions are more consequential in this more disadvantaged cluster of EU countries. In CEE, it has been shown that particular urban socio-technical typologies exhibit increased levels of vulnerability to energy poverty, often connected to the legacies of district heating and new patterns of social segregation, as well as to under-investment in particular types of housing (Bouzarovski, 2009; Bouzarovski and Thomson, 2017); Bouzarovski et al., 2017).

Domestic energy prices: drivers and descriptors of energy poverty

Increases in domestic energy prices have long been regarded as the crucial underpinning of energy poverty. Because the EU is a world region highly dependent on imports of primary energy sources and, as such, has been subject to wider trends in global and regional commodity markets, increasing energy prices are an issue of significant concern among EU institutions. The far-reaching impact of energy tariffs on household well-being and the competitiveness of EU economies is now widely recognized (European Commission, 2014).

From the perspective of final residential energy users, evidence indicates that the price of domestic energy in the EU has consistently increased at faster-than-inflation rates since at least the mid-1990s, progressively reducing the purchasing power of households unless compensated by deflation in other domestic consumption categories. The observed evolution of energy prices needs to be seen not only as a consequence of international commodity market trends and national conditions but also within the context of multiple reconfigurations in the energy sector.

The first of such processes is the transformation of the energy sector, a process that started in the 1990s and has consisted of the privatization of

Table 2.2 A typology of energy poverty factors and implications as they vary along the core-periphery axis in the European Union

Macro region	*Core countries in Western and Northern Europe*	*Periphery in Central and Eastern Europe and the Mediterranean*
Public recognition	Well-established in the United Kingdom and Ireland, officially and widely acknowledged in France. Less visibility in other countries.	Historically limited public recognition, recently rising to the top of the social agenda in austerity-hit countries.
Principal drivers	Low incomes, high energy prices, inefficient homes, disproportionately high energy needs.	Variable by country. Largely same as core countries but also involving questions of housing tenure and infrastructural access to adequate energy sources.
Socio-demographic extent	Typically concentrated within a limited section of the population with energy affordability problems.	A systemic condition, affecting both low- and middle-income strata.
Relationship with energy transitions	Energy poor households have been adversely affected by price increases associated with low-carbon energy transitions, but are benefiting from energy efficiency improvements associated with the process.	Dynamics of crisis-induced austerity and post-communist transformation are adding new levels of complexity to the energy poverty implications of low-carbon transitions, which are themselves less pronounced in this region.

publicly owned utility companies, and the 'horizontal' and 'vertical' unbundling or vertical disintegration of network activities, as well as the liberalization and opening of markets for competition (Florio, 2013). Even though these measures were meant to deliver increased levels of competition and a reduction in end-use prices, evidence suggests that regulatory reforms have not always achieved the desired results, especially when it comes to domestic energy tariffs, consumer welfare and satisfaction levels, and households' ability to pay bills on time (Fiorio and Florio, 2008; Poggi and Florio, 2010; Pollitt, 2012).

In the CEE, ambitious policy packages based on the privatization of utilities were introduced in the 1990s by international financial institutions. Such steps were put in motion with the declarative aim of preventing the

collapse of the energy supply infrastructure following the downfall of central economic planning, and addressing the structural inefficiencies inherited from the previous system. Failures in the successful execution of this process have been attributed to the emergence of substantial legal and policy obstacles, as well as fierce resistance from consumers facing rising energy costs and rapidly declining incomes (Lampietti et al., 2007; Ruggeri Laderchi et al., 2013).

A second relevant trend is the decarbonization of energy systems – a large-scale policy effort driven, inter alia, by EU institutions. The process has been motivated not only by environmental concerns and climate commitments but also by the substantial energy import dependency levels of many member states. However, low-carbon policies have not been neutral in energy poverty terms, mainly because they have entailed the development of mechanisms for internalizing the social costs of carbon emissions.

With carbon prices generated via the EU Emissions Trading Scheme (EU ETS) being passed onto final consumers (Aatola et al., 2013; Kim et al., 2010), such policy mechanisms are affecting not only the price of domestic energy but also influencing a range of other goods and services for which energy is a production input. Low-carbon policies in the EU are also resulting in substantial investment in the renewable energy sector, especially in solar and wind electricity (European Commission, 2014). The costs of these undertakings have also been borne by final consumers through energy bills.

In macro-regional terms, energy prices in the CEE space generally lie below the EU average, and below the values recorded for Northern, Western and Mediterranean Europe (European Commission, 2014). However, euro energy prices fail to incorporate the differences between member states' price levels and 'real' household incomes. Eurostat addresses this shortcoming by expressing prices in purchasing power units (PPS), an artificial reference currency that eliminates price-income differences by correcting prices denominated in national currencies through a purchasing power parity (PPP) factor, calculated on the basis of the price of a hypothetical basket of goods and services that is deemed representative of consumption patterns in individual member states (European Communities, 2009; Eurostat, 2013). Such an approach offers a more realistic picture of the efforts that average households in different member states need to make in order to pay for each unit of energy used at home. Prices in PPS are plotted against the percentage of people at risk of poverty (Figures 2.2 and 2.3) in order to explore the spatial variation in the exposure to these two different energy poverty factors. The picture that arises when household prices are expressed in PPS radically alters the initial perception of cheap energy prices in worse-off, peripheral countries. Thus, states with higher domestic energy prices (in PPS) are mainly located in CEE, where poverty rates are also well above the EU average in most cases (see Figures 2.2 and 2.3). This imbalance is particularly visible in the case of Poland, Bulgaria, Lithuania, Romania and Croatia, all countries

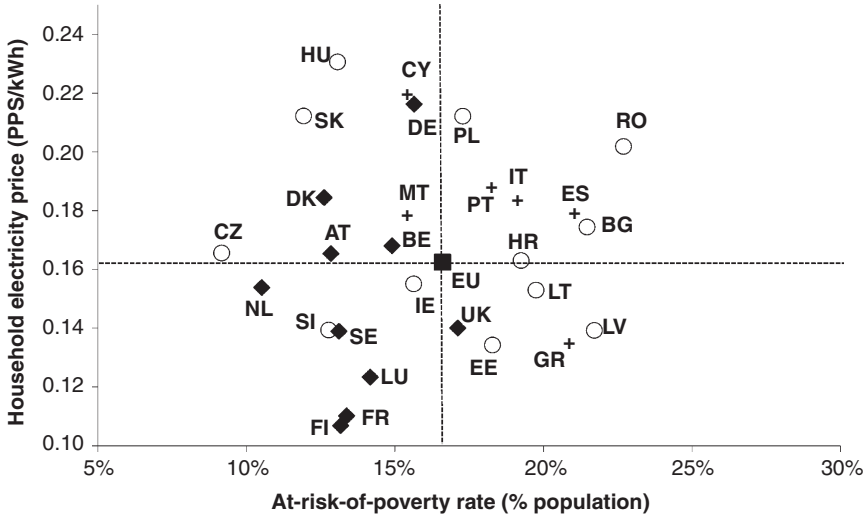

Figure 2.2 Household electricity prices (in purchasing power units of the year 2007) versus at-risk-of-poverty rate, average for the period 2007–2013 (with a few exceptions for the poverty indicator)

Source: Bouzarovski and Tirado Herrero, 2017

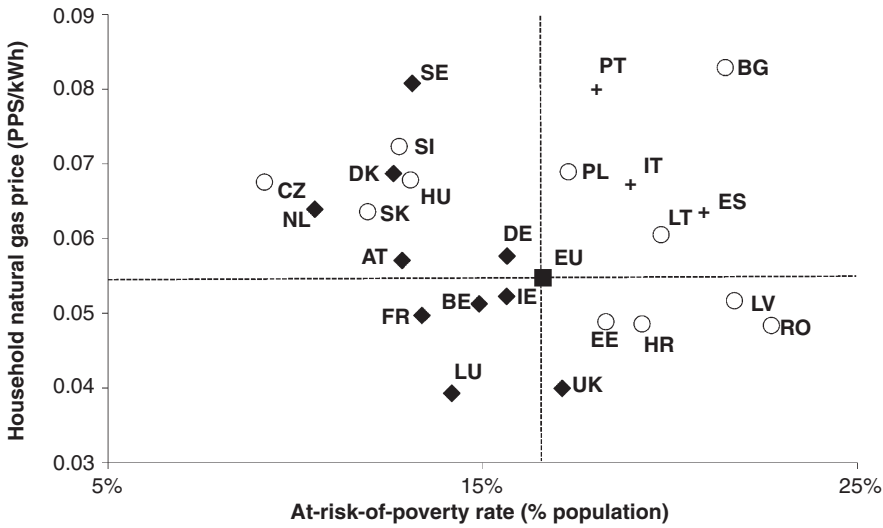

Figure 2.3 Household natural gas prices (in purchasing power units of the year 2007) versus at-risk-of-poverty rate, average for the period 2007–2013 (with a few exceptions for the poverty indicator)

Note: Cyprus, Finland, Greece and Malta missing (no data for natural gas prices)

Source: Bouzarovski and Tirado Herrero, 2017

with above-average domestic energy prices and at-risk-of-poverty rates for the period between 2007 and 2013.

Having identified a general upward trend in domestic energy prices in the EU, we also assessed the evolution of household energy prices across the EU by directly estimating the rates of increase (in percentage points) in natural gas and electricity prices that occurred between the second semester of 2007 and the second semester of 2013. These figures were calculated on the basis of real prices denominated in national currencies, in order to avoid fluctuations associated with exchange rates. In the case of member states that adopted the euro between 2007 and 2013 (Malta, Slovakia, Cyprus and Estonia), a currency conversion was necessary prior to calculating rates of increase.

The percentages of increase (see Figure 2.4) indicate that natural gas prices in the EU rose faster (20 per cent on average) than electricity prices (12 per cent) during the assessed period. This result is relevant from an energy poverty perspective, given the central role of natural gas in fuelling domestic energy services relevant to human health and well-being in many European countries (Fouquet, 2011). It also further highlights the distinction between an energy poverty core

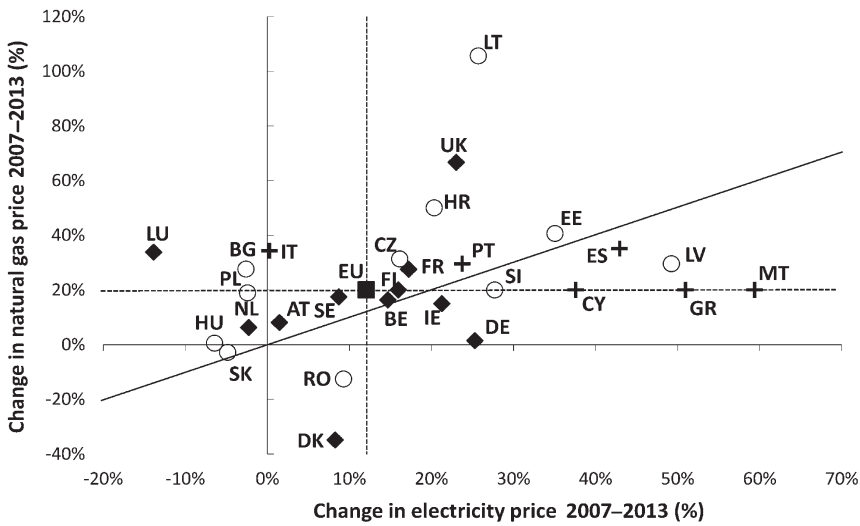

Figure 2.4 Change in household natural gas prices versus change in household electricity prices (accumulated percentage, calculated on real prices denominated in national currency) of member states between the years 2007 and 2013

Notes: 1) No household natural gas prices data available for Greece, Finland, Malta and Cyprus. For comparative purposes, they have are displayed distinctly along the line representing the average natural gas price of the European Union. 2) The diagonal line indicates a theoretical line along which natural gas and electricity prices increase at the same rate

Source: Bouzarovski and Tirado Herrero, 2017

and periphery in the EU: the citizens of CEE member states were forced to put up with increases in domestic energy prices that were above the EU average (with the notable exceptions of Slovakia and Hungary, owing to local energy and price policies). Particularly steep was the rise in the three Baltic republics as well as in the South-Eastern European states (Croatia and Slovenia).

We also assessed the evolution of domestic energy prices in PPS terms. Natural gas and electricity prices in PPS were plotted separately against the at-risk-of-poverty rate. For the purpose of this analysis, we selected the eight EU countries with the largest aggregated variation (in absolute value, calculated on the percentage of change) of both energy price and poverty rates between 2007 and 2013 (see also Bouzarovski and Tirado Herrero, 2017). Such comparisons allow for a synchronous visualization of the increases in energy prices and poverty levels that have occurred, in part, as a result of the euro crisis. The outcomes of our analyses for the case of domestic electricity indicate that member states in Southern Europe and the CEE region have been the most adversely affected, while Northern and Western EU members have even benefited from the transformations seen between 2007 and 2013 (see also Bouzarovski and Tirado Herrero, 2017).

Within the eight member states selected for the purposes of the analysis, the citizens of Croatia, Greece and Spain are among the most vulnerable: as of 2013, over 20 per cent of the population in these countries were at risk of poverty, and had seen a substantial rise in electricity prices during the previous six years. In the case of natural gas, the former socialist states of CEE have recorded the biggest changes in both the price of this domestic fuel and the monetary deprivation rate. But unlike electricity prices, the adjustment is not unidirectional: for example, Romania has reported a significant drop in the poverty rate *and* in the price of natural gas alike.

The predominance of 'periphery' countries within the correlation between energy price changes and at-risk-of-poverty rates indicates that the systemic forces that drive energy poverty need to be seen within the context of deeper regional disparities within the EU – many of which are connected to the continued legacies of post-socialism and the experience of post-socialist infrastructural reforms. While such an analysis cannot in itself demonstrate a causal link between increases in energy prices and monetary poverty levels, there is a clear clustering of countries at the nexus of these two dimensions. The disproportionately high presence of domestic energy deprivation in peripheral member states is also underpinned by wider technical and infrastructural factors. Systemically embedded economic and spatial inequalities are interacting with the diverse dynamics of energy transition to produce regionally specific inequalities.

Conclusion

This chapter has provided a comprehensive assessment of the relationship between domestic energy prices and monetary deprivation rates over time

and space so as to establish i) degrees of national-scale geographic variation in energy poverty rates, and ii) the role of gas and electricity prices in shaping the temporal and spatial distribution of monetary deprivation and energy poverty.

A series analysis of Eurostat data, spanning countries and time, showed that there are substantial regional disparities in the exposure of various countries to the drivers of energy poverty. Our results thus challenge the findings of previous studies by suggesting that the traditional division of EU states into three clusters is increasingly replaced by a relatively well-off 'core' group of countries in Northern and Western Europe, and a heterogeneous 'energy poverty periphery' in the South and East. In the former, domestic energy deprivation is limited to specific demographic and housing groups, while the latter exhibits a more pervasive presence of the problem across a range of social strata.

The energy poverty 'periphery' itself is highly heterogeneous as a result of the various underlying factors involved in driving the condition – particularly when it comes to the inflationary character of domestic energy prices. The post-socialist member states of CEE often report above-average at-risk-of-poverty rates. These have resulted in the expansion of energy poverty to a considerable degree in most countries in the region, with the notable exceptions of the Czech Republic, Slovakia and Estonia. These findings show the possibility of a biunivocal relationship between post-socialist conditions and high rates of energy poverty even if broad spatial trends are well established. If anything, the reviewed data may suggest that low energy prices (as in the case of Estonia) and monetary poverty rates (Slovakia) could be reducing rates of incidence of energy poverty in individual post-socialist countries.

Developing our exploration of the drivers of energy poverty across Europe – and in relation to the second aim of the chapter – we can conclude that domestic energy prices have consistently increased at faster-than-inflation rates for the EU as a whole since the mid-1990s. This pattern can be found throughout individual member states because domestic energy prices have outpaced inflation throughout the EU since 2004. Thus, state-level gas and electricity tariffs are acting on top of a more systemic piece of the energy poverty puzzle: monetary deprivation measured as the at-risk-of-poverty rate.

Paradoxically, countries in the CEE cluster have the EU's lowest nominal energy prices (in euro terms) but are characterized by higher-than-average energy prices when measured in PPS. Even though their real energy tariffs have not increased faster than those in the rest of Europe, such states are more exposed to the price factor because households spend relatively more on domestic energy than in the rest of the EU. The CEE region contains several worst-case scenarios (Bulgaria, Latvia, Lithuania, Croatia and Romania) where conditions are significantly more difficult than in the rest of the EU in terms of the two driving factors of energy poverty assessed in this chapter: high and increasing poverty rates, and high and increasing domestic gas and electricity prices. However, it is also acknowledged that significant driving forces absent

in this analysis exist and operate at national scales (e.g. domestic energy consumption mix, governance of the energy sector, and national and sub-national policies). And while evidence on the extent and characteristics of domestic energy deprivation in EU countries is growing, a systematic investigation of explanatory factors across individual member states is still missing.

Overall, these findings evidence the diverse geography of energy poverty in the EU, which is characterized by substantial differences among the analysed countries in terms of their exposure to the two factors analysed in the chapter (monetary deprivation rates and energy prices) and their evolution. While our results do not indicate that the energy transition is leading to a radical reconfiguration of existing regional inequalities, there is evidence to suggest that the EU at large has experienced an increase in the levels of energy poverty as measured by EU-SILC since 2007.

As a whole, we would argue in favour of further consideration – among research and policy communities alike – of the differential impact that the post-2008 financial crisis is exerting on welfare levels and deprivation rates across the EU. Energy operations in countries affected by austerity and fiscal consolidation measures are of particular relevance here. There is also a necessity for analysing the price and energy poverty risks posed by wider energy transition processes: the liberalization and privatization of the energy sector, and the long-term transition to a low-carbon future. In terms of the former, the post-socialist heuristic holds continued conceptual relevance – and the lessons learned from the social impacts of large-scale infrastructural configurations also hold relevance for the latter.

Acknowledgements

The research leading to this paper has received funding from the European Research Council under the European Union's Seventh Framework Programme (FP7/2007–2013)/ERC grant agreement number 313478.

Notes

1 This chapter is a modified version of the following earlier article by Bouzarovski and Tirado Herrero (2017) 'The energy divide: integrating energy transitions, regional inequalities and poverty trends in the European Union', *European Urban and Regional Studies*, 24, 69–86.

2 This bivariate comparison was not conducted for Eurostat's central measure of monetary and material deprivation ('people at risk of poverty or social exclusion') given that this complex metric is based, among other elements, on the indicators *inability* and *arrears*, and thus issues of collinearity between variables would have arisen in the correlation analysis.

References

Aatola, P., Ollikainen, M. and Toppinen, A. (2013) 'Impact of the carbon price on the integrating European electricity market', *Energy Policy,* 61, 1236–1251.

Amin, S. (1974) *Accumulation on a World Scale,* New York: Monthly Review Press.
Boardman, B. (2009) *Fixing Fuel Poverty: Challenges and Solutions,* London: Routledge.
Boardman, B. (2010) *Fixing Fuel Poverty: Challenges and Solutions,* London: Earthscan.
Bouzarovski, S. (2009) 'Building events in inner-city Gdańsk, Poland: exploring the socio-spatial construction of agency in built form', *Environment and Planning D: Society and Space,* 27, 840–858.
Bouzarovski, S. (2010) 'Post-socialist energy reforms in critical perspective: entangled boundaries, scales and trajectories of change', *European Urban and Regional Studies,* 17, 167–182.
Bouzarovski, S. (2014) 'Energy poverty in the European Union: landscapes of vulnerability', *Wiley Interdisciplinary Reviews: Energy and Environment,* 3, 276–289.
Bouzarovski, S. (2015) *Retrofitting the City: Residential Flexibility, Resilience and the Built Environment,* London: IB Tauris.
Bouzarovski, S. and Petrova, S. (2015) 'The EU energy poverty and vulnerability agenda: an emergent domain of transnational action' in Tosun, J., Biesenbender, S. and Schulze, K. (eds) *Energy Policy Making in the EU,* London: Springer, 129–144.
Bouzarovski, S. and Thomson, H. (2017) 'Energy vulnerability in the grain of the city: toward neighborhood typologies of material deprivation', *Annals of the American Association of Geographers.* Available at: http://dx.doi.org/10.1080/24694452.2017.1373624 (accessed 17 November 2018)
Bouzarovski, S. and Tirado Herrero, S. (2017) 'The energy divide: integrating energy transitions, regional inequalities and poverty trends in the European Union', *European Urban and Regional Studies,* 24, 69–86.
Bouzarovski, S., Petrova, S. and Sarlamanov, R. (2012) 'Energy poverty policies in the EU: a critical perspective', *Energy Policy,* 49, 76–82.
Bouzarovski, S., Sỳkora, L. and Matoušek, R. (2016a) 'Locked-in post-socialism: rolling path dependencies in Liberec's district heating system', *Eurasian Geography and Economics,* 57, 4–5.
Bouzarovski, S., Tirado Herrero, S., Petrova, S. and Ürge-Vorsatz, D. (2016b) 'Unpacking the spaces and politics of energy poverty: path-dependencies, deprivation and fuel switching in post-communist Hungary', *Local Environment,* 21, 1151–1170.
Bouzarovski, S., Herrero, S. T., Petrova, S., Frankowski, J., Matoušek, R. and Maltby, T. (2017) 'Multiple transformations: theorizing energy vulnerability as a socio-spatial phenomenon', *Geografiska Annaler, Series B, Human Geography,* 99, 20–41.
Braubach, M. and Ferrand, A. (2013) 'Energy efficiency, housing, equity and health', *International Journal of Public Health,* 58, 331–332.
Bridge, G., Bouzarovski, S., Bradshaw, M. and Eyre, N. (2013) 'Geographies of energy transition: space, place and the low-carbon economy', *Energy Policy,* 53, 331–340.
Buzar, S. (2007) 'When homes become prisons: the relational spaces of post-socialist energy poverty', *Environment and Planning A,* 39, 1908–1925.
Copus, A. K. (2001) 'From core-periphery to polycentric development: concepts of spatial and aspatial peripherality', *European Planning Studies,* 9, 539–552.
Dagoumas, A. and Kitsios, F. (2014) 'Assessing the impact of the economic crisis on energy poverty in Greece', *Sustainable Cities and Society*, 13, 267–278.

Dubois, U. (2012) From targeting to implementation: the role of identification of fuel poor households, *Energy Policy,* 49, 107–115.

European Commission (2014) *Energy Prices and Costs in Europe,* Brussels: EC.

European Communities (2009) *Panorama of Energy – Energy Statistics to Support EU Policies and Solutions,* Luxembourg: Office for Official Publications of the European Communities.

Eurostat (2013) 'Energy price statistics', *Statistics Explained*.

Fiorio, C. V. and Florio, M. (2008) *Do You Pay a Fair Price for Electricity? Consumers' Satisfaction and Utility Reform in the EU,* Milan: University of Milan.

Florio, M. (2013) *Network Industries and Social Welfare: The Experiment that Reshuffled European Utilities,* Oxford: Oxford University Press.

Formosa, A. (2015) *Analysis of the Current Energy Support Mechanism for Low Income Groups and Investigation of Alternative Energy Support Measures to Support Vulnerable Consumers in Malta*. Unpublished thesis, University of Malta. Available at: www.um.edu.mt/library/oar//handle/123456789/6658 (accessed 20 July 2018).

Fouquet, R. (2011) 'Divergences in long-run trends in the prices of energy and energy services', *Review of Environmental Economics and Policy,* 5, 196–218.

Healy, J. D. (2004) *Housing, Fuel Poverty and Health: A Pan-European Analysis,* Aldershot: Ashgate.

Healy, J. D. and Clinch, J. P. (2004) 'Quantifying the severity of fuel poverty, its relationship with poor housing and reasons for non-investment in energy-saving measures in Ireland', *Energy Policy,* 32, 207–220.

Hiteva, R. P. (2013) 'Fuel poverty and vulnerability in the EU low-carbon transition: the case of renewable electricity', *Local Environment,* 18, 487–505.

Kim, W., Chattopadhyay, D. and Park, J. (2010) 'Impact of carbon cost on wholesale electricity price: a note on price pass-through issues', *Energy,* 35, 3441–3448.

Kovačević, A. (2004) *Stuck in the Past: Energy, Environment and Poverty in Serbia and Montenegro,* Belgrade: United Nations Development Programme.

Lampietti, J. A., Banerjee, S. G. and Branczik, A. (2007) *People and Power: Electricity Sector Reforms and the Poor in Europe and Central Asia,* Washington, DC: World Bank.

Li, K., Lloyd, B., Liang, X.-J. and Wei, Y-M. (2014) 'Energy poor or fuel poor: what are the differences?', *Energy Policy,* 68, 476–481.

Miniaci, R., Scarpa C. and Valbonesi P. (2014) Energy affordability and the benefits system in Italy. *Energy Policy,* 75, 289–300.

National Energy Action (2014) *Developing a Social Energy Target in Europe: Proposals for Bridging the 'Energy Divide' and Putting Low-Income Households at the Heart of Europe's Energy Future*, Newcastle upon Tyne: National Energy Action.

Nicholls, W. J. (2008) 'The urban question revisited: the importance of cities for social movements', *International Journal of Urban and Regional Research*, 32:4, 841–859.

Petrakos, G., Kallioras, D. and Anagnostou, A. (2011) 'Regional convergence and growth in Europe: understanding patterns and determinants', *European Urban and Regional Studies,* 18: 375–391.

Petrova, S. (2017) 'Encountering energy precarity: geographies of fuel poverty among young adults in the UK', Transactions of the Institute of British Geographers. Available at: http://onlinelibrary.wiley.com/doi/10.1111/tran.12196/abstract (accessed 17 November 2018)

Petrova, S., Gentile, M., Makinen, I. H. and Bouzarovski, S. (2013) 'Perceptions of thermal comfort and housing quality: exploring the microgeographies of energy poverty in Stakhanov, Ukraine', *Environment and Planning A*, 45, 1240–1257.

Poggi, A. and Florio, M. (2010) 'Energy deprivation dynamics and regulatory reforms in Europe: evidence from household panel data', *Energy Policy,* 38, 253–264.

Pollitt, M. G. (2012) 'The role of policy in energy transitions: lessons from the energy liberalisation era', *Energy Policy,* 50, 128–137.

Pye, S., Baffert, C., Brajković, J., Grgurev, I., Miglio, D. R. and Deane, P. (2015) *Energy Poverty and Vulnerable Consumers in the Energy Sector across the EU: Analysis of Policies and Measures,* London: Insight_E.

Rademaekers, K., Yearwood, J., Ferreira, A., Pye, S., Hamilton, I., Agnolucci, P., Grover, D., Karásek, J. and Anisimova, N. (2016) *Selecting Indicators to Measure Energy Poverty,* Brussels: European Commission, DG Energy.

Ruggeri Laderchi, C., Olivier, A. and Trimble, C. (2013) *Balancing Act: Cutting Energy Subsidies while Protecting Affordability,* Washington, DC: The World Bank.

Simoes S. G., Gregório, V. and Seixas, J. (2016) Mapping fuel poverty in Portugal, *Energy Procedia,* 106, 155–165.

Thomson, H. and Snell, C. (2013) 'Quantifying the prevalence of fuel poverty across the European Union', *Energy Policy,* 52, 563–572.

Tirado Herrero, S. and Ürge-Vorsatz, D. (2010) *Fuel Poverty in Hungary. A First Assessment*. Report prepared for Védegylet – Protect the Future Society. Budapest: Center for Climate Change and Sustainable Energy Policy.

Ürge-Vorsatz, D., Miladinova, G. and Paizs, R. (2006) 'Energy in transition: from the iron curtain to the European Union', *Energy Policy,* 27, 2279–2297.

Uitermark, J., Nicholls, W. and Loopmans, M. (2012) 'Cities and social movements: theorizing beyond the right to the city', *Environment and Planning A*, 44:11, 2546–2554.

3 The thermodynamics of the social contract

Making infrastructures visible in the case of district heating in two towns in Serbia and Croatia

Deana Jovanović

Introduction

During my ethnographic research in two different post-Yugoslav towns – in the copper-processing town of Bor in Serbia and in the coastal industrial town of Rijeka in Croatia, the provision of district heating was an unavoidable topic of conversation that provoked a lot of affective reactions. For instance, my landlord in Rijeka, Marta,[1] was a woman in her fifties with two children who worked part-time serving food in a kindergarten after losing her job for a railway. She lived in the same skyscraper where I rented her mother's flat. The morning we met, she looked at a bill I had received that day and put on her glasses to better explain to me the complicated and opaque calculations of the heating costs that neither she nor I could decipher. Then she threw the bill on the table and said: 'My darling, don't get into this… these are all *muljavine i pizdarije* (dodgy dealings and annoying things). We used to live well before, and now it's all just an ugly mess. Don't turn your radiator on if you do not have to.'

Unlike in Rijeka where there was an (unsuccessful) attempt to individualize district heating costs, in Bor there was still a flat-rate provision of district heating. Milica was in her seventies and had worked in the kitchen of a socially owned company in Bor. Her late husband had obtained their flat through his work during socialism. She used to tell me that the 'normal' level of heating during winter was when you could walk in your T-shirt in the flat and have to open the windows to cool off the room. For her, the abundant heating was a measure of a good neighbourhood, solidly built flats, and a specificity of the urban character of her town. She continued: 'But, nevertheless, *budalaštine* ("non-senses") are happening to us…the state is cheating us now. We are not being treated fairly. They are just stealing from us.'

While provision of centralized district heating, constructed during the socialist urbanization of Yugoslavia, was relatively similar in both towns during the socialist past, today heating has developed on diverging paths.

Yet despite different policy decisions – one towards individual metering of the heating consumption in Rijeka, and the other keeping the general flat rate provision in Bor – I found that a strikingly similar sense of disenchantment with the promise of heating could be gleaned from both Marta's and Milica's experiences with district provision, and that this was shared with their fellow citizens. More precisely, the promise of modern and comfortable lives, welfare, and care that the Yugoslav state had assured (in the past) Marta and Milica (and their co-citizens) it would deliver in the future were brought into question in both towns. This chapter argues that although the infrastructure has not broken down materially, a sense of post-Yugoslav infrastructural failure emerged through people's experience of a breakdown of the social contract – between the state and the people – that delivered its promises through heating. The encounter with district heating is here studied as a site through which post-Yugoslav transformations of the social contract between citizens and their states are discussed.

The chapter ethnographically illustrates the thermodynamics of the social contract by showing the ways in which infrastructural forms and the provision of heat configured dynamic relations between the states and their citizens. Thus, I show how the interrelation between heat and the political, technological (including material limits of infrastructure and its potentialities), and social aspects formed around the provision of heating were involved in the transformation of the social contract. By illustrating a specific condition upon which visibility of infrastructure was mobilized in everyday life, the chapter joins the anthropological efforts to capture visibility of urban infrastructures (Sneath, 2009), necessary to persistently renew the political effects (Anand, 2017). Unlike the widespread assertion that infrastructures are usually 'taken for granted' (Humphrey, 2003, p. 93), are inflexible and invisible (Furlong, 2010), and that they only become visible upon their physical breakdown (Star, 1999) or when they are repaired and maintained (Graham and Thrift, 2007), the chapter shows how visibility of infrastructures was achieved through the experience of a breakdown of the social contract and people's attempt to make it anew.

So far, infrastructures in this region have been understudied in anthropology, with the exception of Johnson's studies of Belgrade district heating (2016) and housing (2018). Although studies of Yugoslav urban planning are emerging (see also Normand, 2014 for Belgrade; Djurašovic, 2016 for Mostar), there remains a lack of data 'from below'. This chapter also contributes to post-socialist studies by entering into a long overdue dialogue between post-socialist and post-Yugoslav studies (see Gilbert et al., 2008).[2]

My data stem from ethnographic fieldwork and participant observation that I conducted in Bor for 14 months (from August 2012 until September 2013) for the purposes of my PhD research, and in Rijeka for 5 months during my post-doctoral fieldwork (from October 2016 until March 2017). In both locations I used informal and semi-structured interviews, followed the local media, and analysed relevant documents. The daily routines of

living in rented apartments in Bor and Rijeka provided insights into the neighbourhoods, and helped me to share in the common experience of heating provision. In Bor, I spent time in the municipality office (*mesna zajednica*) where I met and established a rapport with Katarina. In Rijeka, I befriended people who self-organized themselves against the local heating provider. Even though I had conversations with many other citizens, in this chapter I will use these examples as paradigmatic because they illustrate shared experiences of the residents of both towns. By taking an anthropological perspective on district heating, ethnography provided in this text is not (and has never been) a mere description; rather, its explanatory use is a theoretical and analytical endeavour (Nader, 2011).

I will first provide a historical account on district heating in Yugoslavia and a brief depiction of the current state in two towns. Then, I will focus on two ethnographic examples from both towns, and end by discussing transformations of the social contract and its relationship with the provision of district heating today.

District heating in Yugoslavia

During the 1960s and 1970s, Bor and Rijeka went through mass housing development projects that included developing district heating networks. The urbanized infrastructure came as a result of rapid industrial expansion, urbanization, and modernization, conjointly promoted by the socialist self-managed system. District heating in both towns consisted of a system of pipes connected to one main source (the heating plant), which then brought heat into homes through radiators. The heating was technically constructed in such a way that the pipes ran vertically through the apartments, linking them successively, rather than in loops (Johnson, 2013), making it almost impossible to provide an individual supply in both towns. Residents could not control the amount of heat brought into their flat, and they could not turn it off whenever they wanted. Heating bills were equal throughout the year, owing to cost distribution, and charges were calculated by square metre.

The municipal heating service in Yugoslavia was provided on the basis of the universal rationale of uniform coverage by a single provider and a network that was part of what Graham and Marvin (2001, p. 43) defined as the 'modern infrastructural ideal' of integrated planning of unitary networked cities with social, economic, and political coherence, visible in the modern urban planning of Yugoslav cities. Being the basis of modernist European planning that tried to unify and homogenize urban space and promote cohesive city building, Graham and Marvin (2001) argue that such provision of public services became the foundation upon which European welfare states were constructed and sustained. This 'modern infrastructural ideal' regulated by the state was simultaneously integrated into the Yugoslav socialist idea of the provision of a living standard for the workers. Within such arrangements, the workers (and my interlocutors) were allocated,

though not entirely equally (Archer, 2016), the rights to use socially owned flats plugged into a centralized heating provision.

It is necessary to emphasize that socialism in Yugoslavia was different from socialism in other East European countries. As 'the third way' between the capitalist United States and communist Soviet Union, it was characterized by a unique mixture of socialist and market-economic principles, self-management, a liberal socialist system of government, and 'openness', including borders open to goods, people and ideas from across the world (Greenberg, 2011, p. 88). The heating system was built in a different manner from the centralized provision in the Soviet Union, and the workers themselves were involved in building the city infrastructure through self-management funds, among others.

More than 25 years after the break-up of Yugoslavia, the process of neoliberalization has taken different paths in both countries. Croatia's accession to the European Union (EU) in 2013 brought increased neoliberal reforms in comparison to Serbia. Such reforms also reflected the greater degree to which the heating system in Croatia has been transformed compared with that in Serbia. Today in Croatia, different actors pursue policies for individualization of heating costs, while environmental and energy efficiency agendas are affected by the local government and, more crucially, EU initiatives and funds. Serbia recently faced such attempts, but the town of Bor in particular was not on the agenda. In both countries, public policies and political and infrastructural transformations are mostly carried out without public involvement. More recently, however, certain activities against the local heating providers emerged both in Croatia and in Serbia.

At the time I spent in the field, the heating infrastructure in Bor and Rijeka was still a 'bundle', or a partial bundle, because both heating providers were still owned by the municipalities and controlled by the state. The transformations of district heating in both towns were not fully carried out owing to material conditions (e.g. inflexible pipes) and the difficulty of privatizing indebted providers. In Rijeka, there was an attempt to individualize heating costs that was introduced only partially, and in Bor such an attempt was on the horizon. Both providers, controlled by the state, tried to 'responsibilize' (Collier, 2011, p.8) the users by asking them to demonstrate a particular solidarity with each other through which they would make their (often volatile) provisions work. In Bor, it seemed that the utility provider had still not made up its mind on whether or not its services were a commodity. According to them, the citizens ought to be responsible for making regular payments for utilities; otherwise, the delivery of heating would destabilize. In Rijeka, according to pamphlets distributed by the provider, citizens were encouraged to keep their radiators set to an average temperature, hence to 'behave equally' (and not independently) in order to attain 'optimal' spending and achieve efficient heating. Further in this text, I will show how this particular context in both towns played out in people's day-to-day engagements with district heating, and how it reflected on my interlocutors'

apprehensions of the breakdown of the social contract and its promises delivered through heating.

A desire to disconnect in Bor (Serbia): Katarina's disenchantment

The town of Bor, located in eastern Serbia (350 km south-east from the capital), is a middle-sized town, characterized by a mono-structural economy. The local copper-processing company (RTB)[3] has historically been, and still is, substantially anchored within the town's social and political life, prosperity, and development. After a prosperous period during Yugoslav socialism, there was an economic, social, and symbolic decline of the company, followed by decay of the town and of industry during the 1990s. After 2009, the state made an investment in the so-called mutual revival of the run-down industry and the town. In Bor, RTB played an important role in building the district heating system because it developed from RTB's power plant. The heating network began expanding in 1973, with the rapid urban development of the town, and finished in the 1990s. Compared with other cities in Serbia, Bor has the highest number of households connected to a single plant.[4] This is why one should not be surprised to find radiators even in barns in some villages near the town.

The heating company split with RTB in 2002 and emerged as an independent public utility company, *Toplana Bor* (Heating Power Plant Bor), run by the municipality. Because of its technical, bureaucratic, and material inflexibility, the centralized system did not provide any possibility for disconnecting from it. In this way, urban infrastructure assembled both social and political life (Collier, 2011) while forming tight connections between the company, the municipality, and the citizens. This kind of assemblage was maintained as the party-political responsibilities of the municipality and the company overlapped, affecting everyday life, including the quality of heating. This assemblage will be further depicted through Katarina's story, where the sense of a breakdown of the social contract made the infrastructure and its provision visible.

Katarina was upset when I came to see her in her flat. Yet again, she had received a letter from the public utility company, a final notice before a summons to pay a debt of nearly €1,700. We sat down in the living room of her flat, which her father had obtained through his work in the factory in the late 1980s (this used to be a part of RTB and was privatized under suspicious circumstances, leaving her father without the support he was entitled to). Katarina showed me a list of alleged debts beginning in 1996, including periods in 2002, 2003, 2008, and so on. She was trying to find the receipts for bills that had already been paid, which her father kept in a pile of unsorted documents. She claimed that the debt seemed to be much larger than what the household actually owed, and that she knew that it should be around €1,150. On a piece of paper, she ticked off the bills that her father had already paid. Katarina was 31, born and raised in Bor, in her final year

of law studies, and unemployed. At that time her parents were living in a village, trying to survive after both losing their jobs in a privatized factory, leaving Katarina to deal with the family debts.

The public utility company was threatening to press charges against Katarina's family. The utility company had introduced a measure to allow citizens to set up a payment plan, which was supposed to allow Katarina to pay the debt with interest in instalments. Should Katarina not accept this offer that accompanied the final warning, her father's pension would be suspended for a while. He would be summoned to court, their belongings could be repossessed, and the whole family could be left without any steady income.

Katarina claimed that the state always found something that one had already paid for and sent a bill for it anyway, relying on the possibility that one would not find a receipt for the first payment, or that nobody would check the second bill. 'This only exists in this country!' she said. She claimed that such 'extortion' and quasi-legal theft existed to generate extra money that went straight into the budget of the political parties in charge of the public utility companies and to financing their own political activities. She said: 'These people, politicians in the municipality, only argue over who should become a general director of some public company, while the people are being robbed and they do not even want to know how we live.' She spoke about the state as a 'usury state'. And, because of that, she was forced to go around to various public institutions and queue at the counters. Every time she went there, she became stressed 'just by entering the room'. 'I'm sick of it!' she said.

District heating was also a source of stress for Katarina because of the involved paperwork and bureaucratic procedures. Much checking needed to be done in order to avoid being defrauded. This required time, nerves, collecting and storing old receipts for years, and then finding them when needed, understanding the bills and final notices, consulting a lawyer, arguing, knowing the ways in which institutions worked (preferably through knowing a person who could help and do favours internally), writing appeals, archiving them in the proper way (by making sure they were legitimized by an institution by being notarized), and so on.

Another paper was pulled from the pile. It was Katarina's father's documentation on substandard heating delivery services and his request to disconnect his flat from the district heating system. 'Argh, I'm so looking forward to disconnecting from them!' Katarina commented on the letter that I had started reading. 'Can you really?' I asked. As far as I knew, one could not easily disconnect from district heating. She insisted that it was a service, and argued that they should offer and sell good services. Because the service was poor and unreliable, she hoped to have a chance to disconnect from it. She did not pay attention to the inherent material limits of the heating system, however, and her expectations did not match the infrastructural possibilities at that point.

I looked at the letter again, stamped in the right corner with '9 October, 2012', the date of dispatch. The letter was written in a bureaucratic way, well-explained and bullet-pointed. Two reasons were stated for the family's request to disconnect. The first was the provision of 'inadequate heating', and the second was their 'difficult financial situation on the verge of poverty'. The problems with the inadequate heating, according to the letter, dated back to the moment the family moved into the flat during the 1980s. The temperature of the flat never rose above 16°C during winter, although the company was required to guarantee 20(± 2)°C by law. This had been confirmed many times by the workers from the Heating Power Plant who came to measure the temperature in the flat. Because of this, Katarina's father argued in the letter, the family was forced to heat the flat by using other sources of energy, such as electricity, which resulted in extra costs. The letter also elaborated on the financial conditions of the household. Four household members, it said, lived off the father's pension of 28,000 dinars (€231) only, which equated to 7,000 dinars (€57) per person per month. Until 2009, the father had been able to pay for the heating services even though they were inadequate. But because he and his wife, along with other workers, had been 'thrown onto the streets' after the lay-offs in the privatized factory, further payment for district heating would lead the family into a greater 'depression'. The letter ended in a poetic tone:

> By respecting the old saying, 'The wise person is not the one who distinguishes good from evil, but the one who chooses between the lesser of two evils,' I judged that the lesser evil for my family would be to disconnect from the district heating system rather than to become evicted from my flat due to enormous debts.

For Katarina, the consequence of not paying her bills was more a moral dilemma between two bad choices that demanded a difficult compromise. The principle of the lesser of two evils was a product of a situation of being a captive (dependent) customer of the centralized provision. In fact, Katarina and her father became morally righteous citizens on the basis of knowing how to distinguish between, and navigate scales of, what they considered to be 'evils'. Because the family could not be disconnected from the system at that point, the debt became so high that heating began to seem like a 'bad' connection that Katarina and her parents had to navigate. Now, let us stop for a moment with Katarina's story and go to Rijeka where, similarly to Katarina's case, a good connection turned into a physically and morally bad one.

The quest for a fair formula: hot bills and cold radiators in Rijeka (Croatia)

Rijeka is the principal seaport and third largest city in Croatia located on Kvarner Bay, an inlet of the Adriatic Sea, 131 km south-west of the capital

Zagreb. During the mid-1960s, urbanization in Rijeka intensified when modern buildings, including skyscrapers, were connected to the centralized heating provision. The main socially owned company that provided heating was nationalized to become the state company Energo in 1989. Today, this company is in the town's majority ownership. Between 2011 and 2013, the Environmental Protection and Energy Efficiency Fund (EU funds) and the city of Rijeka introduced a new ecological measure regarding district heating. The idea was to introduce a method of control over energy spending by which energy efficiency would improve. The state officials and the energy providers appealed to the citizens by using a basic market environmentalist argument: they pitched electronic heat cost allocators (which measured consumption of heat calculated by impulses) as the first technological condition for individualization of billing for heat consumption, and as a basic piece of technical equipment for energy efficiency. Energo advertised that 30 per cent of individual consumption would be saved. The new law on thermal energy market envisaged that everyone who lived in a building that had more than 70 flats should have heat cost allocators by 2016, and it prescribed them as obligatory.[5] The citizens could buy the cost allocators themselves from two private companies, and they paid for the refurbishment of their buildings' façades (which was a big expense). The company initially guaranteed smaller bills, so the people who installed the devices (like my interlocutors) no longer paid the flat rate calculated by the square metre throughout the year.

Protests were organized in Rijeka in 2015 after the attempt to individualize the calculations, as a reaction to a sudden increase in prices. People demanded 'normal prices of heating', complaining that the value of their flats had suddenly decreased due to expensive heating. The people I spent time with were active in their own self-organized initiatives against the company and against the 'formula' the company used to calculate individual costs. They actively had meetings with ministries, Energo and municipal bodies. This action was also initiated on the national level, because the capital of Zagreb and other towns in Croatia had similar problems.

My interlocutors explained that the problem was that the formula Energo used to calculate the costs did not reflect the actual consumption – rather, it made their bills higher. According to them, the formula was not precise and it did not take into account the position of specific flats, heating quality in the neighbouring flats, badly kept buildings, the exact amount of heat that the joint vertical pipes produced, and so on. For those who had cost allocators installed, 50 per cent of heating provision was charged based on square metres, and 50 per cent by actual consumption and through a *korektivni faktor* (multiplier), which depended on the overall consumption of the heat of the whole building. If the flat did not have a cost allocator, the price was even higher. Some of my interlocutors longed for a formula that provided a fair and transparent price for individual consumption; some of them thought there was no fair formula at all. Moreover, a lot of people

I had conversations with had their own suggestions for what a 'fair' formula could and should look like, but they all emphasized that it was not their job to invent it. Often, their critique was not so much directed towards individualizing and measuring as such (although there were some individuals who fundamentally opposed this), but more towards the technicalities of measuring and counting. Thus, the (thermo)dynamic between the states and the citizens did not *only* relate to the political and economic transformations but also to relations with the heat and the existing material conditions of the network, including the expectations and entitlements formed around the provision of heating.

One day I met my interlocutors in a local pub. Mišo was a man in his fifties, active in a workers' union and a public servant in the municipality office. He lived with his wife and two children in a skyscraper. Ivana was in her mid-fifties. She lived with her mother and worked in the local high school as a teacher. As soon as we had ordered coffee, Mišo and Ivana started to complain:

> People started not to heat any more! We, who do not turn on our radiators, still pay 50 per cent for heat per square metre, and we did not consume anything. My vertical pipe has a volume of xy, and it is enough to heat one square metre, so they can't charge me for 40 square metres. You cannot…because I have cost allocators that are imposed onto me. Why should I pay 50 square metres for three pipes, if they cannot heat more than three square metres?! Count per volume, and I'll pay…I just want to have a choice! I don't want to pay a flat rate, and I want to pay as much as I consume! So reduce the flat rate…[…].
>
> (Mišo)

Ivana added to this:

> The problem with the heat cost allocators is that you cannot control your consumption. You cannot know its value. So let's say you've got five impulses. But, what if that is the only impulse spent in the whole building?! You don't know if your neighbours are heating or not. The value of an impulse depends on the whole building, that's how the formula they use works. As everybody closes their radiators, because it's expensive, you pay 50 per cent of the overall consumption of the building…But one should not pay for everything. They call it a 'solidary method', ha! [laughs] People do not use their radiators, and this is why we get high bills. The heat cost allocators are a complete deceit.

Furthermore, they both claimed that the calculations were unjust and socially insensitive. Like Katarina from Bor, they yearned for the calculations of the heating costs to take into account the social and financial situation of the users, and they also wanted to ensure fair charges for consumption. In

addition, my interlocutors claimed that everything about the heating system was a fraud and that the new laws were copied from other EU countries. Allegedly, the private companies that were selling the heat cost allocators were part of *muljavine i pizdarije* (to use my landlord's expression), whereby they made deals with the government to become the official state providers and the subsequent bills became completely non-transparent.

Mišo and Ivana also told me that people had found ways to cheat Energo. For instance, people would take off their radiators with the permission of the head of the building, who was usually bribed. According to Mišo and Ivana, these people no longer paid for heating but still got some heat from the neighbouring flats. Or they would even reinstall the radiators, making the overall building consumption higher, but still pay nothing. 'Why would I pay his heating?' Ivana asked me. She continued:

> And why am I paying per square metre on account of joint building consumption, if people around me do not heat themselves?! For achieving the temperature of a bad fridge?! It is not a lot for heating, it's true… but for refrigeration on account of solidarity during temperatures below zero…I think it's too much!

The breakdown of the social contract and making it anew: making infrastructures visible

As we can see from the ethnography above, the heating system provoked anxieties among residents both in Rijeka and in Bor. Their concerns were especially over what role and responsibilities the state towards the citizens should have in both a moral and practical sense. In fact, from its introduction until today, district heating brought my interlocutors into specific relations with the Yugoslav state (and, later, the successive independent states), their towns (the municipalities[6] that provide the heat) and between each other. This 'social contract', as a set of relations, was imbued with liabilities, obligations, and responsibilities. Even though my interlocutors did not speak about this set of relations as a social contract, as we could see, it did leave significant material and immaterial effects in my interlocutors' everyday lives.

I use the notion of the social contract in a different context from that in which Catherine Alexander (2007) or Caroline Humphrey (2007) used it to mark the relationship between citizens and the Soviet state that was redefined after the end of the Soviet Union. They both showed how post-socialist privatization of utility provisions changed the meaning of infrastructures, and how people saw their roles in the new economy. What the examples from Bor and Rijeka show, where privatization had *not* yet (fully) occurred, is that despite the differences the residents have started to perceive themselves as consumers, like they did in Ulan-Ude (Humphrey, 2007) or in Almaty (Alexander, 2007). Yet, in order to fully understand my interlocutors' moral

entitlements as consumers and how they emerged, I will first address the socialist past that initially brought my interlocutors into the social contract through heating and entitled them to promises for the future. I argue that the apprehension surrounding the breakdown of the social contract, which promised to provide care and welfare, contributed to their attempts to make it anew through their emphasis on becoming moral citizens: the consumers. This argument will help us to understand how the thermodynamics of the social contract rendered infrastructures visible.

During socialism in Yugoslavia, district heating (as with other infrastructural services) was never provided as a consumer good in a way in which other goods, services, and experiences were available and consumed.[7] Socially owned flats, allocated to the citizens, were not commercial commodities either. Johnson (2013) argues in her study of Belgrade's district heating that the flats with all the modern conveniences (such as district heating) were offered as the reward for citizens who were 'contributing to the socialist pursuit of modernity' (Johnson 2013, p. 146). She further contends that 'district heating was a system that helped construct such privileged comfort' (Johnson, 2013, pp. 146–147). Even though 'district heating brought a vision of Yugoslav consumerism into the home and made it material' (Johnson, 2013, p. 147), it was also linked to the moral project of the Yugoslav state as urban planning echoed the aspirations of socio-economic development (such as social ownership, equal access to jobs and housing, and a satisfying minimum living standard) (Djurašovic, 2016, pp. 107–108). By using their flats, my interlocutors entered into a social contract with the Yugoslav state that ought to provide heat (and welfare and care), and which further contributed to 'the social and economic relationships that would make the system work' (Johnson, 2016, p. 99).

After the decline of socialism, and as ownership transformed, the independent states remained the providers of heating, unable to entirely offer the promises of becoming fully fledged heating consumers (as in the case of flats, which were turned into commodities). This was impossible partly due to the pre-neoliberal material specificity of the heating system, which somewhat constrained the reforms (Collier, 2011). In Rijeka, the reforms were carried out to a larger extent than in Serbia, but, as I showed, the formula used to calculate individual heating consumption was contested by Mišo and Ivana, and many other residents of Rijeka, as (morally) unfair. Yet physical connections tied them to the previous social contract. As neither state could offer the old relationship and provide heating as a social good, and when my interlocutors could not physically disconnect (easily), they found themselves in an ambivalent relationship with their states, yearning for both the (welfare) state, which ought to provide, and for a 'proper' capitalist state.

As they contemplated their expectations of the state and its failure to provide, the contemporary states were seen as corrupted, fraudulent entities that 'extorted' money through heating. My interlocutors' mundane encounters

with district heating were therefore also their mundane encounters 'with a fragmented state' (Harvey and Knox, 2012, p. 530). Because of apprehensions over the state as a provider *and* a fraudulent entity from which one needed to protect oneself, they developed different strategies for mitigating what they found 'harmful' in their relationship with the state: they tried to monitor it by carefully gathering their bills, interpreting them, studying new formulas for calculations, monitoring their debts, informing themselves on legal issues, filing complaints, inspecting room temperatures, and so on. By doing so, they developed a particular 'expert' knowledge around the provision of district heating, whether in its legal, political, economic, or technical domain.

As particular hopes and senses of entitlement were formed around the provision of district heating through the social contract, my interlocutors experienced and expressed disenchantment with such promises. The betrayals of expectations of the social contract and disenchantment with the aspirations of socio-economic development, inscribed in the district heating, were visible in the case of Katarina's parents being 'thrown onto the streets' after (illegally) losing their jobs and in Rijeka, where transformation of heating charges contributed to a decrease in the prices of flats. It was also visible in lowering the living standard, which all my interlocutors experienced. The expectations and subsequent disenchantment came precisely from the enchantment experienced by the generation of Mišo, Ivana, and my landlord, or the generation of Katarina's parents, when there was investment that structured such expectations. In Katarina's case, however, there is also a sense of transgenerational consequences of such enchantment. As these enchantments from the past failed to live up to the expectations of the new generations, it became the task of my interlocutors to modify their relationship with the same pipes that my interlocutors or their parents had built through their own work (and the work of their co-citizens).

The thermodynamics of the social contract and its transformation also suggest that my interlocutors' encounters with district heating, regarded in the past as an 'ordinary' provision for the 'ordinary' people (the workers), not only rendered moral reasoning and 'ordinary' ethics (Lambek, 2010) visible: they also indicated that the 'ordinary' provision became less accessible and more unequal, and showed a transformation from, to some extent, a stable social contract to a far more fluid scenario in which the relationship between the people and their states had to be made anew. Mišo's affective exclamation, 'I just want to have a choice!' is paradigmatic for all my interlocutors: the ways with which they attempted to make the social contract anew were precisely to insist on a more liberal doctrine of individual choice. Hence, paying for services guaranteed delineated responsibilities of the social contract: customers were paying the municipality for services, and such payment should have guaranteed the certain, stable, satisfactory, and constant delivery of heating. Therefore, unlike during socialism when socialist morality was inextricably linked to ideologies of labour, and

when the moral ('ordinary') citizen was considered to be the producer, my interlocutors constructed the moral citizen as a consumer. Their entitlements as consumers could further bring a sense of a more individual capacity for decision making, which was seen as a moral entitlement, and which could further offer them a sense of justice. In order to become consumers, whose rights would be guaranteed by the market, they initially needed to become citizens, whose rights would be guaranteed by the state (Simić, 2017, p. 25). Hence, my interlocutors invested their hopes in the framework of the state and not outside it (Jansen, 2015; Simić, 2017).

In both towns, these moral citizens expected a solid, constant service which, if and when it was paid for, was meant to provide value for money using fair calculations of the amount of heat delivered. By reiterating such logic of the individual rational choice, hopes for 'unbundling' seemed to be working to produce a feeling of liberation from being a captive client of the state while simultaneously, in practice, my interlocutors remained even more indebted to or dependent on state provision. Furthermore, they asked to be recognized as consumers and to be fully granted such rights by the state even though the neoliberal reforms of the heating system were not 'fully there'. In other words, the inflexible materialities stayed (mostly) the same and the state provision remained nearly similar but the individuals have changed. Their 'expert' knowledge of district heating and the process of individualization, as well as the emphasis on becoming moral citizens as consumers, all demonstrate a specific neoliberal governmentality in a situation in which infrastructure was still to some extent a 'bundle'. To be more precise, it demonstrates an emergence of what Nikolas Rose has referred to as 'advanced liberal' political subjectivity within the cultivation of self-management techniques (Fennell, 2011; Rose, 1999). Hence the neoliberal, 'free to govern' individuals have almost surpassed the full realization of neoliberal policies, impeded by the given inflexible material qualities of heating infrastructure, among others.

Finally, the thermodynamics of the social contract I have described here also suggest that the visibility of the infrastructure did not occur through its physical breakdown, as a large number of studies on infrastructures have suggested (Furlong, 2010; Graham and Thrift, 2007; Humphrey, 2003; Star, 1999), but through a reordering of relations between the states and their citizens where the conditions of physical continuities played a significant role. The vertical pipes with differing volumes, the radiators, the valves, the heat cost allocators, and even the material properties of heat, became prominently visible and played an important role in the transformation of the social contract. The old heating pipes not only constructed and reproduced ambivalent attachments to the states but they also contributed to an experience of broken promises. Day-to-day engagements with district heating in Bor and Rijeka therefore show how the infrastructure became visible through a shared sense of the broken promises of the social contract, including its promises of (and for) the future (modern and comfortable lives,

and welfare and care), and what the state ought to provide. Moreover, the infrastructure became significantly more visible through people's attempts to make the social contract anew through their desire for even more individual decision-making capacity and for becoming consumers. It is exactly through such practices, as well as through affects and the ambivalent relationship with post-socialist states, that the visibility of heating infrastructure and its provision became considerably mobilized in everyday life.

Conclusion

In this chapter, I illustrated how people in two different post-Yugoslav towns encountered district heating and how the socio-materiality of infrastructures and their endurance and visibility was achieved through a sense of a breakdown of the social contract, established through heating. The common material post-Yugoslav infrastructural legacy, which became the root of my interlocutors' frustrations precisely because it relied on the material continuity of infrastructures, proved to be a fruitful window to explore the weight of the common Yugoslav historical and material legacy, which had an impact on social transformations in these two towns. Although there were significant differences, such as policy decisions that affected infrastructural provisions, the cross-Yugoslav ethnography in this chapter illustrated specific commonalities, such as the residents' ambivalent relationships with their states, common cross-generational concerns, and how infrastructure became a space for moral ruminations and a place for (re)definition of post-Yugoslav citizenship. Moreover, it showed that the infrastructure was still a determinant in people's everyday lives (Humphrey, 2005), not as a part of their integral development like during socialism (Krstić, 1982), but of their deprivation, and a site for the production of inequalities where the 'ordinary' turned into a 'privilege'. Having these local concerns in mind, the infrastructures seem to be a potential site for broader political actions across the post-Yugoslav region, which remain to be explored in the future.

Acknowledgements

I thank Stef Jansen, Madeleine Reeves, Frances Pine, Penelope Harvey, Jasminka Beba Jovanović, Sanja Milutinović Bojanić, Sarah Czerny, the participants in the seminars at the Centre for Advanced Studies – Southeast Europe (University of Rijeka), at the Leibniz Institute for East and Southeast European Studies in Regensburg, at the 'Post-socialist infrastructures' workshop at Tallinn University, the editors of this volume, and the anonymous reviewers for their constructive comments. The Fellowships granted by the Centre for Advanced Studies – Southeast Europe (CAS SEE, University of Rijeka) and the Leibniz Institute for East and Southeast European Studies (IOS, Regensburg) Visiting Fellowship helped writing this chapter.

Notes

1 All interlocutors' names have been changed.
2 On many occasions, studies from the former Yugoslavia were not included in attempts to address post-socialism (see edited 'post-socialist' collections: e.g. Mandel and Humphrey 2002; Burawoy and Verdery, 1999).
3 The 'Mining and Smelter Basin Bor' (*Rudarsko topioničarski basen Bor*, 'RTB Bor'; hereafter referred to as 'the company' or 'RTB'.
4 Out of a total of 14,200 households in the whole town, the district heating covers 11,000 flats and around 1,400 houses.
5 Seventy per cent of the citizens of Rijeka had the heat cost allocators installed by 2016. In April 2017, a new study carried out by the Institute of Economics in Zagreb proved the economic ineffectiveness of the heat cost allocators (M.B.O., 2017).
6 In Croatia and Serbia, many people consider the local government as serving the state's interests, and see it as equivalent to the state. This is partly due to municipal institutions for utility services being run by head directors chosen from the political parties, which are in power both on the local and the state level.
7 Freedom to travel and consumerism in everyday life resembled the 'Western' nature of Yugoslav socialism (see also Duda, 2010).

References

Alexander, C. (2007) 'Rationality and contingency: rhetoric, practice and legitimation in Almaty, Kazakhstan', in Edwards, J., Wade, P. and Harvey, P. (eds) *Anthropology and Science: Epistemologies in Practice*, Oxford: Berg, 58–74.

Anand, N. (2017) *Hydraulic City: Water and the Infrastructures of Citizenship in Mumbai*, Durham and London: Duke University Press.

Archer, R. (2016) 'Paid for by the workers, occupied by the bureaucrats: housing inequalities in 1980s Belgrade', in Archer, R., Duda, I. and Stubbs, P. (eds) *Social Inequalities and Discontent in Yugoslav Socialism*, London and New York: Routledge, 58–77.

Burawoy, M. and Verdery, K. (eds) (1999) *Uncertain Transition: Ethnographies of Change in the Postsocialist World,* Lanham, Oxford: Rowman & Littlefield.

Collier, S. J. (2011) *Post-Soviet Social: Neoliberalism, Social Modernity*, *Biopolitics*, Princeton, New Jersey: Princeton University Press.

Djurašovic, A. (2016) *Ideology, Political Transitions and the City: The Case of Mostar, Bosnia and Herzegovina,* London and New York: Routledge.

Duda, I. (2010) *Pronađeno blagostanje: svakodnevni život i potrošačka kultura u Hrvatskoj 1970-ih i 1980-ih* (Wellbeing Found: Everyday Life and Consumer Culture in Croatia in the 1970s and 1980s), Zagreb: Srednja Europa.

Fennell, C. (2011) '" Project heat" and sensory politics in redeveloping Chicago public housing', *Ethnography,* 12:1, 40–64.

Furlong, K. (2010) 'Small technologies, big change: rethinking infrastructure through STS and geography', *Progress in Human Geography*, 35:4, 460–482.

Gilbert, A., Greenberg, J., Helms, E. and Jansen, S. (2008) 'Reconsidering postsocialism from the margins of Europe: hope, time and normalcy in post-Yugoslav societies', *Anthropology News,* 49:8, 10–11.

Graham, S. and Marvin, S. (2001) *Splintering Urbanism: Networked Infrastructures, Technological Mobilities and the Urban Condition*, London: Routledge.

Graham, S. and Thrift, N. (2007) 'Out of order: understanding repair and maintenance', *Theory, Culture & Society*, 24:1, 1–25.

Greenberg, J. (2011) 'On the road to normal: negotiating agency and state sovereignty in postsocialist Serbia', *American Anthropologist,* 113:1, 88–100.

Harvey, P. and Knox, H. (2012) 'The enchantments of infrastructure', *Mobilities,* 7:4, 521–536.

Humphrey, C. (2003) 'Rethinking infrastructure: cities and the great freeze of January 2001', in Schneider, J. and Susser I. (eds) *Wounded Cities: Destruction and Reconstruction in a Globalized World,* Oxford and New York: Berg Publishers, 91–107.

Humphrey, C. (2005) 'Ideology in infrastructure: architecture and Soviet imagination', *Journal of the Royal Anthropological Institute,* 11:1, 39–58.

Humphrey, C. (2007) 'New subjects and situated interdependence: after privatization in the city of Ulan-Ude', in Edwards, J., Wade, P. and Harvey, P. (eds) *Urban Life in Post-Soviet Asia*, Oxford: UCL Press, 175–207.

Johnson, C. (2013) *Infrastructures of Continuity and Change. A Material Culture Approach to Finance, Heating and Maintenance in Belgrade Homes*, School of Geography, Politics and Sociology. Thesis (PhD): Newcastle University.

Johnson, C. (2016) 'District heating as heterotopia: tracing the social contract through domestic energy infrastructure in Pimlico, London', *Economic Anthropology,* 3:1, 94–105.

Johnson, C. (2018) 'The moral economy of comfortable living: negotiating individualism and collectivism through housing in Belgrade', *Critique of Anthropology,* 38:2, 156–171.

Jansen, S. (2015) *Yearnings in the Meantime:'Normal Lives' and the State in a Sarajevo Apartment Complex*, Oxford, New York: Berghahn Books.

Krstić, B. (1982) *Čovjek i prostor. Pristup Prostornom uređenju.* (The man and the space. Approach towards urban planning.) Sarajevo: Svijetlost.

Lambek, M. (2010) *Ordinary Ethics: Anthropology, Language, and Action*, New York: Fordham University Press.

Le Normand, B. (2014) *Designing Tito's Capital: Urban Planning, Modernism, and Socialism in Belgrade*, University of Pittsburgh Press.

Mandel, R. E. and Humphrey, C. (eds) (2002) *Markets and Moralities: Ethnographies of Postsocialism*, Oxford: Berg.

M.B.O. (2017) 'Konačan zaključak: Razdjelnici topline nisu isplativi!' (Final conclusion: the heat cost allocators are economically ineffective), *Dnevnik.hr*, Available at: https://dnevnik.hr/vijesti/hrvatska/nakon-analize-sest-sezona-zakljuceno-razdjelnici-topline-nisu-isplativi---474432.html (accessed 30 November 2017)

Nader, L. (2011) 'Ethnography as theory', *HAU: Journal of Ethnographic Theory*, 1:1, 211–219.

Rose N. (1999) *Powers of Freedom: Reframing Political Thought,* Cambridge: Cambridge University Press.

Simić, M. (2017) 'Anthropological research of the state: a view on postsocialism', Glasnik Etnografskog instituta, 65:1, 15–29.

Sneath, D. (2009) 'Reading the signs by Lenin's light: development, divination and metonymic fields in Mongolia', *Ethnos* 74:1, 72–90.

Star, S. L. (1999) 'The ethnography of infrastructure', *American Behavioral Scientist*, 43:3, 377–391.

4 Ideologies and informality in urban infrastructure

The case of housing in Soviet and post-Soviet Baku

Sascha Roth

Introduction

Since the early 2000s, the Azerbaijani state has made enormous efforts to turn its capital Baku into a showcase of modernization in urban infrastructure, housing and architecture. The authoritarian government of the oil-rich country has forged large infrastructural projects, such as renovating the old city, the seaside boulevard, parks and metro stations, as well as constructing luxurious hotels and elite housing estates in the context of Baku hosting international mega events like the 'Eurovision Song Contest' (2012), the 'European Olympic Games' (2015) or the 'Formula One Grand Prix of Europe' (2016). Preparations for these events were accompanied by large-scale demolition of pre-Soviet neighbourhoods, which is often legitimized by their deficient infrastructure. Many such neighbourhoods were replaced by new infrastructural model sites such as the Flame Towers[1] or park areas in the central districts. In this context, infrastructure constitutes a key concept in public discourse as being emphasized by Azerbaijan's President Ilham Aliyev:

> Over the recent years, Azerbaijan has managed to assert itself globally as a dynamic, modern and strong country. […] The city infrastructure is being modernized. Baku is one of the most beautiful cities in the world today. It is noted for its beauty, historical appearance and modernity. Additional measures will be taken to develop the urban infrastructure. We will continue to develop Baku to make it even more beautiful.
>
> (President of the Republic of Azerbaijan – Ilham Aliyev, 2013)

Such glorifying promotion of a simultaneously past- and future-oriented nation is primarily addressed to its own citizens. The local government is applying a policy of concealment of the increasing socio-spatial inequality of urban development and those spaces that do not match with the state's envisaged promotion of the nation. These tensions constitute the wider framework for this chapter, which highlights some contrasts between the official representations of infrastructural development and the daily struggles of those citizens who live backstage of the public scenery.

Generally, I approach infrastructure as a fluid and dynamic concept characterized by its 'ubiquity in public and scholarly discourse' (Carse, 2017, p. 34). However, the (post)socialist urban infrastructure in Azerbaijan, its official conceptualization and shifting notions in the everyday lives of citizens have remained scarcely represented in research. One of my aims, therefore, is to contribute to the comparative knowledge 'about how people produce, live with, contest, and are subjugated to or facilitated by infrastructure' (Graham and McFarlane, 2015, p. 2).

My material draws predominantly on neighbourhoods in Baku's *Yasamal* district (*October* district in Soviet times), which still contains a relatively high amount of "traditional" low-storey courtyard houses (Azerbaijani, *həyət evləri*) built in pre-socialist times and having been mostly inhabited by ethnic Azeris (Figure 4.1). In official discourse, such neighbourhoods have always constituted a material and social contrast to the once-Soviet 'cosmopolitan city' (Grant, 2010). My focus on the *Yasamal* district is of special interest because of its central location, its high number of pre-socialist neighbourhoods that occupy a significant amount of valuable urban space for potential new constructions, and for its ranking among the most densely populated districts in Baku. Most importantly, historical and archival documents, as well as personal accounts of local inhabitants on the Soviet[2] past, point to peculiar levels of informality in the domain of housing applied by citizens and local state representatives (e.g. registration practices, the manipulation of waiting lists, illegal construction of dwellings, rooms, or the diversion of construction materials). In the following, I aim to relate the official politics of infrastructural representation in Baku with those infrastructural dynamics in 'the urban backstage' (Amin, 2014, p. 139). My ethnographic data are based on qualitative methods. I applied participant observation, which meant spending as much time as possible with informants, neighbours, friends and acquaintances from various socio-economic backgrounds in order to learn about their biographies, everyday life, challenges and perceptions of present and past urban developments. I conducted 87 structured and semi-structured interviews with architects, lawyers, non-governmental organization workers, real estate agents, scholars, shopkeepers, current and former state representatives, as well as with residents from the neighbourhoods under focus. Archival documents from the Baku branch of the 'State Archive of the Azerbaijan Republic' (SAARBB) on characteristics of Soviet housing, allocation practices, obstacles, informalities, complaint letters and newspaper articles provided historical sources on housing administrations, bureaucracies and the relations between citizens and state representatives.

All too often it seems that housing and (housing) infrastructure mark two complementary aspects, with the latter term referring to the supply of the former with electricity, water, gas, heating, etc. Instead, I advocate a more inclusive notion, which approaches housing *as* infrastructure being embedded in distinct social, political and historical contexts. For instance, the recent housing crisis in the USA triggered public debates on the necessity

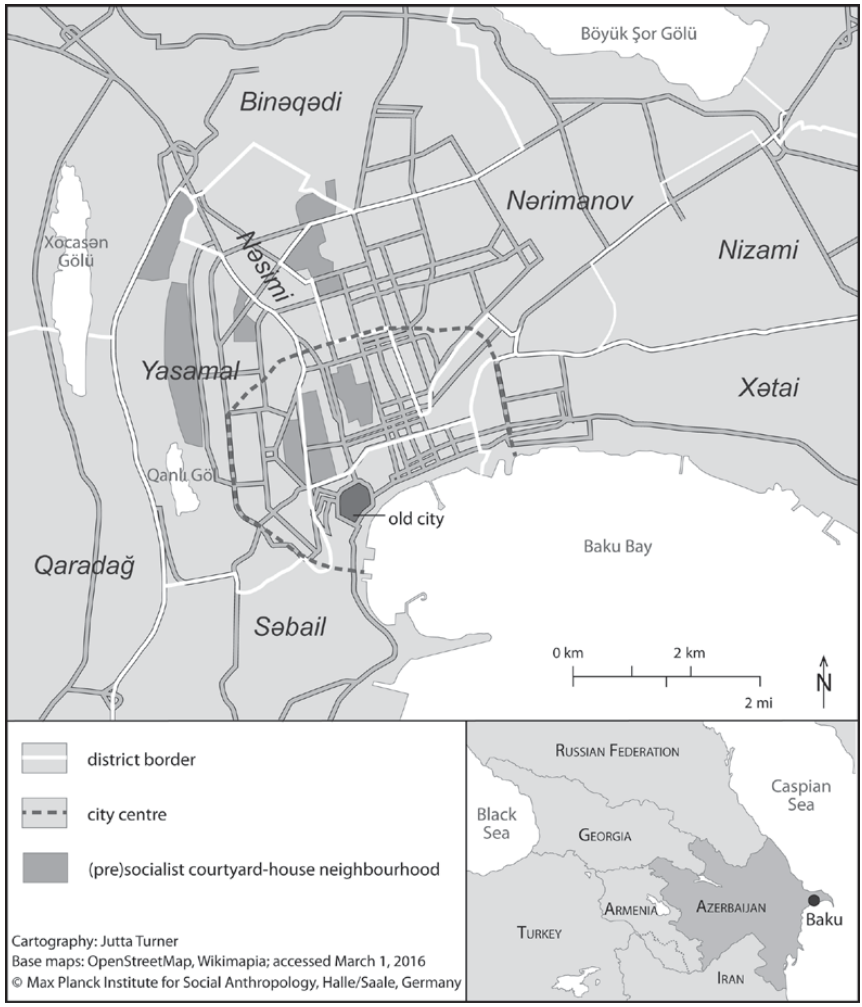

Figure 4.1 Map of Baku depicting the location of neighbourhoods in *Yasamal* and adjacent districts, consisting predominantly of one- and two-storey courtyard houses which have been constructed before and during the socialist era. Most buildings were being built and extended informally by the dwellers on private initiatives

Source: Map by Jutta Turner using openstreetmap.org

of classifying (affordable) housing as infrastructure. In order to increase public and private investment for housing and coming to grips with existing housing shortage, it 'should rank among America's priorities around improved roads, bridges, tunnels, railways, shipping channels, pipelines, power grids, and airports' (McManus, 2016; see also Kushner, 2010). In

post-socialist contexts, however, where the provision of urban housing alongside other public and social infrastructures has previously been under the responsibility of a socialist state, one must apply an integrated approach to housing *as* infrastructure. And although most services of the socialist welfare system have disappeared in the context of neoliberalism, the experiences and nostalgic memories of the past still provide a template for many citizens for perceiving and evaluating present livelihoods and state–citizen relations on the basis of available infrastructure – predominantly housing.

While housing in the Soviet context constituted a legal right for citizens,[3] its socio-cultural importance has received little attention thus far. Housing constitutes an 'intimate infrastructure', if not the most intimate one, because it provides *the* material, social and symbolic base for family life, marriage, social reproduction and home-making. In Azerbaijan, as in other Caucasian and Central Asian societies with a patrilineal bias, the ownership of a house or an apartment for young males is normatively regarded as a prerequisite for marriage and founding a family (although in practice young married couples often continue living with parents until they can afford a separate home). In rural Azerbaijan, it has always been the bridegroom's and his family's duty to provide housing and the necessary infrastructure after marriage. This bias hardly weakened during socialism, when it was not ownership but gaining permanent and inheritable usage rights of urban dwellings. Such moral relevance of the housing question in the domain of family life and kin support is expressed by the efforts of families and kin groups to increase the resource of housing (Roth, 2016). With regard to the peculiarities of the Soviet housing regime, it must be noted that, although having been a legal right for Soviet citizens, in practice, housing within the socialist system of 'bureaucratic allocation' (Verdery, 1991) was always perceived and represented as being a scarce resource. As such, it constituted a collective resource of kin groups that was being hoarded for the long term (Morton, 1980, p. 242).[4] Informal practices and the relevance of social networks were key components in the socialist 'economy of favours' (Ledeneva, 1998). In the case of Azerbaijan, many recent works well describe the prevalence, local characteristics and embeddedness of informality in the social, economic, political and everyday life of citizens (Aliyev, 2017; Safiyev, 2015; Sayfutdinova, 2015). But especially in the little discussed sphere of housing, informal practices by citizens and bureaucrats alike have played a major role in shaping both the Soviet and post-Soviet housing regime.

The case of Baku will point to wider dynamics in other former Soviet republics regarding the material and immaterial legacies of the socialist infrastructure regime, and how they accompany and relate to current 'neoliberal' developments. Hence, I follow authors who emphasize the legacies of Soviet politics, ideologies and practices on contemporary urban transformations in post-Soviet contexts, while those very same states simultaneously seek to distance themselves from their socialist past (Grant, 2014). I shall exemplify how subtle continuities of socialist politics and people's

past experiences with infrastructure still have a significant impact on people's everyday lives. I further argue that, despite the resilience of Soviet approaches towards infrastructure as a representation of progress and modernization, it is the very meaning and content of progress and modernity themselves that have changed, mostly through abandoning the aspects of social welfare: whereas in the Soviet narrative the socialist utopia promised a future without shortages in housing but rather with benefits for its citizens, today's emphasis in public discourse lies in the beauty, prosperity and luxury of Baku as the 'pearl of the Caspian'. Especially after the end of socialism, housing and other infrastructures transformed from a former legal right of Soviet citizens provided by the state into one of the most important venues for accelerated social exclusion and spatial inequalities. This argument resembles what the geographers Stephen Graham and Simon Marvin have called 'splintering urbanism', with which they argue that 'a parallel set of processes are under way within which infrastructure networks are being "unbundled" in ways that help sustain the fragmentation of the social and material fabric of cities' (Graham and Marvin, 2001, p. 33). According to the authors, formerly 'bundled' and integrated notions of infrastructure as connecting and unifying urban places and inhabitants become 'unbundled' and segmented, thus contributing to the process of 'splintering urbanism'. However, while the authors did not include housing in their notion of infrastructure, I suggest that, especially in post-socialist contexts, one must conceptualize housing *as* infrastructure because long-term legal access to cities and urban infrastructures in Soviet times was granted on the basis of a residence permit and, thus, housing. Such past experiences still matter a great deal in people's perception of and interaction with the state.

Infrastructural ideologies: Soviet legacies in the present context

The meaning of infrastructure goes far beyond its technical functioning because it conveys powerful images of civilizational progress. Speaking about the 'politics and poetics of infrastructure', anthropologist Brian Larkin argues for an analysis of infrastructures 'as concrete semiotic and aesthetic vehicles oriented to addressees. They emerge out of and store within them forms of desire and fantasy and can take on fetish-like aspects that sometimes can be wholly autonomous from their technical function' (Larkin, 2013, p. 329). Post-war notions of infrastructure became crucial tools for 'world-making' because the term gained new meanings through global processes of supra-national military coordination and economic development (Carse, 2017, p. 31). Such notions of infrastructure became especially salient in the context of the Cold War during which, both in the East and West, infrastructure became *the* arena of world-system competition.

Despite the conventional definition of what infrastructure *is*, the *Bol'shaia Sovetskaia Entsiklopediia* (*BSE*; 1969–1978) devoted most space to an ideological critique of the political economy of infrastructure in the capitalist

West, where 'infrastructure became the object of inter-imperialist competition' and private capital owns enterprises and generates surplus value while the state is entrusted with the financing and developing of infrastructure that in turn increases the profit of the former. Such relations are taken as evidence of 'the aggressive nature of imperialism'. Whereas social problems with infrastructure are said to characterize merely the capitalist mode of production, under socialism the only remnants are technical and economic challenges being solved by scientific planning. The entry closes with an optimistic stance towards the Ninth Five-Year Plan, which envisaged accelerated development of infrastructure 'in order to meet the needs of the national economy and to increase the welfare of the working people'.

Hence, infrastructure also constituted an important internal narrative as being the material base for the forging of Soviet society and economy. Here, it was especially architecture, which, in the Soviet imagination, became the key arena of ideology (Humphrey, 2005; see also Buchli, 2007). Although such relations between infrastructure, architecture and ideology are far from being restricted to the Soviet Union, 'the Soviet example requires us to think about […] the particular situation where there is a definite pronounced intention of the state to make use of the materiality of dwelling to produce new social forms and moral values' (Humphrey, 2005, pp. 39–40). Beyond the materiality of dwelling, it was also infrastructural architecture at large that contributed to crafting the image of Soviet civilization and a socialist utopia, for example through factories and industrial cities, metro stations, educational institutions, ministries or television towers (see also Collier, 2011; Kotkin, 1995; Lebow, 2013; Lodder, 2013). However, while the efficiency of material output in Soviet factories was limited, a similar or even more important characteristic in social and political terms was the 'overproduction of symbolic meanings' (Todorov, 1995, p. 10; see also Larkin, 2013, p. 335). The current processes of Baku's urban transformation and its above illustrated role as material evidence of national progress push us to be more aware of the impact of Soviet techniques and rhetoric on present infrastructural dynamics across the former Soviet Union. Allow me to exemplify some specific continuities of Soviet-style approaches towards infrastructural representation of urban development from my fieldwork: in today's Baku, fences around construction sites and public banners depict digitally embellished, futurist renderings of areas under (re)construction. Such examples of 'paper architecture' (Grant, 2014) are characteristic of Baku in the present day, but were already excessively used by the Soviet state to craft people's imaginations of the future. The term refers to 'chronicles of the built and unbuilt that circulate in ways separate from actually existing structures' (ibid., p. 507). It visualizes an idealized future that constantly lags behind its own promises. In 1972, the newspaper *Baku* printed a picture of the hotel '*New Inturist*' (later Hotel Azerbaijan) under construction. The caption advertised the project as follows: 'No, not only in the *mikroraions*, not only there, where new housing estates arise, are high-rises

growing. But also in the very centre of our city. By changing the appearance of our streets, they give them a modern face' (*Baku*, 1972, p. 3). Another newspaper article from 1986 praises Baku's new master development plan until the year 2005. Entitled 'A look into the future', it shows drawings and miniatures of planned model sites, high-rises and residential estates. The visual impressions are complemented by phrases such as 'a maximum of comfort for Bakuvians', or 'fast, convenient and comfortable transportation'. Furthermore, the whole city infrastructure is claimed to be further developed with 'water, heating, light, canalization', and, owing to '243,000 convenient apartments' being built, by the year 2000 every family will finally have obtained its own separate apartment (*Baku*, 1986). Here, paper architecture of planned developments acts as a mediator for what others have called 'the enchantments of infrastructure' (Harvey and Knox, 2012) – namely the capacity of infrastructure to generate 'powerful affects of social promise' (ibid., p. 525).

Hence, housing in the Soviet context constituted an essential part of the 'infrastructural whole'. Its public representation was actively promoted by constant references to future developments and utopian visions of society embedded in socialist ideology. The Soviet techniques of promoting modernity by applying infrastructural ideologies still have a great impact on contemporary politics of representation, thus marking a continuity that is important for understanding present urban dynamics in the region. Apart from such Soviet legacy in form, we can observe changes in the content of ideology and public meaning of 'modernity' and the future. As became clear in the *BSE* entry, socialist approaches to infrastructure were promoted as being fundamentally distinct from capitalist ones, mainly by the absence of public goods serving the interests of private enterprise, as well as by setting emphasis on its social motivation to provide equal access to infrastructure for urban inhabitants. Today, on the contrary, infrastructural developments are attached to local images of modernity that aim to construct a closeness to Western countries by a simultaneous distancing from the Soviet past. This marks a shift from inclusive to exclusive notions of infrastructure, contributing to further socio-economic fragmentation and splintering of the urban fabric.

However, tensions between ideologically promoted official narratives and the everyday challenges experienced by many citizens were, to shifting degrees, also characteristic of the socialist period. Such ambiguities found expression in a widespread set of informal practices by families and kin groups in the housing sector, which will be discussed in the next section.

Experiencing infrastructure: housing, unequal infrastructure and informality

In different urban regions, most dwellers inhabit differing types of housing that are evaluated and hierarchized according to their quality, sanitary infrastructure and access to infrastructural facilities. Housing to a large degree

expressed one's socio-economic standing in Soviet society because it became strongly linked to certain occupational groups, organizations and enterprises, and represented their unequal access to urban infrastructure (Andrusz, 1984; Szelényi, 1983). This observation has led some sociologists to apply the concept of 'housing classes' to the analysis and description of socialist housing systems in order to highlight the link between housing types and social stratification (Hegedüs and Tosics, 1983). However, this static model suggests fixed social boundaries *between* professions without sufficiently considering hierarchical differences *within* them. More important for the present argument is that the concept neglects the more dynamic aspects of cooperation and social support for housing, especially the practice of hoarding by which extended families (whose individual members could be of different class background and occupation), to varying degrees, established kin or house networks extending across the city. Successful hoarding practices among kin groups, predominantly among brothers and their families, allowed for flexible use of living space by means of mutual support. Moral expectations towards kin support with housing have continued after socialism (also leading to internal family conflicts if expectations are not met). The following example from the 1980s and 1990s is exemplary for similar mechanisms in Soviet times: Tofiq, his elder brother and parents were living in a two-room *Khrushchevka* apartment in Baku's fourth *mikroraion* during the 1980s. In 1994, Tofiq's father, by then employed in a higher state position and later a professor of economy, was allocated an apartment in the city centre in a residential building constructed by the government for high state officials. There the family lived together with Tofiq's uncle (Azerbaijani, *əmi*, i.e. father's brother) who, because the family was originally from the countryside, was in need of accommodation in the capital. In the early 2000s, Tofiq's uncle became a successful businessman, earning good money and employing many relatives from his extended family. He bought a plot of land in a prestigious Baku neighbourhood and built a three-storey house, which he committed to Tofiq's father and his family. After the wedding of Tofiq's elder brother in 2014, he and his wife moved into the downtown apartment where he had once lived together with the uncle. This example suggests linking the static concept of housing classes with the more dynamic notion of housing mobility. Compared with Soviet times, when the kind of officially allocated housing was primarily connected to professional status and workplace, this link between housing quality and occupational groups has weakened. But what has not weakened are people's classifications of housing types and their different quality.

Regarding housing inequalities in the early Soviet period, scholars have pointed towards the ranking of urban dwellings 'from the unheated wooden shack, through the barracks, the hostel, the shared flat in an old house, to the separate flat in an apartment block' (Humphrey, 2005, p. 45). And still today, a further elaborate hierarchization of housing types among my interlocutors continues to shape the symbolic but also material value of different dwellings,

because both dimensions are reflected in Baku's contemporary housing market and the monetary value of different apartment types.[5]

Today's heritage of Soviet mass housing consists of a variety of types colloquially known as *Stalinka*, *Khrushchevka*, *Leningradskii-*, *Minskii-*, *Kievskii proekt* and others.[6] For instance, the solid stone walls, high ceilings, convenient layout and usually central location in contemporary Baku similarly contribute to the high standing of the *Stalinkas*, as does the fact that such apartments were typically allocated to the political and intellectual elite of Soviet society. *Khrushchevkas*, in contrast, occupy the negative extreme in the housing hierarchy – an association that was quite different during the Khrushchev era itself, when such new housing projects provided many families with a separate apartment for the first time in their family history. Today, they are associated with low ceilings, small kitchens, small bathrooms, an inconvenient passage room and thin walls, all of which could be rapidly assembled from industrially produced panels of concrete.

In addition to their types, the contemporary market value of houses has also become dependent on the condition and quality of renovation (*remont*), which are advertised by a whole set of terms indicating a clear hierarchy in comfort and infrastructural quality, ranging from *pod maiak* (only carcass/shell structure), *khoroshii remont* and *superremont* to *otlichnyi remont* and *evroremont*.[7] If the apartment is located in a *novostroika* (new building), sometimes it says *kupcha var!* – meaning 'with ownership documents' and hence indicating that the object is registered and has obtained proper documentation. This is an important fact because many new high-rises lack such documentation for several reasons (see below). Finally, I want to emphasize that the older, badly maintained courtyard houses like those in the *Yasamal* district enjoy the poorest reputation among Baku's population because of their dilapidated physical condition, the small size of the dwellings and their chaotic appearance (Figure 4.2).[8]

Hence, such neighbourhoods provide plenty of evidence for kin groups' informal strategies to obtain a separate apartment or otherwise to increase their housing resources. In Soviet times, the *Yasamal* district was characterized by a high level of housing-related informal practices by citizens and municipal representatives alike, with the latter sometimes being inhabitants and part of the neighbourhood community themselves. Irregularities included the formation of waiting lists and the allocation of housing, false registrations, squatting, informal construction or preferential treatment by kin members employed in the local state's housing administration (Ivanov and Sukhov, 1971). Further challenges to the district's housing system were linked to the relatively high level of privately owned dwellings in poor condition, which often lacked state support for maintenance and thus encouraged practices of informally obtaining construction materials or jumping the waiting lists for a separate apartment.

An internal enquiry by the Executive Power into the district's infrastructural challenges from 1977 stated that there were more than 3,000 privately

Figure 4.2 First floor in a small courtyard in the *Yasamal* district with several partitioned rooms. The dwelling has been continuously extended and transformed and is inhabited by members of one extended family

Source: Sascha Roth

owned single- and two-storey houses from 'pre-revolutionary'[9] times with deficient infrastructure, which housed 89,444 inhabitants (SAARBB, 1977). This accounted for about 30 inhabitants per house and points to the distorted character of official statistics compared with actual living conditions. Because several rooms and dwellings within the yard were predominantly inhabited by patrilineal extended families, this necessarily contributed to higher numbers. A further reason, though, was the widespread strategy of registering relatives who, de facto, were not living in the household (see also Morton, 1980, p. 242). Such phantom registrations were made in order to gain the residence permit (*propiska*), which was necessary for obtaining access to the district's housing lists, social infrastructure and other services (for details on the Soviet *propiska* regime, see also Höjdestrand, 2009, pp. 20–45; Matthews, 1993; Morton, 1980, pp. 237–239). Soviet citizens frequently made informal registrations that were facilitated by the 'grey area' of Soviet housing law. The following quote by a former university professor exemplifies this general practice applied by many citizens across the Soviet Union:

> After the birth of my two daughters, five people were registered in our dwelling. When my elder daughter married and moved to her husband's,

> I did not sign her off in order to increase my chances for receiving a bigger apartment. At the *raiispolkom*[10] I explained that in our family we are five people and that the current three-room apartment is too small. I applied for a bigger one – that's how we got it. This was common practice everywhere; Russian families acted like this as did the Azerbaijanis – everyone did it.
>
> (Interview on 11 December 2013)

In the *Yasamal* district, the inflationary use of citizens' informal *propiska* was well-known and often tolerated among housing officials. In one case, a family of 19 people (main tenant, father, mother, two brothers, a sister, two daughters-in-law, ten nephews and a son-in-law) were officially living in a single room of 10 square metres (SAARBB, 1978). In practice, though, it was apparent that these were phantom numbers. Another issue was illegal construction and acquisition of construction materials usually because of changes in household size. As one inhabitant explains:

> When it was time for one of your sons to marry, you simply built another room within the courtyard where he could live with his wife. This continued in the next generation. And when there was no more space to add supplementary rooms this way, people just continued building a second floor on top. It happened only occasionally that there were problems with the housing authorities. Most issues could be solved with bribes to make authorities turn a blind eye to it.
>
> (Interview on 28 August 2014)

In January 1971, the *Bakgorispolkom* started an initiative on the 'prevention of unauthorized construction […] of living rooms, kitchens, shower rooms, garages, etc.' – activities that 'intensify with every year' and because of which the district Soviets were instructed to investigate the issue. In 1973 alone, the local administration demolished 80 unauthorized houses, 39 garages and 80 glazed balconies. Furthermore, ten drivers who were illegally transporting construction material were arrested, and so on (SAARBB, 1976).

In today's Baku, we encounter similar obstacles in terms of proper documentation, informality and infrastructural provision (Valiyev, 2013). For instance, despite their illegal status, most informal dwellings in the city's suburban settlements are well connected to transport, water or electricity. State and private companies rarely check the legal status of properties carefully, instead delivering the requested infrastructure, usually involving bribes. Things are further complicated because 'In many cases, construction has some document issued by municipalities for a fee (very often bribes). However, subsequent elected municipality members very often do not recognize these documents as legal' (Valiyev, 2014, p. S49). As a lawyer dealing with property issues explained to me, there are even cases in which ownership documents have become subject to fraud by organized circles

of criminal businessmen, often real estate agents with close ties to district authorities. The lawyer described one case where an owner of an empty land plot in the urban periphery living abroad discovered a house being built and inhabited on that very plot. The buyer and alternative owner had himself 'legally' obtained the land from a real estate agency with all 'proper' documentation, a fact that created a complicated legal conflict about the property in question.

Other examples of informality in housing concern the ownership of apartments in newly built mass housing estates. Here, informal practices are often linked to the apartments' connection to gas infrastructure and how it relates to the legal status of the property: only after a building's gasification can ownership documents be applied for. For many citizens, it is desirable to buy an apartment without *kupcha* (see earlier), usually classified as *pod maiak* – consisting only of the building's carcass and mains connections for water, gas and electricity – because they can save up to one third of the normal purchasing price. On the other hand, this involves a high level of risk because the completion of the building is often a matter of uncertainty. Buyers, who often have purchased the apartment before finalization of the construction process, will then carry out all the necessary work on the interior at their own risk. Many people then live in fully furnished and equipped apartments (or rent them out to others) but provide themselves with gas from a bottle. At the same time, the building's entry, staircases and empty apartments demonstrate its unfinished character. The gasification of a *novostroika* is the last step in the construction process, upon which the State Agency for Control over the Safety of Construction within the Ministry of Emergency Situations determines that the construction complies with safety standards and may be inhabited. According to one of my interviewees, buildings only become gasified if at least 60 per cent of the apartments are inhabited. And getting the Ministry to approve the building's safety standards often requires the payment of bribes.

Finally, it is worth returning to the still widespread informal sphere of residential registrations. Whereas people in Soviet times usually registered more people than actually inhabiting a dwelling, for reasons illustrated earlier, today the opposite seems to be the case. Many of my interlocutors are still registered at their previous address despite inhabiting another dwelling for more than a decade now. This is partly explained by the fact that people can save taxes and other expenditures for infrastructural provision that are calculated on the basis of the number of inhabitants in a dwelling. Hence, in contrast to Soviet times, the fewer people registered today, the more benefits there are for the dwellers.

Conclusion

My aim in this chapter was to examine the tensions between state politics of representation by means of infrastructure and ideology, and some of the challenges and informal strategies that people in the urban backstage have

been experiencing and applying in Soviet and post-Soviet Baku. Contrary to the majority of existing works on infrastructure, I advocate an approach that conceptualizes housing in post-socialist contexts *as* infrastructure and places it at the centre of enquiry. Additionally, from the viewpoint of citizens, I consider housing an intimate infrastructure because it shapes a variety of social processes in the private lives and moral expectations of Azerbaijani citizens.

A great deal of this chapter discussed the impact of Soviet legacies on contemporary ideologies of representation and dynamics in housing. Whereas other authors have pointed to socialist legacies in the present urban boosterism (Koch and Valiyev, 2015), administrative structures and the problem of their diffuse responsibilities (Valiyev, 2013, p. 636), historical and ethnographic data on housing strategies from the viewpoint of citizens have been scarce. I have shown that, although many of the ideological underpinnings, official promotion of modernization and infrastructural developments in current Azerbaijan follow logics of Soviet governance, their very content demonstrate a significant shift owing to a different image of modernity for the independent Azerbaijani nation. The 'paper architecture' of the past carried the meaning of modernization and infrastructure as a collective good for Bakuvians. In the paper architecture of the present, both spheres represent a modernity based on national pride, prosperity and autonomy by forging exclusive mega projects and housing estates that are increasingly disconnected from urban life as it unfolds behind the façades of privileged model sites. And we might add that, contrary to Soviet mass housing that was built for masses of people, the emphasis of 'new mass housing' being built in the city within the past decade refers to masses of buildings but not to masses of residents (which becomes evident when observing the high proportion of uninhabited residential buildings in Baku).

The second section of this chapter highlighted specific continuities in the way families engaged in the informal sector in order to improve their housing situation. On a structural level, I have critically discussed the concept of housing classes in order to describe continuities in socio-spatial inequalities, while at the same time emphasizing a more dynamic understanding of the concept by describing the practice of hoarding – kin groups' collective engagement in increasing and utilizing their collective dwelling stock. Still, it is largely the type of housing obtained in Soviet times, its location, and differences in infrastructural quality that strongly influence citizens' contemporary socio-economic standing as former housing classes are translated into dwellings' monetary value in the era of market economy. Furthermore, although being embedded in a new political and economic context, housing after privatization maintained its crucial relevance as it became 'the chief source of household wealth' (Zavisca, 2012, p. 1) for the majority of urban residents. In light of the uncertain labour market and low salaries, housing constitutes the most important element of financial security for the future, and the major form of capital for new home-owners with which to profitably engage in the housing market. In contrast, most owners of badly

maintained (pre)socialist dwellings, often being built or extended informally and thus lacking proper documentation, find themselves in a disadvantaged situation. Furthermore, because of corrupt officials and the merging of political and economic power and interest with regard to urban development, many home-owners receive far too little compensation for their properties. Finally, the everyday relevance of informality in the Soviet housing framework has remained a strong factor in shaping contemporary dynamics of housing development in Baku. But whereas mechanisms such as *blat* and kin support remain relevant in the present, recent developments increased the role of (monetary) corruption in the public sector (e.g. education, police, administrations). Today it is money that has become a scarce resource for many, while in Soviet times it was the scarcity of housing, among other consumer goods, that led people to apply informal practices to influence and compensate for state mechanisms of resource allocation.

In general, I have aimed to show some repercussions of the Soviet housing regime on today's processes of social and economic reconfigurations in the everyday lives of citizens. This is not to say that the informal practices or tensions between ideological representation and everyday life described in this chapter are rooted in socialism. But it is the historical experience of socialist housing at large, its ideological and infrastructural emphasis as well as the peculiarities in housing policies and administration that still have great influence in the post-socialist era. The *Yasamal* neighbourhoods discussed here well illustrate such continuities within the contemporary urban context. In early summer 2014, roughly one year before Baku was to host the first 'European Olympic Games', the city's Executive Power began the long-prepared demolition of one such neighbourhood called *Sovetski*, affecting an area of 50 ha that was home to 50,000–60,000 people (Alibayli and Mahmudbeyli, 2014). Many of the inhabitants I talked to expressed their nostalgic memory of Soviet times when dwellers were compensated with new apartments. At present, however, they have received financial compensation of roughly one third the usual square metre value in this very central area – not enough even to obtain a dwelling in the outskirts for most. Hence, most inhabitants are experiencing a process of unbundling infrastructure that characterizes the global trend of splintering urbanism, and which many Bakuvians interpret in relation to nostalgic memories of the Soviet welfare state.

Acknowledgements

This chapter is based on 1-year's fieldwork conducted in Baku in 2013–2014 for my PhD thesis on the dynamics between housing, the family and the state in Soviet and independent Baku (Roth, 2016). I'd like to thank the Max Planck Institute for Social Anthropology in Halle/Saale, the International Max Planck Research School on the Anthropology, Archaeology and History of Eurasia, and the Graduate School Society and Culture in Motion

for supporting this project. Furthermore, I am grateful to the editors and authors of this volume as well as to the two anonymous reviewers for their detailed comments on earlier drafts of this chapter.

Notes

1 The Flame Towers are three skyscrapers containing exclusive apartments, a 5-star hotel and office blocks. They have become the modern brand of the city, dominating the central skyline, and shall represent Azerbaijan architecturally as the historical 'Land of Fire'.
2 My use of the terms '(post)socialist' and '(post)Soviet' in this chapter require some brief explanation. Both versions refer to a geographical space, a historical era, a socio-political regime or an ideology. Although I use both forms, for the following reasons, I apply (post)Soviet more frequently. First, the Caucasus had long been a part of Tsarist Russia and later of the Soviet Union. Hence, in the present context, it is more accurate to speak of (post)Soviet. Socialism in Central Eastern Europe, for instance, was different from Soviet socialism, with the latter having been established much earlier and also emerging from a distinctively different empire. Second, the terms 'socialist' or 'socialism' summarize political ideologies, visions and imaginations of society based on Marxist principles, the practical implementations and outcomes of which brought forth different realities of socialism.
3 The preface of the Soviet Housing Codex stated that 'Soviet housing legislation is designed to promote the right of citizens to housing, effective use and protection of the housing stock'. According to Article 44 of the Soviet Constitution from 1977, 'Citizens of the USSR have the right to housing' that is 'ensured by the development and upkeep of state and socially-owned housing; by assistance for co-operative and individual house building [and] by fair distribution, under public control […]'.
4 The anthropologist Katherine Verdery (1996, p. 21) describes the widespread practice of 'hoarding' productive resources like budgets and materials in socialist economies. Such strategies allowed firms to save resources for the next production cycle, or for use as a means of exchange for needed goods with others. Although she talks about 'hoarding' on a different level, the same logic applies to families and their housing strategies. For families, housing as a collective resource of kin groups was hoarded for the next generation.
5 Housing journals, newspaper articles and advertisements, as well as interviews with and participant observation among local real estate agents, provided an important source for understanding local preferences and ascriptions to different housing types.
6 Those terms are still widely used across the former Soviet republics and refer to certain types of residential buildings having been constructed during the period of Stalin (*Stalinka*) or Khrushchev (*Khrushchevka*). Other, mostly later, types are named after the cities in which they were first projected, such as Leningrad, Minsk or Kiev.
7 The Russian term '*maiak*' literally means 'lighthouse'. Among construction workers it denotes 'plaster profiles' – that is, an accessory used for achieving an even plastering of interior walls. The types of *remont* that follow reflect

increasing levels of comfort, ranging from 'good', 'super' to 'excellent' renovation. Finally, '*evroremont*' suggests European materials and the finest quality standards.

8 The same term for courtyard house (*həyət evi*) is applied to the more spacious single or multi-family houses by rural migrants and middle-class families in the suburban peripheries as well as to the traditional rural housing architecture.

9 'Pre-revolutionary' is the expression used in the archival documents I have worked with. They refer to the time prior to 1920 when the Soviets took power over Azerbaijan.

10 The *raiispolkom* (*raionnyi ispolnitel'nyi komitet*) describes each district's executive power. Each of those is subordinated to the *Bakgorispolkom* (*Bakinskii gorodskoi ispolnitel'nyi komitet*) – the central executive power of Baku city.

References

Alibayli, V. and Mahmudbeyli, F. (2014) 'There goes the neighborhood: in construction-crazy Baku, another old district faces the wrecking ball', *Transitions Online: Regional Intelligence*. Available at: www.tol.org/client/article/24329-azerbaijan-baku-poverty-development-sovetski.html (accessed 30 November 2014)

Aliyev, H. (2017) 'Informal institutions in Azerbaijan: exploring the intricacies of tapsh', *Europe-Asia Studies*, 69:4, 594–613.

Amin, A. (2014) 'Lively infrastructure', *Theory, Culture & Society*, 31:7/8, 137–161.

Andrusz, G. (1984) *Housing and Urban Development in the USSR*, Houndmills: Macmillan.

Baku (1972) Untitled, *Baku*, 1 May, p. 3.

Baku (1986) Baku 2005: Vzglyad v budushchee, *Baku*, 28 November, pp. 2–3.

Bol'shaia Sovetskaia Entsiklopediia (1969–1978). Available at: https ://dic.academic.ru/dic.nsf/bse/90931 (accessed 5 May 2017)

Buchli, V. (2007) 'Astana: materiality and the city', in Alexander, C., Buchli, V. and Humphrey, C. (eds) *Urban Life in Post-Soviet Asia*, London: University College London Press, 40–69.

Carse, A. (2017) 'Keyword: infrastructure: how a humble French engineering term shaped the modern world', in Harvey, P., Bruun Jensen, C. and Morita, A. (eds) *Infrastructures and Social Complexity: A Companion,* London: Routledge, 27–39.

Collier, S. J. (2011) *Post-Soviet Social: Neoliberalism, Social Modernity, Biopolitics*, Princeton: Princeton University Press.

Graham, S. and Marvin, S. (2001) *Splintering Urbanism: Networked Infrastructures, Technological Mobilities and the Urban Condition*, London: Routledge.

Graham, S. and McFarlane, C. (2015) 'Introduction', in Graham, S. and McFarlane, C. (eds) *Infrastructural Lives: Urban Infrastructure in Context,* London: Routledge, 1–14.

Grant, B. (2010) 'Cosmopolitan Baku', *Ethnos*, 75:2, 123–147.

Grant, B. (2014) 'The edifice complex: architecture and the political life of surplus in the new Baku', *Public Culture*, 26:3, 501–528.

Harvey, P. and Knox, H. (2012) 'The enchantments of infrastructure', *Mobilities*, 7:4, 521–536.

Hegedüs, J. and Tosics, I. (1983) 'Housing classes and housing policy: some changes in the Budapest housing market', *International Journal of Urban and Regional Research*, 7:4, 467–494.

Höjdestrand, T. (2009) *Needed by Nobody: Homelessness and Humanness in Post-Socialist Russia*, Ithaca: Cornell University Press.

Humphrey, C. (2005) 'Ideology in infrastructure: architecture and Soviet imagination', *Journal of the Royal Anthropological Institute*, 11:1, 39–58.

Ivanov, Y. and Sukhov, M. (1971) 'Komu byt' novoselom': O praktike ucheta i raspredeleniia zhil'ia v Oktiabr'skom Raione. *Bakinskii Rabochii*, 23 December.

Koch, N. and Valiyev, A. (2015) 'Urban boosterism in closed contexts: spectacular urbanization and second-tier mega-events in three Caspian capitals', *Eurasian Geography and Economics*, 56:5, 575–598.

Kotkin, S. (1995) *Magnetic Mountain: Stalinism as a Civilization*, Berkeley: University of California Press.

Kushner, J. A. (2010) 'Affordable housing as infrastructure in the time of global warming', *The Urban Lawyer*, 42/43:4/1, 179–221.

Larkin, B. (2013) 'The politics and poetics of infrastructure', *Annual Review of Anthropology*, 42, 327–343.

Lebow, K. (2013) *Unfinished Utopia: Nowa Huta, Stalinism, and Polish society, 1949–56,* Ithaca: Cornell University Press.

Ledeneva, A. (1998) *Russia's Economy of Favours: Blat, Networking, and Informal Exchange*, Cambridge: Cambridge University Press.

Lodder, C. (2013) 'The ghost in the machine: the modernist architectural utopia under Stalin', in Lodder, C., Kokkori, M. and Mileeva, M. (eds) *Utopian Reality: Reconstructing Culture in Revolutionary Russia and Beyond*, Leiden: Brill, 161–191.

Matthews, M. (1993) *The Passport Society: Controlling Movement in Russia and the USSR*, Boulder: Westview Press.

McManus, J. (2016) *Grid Block: Why isn't Housing 'Infrastructure?'*. Available at: www.builderonline.com/builder-100/strategy/grid-block-why-isnt-housing-infrastructure_o (accessed 27 May 2017)

Morton, H. W. (1980) 'Who gets what, when and how? Housing in the Soviet Union', *Soviet Studies*, 32:2, 235–259.

President of the Republic of Azerbaijan – Ilham Aliyev (2013) *Ilham Aliyev chaired the first meeting of the Organizing Committee of the European Olympic Games due to be held in Baku in 2015*. Available at: http://en.president.az/articles/7175 (accessed 21 December 2016)

Roth, S. (2016) *Making a home in Baku: dynamics of housing, family and state in Azerbaijan*. Thesis (PhD): Martin Luther University Halle-Wittenberg.

Safiyev, R. (2015) 'Informality in a neopatrimonial state: Azerbaijan', in Voell, S. and Kaliszewska, I. (eds) *State and Legal Practice in ihe Caucasus: Anthropological Perspectives on Law and Politics*, Farnham: Ashgate, 133–148.

Sayfutdinova, L. (2015) 'Negotiating welfare with the informalizing state: formal and informal practices among engineers in post-Soviet Azerbaijan', *Journal of Eurasian Studies*, 6:1, 24–33.

State Archive of the Azerbaijan Republic, Baku Branch (1976) *O grubykh narusheniiakh semel'nogo zakonodatel'stva v gorode i merakh po ikh ustraneniiu v svete postanovleniia BK KP Azerbaidzhana ot 8 iiulia 1973 g* (4 September 1976), fond 23, opis 1, delo 1337, 5–11.

State Archive of the Azerbaijan Republic, Baku Branch (1977) *O rabote Oktiabr'skogo ispolkoma po vypolneniiu reshenii vyshestoiashchikh partiinykh i sovetskikh organov v chasti sokhrannosti zhilogo fonda i ustraneniia narushenii imeiushchikhsia v etom voprose* (20 January 1977), fond 23, opis 1, delo 1442, 1–4.

State Archive of the Azerbaijan Republic, Baku Branch (1978) *O predostavlenii zhilploshchadi grazhdanam iz osvobozhdennogo zhilogo fonda* (29 November 1978), fond 23, opis 1, delo 1681, 76–77.

Szelényi, I. (1983) *Urban Inequalities under State Socialism*, Oxford: Oxford University Press.

Todorov, V. (1995) *Red Square, Black Square: Organon for Revolutionary Imagination*, Albany: State University of New York Press.

Valiyev, A. (2013) 'Baku', *Cities*, 31, 625–640.

Valiyev, A. (2014) 'The post-communist growth machine: the case of Baku, Azerbaijan', *Cities: Supplement 1*, 41, S45–S53.

Verdery, K. (1991) 'Theorizing socialism: a prologue to the "transition"', *American Ethnologist*, 18:3, 419–439.

Verdery, K. (1996) *What Was Socialism, and What Comes Next?,* Princeton: Princeton University Press.

Zavisca, J. (2012) *Housing the New Russia*, Ithaca: Cornell University Press.

5 Changing times, persistent inequalities?

Patterns of housing infrastructure development in the South Caucasus

Joseph Salukvadze and David Sichinava

Introduction

Yerevan and Tbilisi – the capital cities of the two former Soviet republics of Armenia and Georgia in the South Caucasus – enjoyed spectacular population and territorial growth during the 70 years of Soviet power. The population of Yerevan grew from fewer than 50,000 in the early 1920s to more than 1.1 million in the late 1980s, amounting to more than half the total urban population of the republic, while Tbilisi's population in the same period increased from about 200,000 to more than 1.2 million (more than 40 per cent of the urban population of Georgia). As in many large Soviet cities, housing development has been a main driver for spatial growth, especially since the 1960s, when the mass housing programmes began in the main cities all over the Soviet Union to overcome the scarcity of housing stock caused by rapid population and economic growth.

The provision of accessible and decent living conditions to everyone was one of the communist mantras. In this regard, housing was an essential and integral part of the basic public infrastructural complex, interlinked with many other infrastructural components, both social and technical, such as schools and kindergartens, roads, and green areas on the one hand, and electricity, sewage, water and gas networks on the other. Remarkably, the provision and maintenance of housing were performed by the state agency in a way quite similar to other infrastructure. We are therefore inclined in this chapter to consider housing itself as an infrastructure consisting of multiple internal (living spaces, utilities) and external (courtyards, roads, greenery) components. Although the above-mentioned housing concept – housing for everyone – was challenged after the collapse of the Soviet Union and resulted in marketization of the housing supply, it did not completely alter the existing overall picture but added new features to housing development and distribution. These are reasons why we argue that the consideration of housing as infrastructure is sufficiently justified and rightful.

The link between inequality and the availability of and access to infrastructure in general has been long attested (most famously in Graham and Marvin, 2001). As it has been argued, the solutions to infrastructural

problems most benefit those with better access to resources, while the poor are affected most negatively (Silver, 2015). In this chapter, we explore the nexus between housing as an infrastructure (a complex set of technical utilities, and social and environmental services within individual houses and their close surroundings) and social inequality – that is, the differentiated access to resources based on class and/or other social markers. Considering these, we investigate the cases of Tbilisi and Yerevan, specifically focusing on the mass housing constructed and allocated between 1950 and 1990. Two perspectives guide our analysis:

(a) How and to what extent has the production of housing infrastructure – that is, its planning, construction, and allocation, influenced urban socio-spatial inequalities when embedded within the Soviet housing system and private housing market respectively?
(b) How and to what extent do these social inequalities affect housing infrastructures, their maintenance and provision?

Our empirical analysis is based on 71 carefully administered interviews, 39 of which come from Yerevan and 32 from Tbilisi. The interviews were conducted in a convenient environment for the respondents, either at their homes or in the courtyards of the residential apartments. The interviews, conducted as semi-structured discussions, explored topics such as the history of their moving to the residence, their attitudes towards the changing physical and social environment in the neighbourhood, and patterns of residential mobility. The interviews took place in the spring and summer of 2015.

First, we review relevant literature on infrastructures with specific focus on housing as infrastructure. Additionally, we present several empirical and theoretical propositions on inequality during socialism and afterwards. We then explore the peculiarities and the trajectories of urban infrastructural development in Tbilisi and Yerevan. Based on the materials from in-depth interviews, we analyse perceptions of the physical changes to housing infrastructure and the differentiated practices of infrastructure maintenance, with a specific focus on inequality. Finally, we discuss the findings through the lens of relevant theoretical concepts.

Housing as infrastructure

Contemporary debates on urban infrastructure often treat it as embedded into the urban fabric and only visible upon its breakdown (Graham and Marvin, 2001; Star, 1999; Star and Ruhleder, 1996). Infrastructural disruptions alleviate underlying inequalities by providing a way for the commodification of infrastructure and its provision (Graham, 2010, McFarlane, 2010). On these occasions, as Larkin (2013, p. 336) argues, infrastructures (and infrastructural projects) 'move from unseen', thus asserting their visibility and symbolic meaning (Amin, 2014). Tonkiss (2014, p. 362) suggests considering

infrastructures as relational and ecological, because both these concepts shape the relationships between humans and material things, and also determine the nature of the environment where these relationships occur.

The Marxian definition of infrastructure presents it as the basic resource for a functioning society. As Humphrey (2003, p. 92) argues, infrastructure in the Soviet Union, especially in the first years of its existence, was perceived as 'the economic basis' for societal reproduction. In the Soviet Union, apart from the normative meaning, infrastructure symbolized how governmentality was exercised (Larkin, 2013). Infrastructure was taken for granted in the Soviet Union, and it was assumed that it would be provided even in places that had few if any conditions for living, even at the expense of vast capital investments (Humphrey, 2003, p. 93). Indeed, the right to housing was guaranteed by the constitution of the Soviet Union (e.g. in article 44 of the 1977 USSR constitution).

The atomized concept of 'home' has been an important focus of thought for various schools of Anglo-American geography and environmental psychology (Moore, 2000). These works explored the emotional attachment to home as a place (Lewicka, 2011; Manzo, 2003; Rakoff, 1977). It needn't be said that infrastructures similar to housing are experienced and 'woven into the fabric of society' (Carse, 2016, p. 35), and moreover reflect the dominant political narratives of progress and modernization articulated by the ruling classes (discussed, for example, in Collier, 2011; Graham and Marvin, 2001; Harvey and Knox, 2012). Indeed, the symbolic meaning of infrastructure (elaborated in this volume by Tuvikene, Sgibnev and Neugebauer, Chapter 1), in the Soviet Union especially, as readily and universally accessible housing, promised social justice and overall prosperity for all urban dwellers (e.g. in Smith, 1996; Sýkora, 2009), and was thought to anticipate the construction of a new society (Humphrey, 2005). Another symbolic meaning of housing as an infrastructure was the metaphor that proposed the 'nation' as the house for the multi-ethnic society, where each people *possessed* its *own* apartment (e.g. in Slezkine, 1994).

Soviet-era housing, despite being projected as egalitarian, was neither 'created equally' nor 'universally accessible' (Alexeev, 1988b). The dire state of housing provision in the country (Gerasimova, 1998) necessitated large-scale mass housing construction programmes. The Soviet urban planning school invented a basic planning unit for several thousand inhabitants, the microrayon (Herman, 1971; Hess, 2017). This represented the essential building blocks for socialist cityscape assemblages and contained bundled (see also Graham and Marvin, 2001) infrastructures such as blocks of flats, roads, electricity grids, water, heat and gas supply, schools, kindergartens, and grocery shops.

Thus, although an overall provision of utilities, public open spaces, social facilities and other infrastructure was considered to be similar and standard-based, certain disparities have been observed from district to district in terms of better/worse geographic location of housing units and residential estates,

quality and quantity of living spaces, design and arrangement of public spaces and, sometimes, provision of basic utilities and communal services (Gentile and Sjöberg, 2010). Such inequality had a strong impact on initial allocation and further redistribution of housing among different population groups according to their social, ethnic, and professional belonging, as well as the ability to negotiate with actors of the decision-making and housing distribution systems.

Perennial crisis in the Soviet housing construction sector (Morton, 1979) created fertile ground for creation of inequalities in a seemingly egalitarian society. Housing construction and allocation in the Soviet Union reflected both formal (Gentile and Sjöberg, 2006) and informal (Morton, 1980) power geometries. Entities operating in the priority sectors of the national economy (Szelenyi, 1987), for example, the military defence sector (Gentile and Sjöberg, 2010), and powerful state establishments, such as law enforcement agencies and Communist Party institutions (Gentile and Sjöberg, 2010; Smith, 1996), were able to secure quality housing through their formally assigned power resources. But because the Soviet Union also possessed an all-embracing second economy (Kim, 2003; O'Hearn, 1980), the institution of informal networks of loyalty, so-called *blat*[1] (Ledeneva, 1998), was a powerful source of 'housing manipulations' as well (Morton, 1980). The socio-spatial pattern of housing provision in the cities was even further complicated by ethnic differences (Gentile and Tammaru, 2006; Hess et al., 2012; Sýkora and Bouzarovski, 2012).

The dissolution of the Soviet Union brought immense changes, including to infrastructure. The economies of the former Soviet republics shrank enormously. The newly 'unblackboxed' (Graham, 2000) water, electricity, and heating infrastructures pushed the urbanites to 'micrological' (Collier and Way, 2004, p. 267) interventions: in the 2003 film documentary, *Power trip*, directed by Paul Devlin, illegal individual electricity wires and water pipes represented practices of coping with dilapidation of infrastructure caused by a lack of maintenance.

Neoliberal economic policies, especially the overarching privatization of the housing stock, exacerbated socio-spatial inequalities in urban space. The privatization of the formerly state-owned housing stock and the shortage of affordable housing in post-socialist cities helped to maintain relatively low residential mobility, offering certain housing options to the socially weak but often trapping average-income households and enabling only the most well-off to choose and move freely (Gentile and Marcińczak, 2014; Neugebauer and Kovacs, 2015; Ruoppila and Kährik, 2003). These market conditions seemingly 'froze' the existing urban social geographies (Sýkora and Bouzarovski, 2012) and the socialist pattern of bundled infrastructures: many residents are still living in their centrally planned and more or less well infrastructured microrayons. However, the neoliberal turn with its reforms towards privatization and individualization means the unbundling of housing as infrastructure and splintering urbanism. This we

will discuss when looking at new in-fill housing construction in Tbilisi and Yerevan and at infrastructural developments in the Soviet microrayons.

Setting the context: shared trajectories of urban development

The contemporary physical and social fabrics of Tbilisi and Yerevan have been shaped by the events that took place after the dissolution of the Soviet Union and were contained in the Soviet-era socio-demographic, infrastructural and, to a certain extent, institutional conditions. The bulk of urban infrastructure, while a Soviet relic, is widely utilized. Only about 10 per cent of households in the capital cities of Armenia and Georgia reside in housing estates constructed after independence (Salukvadze, 2016). During the Soviet period, the population of Yerevan increased eighteenfold while the population of Tbilisi grew fivefold. The two cities housed from one fifth to one quarter of the population of their respective republics and played an oversized role in national economics (Gachechiladze et al., 1984). Such an explosion of population and industries yielded the physical expansion of the two cities to the outskirts. The population of Tbilisi mainly grew thanks to ethnic Georgians moving from other parts of the Georgian Soviet Socialist Republic (SSR), while Yerevan absorbed newcomers from both the Armenian SSR proper and from other parts of the Caucasus, as well as via repatriates from the Middle East and Western Europe (Pattie, 2004).

Master plans played the most crucial role in shaping the physical characteristics of the city because they provided an outline for development usually 30 years ahead (Herman, 1971; Salukvadze et al., 2010). Such regulatory documents were developed three times for Tbilisi and four times for Yerevan.[2] Among others, general plans provided a blueprint for housing provision, which with very few exceptions[3] was planned, administered, and constructed by state institutions. In Tbilisi, new housing microrayons stretched along the Kura river, since the pre-revolutionary city core had already been developed. Unlike Tbilisi, Yerevan possessed negligible pre-Soviet urban infrastructure. The Armenian capital was built almost from scratch around a small historical core.

The urgent need for mass housing outweighed considerations of quality, and housing construction and allocation therefore did not always comply with rules of quality or of equality (Alexeev, 1988a; Morton, 1979). Therefore, the scarcity of goods and the inefficiency of allocation were countered with a widespread second economy (Mars and Altman, 1983; Scott, 2016), which according to various estimations (e.g. by Kim, 2003; Kim and Shida, 2014) accounted for about 15–20 per cent of the national economy of the Armenian SSR, and for 27–33 per cent of the Georgian SSR. Although illegal housing markets existed almost everywhere in the Soviet Union (Katsenelinboigen, 1977), and 'housing manipulations' – that is, the exploitation of one's power in order to receive quality housing on time

(Marcińczak et al., 2013) – were especially widespread in the republics of the South Caucasus (Morton, 1980).

Housing manipulations in the South Caucasus capital cities can be attested to in the archival documents recording patterns of housing construction. On average, apartments constructed in Tbilisi and Yerevan between 1950 and 1990 were about 37 square metres in size. However, the floor space fluctuated greatly across the industries and institutions doing the construction. The average floor space of an apartment in a house constructed through the Georgian Communist Party was about 53 square metres, followed by the planning committees of Georgia (50 square metres) and Tbilisi communal services (48 square metres). The disparity was less pronounced in Yerevan, where the most privileged sectors of the economy (machinery building, science and education, and communications) would be allocated 40-square-metre apartments on average.

The dissolution of the Soviet Union, which brought capitalism with all its perils to the South Caucasus, created the distinctive context (Golubchikov et al., 2014) in which the two cities are now operating. Populations expelled as the result of ethnic conflicts in the former autonomous regions of Abkhazia, South Ossetia, and Nagorno-Karabakh, as well as in Azerbaijan, created waves of internally displaced populations and refugees – mainly ethnic Armenians and Georgians who sought shelter in the capital cities. The displaced population was mainly housed in former government buildings such as hotels, university lodgings, and former scientific and educational institutions (Salukvadze et al., 2013). The governments in both countries employed an exclusively neoliberal 'developmental' approach to the 'temporary integration' of the new populations into the mainstream societies, which also included the privatization of the refugee camps (Manning, 2009). Armenia's housing crisis and the low quality of existing stock were also exacerbated by the devastating earthquake of 1988, which caused significant forced displacement (Sargsyan, 2013).

The rapid privatization of the housing stock, which was undertaken in Georgia in 1991 and in Armenia in 1993, not only created a new class of 'poor home-owners' (Van Assche and Salukvadze, 2012) but also froze the existing socio-spatial disparities that now imbue the contemporary unequal economic geographies of the two cities. Privatization also meant that market forces would now regulate both the demand and supply side of housing construction, maintenance, and allocation. The state withdrew from the provision of most social security (Collier and Way, 2004), including housing, and triggered the emergence of various types of new 'urbanisms', including apartment building extensions and illegal land squatting (Bouzarovski et al., 2011; Stephens, 2005).

The economies of the two republics suffered enormously as a result of the dissolution of the Soviet Union. For example, between 1990 and 1994, the economy of Armenia cumulatively declined by 61 per cent while Georgia's shrank by 85 per cent relative to 1990 (Sachs et al., 1995). On top of that,

Armenia was involved in a violent armed conflict with Azerbaijan over the Nagorno-Karabakh province (De Waal, 2013), which led to an economic blockade from Azerbaijan and Turkey in the mid-1990s and chronic electricity blackouts referred to as the 'Dark Years' (Ter-Ghazaryan, 2013).

Post-Soviet transition in Yerevan and Tbilisi took place against the backdrop of harsh political instability, economic decline, disruption of institutions, and population out-migration, during which both cities lost up to 200,000 inhabitants each. In the meantime, both Yerevan and Tbilisi experienced dramatic urban transformation driven by the introduction of radical neoliberal approaches, which also brought immense changes to housing development. Foremost, overwhelming privatization of dwellings took place after which, by the 1990s, Armenia and Georgia, and their respective capital cities, had already became the world leaders in housing privatization, consequently reaching 96 and 95 per cent of their housing stock respectively (UNECE, 2004; von Schweinichen, 2007). This was followed by the privatization of most utility service provisions and the destatization of construction business and building maintenance. The production of new housing occurred only on a commercial basis, often under conditions of ignorance of spatial planning and deregulation of building norms and rules. All these changes affected patterns of mobility and residential perceptions and attitudes towards housing and (housing) infrastructure (Herfert et al., 2013). They resulted in a significant transformation of housing units and housing landscapes on the one hand, and caused the social reconfiguration of residential districts and inflamed existing socio-spatial inequalities on the other.

Economic decline led to huge waves of out-migration from the capital cities, compensated by the influx of internal migrants. Needless to say, the remittances from the working migrants – and in the case of Yerevan, from the powerful Armenian diaspora – significantly contributed to the local housing markets (and to the inequalities). Typically, in both cities, households receiving remittances were more likely to invest the funds in improving living conditions (Manookian and Tolosa, 2011), while real estate developers especially targeted Georgians (and Armenians) living abroad with luxury, newly built high-rise apartments (Gentile et al., 2015; Salukvadze, 2016). The diaspora contributed greatly to the physical infrastructure of Yerevan by investing in luxury condos and gated communities (Petrosyan, 2016; Topalian and Petrosyan, 2015).

Although the roads of political development in the two countries diverged from the beginning of the 2000s, the characteristics of their economic policies did not differ much. While, after the infamous Rose Revolution, the Georgian government declared its alignment to Western-style democracy and announced its integration into European and Euro-Atlantic organizations as ultimate goals (De Waal, 2011), Armenia never did so. Governments in Armenia and Georgia to varying extents embraced a neoliberal economic model (Gugushvili, 2016; Ishkanian, 2014). The economic boom in the early and mid-2000s, and the accompanying process of planning deregulation,

effectively created a new player on the housing market. Small development/investment agencies started in-fill constructions in the central areas of the two cities (Van Assche and Salukvadze, 2012; Van Assche et al., 2012; Salukvadze and Golubchikov, 2016). The boom cycle was disrupted by the economic crisis of 2008. However, major flagship urban development projects, such as the Northern Avenue in Yerevan, soon began. New housing developments are currently almost completely conducted by the private sector (Sargsyan, 2013). Contrary to the previously embraced approach of pre-planned microrayons, housing is now constructed as in-fills in areas considered to be prestigious (Jones Lang LaSalle, 2012). Often, newly constructed housing is marketed in the shell-and-core form, thus allowing relatively low prices with a corresponding low quality of delivery. The lack of prior neighbourhood planning and relatively flexible construction requirements ensures that, for non-premium buyers, access to infrastructural amenities is limited. This neoliberal approach of producing and selling shell-and-core houses of unbundled infrastructural services thus contrasts with the former reality of bundled infrastructural provision in the Soviet microrayons.

Access to housing and inequality

The housing allocation system of the Soviet Union primarily declared, and in general realized, egalitarian access to the infrastructural services of housing. Still, as mentioned earlier, it also showed differentiated access to resources determined by the workplace, *blat*, or necessity (Gentile and Sjöberg, 2010). The inequality was reflected not only by the location of the housing and the state of the neighbourhood but also by the quality of infrastructural amenities that were present in the apartments. Our interlocutors reported on malpractices during the housing construction and allocation process that were expressed in the exploitation of one's workplace or status. To the bulk of the interviewees, the allocation of housing encapsulated a simple but prolonged procedure. Depending on the type of housing they were applying for, the queue would last for several years and the only way out of the situation was either patience, a lucky break, or manipulation.

Skipping the queue was one of the most widespread types of manipulation. The geographic differentiation in terms of housing has been attested to in several studies (e.g. Gentile and Sjöberg, 2006, 2010). These 'intra-urban landscapes of priorities' were formed through a complex interplay between powerful entities and individuals, thus creating pockets of privileged populations. Our informants from the Kentron district in Yerevan, and the Vake and Saburtalo neighbourhoods of Tbilisi, worked in prestigious jobs that ensured better housing in a better location. Getting an apartment in a non-prestigious area, by contrast, did not require housing manipulations.

Indeed, the 'prestigiousness' of a particular neighbourhood was not defined only by the presence of a particular infrastructure or the quality of housing. The *social* composition of the neighbourhood or the apartment was

also a factor. Our interlocutor from Tbilisi, the spouse of an engineer, recalled her disappointment when their household was assigned an apartment in the peripheral Navtlughi neighbourhood, while all other fellow engineers were allocated apartments in the more *central* Saburtalo area:

> Once, [at a party at another engineer's home] I complained with my fellow colleagues how I was feeling left out [from the others]. I mentioned that I had an apartment in Navtlughi [the periphery], and then I was promised that they would give me an apartment on Pavlov Street [located in the Saburtalo neighbourhood]…Finally we were assigned an apartment – although it had a lower ceiling, it was [in a better location] on Pavlov Street!

Not only well-connected and privileged residents were concentrated geographically. Large enterprises constructed and allocated apartments to their workers in a spatially concentrated way. Residents often shared the same workplace or job type, at least at the apartment level: 'Our apartment block was constructed [by the Factory after 26 Commissars of Baku]. Two other neighbouring apartments including one up on the hill were also commissioned by the same factory' (Tbilisi, respondent from Didube). Still, even though the Soviet model of social welfare was a 'deficit model' and regulated people's access to housing differently, it generally ensured more or less de-commodified access to social services (Collier and Way, 2004) and housing-related infrastructures. The provision of shelter, regardless of its quality, and relatively uninterrupted connections with hot water, gas, and electricity were mentioned by the respondents as sources of relative stability in their lives.

This overall feeling was contrasted by developments following the dissolution of the Soviet Union when the respective republics found distinctive ways of maintaining or completely replacing the existing modes of welfare provision by simply dismantling the elements of the welfare state and scrapping social expenditures (Pascall and Manning, 2000). Both Armenia and Georgia were strongly advised by international monetary institutions to follow closely the principles outlined in the Washington Consensus by further reducing government spending on social security services (Deacon, 2000), which indirectly contributed to the depletion of urban infrastructure.

Housing and infrastructural inequality

As attested by Gentile and Sjöberg (2006), residential blocks and microrayons commissioned by 'less-prioritized enterprises' were worse equipped with communal infrastructure. This was true for the South Caucasus as well, although problems with infrastructure were especially vivid in the peripheral neighbourhoods. In Tbilisi and Yerevan, after moving to new apartments,

residents often had to conduct basic repairs and maintenance themselves. Memoirs of moving to housing units not supplied with basic infrastructural connections are still striking. The most conspicuous examples come from the informants who moved to newly built bedroom neighbourhoods of Yerevan in the 1970s and 1980s: 'People would lay cables together, renovate walls (Yerevan, Avan)'; 'When I moved to this neighbourhood, there were no shops or transportation, […] only mud and dust…I was so terrified' (Yerevan, Malatia-Sebastia).

The inequalities were indeed exacerbated by the differentiated access to infrastructure and services, especially after the demise of the Soviet Union. Both cities privatized their energy and water supplies, which are currently owned or operated by large multinational corporations. The financialization of the utility sector, which turned from a service provider into a profit-making business, put an additional burden on the poorest citizens: 'Today people would not be able to earn as much as they need to afford those [communal] fees' (Yerevan, Malatia-Sebastia). Water outages and timetables for water supply, as well as electricity blackouts are still present in Yerevan and to a lesser extent in Tbilisi, further exacerbating insecurity and provoking feelings of nostalgia for the Soviet Union: 'Well, [in Soviet times] if something happened [with gas or electricity, the authorities] would announce it on TV and then come and repair it, if necessary' (Yerevan, Kentron). Apart from disruptions, unpaid utility fees also mean disconnection from the infrastructural networks, be it electricity, gas, or water: 'It has happened that I would pay the last money I had [to pay utilities] and stay without money. I have to do it, as you can't sit without gas, without electricity in winter.' (Tbilisi, Mukhiani).

Apart from the utilities, the transition also brought the withdrawal of the state from the repair and maintenance sector of housing itself. Almost all informants from both cities stated that at a certain point they had renovated their private apartments themselves. However, they did not mention a single initiative of self-organization aimed at solving communal problems by their own means. The involvement of the municipality is limited to participation in state-initiated programmes of infrastructure repair. Such ignorance regarding the public space on the part of the municipality could be attributed to the overwhelming privatization of the housing stock at the beginning of the 1990s. Although privatization has assigned some obligations for looking after common spaces, as becomes clear from the interviews, the privatization of housing stock did not incentivize either private involvement or self-initiatives of the municipalities for the maintenance of shared spaces. Privatization and individualization have triggered fragmentation instead of local initiatives for cooperative infrastructure management. The national state still remains the principal actor in infrastructure maintenance and development.

So, with regard to the current physical state of neighbourhoods and shared infrastructures, the respondents mention that maintenance activities

are mostly initiated by the national state. The two cities utilize different models of public-private partnership for general maintenance. In Yerevan, special municipal entities ('*Zheks*') are responsible for maintenance, while in Tbilisi it is conducted through the Homeowners' Associations (HOAs) in partnership with the City Hall and district *gamgeobas*[4] (Salukvadze, 2016). However, these entities are not always helpful: the only way of solving the problem is to address the responsible authorities, which could drag the informants into a Kafkaesque bureaucratic trap. Now, the authorities in Yerevan 'are aware of [the issue], they are informed, they know, however, the issue has not been solved yet' (Yerevan, Nor-Nork). Concerning Tbilisi, the respondents are generally satisfied with the work of communal services and the responsiveness of city authorities when it comes to the repair of ageing infrastructure. However, the programmes imply the financial participation of the residents for funding repairs.

Conclusion

As has been argued, Soviet infrastructure was meant to embody the Marxist political project (Humphrey, 2005; Larkin, 2013). Overall, it created a safety network for most of the population in the manner of an 'authoritarian welfare state' (Collier and Way, 2004). Simultaneously, as we show, housing infrastructure in the Soviet Union also encapsulated the differentiated treatment of certain populations, thus epitomizing inequalities still persistent in post-Soviet society. Apart from materialities, the quality of housing infrastructure was also defined by its *social content* – that is, with the possibility of connecting and living with representatives of similar occupational classes.

On the other hand, McFarlane's (2010) other argument on the persistence and reproduction of inequality through infrastructures is compelling in the context of the South Caucasus. The effects of this infrastructural depletion were overarching, and also exposed hidden inequalities and brought them to the surface. After the dissolution of the Soviet system, those with better access to resources were quick to recover, while the poor, the less connected, and those at the urban fringes, still struggle.

The persistent nature of Soviet urban inequalities was exacerbated by the perils of the Washington Consensus, which became a dreadful experience for the urban poor of Tbilisi and Yerevan. In the subsequent decades after the Soviet Union, Armenia and Georgia enacted far-reaching liberal reforms and reduced social expenses with the blessings of the International Monetary Fund and the World Bank. The total privatization of housing stock, marketization of its provision, and the financialization of the communal sector further exacerbated already existing inequalities that were put in place during Soviet socialism and before.

And finally, as Graham (2010) suggests, the politics of infrastructure dominate urban political life. In the case of contemporary Tbilisi and Yerevan,

the circulation of neoliberal political regimes and rotating election cycles are intimately linked with the appearance of road construction works, as bitterly described by our interlocutor from the 'peripheral' Malatia-Sebastia neighbourhood of the Armenian capital: 'When elections come, the asphalt patches pop up…after all, [the quality of the patches is] normal and they'll stay there for two or three more years' (Yerevan, Malatia-Sebastia).

Acknowledgements

This work was supported by a grant from the Academic Swiss Caucasus Net. The authors would like to thank Dr Harutyun Vermishyan of Yerevan State University for his invaluable contribution to the collection of empirical materials for this study.

Notes

1 Alena Ledeneva (1998) gives by far the most comprehensive definition of '*blat*': '… the use of personal networks and informal contacts to obtain goods and services in short supply and to find a way around formal procedures'.
2 Respectively, in 1934, 1955 and 1970 for Tbilisi (Van Assche et al., 2012), and 1924, 1935, 1951 and 1970 for Yerevan (Mamyan, 2005).
3 For example, through cooperative housing or illegal squatting of urban land (Darjania, 2015).
4 *Gamgeoba* – a municipal government of administrative districts in Tbilisi, headed by a manager appointed by the mayor.

References

Alexeev, M. (1988a) 'Market vs. rationing: the case of Soviet housing', *The Review of Economics and Statistics*, 70:3, 414–420.

Alexeev, M. (1988b) 'The effect of housing allocation on social inequality: a Soviet perspective', *Journal of Comparative Economics*, 12:2, 228–234.

Amin, A. (2014) 'Lively infrastructure', *Theory, Culture & Society*, 31:7–8, 137–161.

Bouzarovski, S., Salukvadze, J. and Gentile, M. (2011) 'A socially resilient urban transition? The contested landscapes of apartment building extensions in two post-communist cities', *Urban Studies*, 48:13, 2689–2714.

Carse, A. (2016) 'Keyword: infrastructure – how a humble french engineering term shaped the modern world', *Infrastructures and Social Complexity: A Companion*, 27.

Collier, S. J. (2011) *Post-Soviet Social: Neoliberalism, Social Modernity, Biopolitics*, Princeton, USA: Princeton University Press.

Collier, S. and Way, L. (2004) 'Beyond the deficit model: social welfare in post-Soviet Georgia', *Post-Soviet Affairs*, 20:3, 258–284. doi: 10.2747/1060-586X.20.3.258.

Darjania, E. (2015) 'Informal settlements and illegal subdivision of land in Tbilisi', in Gutbrod, H. (ed.) *From Private to Public – Transformation of Social Spaces in the South Caucasus*, Tbilisi: South Caucasus Regional Office of the Heinrich Boell Foundation.

De Waal, T. (2011) *Georgia's Choices: Charting a Future in Uncertain Times*, 5, Carnegie Endowment for International Peace, Washington. Available at: https://carnegieendowment.org/files/georgias_choices.pdf (accessed 30 November 2018)

De Waal, T. (2013) *Black Garden: Armenia and Azerbaijan through Peace and War, 10th Year Anniversary Edition, Revised and Updated*, New York: New York University Press.

Deacon, B. (2000) 'Eastern European welfare states: the impact of the politics of globalization', *Journal of European Social Policy*, 10:2, 146–161.

Gachechiladze, R., Nadzhafaliyev, M. A. and Rondeli, A. (1984). 'The regional development problems of Transcaucasia', *Geoforum*, 15:1, 65–73.

Gentile, M. and Marcińczak, S. (2014) 'Housing inequalities in Bucharest: shallow changes in hesitant transition', *GeoJournal*, 79:4, 449–465. doi: 10.1007/s10708-014-9530-5.

Gentile, M. and Sjöberg, Ö. (2006) 'Intra-urban landscapes of priority: the Soviet legacy', *Europe-Asia Studies*, 58:5, 701–729.

Gentile, M. and Sjöberg, Ö. (2010) 'Spaces of priority: the geography of Soviet housing construction in Daugavpils, Latvia', *Annals of the Association of American Geographers*, 100:1, 112–136.

Gentile, M. and Tammaru, T. (2006) 'Housing and ethnicity in the post-Soviet city: Ust'-Kamenogorsk, Kazakhstan', *Urban Studies*, 43:10, 1757–1778.

Gentile, M., Salukvadze, J. and Gogishvili, D. (2015) 'Newbuild gentrification, teleurbanization and urban growth: placing the cities of the post-communist south in the gentrification debate', *Geografie*, 120:2, 134–163.

Gerasimova, Y. (1998) 'Soviet communal apartment', *Sotsiologicheskiy Zhurnal*, 1–2, 224–243.

Golubchikov, O., Badyina, A. and Makhrova, A. (2014) 'The hybrid spatialities of transition: capitalism, legacy and uneven urban economic restructuring', *Urban Studies*, 51:4, 617–633. doi: 10.1177/0042098013493022.

Graham, S. (2000) 'Constructing premium network spaces: reflections on infrastructure networks and contemporary urban development', *International Journal of Urban and Regional Research*, 24:1, 183–200.

Graham, S. (2010) 'When infrastructures fail', in S. Graham (ed.) *Disrupted Cities: When Infrastructure Fails*, New York and Abingdon, UK: Routledge, 1–26.

Graham, S. and Marvin, S. (2001) *Splintering Urbanism: Networked Infrastructures, Technological Mobilities and the Urban Condition*, London: Psychology Press.

Gugushvili, D. (2016) 'Lessons from Georgia's neoliberal experiment: a rising tide does not necessarily lift all boats', *Communist and Post-Communist Studies*. doi: 10.1016/j.postcomstud.2016.11.001.

Harvey, P. and Knox, H. (2012) 'The enchantments of infrastructure', *Mobilities*, 7:4, 521–536. doi: 10.1080/17450101.2012.718935.

Herfert, G., Neugebauer, C. S. and Smigiel, C. (2013), Living in residential satisfaction? Insights from large-scale housing estates in Central and Eastern Europe', *Tijdschrift Voor Economische En Sociale Geografie*, 104:1, 57–74. doi: 10.1111/j.1467-9663.2012.00727.x.

Herman, L. M. (1971) 'Urbanization and new housing construction in the Soviet Union', *American Journal of Economics and Sociology*, 30:2, 203–220. doi: 10.1111/j.1536–7150.1971.tb02959.x.

Hess, D. B. (2017) 'Transport in mikrorayons: accessibility and proximity to centrally planned residential districts during the socialist era, 1957–1989', *Journal of Planning History*, 1538513217707082. doi: 10.1177/1538513217707082.

Hess, D. B., Tammaru, T. and Leetmaa, K. (2012) 'Ethnic differences in housing in post-Soviet Tartu, Estonia', *Cities*, 29:5, 327–333.

Humphrey, C. (2003) 'Rethinking infrastructure: Siberian cities and the great freeze of January 2001', in Schneider, J. and Susser, I. (eds) *Wounded Cities: Destruction and Reconstruction in a Globalized World*, Oxford: Berg, 91–107.

Humphrey, C. (2005) 'Ideology in infrastructure: architecture and Soviet imagination', *Journal of the Royal Anthropological Institute*, 11:1, 39–58. doi: 10.1111/j.1467-9655.2005.00225.x.

Ishkanian, A. (2014) *Engineered Civil Society: The Impact of 20 Years of Democracy Promotion on Civil Society Development in Former Soviet Countries*, Basingstoke, UK: Palgrave Macmillan. Available at: https://books.google.com/books?hl=en&lr=&id=4CvFAgAAQBAJ&oi=fnd&pg=PA150&dq=%22caucasus+barometer%22&ots=mC6Fa5uLeH&sig=S-K-xTPUmk073LGFwF0AhtG4sB4 (accessed 18 February 2018)

Jones Lang LaSalle (2012) *Real Estate Market Overview of Tbilisi*, Tbilisi.

Katsenelinboigen, A. (1977) 'Coloured markets in the Soviet Union', Soviet Studies, 29:1, 62–85. doi: 10.1080/09668137708411106.

Kim, B.-Y. (2003) 'Informal economy activities of Soviet households: size and dynamics', *Journal of Comparative Economics*, 31:3, 532–551. doi: 10.1016/S0147-5967(03)00052-0.

Kim, B.-Y. and Shida, Y. (2014) *Shortages and the Informal Economy in the Soviet Republics: 1965–1989*, RRC Working Paper Series No. 43, Russian Research Center, Institute of Economic Research, Hitotsubashi University. Available at: http://econpapers.repec.org/paper/hitrrcwps/43.htm (accessed 9 August 2017)

Konstitutsiya SSSR (1977), article 44.

Larkin, B. (2013) 'The politics and poetics of infrastructure', *Annual Review of Anthropology*, 42:1, 327–343. doi: 10.1146/annurev-anthro-092412-155522.

Ledeneva, A. V. (1998) *Russia's Economy of Favours: Blat, Networking and Informal Exchange*, 102, Cambridge, UK: Cambridge University Press.

Lewicka, M. (2011) 'Place attachment: how far have we come in the last 40 years?', *Journal of Environmental Psychology*, 31:3, 207–230. doi: 10.1016/j.jenvp.2010.10.001.

Mamyan, Z. (2005) *Basic Developments in Planning of Yerevan in Master Plans*, Available at: http://rcchd.icomos.org.ge/?l=G&m=4-4&JID=5&AID=38 (accessed 30 November 2018)

Manning, P. (2009) 'The hotel/refugee camp Iveria: symptom, monster, fetish, home', in Van Assche, K., Salukvadze, J. and N. Shavishvili (eds.) *City Culture and City Planning in Tbilisi: Where Europe and Asia Meet*, Lewiston: Mellen Press, 319–349.

Manookian, A. and Tolosa, G. (2011) *Armenia's Housing Boom-Bust Cycle*, Washington, D.C.: International Monetary Fund.

Manzo, L. C. (2003) 'Beyond house and haven: toward a revisioning of emotional relationships with places', *Journal of Environmental Psychology*, 23:1, 47–61. doi: 10.1016/S0272-4944(02)00074-9.

Marcińczak, S., Gentile, M. and Stępniak, M. (2013) 'Paradoxes of (post) socialist segregation: metropolitan sociospatial divisions under socialism and after in Poland', *Urban Geography*, 34:3, 327–352.

Mars, G. and Altman, Y. (1983) 'The cultural bases of soviet Georgia's second economy', *Soviet Studies*, 35:4, 546–560. doi: 10.1080/09668138308411503.

McFarlane, C. (2010) 'Infrastructure, interruption, and inequality: urban life in the global South', in *Disrupted Cities: When Infrastructure Fails*, New York: Routledge.

Moore, J. (2000) 'Placing home in context', *Journal of Environmental Psychology*, 20:3, 207–217. doi: 10.1006/jevp.2000.0178.

Morton, H. W. (1979) *Recent Reforms in the Soviet Housing Construction Process,* Washington, D.C.: Kennan Institute for Advanced Russian Studies. Available at: www.wilsoncenter.org/sites/default/files/op87_reforms_soviet_housing_morton_1979.pdf (accessed 24 December 2016)

Morton, H. W. (1980) 'Who gets what, when and how? Housing in the Soviet Union', *Europe-Asia Studies*, 32:2, 235–259.

Neugebauer, C. and Kovacs, Z. (2015) 'Paths of socio-spatial change in post-socialist cities – insights from five city regions in Central and Eastern Europe', in Lang, T., Henn, S., Ehrlich, K. and Sgibnev, W. (eds) *New Geographies of Central and Eastern Europe. Patterns of Polarization and Peripherialization*, Basingstoke: Palgrave.

O'Hearn, D. (1980) 'The consumer second economy: size and effects', *Soviet Studies*, 32:2, 218–234.

Pascall, G. and Manning, N. (2000) 'Gender and social policy: comparing welfare states in Central and Eastern Europe and the former Soviet Union', *Journal of European Social Policy*, 10:3, 240–266.

Pattie, S. (2004) 'From the Centers to the Periphery: "Repatriation" to an Armenian Homeland in the Twentieth Century', in Markowitz, F. and Stefansson, A. H. (eds) *Homecomings: Unsettling Paths of Return*, Lanham: Lexington Books, 109–24.

Petrosyan, S. (2016) 'The transformation of Yerevan's urban landscape after independence', *Caucasus Analytical Digest*, 87, 2–4.

Rakoff, R. M. (1977) 'Ideology in everyday life: the meaning of the house', *Politics & Society*, 7:1, 85–104. doi: 10.1177/003232927700700104.

Ruoppila, S. and Kährik, A. (2003) 'Socio-economic residential differentiation in post-socialist Tallinn', *Journal of Housing and the Built Environment*, 18:1, 49–73.

Sachs, J. D., Warner, A., Åslund, A. and Fischer, S. (1995) 'Economic reform and the process of global integration', *Brookings Papers on Economic Activity*, 1, 1–118. doi: 10.2307/2534573.

Salukvadze, J. (2016) 'The current state of housing in Tbilisi and Yerevan: a brief primer', *Caucasus Academic Digest*, 87, 8. Available at: www.css.ethz.ch/content/dam/ethz/special-interest/gess/cis/center-for-securities-studies/pdfs/CAD87.pdf (accessed 3 November 2016)

Salukvadze, J. and Golubchikov, O. (2016) 'City as a geopolitics: Tbilisi, Georgia – a globalizing metropolis in a turbulent region', *Cities*, 52, 39–54.

Salukvadze, J., Sichinava, D. and Gogishvili, D. (2013) 'Socio-economic and spatial factors of alienation and segregation of internally displaced persons in the cities of Georgia', in *Spatial Inequality and Cohesion*, 38, 45–60, Warsaw: Polish Academy of Sciences. Available at: www.infona.pl/resource/bwmeta1.element.pan-sr-yid-2014-iid-38-art-000000000005 (accessed 30 November 2018)

Salukvadze, J., Van Assche, K. and Shavishvili, N. (eds) (2010) *T'bilisi cvlilebebis xanas'i: urbanuli sivrcisa da k'alak'dagegmarebis socialur-kulturuli ganzomilebani*. (Tbilisi in times of change: socio-cultural dimensions of urban space and urban planning) Georgia: TSU Publishing.

Sargsyan, T. (2013) 'Residential environmental conditions on housing estates in Yerevan', *Hungarian Geographical Bulletin*, 62:1, 121–130.

von Schweinichen, C. (2007) *Country Profiles on the Housing Sector – Georgia*, Geneva: Economic Commission on Europe, United Nations. Available at: www.unece.org/housing-and-land-management/housingpublications/housing-and-land-management-hlm/2007/country-profiles-on-the-housing-sector-georgia/docs.html (17 November 2018)

Scott, E. R. (2016) *Familiar Strangers: The Georgian Diaspora and the Evolution of Soviet Empire*, Oxford: Oxford University Press.

Sgibnev, W. (2014) 'Urban public transport and the state in post-Soviet Central Asia', in *Mobilities in Socialist and Post-Socialist States,* Berlin: Springer, 194–216. Available at: http://link.springer.com/chapter/10.1057/9781137267290_10 (accessed 16 September 2017)

Silver, J. (2015) 'Disrupted infrastructures: an urban political ecology of interrupted electricity in Accra: DISRUPTED INFRASTRUCTURES', *International Journal of Urban and Regional Research*, 39:5, 984–1003. doi: 10.1111/1468–2427.12317.

Slezkine, Y. (1994) 'The USSR as a communal apartment, or how a socialist state promoted ethnic particularism', *Slavic Review*, 53:2, 414. doi: 10.2307/2501300.

Smith, D. M. (1996) 'The socialist city', in Andrusz, G., Harloe, M. and Szelenyi, I. (eds) *Cities after Socialism: Urban and Regional Change and Conflict in Post-Socialist Societies*, Oxford and Cambridge, MA: Blackwell, 70–99.

Star, S. L. (1999) 'The ethnography of infrastructure', *American Behavioral Scientist*, 43:3, 377–391. doi: 10.1177/00027649921955326.

Star, S. L. and Ruhleder, K. (1996) 'Steps toward an ecology of infrastructure: design and access for large information spaces', *Information Systems Research*, 7:1, 111–134.

Stephens, M. (2005) 'A critical analysis of housing finance reform in a "super"home-ownership state: the case of Armenia', *Urban Studies*, 42:10, 1795–1815.

Sýkora, L. (2009) 'New socio-spatial formations: places of residential segregation and separation in Czechia', *Tijdschrift Voor Economische En Sociale Geografie*, 100:4, 417–435.

Sýkora, L. and Bouzarovski, S. (2012) 'Multiple transformations conceptualising the post-communist urban transition', *Urban Studies*, 49:1, 43–60.

Szelenyi, I. (1987) 'Housing inequalities and occupational segregation in state socialist cities: commentary to the special issue of IJURR on east European cities', *International Journal of Urban and Regional Research*, 11:1, 1–8. doi: 10.1111/j.1468–2427.1987.tb00031.x.

Ter-Ghazaryan, D. K. (2013) '"Civilizing the city center": symbolic spaces and narratives of the nation in Yerevan's post-Soviet landscape', *Nationalities Papers*, 41:4, 570–589. doi: 10.1080/00905992.2013.802766.

Tonkiss, F. (2014). *Cities by Design: The Social Life of Urban Form*, Hoboken, NJ: John Wiley & Sons.

Topalian, N. and Petrosyan, S. (2015) 'Contrivances on Araratian Street: an ideology or an urban public space', in *Radical Space in between Disciplines*, Novi Sad.

UNECE (2004) *Country Profiles on the Housing Sector: Armenia*, New York: United Nations Publications.

Van Assche, K. and Salukvadze, J. (2012) 'Tbilisi reinvented: planning, development and the unfinished project of democracy in Georgia', *Planning Perspectives*, 27:1, 1–24.

Van Assche, K., Salukvadze, J. and Duineveld, M. (2012) 'Speed, vitality and innovation in the reinvention of Georgian planning aspects of integration and role formation', *European Planning Studies*, 20:6, 999–1015.

6 Post-Soviet 'nuclear' towns as multi-scalar infrastructures

Relating sovereignty and urbanity through the perspective of Visaginas

Siarhei Liubimau

Introduction

In this chapter, I argue that focusing on the Soviet nuclear industry from a Lithuanian perspective opens a fruitful angle toward nuancing existing operationalizations of 'post-socialist' in relation to the realities of urban infrastructural transformation after the USSR. In order to do this, I unpack three aspects of a specific mode of urbanization inherent to the Soviet nuclear industry that are helpful in defining the significance of the infrastructural dimension of both Soviet and post-Soviet state-society relations. These aspects are the 'nuclear' as a Cold War phenomenon, the 'nuclear' as an imperial phenomenon and the 'nuclear' as an exclusive Soviet welfare phenomenon. By contrasting these three aspects of the 'nuclear' and by grounding them in the particularities of the Lithuanian 'nuclear' town of Visaginas, I propose to discuss empirical realms and conceptual instruments that make it possible to look at the town's path after 1991 from the perspective of its future rather than of its past. Additionally, my modest expectation is that approaching a particular urban unit through this threefold analytical construct will enrich and supplement already existing influential conceptualizations of post-socialism in urban terms as a market-driven process of dis-embedding infrastructures and places from the dominance of modernist, centralized top-down planning (Collier, 2011; Sykora and Bouzarovski, 2012).

Visaginas is a town in Eastern Lithuania[1] that was built in the late 1970s and early 1980s as a part of the infrastructure for a large-scale strategic project of the USSR – the North-West United Power System (UPS). The North-West UPS incorporated four nuclear power plants (NPPs) – Chernobyl, Smolensk, Leningrad and Ignalina. All these NPPs were built with what, at the time, was the largest RMBK-type reactor in the world: a reactor that later, after the Chernobyl catastrophe in 1986, became widely recognized as unsafe. Seven kilometres away from the Ignalina Nuclear Power Plant (INPP), Visaginas was built just adjacent to the border with Belarus and in the close vicinity of the border with Latvia. Its sole function was to house the plant's workers and their family members. In the 1980s, the INPP had around 7,000 employees, while the number of Visaginas inhabitants was

close to 35,000 people. Lithuania's negotiations to join the European Union (EU) in 2004, however, required the country's commitment to decommission both units of the INPP reactor. These tasks were executed in 2004 and 2009, respectively. Thus, the INPP is currently on course to be fully dismantled by 2038, and for this purpose it employs around 2,000 people out of a current town population of 21,000 inhabitants.

In the given circumstances, the aim of this chapter is to address a crucial contradiction. On the one hand, the INPP is a key issue, one of the central factors that, beginning with the Chernobyl disaster in 1986, has shaped practices of Lithuanian state sovereignty on different historical stages. On the other hand, Visaginas' urbanity has been marginalized in locally grounded interpretations of post-Soviet transformations, and systematically reduced to a rupture that happened once and forever (Freimane, 2016). In the argument of this chapter, the deployment of the term 'infrastructure' in the conceptual context of early 21st-century discussions on urbanization processes provides a framework for an analytical narration of the Visaginas case as essentially combining these two contradictory elements. These discussions seek to overcome operationalizations of the 'urban' as a bounded unit: a settlement-type embedded into a territorialized nation-state system of production and distribution (Brenner, 2014; Schwarz and Streule, 2017). Instead, they endeavour to scrutinize urbanization as a multi-scalar process of the socio-territorial relational embeddedness of human habitat in a [neoliberal] world system. In this respect, in addition to the modernist understanding of urbanization as a process of concentration, Brenner and Schmid (2015, p. 162) introduce the terms 'extended urbanization' to designate the 'fundamental conditions of possibility for the production of historically and geographically specific forms of "cityness"', and 'differential urbanization' to indicate the creative destruction of inherited geographical and social configurations in relation to the broader developmental dynamics of capitalism (ibid., 2015, p. 168). The interpretation of nuclear technology, as resulting both in concentrated, extended and differential urbanization, enables empirical work on the built, social and symbolic environments of 'nuclear' towns as essentially multi-scalar infrastructures. It also provides an opportunity for going beyond hegemonic rupture when thinking about the INPP decommissioning, and thus also for this being of relevance to other cases of historically changing relations between city, industry and community. By adhering to the shared research purpose proposed by the anthropology of infrastructuring (Niewoehner, 2015) to identify relations between technology, actors and symbolic orders, I will attempt to suggest epistemic lenses for scale-sensitive analysis of urbanization related to the nuclear industry in the Soviet context.

The 'nuclear' as a Cold War phenomenon

Both historically and conceptually, the nuclear industry is a phenomenon that is homologous to Cold War politics and economy. The Cold War as a

largely unseen, strictly dichotomous and technologically all-encompassing conflict implied new notions of threat, new arguments about protection and new representations of the enemy. In these circumstances, nuclear technology was one of the central factors in defining this conflict in institutional and ideological terms. Since the nuclear industry presented an instrument of destruction on a totally new scale – with mutually assured destruction as its most dramatic scenario – it therefore also required a reorganization of statehood. Gabrielle Hecht explains the nuclear state and nuclear exceptionalism as conceptions that nuclear weapons are fundamentally different from any other type of weapons that have ever existed before (2006). Joseph Masco (2006, 2010) develops a notion that the mode of US statehood after World War II was crucially shaped by the nuclear arms race and by the centrality of the concept of planetary crisis. In technological terms, because the nuclear threat factor, this mode of statehood for the first time implied direct co-articulation with the entire globe, the earth as an integrated biosphere. This observation can equally be put into an institutional perspective and regarded as a situation wherein a new technological reality became pivotal for the realization of the US containment strategy. In developing this perspective, Masco comes to the notion of 'the nuclear' as inherent both to the logic of the nation-state embedded in fierce international competition on the one hand and to the understanding of the global as a 'post-national', fragile biosphere on the other. While internationally the US Eisenhower administration was promoting the peaceful and positive aspects of nuclear science, domestically the 'nuclear' state was characterized by a mode of sovereignty that supposes a normalization of a state of exception or a state of emergency (Masco, 2006).

In the USSR in the period of the early Cold War, the centralized developmental state generally established legitimization for itself via large-scale infrastructural projects that were expected to enable the further centralization and control of territory, people and production. The aftermath of World War II and the consolidated features of the Stalinist state determined the brutality of at least the first years of the development of the nuclear industry in the USSR. It was Gulag and war prisoners – often originally from areas where the dominant ethnicity was considered to be disloyal to the Soviet state – who did the most hazardous work in building emerging nuclear industry sites (Brown, 2013, 2015). The Special Committee, with Lavrentiy Beria at its head, curated the Soviet nuclear industry in the late 1940s and early 1950s. This organization was characterized by secrecy as well as by violence and repressive segregation. It formed part of the structure of the State Defence Committee, which in its turn was created specifically for the coordination of Soviet military, political and economic policy during World War II. The Special Committee was founded specifically for managing nuclear projects right after the Hiroshima bombing in 1945. From this perspective, the Soviet nuclear industry too was initially an element of warfare in a strict sense.

From the mid-1950s, Eisenhower's 'Atoms for peace' programme (1953), as well as the recognition that uranium ore is quite widespread and thus cannot be exclusively mastered as a secret commodity by a sole superpower (Hecht, 2006, pp. 324–325), made the nuclear industry a more civic and public issue. In the USSR, this coincided with a change of political course after Stalin's death and Beria's execution. Under Khrushchev as First Secretary of the USSR Communist Party, a new institutional agency responsible for the nuclear industry was founded in 1953. It was termed 'the Ministry of Medium Machine Building', and existed until the collapse of the USSR. Today, Russia's Federal Agency of Atomic Industry (Rosatom) is considered the successor to this institution. In the mid-1950s, the Ministry started the process of the formalization of the nuclear industry, its re-orientation towards commercial ends and its gradual internationalization. From the early 1950s, it started to be perceived and planned from an economic modernization perspective (Josephson, 1999). This significantly strengthened the position of nuclear scientists, giving them more autonomy in terms of scientific work and political decisions, and creating possibilities for their public heroization. As a result of these Soviet domestic and international power shifts, the first NPP was built in Obninsk in 1954. As early as the late 1950s, an agenda existed for spreading the civic nuclear industry to the Soviet republics (Josephson, 1999, p. 204). Another shift that the Atoms for Peace agenda brought about was the start of the USSR's cooperation with Eastern European states to build their own nuclear power plants in 1955.

In a crucial sense, the Cold War was a conflict mediated by the process of decolonization and the worldwide universalizing of nationalization. Science and technological development, and the nuclear industry in particular, essentially became the driving forces of this paradigm. In such a perspective, the Atoms for Peace agenda combined both ends – the access of decolonizing nation-states to nuclear technology for peaceful purposes, and the non-proliferation of nuclear weapons. In this respect, the Soviet republics and Eastern European states can be considered through the lens of post-colonialism. The military, political and technological formation of Soviet colonialism after World War II coincided with the rapid scientific, military and institutional development of the nuclear industry. The USSR started mining uranium in the German Democratic Republic (GDR), Czechoslovakia and Hungary right after the war, and fully controlled and dominated this process. However, as early as the 1970s, East European states could be at least partially autonomous. Schmid (2011) refers to the cases of Czechoslovakia and Romania choosing for themselves the types of reactor for their NPPs. Initially – because of USSR's commitment to the non-proliferation policy, according to the 1970 Treaty of the Non-proliferation of Nuclear Weapons – most of the equipment needed in Eastern European NPP construction projects was produced in the USSR. This defined the slow pace of their development. However, already by the 1980s, most of this

production was located outside the USSR (Schmid, 2011). The end of the Cold War, and the Chernobyl disaster prior to it, defined the fate of the nuclear industry and of related research and educational programmes in former USSR colonies. After 1989, most of the reactors built in Eastern European countries with Soviet participation were decommissioned, while the industry itself either stalled or was incorporated into the techno-political regime of the EU. From the perspective of the Cold War and of nuclear industry as its central technological factor, post-socialism therefore meant a growing prominence of the nuclear safety issue, instead of the issue of geo-political rivalry and military threat.

The 'nuclear' as an imperial phenomenon

Although incorporation into the techno-political regime of the EU was precisely the fate of the INPP (Stsiapanau, 2017), it is less certain whether the INPP project can be considered through a strictly post-colonial lens, – that is, through a lens that sees colonialism as an ambivalent project that both subjugated and empowered the colonized territory. If we take a post-colonial approach to Lithuanian rapid industrialization and urbanization under Soviet rule as a central constituent of nation-scale society formation, the particular case of the nuclear industry does not really comply with the logic of this process. Both technologically and institutionally, the nuclear industry in Lithuania was exceptional in relation to other industrialization and urbanization projects that equally belonged to the context of disrupted Lithuanian statehood but facilitated the nation-building process via colonial institutions and infrastructures that nurtured mass urban solidarities, identities and lifestyles (Davoliūtė, 2013; Ivanauskas, 2010). As is increasingly recognized, the colonial production of territory-society relations in Soviet republics in the 1950s and 1960s involved the spread of university literacy and bureaucratization, as well as a growing autonomy of both institutions and individuals. In the 1970s, these features became structural causes for a crisis of identification with the Soviet project and for resulting dissent. Later on, in the 1980s, they became the grounds for popular mobilizations against colonial rule with varying combinations of ethnic and civic components (Derluguian, 2005; Ivanauskas, 2014). In the context of the colonial production of territory-society relations in Soviet Lithuania, both the INPP and the town of Visaginas were literally exclaves of power and of professional and everyday culture. The local Lithuanian ethnic bureaucracy not only had no political leverage regarding this exclave, but also to a certain extent did not share a common language with those who were running it. Hence, when assessed in the broader process of the colonial making of Lithuania under Soviet rule, the INPP should be regarded as an imperial exclave rather than as a factor facilitating egalitarian nation-scale society.

Key decisions about the location, planning, building and operation of both the INPP and the town of Visaginas were indeed taken by the

Moscow-based Ministry of Medium Machine Building and, more specifically, by the Leningrad-based branch of an institute associated with this ministry – the USSR Scientific Research and Design Institute for Energy Technologies.[2] This institute was founded in 1952 and was responsible for the research and development of all types of nuclear reactors, including RMBK. Apart from this, at least in the 1970s, it was responsible for related systematic infrastructural development including city planning. It is possible to identify an isomorphic effect in the dimension of social infrastructure. Key positions in the Soviet nuclear industry, and at the INPP in particular, were occupied by specialists of Russian origin, educated and professionalized in Russian institutions. Moreover, Lithuania beyond the INPP was geographically, socially and discursively off the map of the professional socialization and culture networks to which Soviet nuclear scientists and engineers belonged. Physicists from the research institutes at the Lithuanian Academy of Sciences, as well as architects and planners from Vilnius and Kaunas institutes, had very limited possibilities for strategically influencing the process and primarily held roles of local implementers. Architects from the Lithuanian Urban Planning Institute designed only public buildings in Visaginas. Furthermore, both the town of Visaginas and the INPP were run as a single entity by the INPP director and legally were the property of the Ministry of Medium Machine Building and not of the Lithuanian Soviet Socialist Republic. Both were transferred from the Ministry to the Republic of Lithuania only in October 1991.

At the same time, in the national history of Lithuania of the last 30 years, the varying claims, constructions and legitimizations of state sovereignty have been essentially framed by the technological and political horizon of the nuclear industry. These produced and mobilized particular meanings of the INPP and the institutions that dealt with nuclear technology. The national independence movement, *Sąjūdis*, became massive and prominent largely as an environmentalist, anti-nuclear movement. It was formed on the wave of success of the ecology club, *Žemyna*, which gathered momentum after the Chernobyl disaster in 1986. *Sąjūdis* was formed in 1988 and consistently deployed nuclear technology as a target to reveal and criticize the harmful and unaccountable policies of various Moscow agencies in the Lithuanian context. An iconic event within this movement was the 'Ring of Life' in 1988: a meeting of tens of thousands of Lithuanians around the territory of the INPP with demands to stall it and to transfer its control to the Lithuanian Soviet bureaucracy. In such circumstances, the exclave nature of both the INPP and of Visaginas, their exclusivity and opaqueness for a broader and only recently massively urbanized society, as well as the growing doubts after the Chernobyl disaster about the modernizing mission of nuclear technology, made the INPP and Visaginas the locus from where Lithuanian national territorialization beyond the USSR was supposed to start. It is therefore revealing to compare the Lithuanian situation to that of Ukraine, where anti-nuclear protests were much less an issue of the

nationalizing state and did not directly imply ethnic mobilization against 'nuclear' loci. Jane I. Dawson explains this mainly through the fact of the general weakness of the national movement in Ukraine compared with that in Lithuania. She depicts the Ukrainian situation as structurally similar to the Lithuanian, – that is, one where local scientists and engineers had no say in the strategic decision making related to the nuclear industry, as well as one where there were no 'native' facilities for training nuclear scientists (Dawson, 1996, p. 67). However, one can object that, in comparison to Lithuania, Ukraine was much better integrated scientifically and industrially into the Soviet nuclear development agenda. This can be explained by the intensive 'pre-nuclear' development of physics in Ukraine, which created a basis for this Soviet republic to be later turned into the major field for nuclear development beyond the Russian Soviet Federative Socialist Republic (RSFSR). The biographical dimension of the history of the 'pre-nuclear' development and institutionalization of physics and of the related industrialization of Soviet Kharkov and Dnepropetrovsk in Ukraine can be found in Paul Josephson (1999, Chapter 7). For instance, the first director of the Scientific Research and Design Institute for Energy Technologies, Nikolay Dollezhal, was born in Ukraine and, before founding the institute, in the 1930s worked in high-ranking engineering and bureaucratic positions in Soviet Kiev and Kharkov. In this respect, because of the width and density of physics research and educational institutions, the intensive social infrastructure overlap between the RSFSR and Eastern Ukraine, and the intensive relations of physics institutions to local industry, the Ukrainian case did not so obviously constitute an opaque exclave for broader Ukrainian society, even after the Chernobyl disaster. In contrast to the Lithuanian situation, there are reasons to apply a post-colonial as opposed to an anti-colonial lens to the course of nuclear industry development in Soviet and post-Soviet Ukraine.

The INPP's story after 1991 is the course of the nationalization of an industry that had no predecessors in pre-Soviet political, technological or linguistic domains in Lithuania. The Lithuanian national institution responsible for the functioning of the INPP after independence was the State Nuclear Power Safety Inspectorate (VATESI). In this period, a persistent trope in broad public policy discussions over the plant's future was the issue of an inevitable dependency on Russian energy supply should the INPP be decommissioned. As evident in the results of surveys on the issue conducted in Lithuania in the 1990s and 2000s, 60–80 per cent of the population were consistently against the INPP's closure (Gaidys and Rinkevičius, 2008). Moreover, when a consultative referendum was held on the issue in 2008, 88.7 per cent of the voters were against the shutdown, but turnout (47.6 per cent) was not sufficient for the referendum to be valid. In 2012, the nuclear issue reappeared on the Lithuanian national agenda when another referendum was held on a new NPP in the Visaginas area. The new station was meant to be a joint international project between Latvia, Poland and

Lithuania, formed around a Hitachi-produced reactor. Voters, however, rejected the new NPP option – 64.5 per cent voted against its construction. In any case, in 1999, in the course of negotiations over accession to the EU, the Lithuanian state had already committed to the closure of both INPP units in 2004 and 2009 (Stsiapanau, 2017). The decommissioning of the INPP was unequivocally presented as an EU requirement on the basis of safety considerations. This whole process since 1990 implied both institutional and discursive attempts to scale the INPP down to the purposes of a nationalizing Lithuanian state. In light of these attempts, one can say that Lithuania's EU accession negotiations facilitated such a downscaling and enhanced the Lithuanian state's agency in the form of pooled sovereignty, i.e. one enabled by interconnections within a net of supra-national institutions.

In existing social history and anthropology depictions of this process of nationalization of the nuclear industry in Lithuania, as well as in arguments concerning its mechanisms, the Visaginas population is most often constructed as fully homologous to the INPP. Its current symbolic and emotional properties are therefore considered and interpreted almost exclusively in the perspective of the rupture of the INPP project and a resulting nostalgia (see *Butterfly City*, 2017; *Žalia pievelė* (2017). Analysis of local mass media narratives, as well as of town dwellers' narratives, enabled grounded arguments about industrial decline and Soviet nostalgia to emerge as key tropes of the town's semiosis in a broader web of the meanings of the Lithuanian transition (Baločkaitė, 2010, 2012; Šliavaitė, 2005; Storm, 2014). This tendency is not a product of the researchers' bias. Mono-functional and binary 'town/employer' thinking clearly dominates in the process of projecting future scenarios for Visaginas. As it is possible to observe, the most powerful discussed visions of new sources of employment and, more broadly, of attempts to reinvent Visaginas' urbanity are still projected as located outside the town and hence, as determined externally, in full analogy with the INPP. At the same time, not much attention is yet paid to actors in, and projects of, Visaginas' nationalization in ethnic terms that de facto destroy the hermetic relations between the town and nuclear technology. These actors and projects exist in the domain of attempts at history writing, and hence of the creation of identity-giving narratives that emphasize the pre-INPP history of the area. They can equally be found in the domain of institutional change – the gradual incorporation and assimilation of ethnic Lithuanian bureaucrats into municipal governing bodies. This new bureaucracy not only possesses no socialization experience in nuclear technology but often actually lives in other towns and has long-term experience of working in other areas. This group hence elaborates new practices and symbols of belonging to the place – for instance, emphasizing the quality of the integration of built and natural environments, or the quality of welfare institutions and infrastructures.

This widely perceived homology between town and nuclear power plant is amplified both in academic and public discourse by the fact that Visaginas is characterized by a multi-ethnic composition that is outstanding in the Lithuanian context. It is the town with the highest percentage of foreign-born inhabitants in the country (Valatka and Liubimau, 2016) and with a predominant usage of the Russian language. An eloquent example of Visaginas' exceptional status in this respect is the fact that after Lithuanian independence, when the law on Lithuanian as the national language was adopted, Russian was still granted the status of second official language in the town and at the INPP – formally as one of the official languages of the International Atomic Energy Agency. Indeed, to this day, the high professional status of INPP employees reinforces a high status of the Russian language spoken in the town. These ethno-linguistic features, as well as the technological peculiarity of the site itself, are today considered primarily as resources for memorialization. This does not leave much space for other meanings to be applied to the town and to the INPP, except of what exactly can be memorialized of it and how exactly this should be done (Ruseckaitė, 2016; Storm, 2014). At the same time, both despite and because of the exceptional history of the INPP and of Visaginas, there is still no town museum here. On the basis of observations of evolving initiatives in this direction, as well as of their assessment by town politicians and workers in the cultural sector, the question of how to relate the INPP history with that of the pre-nuclear period of the area is a hindering one.

This suggests that researchers today predominantly construct Visaginas through what it has lost. Meanwhile, there is no systematic work on establishing a multi-scalar interpretative horizon for this specific mode of urbanization that was caused by the project of Soviet nuclear development but retained key features in the context of Lithuanian statehood after that project ceased to exist. Looking at Visaginas in a multi-scalar perspective, one can see that the exceptional aggregation of technologies, material resources, human capital, and related lifestyles and values, as well as the establishment of a lasting isomorphism between all these, was strategically enabled by the Ministry of Medium Machine Building within its USSR-scale infrastructure. This Ministry, for its part, was an equally exceptional entity in the wider history of the USSR of the Cold War period. In the Soviet Union as an emerging superpower in a bipolar militarized globe (a 'closed world'), the Ministry of Medium Machine Building was called on to secure and strengthen the Soviet grip on the globe by advancing the most powerful military and civic technology. This global Soviet agenda thus nurtured a network of a multi-scalar essence, with very well-financed, exceptional and often secret or semi-closed urban infrastructures. In addition, these sites had highly scientifically advanced and technocratically disciplined populations where nuclear scientists and engineers were clearly the privileged professional group dominating all domains of the decision-making process. Nuclear towns were run

by the NPP's directors and administrations that were accountable directly to the Ministry of Medium Machine Building. The KGB and Komsomol strictly filtered those who were offered jobs in such towns, especially those who had direct contact with nuclear technology. Composure, sobriety and the internalization of the Soviet stance on the geopolitical realities of the Cold War were considered the mandatory virtues of such workers. Visaginas is just one example of Soviet nuclear infrastructures, and therefore its social history cannot be properly written without the reconstruction of its technological, infrastructural and biographical connections to other Ministry of Medium Machine Building locations. There is evidence that many people holding scientists' or engineers' positions at the INPP and living in Visaginas were previously employed in other 'nuclear' urban sites throughout the entire USSR.

In such a vein, this particular Ministry's projects are not so easily explained as phenomena of Soviet industrial modernity, forging egalitarian, urban and bureaucratized, nationalizing societies in the post-World War II period. The INPP and Visaginas are rather an imperial exclave phenomenon, in contrast to other large-scale infrastructural nationalizing state projects that required the massive employment of university-educated ethnic Lithuanian engineers and managers. Besides, the specificity of nuclear technology suggests that it is problematic to term the decommissioning of a nuclear power plant 'de-industrialization', because it takes much time and skilled effort to dismantle the technology, while some types of nuclear waste will foreseeably require thousands of years of professional management. Decommissioning is a long, open-ended process of generating or failing to generate individual and collective professional lineages and narratives of progress and hybridized identities, in line with opportunities provided by a partially rescaled infrastructural, scientific, educational and power geography of the Soviet nuclear industry after the end of the Cold War. Despite its apparent technological and political centrality in the recent history of Lithuania's regained independence, Visaginas and the INPP have been reduced to marginal themes in the public history of post-Soviet transformation in the Baltic States. Both in academic and artistic discourse, the closure of the INPP has been translated into a closure of future projections and reworkings of both the technology and the community of the town. Visaginas has been systematically used as an example of trouble in order to portray the drama of irreversible post-Soviet transition. In fact, one can hypothesize that it is precisely the attention paid to Visaginas' urbanity – with its particular centrally and externally planned constructed environment, as well as its particular centrally and externally assembled community – that made such marginalization possible.

The 'nuclear' as an exclusive Soviet welfare phenomenon

In the context of Visaginas' historically evolving environment, an important feature is that neither the town nor the surrounding area have any social

or constructed urban history prior to this particular Ministry of Medium Machine Building project. In this sense, it is a prime example of Soviet socialist urbanism in the Baltic States and Eastern Europe. It was built from scratch, in the forest, in just 15 years beginning in 1975, while an over-abundance of resources is one of the most recurrent themes in talks by specialists related to the planning process. The town was ambitiously projected in the shape of a butterfly, but only one wing was finished. It is characterized by a wide variety of high-quality public spaces, and is pedestrian friendly: there are no traffic lights in town. It typifies the 'return to nature' tendency in Soviet planning in the late 1970s. There is a very wide variety of types of USSR buildings from the 1970s and 1980s and, in this sense, it is jokingly called a 'zoo of Soviet modernist architecture' (Ruseckaitė, 2016). Visaginas is therefore taken primarily as an experimental case of Soviet urban planning, realized on a blank slate and therefore in its absolute form. Such an angle is reinforced by comparisons to other iconic cases of socialist urban planning in Poland, Estonia and Latvia (Baločkaitė, 2010, 2012; Cinis et al., 2008). In this respect, Visaginas is part of the arguments that portray nuclear towns as the utopian projects that came closest to the realization of Soviet ideals (Storm, 2014). Nuclear towns are sometimes discussed, in conditions broader than just the USSR, as similar to company towns, but ones that are owned by the government and thus exclude any possibility of private property. Such an interpretative line can be found in Kate Brown who researched the US case of Richland, Washington, as developing in parallel to Soviet Ozersk (originally Cheliabinsk-40 and Cheliabinsk-65) from the very start of the Cold War. Brown (2013, 2015) portrays nuclear towns as ones where dwellers had no civic or political authority, but where at least some of the dwellers were highly advantaged as consumers of goods and services. Focusing on the case of Ozersk, a city built to serve a plutonium plant from 1946, Brown shows that a Soviet nuclear town presupposed the zoning and division of its population into privileged ethnic Russians, as opposed to unprivileged ethnic minorities, prisoners, prisoners of war, etc. The first group performed safer jobs and enjoyed better living conditions and welfare, whereas the second group was forced to deal with the most hazardous tasks on contaminated ground. The first group lived in a closed city, while the second lived in camps and garrisons (Brown, 2015, p. 10). The first group is thus identified as properly 'nuclear', and the second as not 'nuclear'. Such a split in the city was not conceived from the beginning, but occurred during the process of dividing loyal Soviet citizens from those who were disloyal and undesirable. In the USSR context, such strict division was created by the path of the Soviet state from the 1930s and 1940s, and more precisely by the state's strategies to violently discipline the labour force, like passport laws in the 1930s and labour laws in the 1940s. The Soviet nuclear industry in this sense, despite the relative autonomy of the elite of physicists, developed in significant ways along the path of the Bolsheviks' state terrorist approach of segregation to managing its population. However, there are

arguments that the nuclear industry, both locally and internationally, generically implies such a strict segregation of activities that necessarily marks workers in this industry, and entire states, as either strictly 'nuclear' or as being merely related to the nuclear industry. The latter consist of low-skilled, hazardous, extractive activities, not legitimized as properly belonging to the 'nuclear' industry, and therefore not scrutinized as 'nuclear' in medical, political or economic dimensions. Discussion of this distinction as enacted and re-enacted in the course of the complex geopolitical process of the Cold War can be found in Gabrielle Hecht (2006).

Although Visaginas in the 1970s and 1980s still functioned as a semi-closed town (one had to get several permissions to settle there), it was already a product of another type of Soviet statehood – one that was more urbanized, bureaucratized and welfare oriented. Yet, even at this stage of the USSR, nuclear towns incarnated configurations of the welfare state that were very different in their essence from the universalizing tendency of welfare infrastructures created in wider society, i.e. not within exceptional or secret industrialization and urbanization projects. Several studies and interviews about the memories of dwellers of Soviet 'nuclear towns' depict them as spaces of abundance in the context of a broader environment of shortage. Chocolate, sausage and bananas are most commonly presented in such stories as those deficit goods that were steadily available to nuclear town dwellers, and therefore distinguished those dwellers from other Soviet citizens. The high social status of nuclear town dwellers, however, was a reward for agreeing with the normalization of the state of emergency, i.e. for loyal acceptance of hierarchical, technocratic governance by nuclear scientists and engineers, and with the internalization of the USSR's geopolitical agenda in the Cold War. As such, it is the global Cold War configuration, sustained by nuclear science and nuclear technology, that gave rise to such exclusive modernist urbanization projects.

What primarily attracts attention in Visaginas today is the underuse or decline of very high-quality school and kindergarten buildings that were and are considered major infrastructural achievements of Soviet modernity in the town (Ruseckaitė, 2016). This decline, however, paved the way for the most innovative efforts in town to re-tool and democratize its 'infrastructural lives'. The new activities that are injected into these modernist educational infrastructures are a mixture of work and heritage, education (courses and workshops), and leisure. In the Lithuanian context, these institutions and the buildings that host them represent exemplars of an advanced provision of welfare. These initiatives are not merely reuses of modernist welfare infrastructures. They are rather mash-ups of material infrastructures, pedagogical traditions and interpretations of past, everyday and popular cultures that define varying and competing regimes and meanings of education, leisure and heritage in the town. By introducing new functions and meanings to these places, such efforts in effect destroy the hermetic relations between the

INPP and the city. For the initiators themselves, their efforts create arenas of further learning and socialization in a scalar context that is more complex than the Soviet/post-Soviet rupture. On the one hand, these initiatives are predominantly dependent on EU funding. The town is still quite well invested in – something often interpreted, for political reasons, as compensation for the INPP closure. On the other hand, it is the community formed in Soviet times that predominantly sustains both the town's material and social infrastructure in totally new conditions (the EU-embedded Lithuanian nation-state). This can be considered a case of gridding and producing a habitual mode of statehood from below (Jansen, 2014), yet it is substantially dependent on supra-national institutions. There is, for instance, a conflict in town between those who expect cultural and educational institutions to be more alternative and those who work on ensuring continuity with the Soviet period on the levels of individual professional biographies and of valuation of cultural products.

Conclusion

The urbanity of Visaginas, which has served as the case for this study of 'nuclear' urban infrastructures in the post-Soviet context, has been diagnosed as resulting from the intersection of three dimensions of the Soviet nuclear industry. In the particular circumstances of post-World War II Lithuania, the Soviet 'nuclear' urbanization process has been considered an essentially Cold War phenomenon, as an essentially imperial phenomenon and as an essentially exclusive Soviet welfare phenomenon. All these dimensions of the Soviet nuclear industry have been discussed as interconnected in practice. The intention was to show that they produced a mode of urbanization and of Soviet state building that is critically different from the conventionally discussed features of Soviet industrial modernity in the Baltic States and Eastern Europe. The Cold War has been examined as a technological, institutional and ideological environment, sustained by a scalar framework that prioritized the scale of the vulnerable globe. In its specific USSR articulation, this scalar framework of global techno-political competition and containment via nuclear industry development implied the creation of an exceptional mode of urbanization – coordinated by the Soviet Ministry of Medium Machine Building and nurtured by this ministry's material and human resources. Visaginas and the INPP, as one of the sites where this mode of urbanization was territorialized, can be properly comprehended and studied only in connection with the ministry's other sites in the USSR. In comparison to other cases of Soviet nuclear colonialism, the Lithuanian case is particular, because it is characterized by only a very weak lineage of Soviet technologies and institutions related to nuclear development in the broader scientific and industrial landscape of the Lithuanian Soviet Socialist Republic. Both technologically and

socially, Visaginas and the INPP became an opaque exclave for Lithuanian society. Despite this, from the moment of the Chernobyl disaster in 1986, the INPP became the central focus of the process of the re-establishment of Lithuanian sovereignty. This process is more complex than the singular ruptures of Lithuania regaining independence and taking the decision to decommission the INPP in the course of integration into the EU. More attention should be paid to techno-social lineage, not only on the level of institutions and policies but also on the level of micro-interactions and socio-infrastructural mash-ups.

Acknowledgements

The author's research, on which this chapter is based, was generously supported by the Kone Fellowship at the Helsinki Collegium for Advanced Studies. I am grateful for comments on an earlier version of this paper to my colleagues at the European Humanities University – Benjamin Cope, Felix Ackermann and Miodrag Kuč.

Notes

1 Initially named 'Sniečkus' (after Lithuanian Communist Party leader Antanas Sniečkus).
2 NIKIÈT – Naučno-issledovatel'skij i konstruktorskij centr ènergotehniki.

References

Baločkaitė, R. (2010) 'Post-soviet transitions of the planned socialist towns: Visaginas, Lithuania', *Studies of Transitions States and Societies*, 2:2, 63–81.

Baločkaitė, R. (2012) 'Coping with the unwanted past in planned socialist towns: Visaginas, Tychy, and Nova Huta', *Slovo*, 24:1, 41–60.

Brenner, N. (ed.) (2014) *Implosions/Explosions: Towards a Study of Planetary Urbanization*, Berlin: Jovis.

Brenner, N. and Schmid, Ch. (2015) 'Towards a new epistemology of the urban?', *City*, 19:2–3, 151–182.

Brown, K. (2013) *Plutopia: Nuclear Families, Atomic Cities, and the Great Soviet and American Plutonium Disasters*, Oxford, UK: Oxford University Press.

Brown, K. (2015) 'Securing the nuclear nation', *Nationalities Papers*, 43:1, 8–26.

Butterfly City (2017) Directed by Černovaitė, O. (Film), Ireland: Planet Korda Pictures.

Cinis, A., Drėmaitė, M. and Kalm, M. (2008) 'Perfect representations of soviet planned space', *Scandinavian Journal of History*, 1–21.

Collier, S. J. (2011) *Post-Soviet Social: Neoliberalism, Social Modernity, Biopolitics*, Princeton, NJ: Princeton University Press.

Davoliūtė, V. (2013) *The Making and Breaking of Soviet Lithuania: Memory and Modernity in the Wake of War*, London and New York: Routledge.

Dawson, J. I. (1996) *Eco-Nationalism. Anti-nuclear Activism and National Identity in Russia, Lithuania, and Ukraine*, Durham, NC: Duke University Press.

Derluguian, G. M. (2005) *Bourdieu's Secret Admirer in the Caucasus. A World-System Biography*, Chicago, CHI: The University of Chicago Press.

Freimane, I. (2016) 'The centrality in and of Visaginas', in: Ackermann, F., Cope, B. and Liubimau, S. (eds) *Mapping Visaginas. Sources of Urbanity in a Former Mono-functional Town*, Vilnius, Lithuania: Vilnius Academy of Arts Press, 41–47.

Gaidys, V. and Rinkevičius, L. (2008) 'Černobylio baimė, pigios energijos nauda ar kai kas daugiau? Dvidešimties metų visuomenė s nuomonė s apie Ignalinos AE sociologiniai tyrimai Lietuvoje', *Filosofija. Sociologija*, 19:4, 102–111.

Hecht, G. (2006) 'Nuclear ontologies', *Constellations,* 13:3, 320–331.

Ivanauskas, V. (2010) 'The projection of the 'blossoming of the nation' among the Lithuanian cultural elite during the soviet period', *Meno Istorija ir Kritika*, 6, 172–178.

Ivanauskas, V. (2014) "Engineers of the human spirit' during late socialism: the Lithuanian union of writers between soviet duties and local interests', *Europe-Asia Studies*, 66:4, 645–665.

Jansen, S. (2014) 'Hope for/against the state: gridding in a besieged Sarajevo suburb', *Ethnos,* 79:2, 238–260.

Josephson, P. (1999) *Red Atom. Russia's Nuclear Power Program from Stalin to Today*, Pittsburgh, PA: University of Pittsburgh Press.

Masco, J. (2006) *The Nuclear Borderlands: The Manhattan Project in Post-Cold War New Mexico*, Princeton, NJ: Princeton University Press.

Masco, J. (2010) 'Bad weather: on planetary crisis', *Social Studies of Science,* 40:1, 7–40.

Niewoehner, J. (2015) 'Infrastructures of society, anthropology of', in: *International Encyclopedia of the Social and Behavioral Sciences*, Second Edition, 12, 119–125.

Ruseckaitė, I. (2016) 'Visaginas – a zoo of soviet architecture? An interview with Marija Drėmaitė', in: Ackermann, F., Cope, B. and Liubimau, S. (eds) *Mapping Visaginas. Sources of Urbanity in a Former Mono-functional Town*, Vilnius, Lithuania: Vilnius Academy of Arts Press, 35–39.

Schmid, S. D. (2011) 'Nuclear colonization?: soviet technopolitics in the second world', in: Hecht, G. (ed.) *Entangled Geographies: Empire and Technopolitics in the Global Cold War*, Cambridge, MA: MIT Press, 125–154.

Schwarz, A. and Streule, M. (2017) 'A transposition of territory: decolonized perspectives in current urban research', *International Journal of Urban and Regional Research*, 1–17.

Šliavaitė, K. (2005) From pioneers to target group: social change, ethnicity and memory in a Lithuanian nuclear power plant community, in: *Lund Monographs in Social Anthropology*, 16, doctoral dissertation, Lund University.

Storm, A. (2014) *Post-Industrial Landscape Scars*, Basingstoke, UK: Palgrave Macmillan.

Stsiapanau, A. (2017) *Lithuania – Short Country Report,* HoNESt: History of Nuclear Energy and Society Available at: www.honest2020.eu/sites/default/files/deliverables_24/LT.pdf (accessed 12 December 2018)

Sykora, L. and Bouzarovski, S. (2012) 'Multiple transformations: conceptualizing the post-communist urban transition', *Urban Studies,* 49:1, 43–60.

Valatka, V. and Liubimau, S. (2016) 'Comments on the socio-geographical specificity of Visaginas in the context of Lithuania', In: Ackermann, F., Cope, B., and Liubimau, S. (eds) *Mapping Visaginas. Sources of Urbanity in a Former Monofunctional Town*, Vilnius, Lithuania: Vilnius Academy of Arts Press, 29–33.

Žalia pievelė (2017) Directed by Jonas Tertelis and Kristina Werner (Theatre) Lithuania: Lithuanian National Drama Theatre.

7 Green infrastructure in post-socialist cities

Evidence and experiences from Eastern Germany, Poland and Russia

Dagmar Haase, Diana Dushkova, Annegret Haase and Jakub Kronenberg

Introduction

This chapter discusses the current state of, changes to and future prospects of green infrastructure (GI), using examples from an Eastern German, a Polish, and a Russian city. Urban GI – that is, not only forests, parks, semi-natural areas and reused brownfield sites but also gardens, cemeteries, pocket parks, green roofs and green walls – present a complex picture in post-socialist cities across Europe. Because of strongly hierarchical, non-democratic societal structures and limited financial budgets during the period of state socialism, green spaces in cities were resources of very strict top-down planning, but which included participatory elements. Political and economic transition after 1989 brought fundamental change to cities, urban societies and also urban nature. This change embraced a reduction of air and water pollution and ecological restoration of water courses in parts of cities, but also diverted more attention to urban green spaces as places for physical and mental recreation, aesthetics, urban history and biocultural diversity. Post-socialist cities underwent periods of population decline and shrinkage while urban brownfield sites were transformed into new parks, gardens and interim use open spaces. In some of the post-socialist countries, urban gardening became fashionable among young urbanites including those involved in guerrilla gardening and community activism. Traditional allotment gardens and summer cottages came under pressure from those new uses. Faced by reurbanization, many post-socialist cities experienced a sort of balancing act between regrowth, new construction and in-fill development on the one hand, and the preservation and enhancement of green spaces and green infrastructure on the other. This chapter presents three case studies ranging from 'the west' to 'the east' of the post-socialist world: Leipzig, Łódź and Arkhangelsk.

Green infrastructure in European cities with a focus on post-socialist cities

As highlighted in the introduction of this book, infrastructures 'make' a city in various ways, involving the biophysical and material but also the image and meaning of a city both as a place to live and to identify with (Tuvikene et al., this issue) and a place to be, to sense and to make (Schetke et al., 2010). The concept of GI in cities has become increasingly important and prominent in the past decades, namely in an era when climate change and its impacts have been largely discussed in urban policy (Davies et al., 2015). GI is a cutting edge concept for cities across the different disciplines and spheres of science, policy, planning and governance. It is understood as a strategic approach to develop '…an interconnected network of green space that conserves natural ecosystem values and functions, and that provides associated benefits to humans' (Benedict and McMahon, 2006, p. 321). In other words, ecosystem services and benefits are provided and enabled through a network of GI in cities.

GI components, ranging from larger woodland and nature areas, private gardens, and sustainable urban drainage systems to green roofs and balconies, are not only seen as biological or biophysical units, but also considered from the point of view of their interactions with people in the city and their place in human ideas, imaginations and appreciations of urban nature (Elands et al., 2015; Vierikko et al., 2017). In a practical sense, urban GI represents a planning approach or planning instrument aimed at creating networks of multifunctional green space in urban environments (Elands et al., 2015) for people in places and place-making by people as a reflexive concept (Vierikko et al., 2017). Thus, GI is considerably different from what we have so far understood as 'grey' or built urban infrastructure by being part of urban nature, consisting of living organisms but at the same time being designed and maintained by society.

The focus of our chapter is on the role, development and function of urban GI in post-socialist cities. We explore the nexus between the nature, design and thinking about GI on the one hand and post-socialist urban change in cities of the post-socialist world on the other.

Historically, most cities in Europe were almost devoid of green spaces, but were comparatively small and most people lived in the countryside. It was not until the 1850s that the importance of parks or gardens for urban dwellers was recognized to some extent (Dankowska et al., 2017; Swanwick et al., 2003). This attitude dramatically changed during industrialization as urban populations began growing enormously and living conditions worsened in such a way that spaces for public recreation became key for restoring and maintaining the labour force and public health (Breuste et al., 2016). Land was acquired by city governments and large parks were created which, until today, characterize many capitals and large cities in Europe: Hyde Park in London, many 'Volksparks' in German cities, the

Tiergarten Park in Berlin, the Prater Park in Vienna, the Pushkin Park in Moscow and the Slots-Kungsparken in Malmö, to list just a few.

Today, urban green spaces are seen as essential for well-functioning, healthy and liveable cities because they: (1) play a recreational role in everyday life; (2) contribute to the conservation of biodiversity in the urban world; (3) contribute to the cultural identity of the city and of its residents; (4) help maintain and improve the environmental quality (such as of soil, air and water) of the city; (5) bring natural solutions to technical problems (e.g. sewage treatment) in cities (Nesshoever et al., 2017; Swanwick et al., 2003) and, (6) make cities stronger in mitigating and adapting to climate change, warming, heat waves and summer droughts (Scheuer et al., 2017).

Since the 2010s, the current rural-to-urban migration in almost all regions of Europe, the international migration and influx of young people into large and capital cities, related pressures for new flats and housing opportunities and, last but not least, the functioning of neoliberal land policies and real estate markets have placed green spaces in danger of getting smaller in size or being developed or privatized and thus becoming exclusive to private use. Scholars and practitioners test the potential and implementation of GI systems for ecological, social and economic sustainability and resilience in increasingly polarizing urban contexts, namely in growing (Kabisch and Haase, 2014) and shrinking cities (Haase et al., 2014), the latter being particularly important for post-socialist cities. Moreover, these strands are linked to current debates on public and open spaces in cities in general (Rall and Haase, 2011; Vierikko et al., 2017) and forms of civil, bottom-up appropriation of open spaces (community gardening, interim use, etc.) in particular (see also Zupan and Büdenbender, this issue).

Three case studies in Eastern Germany, Poland and Russia

Leipzig, Eastern Germany

Leipzig, situated in the eastern and former socialist part of Germany, represents a 'city of extremes' (Rink, 2015). The city underwent a long phase of shrinkage, beginning in German Democratic Republic (GDR) times but most massively in the 1990s when it lost 20 per cent of its inhabitants (100,000 people) because of job losses, a remarkable decrease in birth rates and residential suburbanization into the city's periphery (Nuissl and Rink, 2005). By 2000, Leipzig had become the 'capital city of housing vacancy' with about 20 per cent of its flats vacant (Rink et al., 2011). Moreover, the city had thousands of brownfield sites due to industrial decline: in its urban region, the lignite coal industry left many pits and a partially destroyed landscape. From 2000 onwards, shrinkage came to a halt and, since 2010, Leipzig has seen dynamic regrowth of more than 2 per cent per year (Kabisch et al., 2016a; Wolff et al., 2016).

Of course, this extreme development had impacts on existing GI, open spaces, brownfield and greyfield sites as well as on green planning

and greening strategies. Leipzig has an enormous natural heritage with a floodplain forest running through the city that provides an element of urban GI containing many different ecosystem services. Leipzig also features a diversified blue infrastructure, namely rivers and their wetlands, but also large post-mining lakes in the south of the city that are much less well known than the floodplain forest.

During the socialist period, GI such as new parks in the city's core was developed and/or enlarged mainly in the 1950s and 1960s, for example, the centrally located Clara-Zetkin Park that was shaped according to a Moscow blueprint. Newly erected housing estates were planned with green spaces, although of limited quality. By and large, urban GI suffered increasingly from under-maintenance in the later decades of the GDR, and GI also suffered through industrial fallouts and pollution. The bad environmental situation was a crucial reason for out-migration from Leipzig since the 1960s, which made the city a shrinking one long before the political changes of 1990.

Post-socialist transformation brought an almost complete de-industrialization that led to massive job losses (80,000) but also to a sudden improvement of the environmental situation (decontamination and a decrease in air pollution as kinds of positive side effects; see Haase et al., 2014) and new priorities and strategies for urban development towards greater environmental quality and a greener, more liveable city. Thanks to transfer money received by Eastern Germany after 1990, the economic decline following political transformation did not lead to a cut in welfare as in other post-socialist countries. From an environmental perspective, the post-socialist transformation thus offered a lot of relief, chances and new opportunities (Haase et al., 2014; Püffel et al., 2018; Rall and Haase, 2011). Urban sustainability and urban-regional greening strategies became overarching goals of policy-making and planning, and main targets of funding. Massive shrinkage, abandonment and de-densification created a specific situation for the development of urban GI and greening strategies in Leipzig. The high number of brownfield sites (numbering some 3,000 in 2007, among them sites of 30 hectares and more as a result of demolition of housing since 2000, Rink et al. 2011, p. 52), as well as housing and commercial vacancies, represented a challenge for restructuring but, at the same time, a chance for greening. Simultaneous to renaturation and the shaping of new green areas, residential and commercial suburbanization in the mid-1990s led to new soil sealing and construction of transport and commercial infrastructure in Leipzig's hinterland (Nuissl and Rink, 2005).

After 1990, an overall improvement of GI in the city including the hinterland took place. A 'green belt' around the city was created, which included the renaturation of former lignite coal mining sites as new water landscapes, and also demanded the active cooperation between urban and regional actors.[1] Many of the above-mentioned brownfield sites saw green reuse through the creation of new parks and other green uses (Figure 7.1), while existing parks were enlarged, restructured and improved, and water landscapes such as the

Karl-Heine-Chanel were completely restructured and made accessible for walkers, cyclists and boaters (Stadt Leipzig 2017, pp. 43–47). 'Green' interim uses, such as urban community gardens, playgrounds and urban agriculture experiments (e.g. the millennium field for Urban EXPO 2000), and new forms of use, such as urban afforestation areas, were set up (Rink and Arndt, 2016; Rink and Behne, 2017; Figure 7.1). Interim uses were legalized by a specific instrument, the so-called licence agreements, an informal planning tool to regulate limited term public-use of private property while still maintaining the owner's building rights (Rall and Haase, 2011).

For realizing these projects, new cooperation between municipal and civic society actors was established. Greening strategies helped to reuse abandoned or post-demolition spaces, keep residential neighbourhoods attractive and improve quality of life. Some of the projects, such as the urban forest experimentation project (Rink and Arndt, 2016), were explicitly linked to sustainability and climate change adaptation goals. Other projects, such as the millennium field, became prominent examples of brownfield reuse during Leipzig's involvement in the EXPO 2000. Generally, the phase of early reurbanization that followed the period of shrinkage from around 2000 onwards was one of experimentation and innovation. In this vein, GI became a deliberate strategy for quality of life improvement. Massive public investment in GI and the environment made Leipzig one of Germany's large cities with the best living conditions.

Since 2010, Leipzig represents one of the hubs of urban (re)growth in Germany. The city has seen yearly growth rates of more than 2 per cent during those years. Today, we see re-densification instead of de-densification. Less dense or green plots of land, as well as open space in general, have come under the pressure of high-density reuse (Haase et al., 2017a, pp. 17–18). Interim uses especially are under pressure: some 25 per cent of those areas are already rebuilt and many others will follow (Rall and Haase, 2011). Additionally, community gardens that contributed to the upswing of neighbourhoods and attracted new inhabitants have to move constantly because of displacement. Traditional allotment gardens could also become endangered in the future by the demand for new building areas. At the same time, both green and blue infrastructures are increasingly deliberately employed in restructuring and in new housing construction projects. New growth thus endangers some green qualities and standards that were achieved in the period of shrinkage. Simultaneously, first signs of 'green inequalities', due to city-wide segregation processes related to new, expensive and 'green' housing projects, have emerged, mostly in the most attractive inner-city districts.

'New thinking' and planning priorities from the period of shrinkage, which had a stronger focus on green reuse of lots and areas that were unlikely to be rebuilt, lost their importance almost immediately as the city started to regrow. Interests once again follow the logics of the market and maximum benefit. This is all the more true because the municipality is (despite new

Figure 7.1 New urban green spaces resulting from brownfield conversion after 1990: the Lene-Voigt-Park named after Leipzig's famous dialect writer making the place a post-socialist legacy with new meanings for recreation and health as well as a place of cultural heritage of the city (left); newly created green spaces in Leipzig: urban forest (centre); and spontaneous green interim use (right) after the demolition of former built structures

Source: A. Haase

growth) poor and depends on private investment (Haase et al., 2017b). In this context, public ownership of space and good arguments for keeping public green spaces in the inner city are crucial for their maintenance. For this purpose, the city of Leipzig elaborated a new green space strategy in 2017 (Stadt Leipzig, 2017). This is particularly important because GI on privately and individually owned houses or land patches is increasingly displaced by the construction of new houses.

Private use of green and blue infrastructures serves mostly only those who can afford to live in new housing complexes, revitalized lofts, etc. Within the past years, the urban green-health nexus has become more in focus because of increased traffic, pollution and health problems arising from exposure and a lack of greenery along main roads with heavy traffic loads (Kabisch et al., 2014). Another threat to GI and sustainability goals in Leipzig is its long-term austerity policy and the commitment of the city to get rid of municipal debts by 2037 (Haase et al., 2014).

At the moment, Leipzig finds itself in a puzzling situation: the city benefits from a good image whereby GI plays an important role but is under pressure because of new growth. The main question will be how opposing interests will be negotiated in the future. The post-socialist 'legacy' of the city still works as an ingredient of what we see today. On the one hand, post-socialist shrinkage and the related land/building abandonment were partly turned into new green areas. On the other, its location in Eastern Germany makes Leipzig, despite its high attractiveness, one of Germany's cheapest large cities in terms of housing and living costs, which now attracts further inhabitants thus causing re-densification and increased pressure on green infrastructure. The case of Leipzig is specific because of a combination of post-socialist changes and a simultaneous integration into Western German and European political and institutional structures. It is also specific because of massive state funding to improve the environment, and green and blue areas.

Łódź, Poland

Łódź is the third largest city in Poland, 140 km south-west of Warsaw. It currently has around 700,000 inhabitants, down from 850,000 in 1989. The area of the city is 293 km^2 and, depending on which green space categories are included, the share of green spaces in the city area is between 13 per cent and 60 per cent (Feltynowski et al., 2018; Kabisch and Haase, 2014; Figure 7.2), the latter including arable land, orchards, brownfields, etc. Regardless of which measure we use, the share of green spaces in the city area has been shrinking with the ongoing socio-economic transition since 1989 (Feltynowski et al., 2018; Kabisch and Haase, 2013).

Łódź, and especially its city centre, is widely perceived as grey and neglected, and it suffers from unsatisfactory environmental health indicators. Green spaces in Łódź are under constant pressure from the development of infrastructure and other priorities (Kronenberg, 2015). The potential

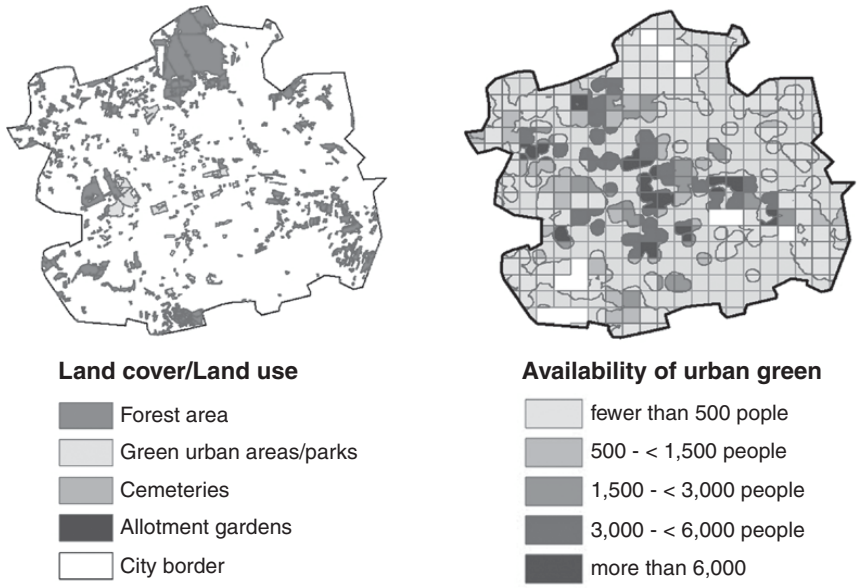

Figure 7.2 (left) Urban green space of Łódź in the Urban Atlas database; (right) Availability of urban green space and forest areas of a minimum size of 2 ha to urban inhabitants living within a 300 m distance using detailed Urban Atlas data

Note 1: Urban Atlas only defines forest area and green urban areas

Note 2: Only those grid cells that are shaded are within this distance. The respective colour of those grid cells represents the number of people living in that grid cell. Calculation is based on GEOSTAT 1 km² grid and Urban Atlas land cover data

Source: Kabisch et al., 2016b

for green spaces to improve the quality of life for urban inhabitants has only recently begun to be recognized by local authorities (Giergiczny and Kronenberg, 2014). Much of this pressure is due to the reintroduction in Poland of a free market economy in 1989. The freedom to purchase land and houses has brought about socio-spatial changes in post-socialist cities, with suburbanization, fragmentation of ecosystems and gentrification of certain areas (Marcińczak and Sagan, 2011; Tsenkova and Polanska, 2014).

Despite rapid growth in the 19th century and at the beginning of the 20th, Łódź remained relatively compact until the beginning of the 21st century, with rather clearly designated functional zones and extensive agricultural areas (Dzionek-Kozlowska et al., 2018). During the socialist period, GI was under-maintained in the core city, whereas relatively large green spaces were established in the newly erected housing estates (Kronenberg et al., 2017b). Green spaces also increased because of enlargement of the city boundaries (Kronenberg et al., 2017b). After 1990, Łódź's development was focused on economic restructuring and strongly market-oriented. Shrinkage and

abandonment led to the emergence of many brownfield sites in Łódź's industrial areas, and suburbanization both outside and within the city borders led to new sealing and a decrease in green space (Kronenberg et al., 2017b). The baseline planning document for the city was 'The study of land use conditions and directions' (the master plan), which to some extent secured, until 2009, the compact character of Łódź as well as protected zones of ecosystem service delivery located around the city. Since 2016, national law has automatically released agricultural land within urban boundaries from productive functions and related protections, and simplified the procedures for acquiring building permissions. This reinforced urbanization, which earlier proceeded along roads and around existing suburban settlements, and later affected agricultural land around forests and in proximity to areas of protected landscapes, reserves and river valleys.

Also, earlier local zoning plans were repealed in 2003 as part of the reform of the spatial planning system. As a result, at the end of 2016, only about 15 per cent of the area of Łódź was covered by new local zoning plans and, in the remainder, construction decisions are still been made ad hoc based on very simplistic criteria with priority given to any sort of investment. As a result, despite a shrinking population, urban sprawl has accelerated, supported by the general favourability of suburbanization by Polish policy.

Officially, authorities focus on inner city development, making use of post-industrial land and other brownfields. In 2014, the city initiated a large urban revival project, which focuses on the historical centre of the city with an overall objective to improve living conditions. In practice, the project focuses on restoring historical buildings and densifying the urban tissue, again in an attempt to make the city centre more attractive and encourage people to live there rather than move outside. In addition, there is a series of large-scale investment projects being carried out in the city centre around the reconstructed railway station. Unfortunately, these large projects, similar to most of the revitalization plans and many other smaller municipal investment projects, neglect blue-green infrastructure and significantly contribute to paving the city.

Street greenery and green spaces in residential areas provide a particularly relevant example of the loss of green infrastructure components in Polish cities in general and in Łódź in particular (Kronenberg, 2015). According to official data, the number of new trees planted in Łódź per year more than doubled between 2010 and 2015. However, it was only in 2015 that the number of planted trees slightly exceeded the number of removed trees for the first time. Young trees planted in Polish cities survive an average of ten years. Therefore, even planting as many trees as those that are removed does not ensure replacement, not to mention the differences in benefits offered by large removed trees and small, newly planted ones (Łukaszkiewicz, 2013).

To make matters worse, there is no inventory of street trees in Łódź and management practices in the city centre are largely restricted to removing trees that are deemed 'in bad condition' or related to new infrastructural

developments. Compensation plantings are ordered only when healthy trees are removed and these mostly take place outside the city centre. Although previous legal documents downplayed the significance of urban trees and urban green spaces in general (Kronenberg, 2015), new regulations introduced at the beginning of 2017 by the populist government have further loosened the legal protection of urban trees and green spaces.

Moreover, some green spaces are under particular pressure because they are seen as relics of the socialist past. In particular, this concerns allotment gardens, which are often seen as wastelands and potential investment areas by those who promote a 'modern' vision of the city. Moreover, as allotments are often used by underprivileged social groups, their interests are rarely voiced in public discussions.

All the above reflects how neglected green spaces have been in policy and especially decision making in Łódź to date. Even parks that seem to be the best-protected green spaces in the city centre are subject to threats such as road construction or encroaching residential buildings (Haase et al., 2017b). This has taken place despite several important research projects focused on urban green and blue infrastructures undertaken by research institutes and non-governmental organizations (Giergiczny and Kronenberg, 2014; Kronenberg et al., 2012; Ratajczyk et al., 2017). Since the beginning of the 21st century, such research and knowledge dissemination activities have helped to introduce concepts of ecosystem services and blue-green infrastructure to planning documents in Łódź.

At the same time, there have been attempts to promote and better preserve GI in Łódź. The most prominent of these attempts was the formulation of the Blue-Green Network concept in the mid-2000s, which suggested that Łódź should invest in the rehabilitation and restoration of its 18 rivers, and that these should serve as green and blue corridors that would connect the inner city with peri-urban zones. Interestingly, the rivers are not present in public awareness because most of them – at least in the city centre – are hidden in underground culverts or other channels. Bringing them to public awareness, and hypothetically also to daylight, has been crucial for discussions regarding GI. However, although this concept has been welcomed by most if not all stakeholders, and has been formally included in several planning documents, very little has happened to implement it in practice (Kronenberg et al., 2017a). Quite to the contrary, as indicated by the aforementioned examples of urban sprawl and ongoing urban revival activities, GI is hardly considered and never as an interconnected system.

In short, the post-socialist context has made the maintenance and development of urban GI difficult because it has brought about the neglect of public interests and the high political prioritization of private interests. Even though there is already considerable knowledge and data on urban GI, and on the related social preferences in Łódź, this knowledge is not reflected in public decision making. To the contrary, factors such as limited budgets, inadequate regulations, neoliberal orientation and poor collaboration

between different stakeholders contribute to the further loss of GI. External initiatives, such as the European Union requirement to produce urban climate adaptation strategies, are often seen as an irrelevant and unnecessary burden rather than an opportunity to contribute to improved quality of life and to making the city more attractive for its inhabitants. Still, since 2012, when the city adopted its Integrated Development Strategy 2020+ (City of Łódź Office, 2012), and as a result of public pressure to include environmental issues in this strategy, there is hope that more attention will gradually be paid to urban GI in decisions and documents. As shown by recent urban revival strategies, however, city authorities are still reluctant to use existing knowledge and translate it into practical decisions regarding the conscious use of urban GI.

Arkhangelsk, Russia

Arkhangelsk is one of the oldest cities on the Arctic Coast which, compared with the majority of other Northern Russian cities that were founded primarily at the beginning of the 20th century, received city status in 1584 when it was the most important seaport of medieval and early-modern Russia – hence its status as 'gateway to the Arctic'. Today, Arkhangelsk is one of the largest seaports in Northern Russia and an important centre of saw mills, timber, shipping and the fishing industry (Feklistov, 2014). In both the Stalin and Khrushchev periods, the typical residential stone houses were built and prevail even today. The political transition after 1990 brought with it a phase of extreme uncertainty and decay: residents waited for many years for the state to decide on renovations and new flats, but nothing ever came to fruition (Belyaev et al., 2010). The lack of funding hindered any work that was to be done on the ageing wooden houses and, in turn, worsened living conditions. Under such circumstances, greening ideas and projects are without lobbying power and have little chance of being realized. These circumstances are quite similar to those in other post-socialist countries and cities, and make Arkhangelsk a very illustrative and knowledge-contributing case to the discussion on 'post-socialist greening'.

Historically, Arkhangelsk had only a small number of parks. As far back as the 18th century, the areas surrounding housing were 'greened' largely thanks to foreigners who began to improve their neighbourhoods (Belyaev et al., 2010) using trees and shrubs for decoration, for example. At the beginning of the 20th century, the first general plan was created and industrial areas, residential areas, the city centre and also open spaces were defined. In the years following World War II, activists established the All-Russian Society for the promotion and protection of urban green spaces, which became an important environmental movement. Available green space for all was one of the essential goals of urban planning in the Soviet Union. Most of the green spaces in Arkhangelsk were established during the Soviet period. Furthermore, per capita and minimum size targets of public

green space were developed for each settlement according to population size and geographical conditions. According to those targets, Arkhangelsk, a city belonging to the population category of between 250,000 and 500,000 inhabitants, should have 34.4 m^2 of green space per capita. To accomplish this target, extensive greening took place including the construction of large parks and squares. Green targets are therefore not only an instrument of the post-socialist period but have been deeply rooted in town planning of Russian cities for decades.

Per capita green space in the city significantly increased during the Soviet period, namely from 2 m^2 (1850) to 18–25 m^2 (1950–1960) to its maximum in the 1970s of 37 m^2. However, in the early post-Soviet period, per capita green space declined to 27 m^2 in the 1990s and to 19 m^2 in the 2000s. This correlates with population growth and the new construction boom that included new houses for the upper-middle class as well as shopping malls and commercial space. Population and commercial growth also resulted in extreme air pollution, mainly from the pulp and paper industry, and thus former green spaces were not only built on but, additionally, became themselves sources of pollution (after having been built).

The development of urban greening in state socialist Arkhangelsk came about from the need to solve three key problems in the city: to provide for safe sanitary conditions and aesthetics of the urban environment; to create places where citizens could spend leisure time in an outdoor setting; and to shape opportunities for people to meet and communicate (Dushkova et al., 2016). The strategy of greening the streets of Arkhangelsk reduces transport emissions by up to 35 per cent. Furthermore, green spaces (especially under trees) trap 20–80 per cent of dust and minimize the overall noise level up to 25 per cent (Babich et al., 2008; Feklistov, 2014). Coniferous trees, the dominant type of trees in Arkhangelsk next to deciduous ones, reduce the strength and speed of wind in the winter up to 10 times (Dushkova et al., 2016). This is of great importance because the frequency of weather with wind forces of more than 4–5 m/s (i.e. the threshold of negative physiological changes in the human organism) in Arkhangelsk is very high. Urban green space contributes to a 25 per cent reduction in mortality rates relating to respiratory diseases: citizens and especially children from districts with higher green areas per capita have fewer respiratory diseases like asthma and bronchitis than their neighbours from 'green-poor' districts (Dushkova et al., 2016). Green spaces also contribute to mental health, ecological education and fostering of a feeling of home among citizens (Dushkova et al., 2016).

Greening projects during the Soviet era were often carried out without taking into account ecological aspects and long-term management. This led to inhabitants of these new neighbourhoods being obliged to take care of the courtyards and backyards, squares and parks themselves. For this purpose, voluntary get-togethers of city residents, known as '*subbotniks*' (taking place on Saturdays) and '*voskresniks*' (on Sundays), appeared to improve or

Figure 7.3 Public participation in greening during subbotniks: (left) 1938, (right) 2014

Sources: (left) Old Arkhangelsk, (right) Diana Dushkova

clean up green spaces (Figure 7.3). Such 'social cohesion practices' aimed to contribute to the ecological and sanitary improvement of the affected green spaces and surrounding residential areas while, at the same time, promoting collectivism as the main purpose of public life within the major leitmotif of state socialism (Ignatieva et al., 2013).

Arkhangelsk today has a population of 350,982. Accounting for an area of 10,334 ha, public green spaces and parks make up 35 per cent of the city's total area, or 29.9 m^2 per capita (City Administration of Arkhangelsk, 2015). Arkhangelsk has a higher percentage of green space compared with other Northern Russian cities, only 'topped' by Murmansk (56.5 per cent) and Petrozavodsk (44 per cent). According to Arkhangelsk's general plan, the total green space shall expand to at least 3,446 ha of which 1,050 ha, or 36.2 per cent, still need to be converted. Statistically, Arkhangelsk can be considered a green city because of its large number of parks, gardens, squares, boulevards, green areas and urban forests. However, the past decades of transition have led to the deterioration of many parks because of a lack of finances and new in-fill constructions. While the legacy of the Soviet park tradition based on communist ideology is still apparent, there is a large discrepancy between what green spaces have remained and what are needed today.

The new general plan for Arkhangelsk, established after 1991 by the urban planning department, focuses on the ongoing process of urbanization leading to an increase of anthropogenic pressure on existing urban green areas and the worsening of the ecological situation in the city. The protection of existing green areas from development and the growing demand for parking represent the greatest challenges for Arkhangelsk's central districts since their establishment by Peter the Great. Those districts that were created during the Soviet era have a higher amount of green area compared with the

central districts. However, these green areas need extensive repair and modernization after decades of neglect. New residential areas constructed over the past few years often completely lack green space (Feklistov, 2014).

According to the city's general plan for future development (2009), one of the main tasks is the increase of green space by 70 per cent in relation to the actual total area. However, maintaining existing parks comes at the expense of local and supplemental budgetary funds allocated for the improvement of districts, and is thus partly weak. Given the lack of funding, greening and landscaping are sporadic and characterized by an almost complete lack of coordination among departments dealing with green areas and other related issues. Conflicts often occur because of differing needs within the urban planning strategy. However, such a governance perspective is extremely relevant to the improvement of the urban environment.

After the fall of state socialism and the establishment of a post-Soviet capitalist regime, urban space has been characterized by an extreme privatization, the exclusion of citizens from decision making regarding spatial development and use, and a strict control of space by local authorities and business elites. Despite a liberalization and internationalization of values and consumption practices, the legacy of the Soviet era still shapes Arkhangelsk's modern urban culture and the identity of its citizens – for example, the residents' appreciation and use of green spaces for aesthetic inspiration, recreation, sanitation and social encounters, or the continued practice of subbotnik. The green spaces continue to be places for everyday social interaction among city dwellers. At the same time, they are places of contestation where ecological activists protest against the demolishing of green areas for new building projects. Thus, current urban planning in Arkhangelsk is often challenged by different perceptions of urban space – either as a home and environment for local people to live, or as a place for investment and new housing and commercial projects.

Today, Arkhangelsk needs new ideas for finding a balanced way to navigate its history and traditions, and it also needs innovations in the planning, design and management of urban landscapes. From its experience with the development of green areas during Soviet times, Arkhangelsk has considerable potential regarding the creation of a sustainable green infrastructure that could enhance the quality of urban life. The example of Arkhangelsk illustrates that citizens need to take an active role in greening and environmental protection actions. There is some well-founded hope that environmental concerns will become a part of mainstream strategies of urban development throughout the entire country in the future.

Conclusion

The cross-case study comparison presented in this chapter offers a full range of interesting findings that bring the discussion of GI in post-socialist cities forward, showing both similarities and differences, all of which have legacies

and path dependencies in the post-socialist past of the respective countries. In the following, we summarize these findings in four premises that we wish to bring into the discussion:

1) There is no single post-socialist case or type or pattern. The comparison of the three cases shows that there are three different contexts and distinct pathways of post-socialist transformation that the cities have followed within the past decades. However, in all three cases, we have the legacy of the state socialist past that interferes with or has an impact on the way post-socialist transformation has emerged and developed. While the characteristics of this relation between legacy and transformation are different across the cases, the fundamental structure of elements or ingredients of recent change are of the same nature.
2) A common characteristic between the cases is the fact that, during the post-socialist period, multiple changes occurred at the same time and in a very short period of time. Post-socialist change as such gave way to new problems, such as rapid and rushed privatization or the withdrawal of state action and planning. But new opportunities also arose, such as the development of a civic society and the transformation of fundamental mindsets and values, as well as developments in living and housing standards. This multiplicity of change and co-existence of both new problems and chances had an impact on all policy fields in post-socialist cities, including GI development and management. Arkhangelsk is distinct from the two European case studies in that more continuity in GI planning was apparent than in Germany and Poland.
3) When looking more closely at GI development and management, we can identify slightly different developments in the three different settings. The Leipzig case is somewhat different from the other two cases in that the transformation period began with German reunification that brought new political, legal and institutional settings overnight, plus EU membership. Leipzig's development has been characterized by massive shrinkage in the 1990s and reurbanization and dynamic regrowth since 2010. The restructuring, decontamination and renaturation activities that occurred after 1990 were massively funded by the EU and particularly the national state, the latter dissimilarly to any other post-socialist context. While the 'extreme development' since 2010 favoured green solutions in the time of shrinkage, recently green spaces have come under more pressure due to increasing demand for construction space. The main question today is how opposing interests will be negotiated in the future and what remains from the 'legacy' of the post-socialist shrinkage period that produced new green areas such as parks, community gardens or interim use open spaces like pocket parks. Compared with Leipzig, Łódź and Arkhangelsk – although the latter to a lesser extent – have shown since the early 1990s what impact a more market-oriented and neoliberal approach to restructuring has

had on the cities, urban societies and GI development – which seems quite typical for many post-socialist countries in Eastern Europe except the former GDR (see also Hirt, 2012). GI was not a priority for transformation, and qualities that were created during state socialist times were sometimes lost because of a lack of maintenance, use, care and demand during the times of restructuring, reorganization and social harshness in the 1990s. Nevertheless, there are enormous potentials for the future, and it has become clear that civic society especially can make a strong contribution to making cities greener and more healthy, perhaps with support from the municipalities but also in the absence of such municipal strategies and efforts. Nevertheless, EU initiatives, such as the guidelines for urban climate adaptation strategies or the NATURA 2000 programme, are predominantly perceived as 'extramural', irrelevant and unnecessary burdens, rather than as opportunities to contribute to improved quality of life and catalysts for making cities more attractive for inhabitants. Compared with other cities, GI development in Arkhangelsk had already begun in pre-socialist times and was actively shaped in socialist times and later, exhibiting more continuity in urban governance than in Leipzig or in Łódź. A similarity between Leipzig and Arkhangelsk is the engagement of civil society in GI maintenance and stewardship, which we can also understand as a remnant from socialist times (subbotniks) and thus the function of GI management as a carrier of social norms, place making and identification (Andersson and Barthel, 2016).

4) The quality of green spaces in the three cities varies considerably in terms of shape, biodiversity, functions and use. At least in Leipzig and Łódź, land use pressure in the inner cities is high and green spaces are perceived to a certain extent as reserve land for investment purposes, so cheap and straightforward 'green solutions' (e.g. lawns and fast growing heat- and drought-resistant trees) are preferred because they serve to achieve municipal targets such as per capita green space or green space accessibility minimums. Quality criteria, such as species composition, structural diversity or the preference of native plants or animals, rarely play a role. Setting these notions against what we have written in the introduction to the chapter – that GI is a place maker and identity creator in cities – the 'economic view' on GI being a functioning unit of the urban matrix rather than a living element of nature that has an impactthrough its diversity could become completely lost, and with it the ecosystem services that GI could provide. Finally, regarding the links between GI development and post-socialism, all three case studies show that GI can be looked at as a mirror of societal development, and that it reflects major determining factors and influences of post-socialist societies. All developments that emerged in the case studies are, until today, connected to the early phase of transformation or at least bear some of its legacies. When compared with other types of urban infrastructures, GI is no

exception with regard to the outline of change as a mosaic of prevailing, new and hybrid structures, uses and mindsets. The increased interest in and importance of GI as an indicator for 'green thinking' and healthy solutions to urbanization problems in scientific and public debates is not a specific post-socialist phenomenon, but rather categorizes our three cities as typical examples of European cities, or cities anywhere in the world, being urged to cope with increased needs and demands for a greener and more healthy environment on one hand, and with the constraints of scarce municipal budgets and limited land availability, as well as general trends in market-driven urbanization, on the other.

Acknowledgements

We wish to thank our colleagues from the FP7 collaborative project GREENSURGE (FP7-ENV.2013.6.2-5-603567), the BiodivERsA project ENABLE (COFUND 2015–16) and the Horizon 2020 innovation action CONNECTING (COproductioN with NaturE for City Transitioning, Innovation and Governance; No 730222-2) for fruitful discussions and comments.

Note

1 See Grüner Ring Leipzig. Available at: https://gruenerring-leipzig.de (accessed 25 November 2018)

References

Andersson, E. and Barthel, S. (2016) 'Memory carriers and stewardship of metropolitan landscapes', *Ecological Indicators*, 70, 606–614.

Babich, N., Zalewska, O. S. and Travnikova, I. G. (2008) *The Exotic Species in Green Building of Northern Cities*, Arkhangelsk: State technical University.

Belyaev, A., Varfalomeev, A. and Freiberg, A. (2010) 'Urban planning evolution of Arkhangelsk and Severodvinsk', *Vestnik of Arctic (Northern) State University*, 2, 5–9 (in Russian).

Benedict, M. A. and McMahon, E. T. (2006) *Green Infrastructure: Linking Landscapes and Communities*, Washington, DC: Island Press.

Breuste, J., Pauleit, S., Haase, D. and Sauerwein, M. (2016) *Stadtökosysteme. Funktion, Management und Entwicklung*, Berlin: Heidelberg Springer.

City administration of Arkhangelsk (2015) *The State of Environment in the Municipality of Arkhangelsk in 2014*, Arkhangelsk (in Russian).

City of Łódź Office (2012) *Integrated Development Strategy for Łódź 2020+*, Łódź: City of Łódź Office.

Dankowska, A., Haase, D. and Haase, A. (2017) 'Urbane Gärten – Alles Kraut und Rüben?', *Garten und Landschaft*, 3, 12–19.

Davies, C., Hansen, R., Rall, E., Pauleit, S., Lafortezza, R., De Bellis, Y., Santos, A. and Tosics, I. (2015) 'Green infrastructure planning and implementation', *Green Surge*, Report 5.1.

Dushkova, D., Haase, D. and Haase, A. (2016) 'Urban green space in transition: historical parks and Soviet heritage in Arkhangelsk, Russia', *Critical Housing Analysis*, 3:2, 61–70. doi:10.13060/23362839.2016.3.2.300.

Dzionek-Kozlowska, J., Kowalski, K. and Matera, R. (2018) 'The effect of geography and institutions on economic development: the case of Lodz', *Journal of Interdisciplinary History*, 48:4, 523–538.

Elands, B., Wiersum, F., Buijs, A. and Vierikko, K. (2015) 'Policy interpretations and manifestations of biocultural diversity in urbanized Europe: conservation of lived biodiversity', *Biodiversity and Conservation*, 24:13, 3347–3366.

Feklistov, P. A. (ed.) (2014) *Environmental Problems of the Arctic and Northern Territories*, Arkhangelsk (in Russian).

Feltynowski, M., Kronenberg, J., Bergier, T., Kabisch, N., Łaszkiewicz, E. and Strohbach, M. (2018) 'Challenges of urban green space management in the face of using inadequate data', *Urban Forestry and Urban Greening*, 31, 56–66. doi:10.1016/j.ufug.2017.12.003.

Giergiczny, M. and Kronenberg, J. (2014) 'From valuation to governance: using choice experiment to value street trees', *AMBIO,* 43, 492–501. doi:10.1007/s13280-014-0516-9.

Haase, D., Haase, A. and Rink, D. (2014) 'Conceptualising the nexus between urban shrinkage and ecosystem services', *Landscape and Urban Planning*, 132, 159–169.

Haase, D., Haase, A. and Rink, D. (2017a) 'Change and persistency: understanding social-ecological transition in a post-socialist city – the example of Leipzig, Germany', in Frantzeskaki, N., Coenen, L., Castán Broto, V. and Loorbach, D. (eds) *Urban Sustainability Transitions*, London and New York: Routledge, 257–271.

Haase, A., Wolff, M. and Rink, D. (2017b) 'From shrinkage to regrowth. The nexus between urban dynamics, land use change and ecosystem service provision', in Kabisch, S., Koch, F., Gawel, E., Haase, A., Knapp, S., Krellenberg, K. and Zehnsdorf, A. (eds) 'Urban Transformations – Sustainable urban development towards resource efficiency, quality of life and resilience', *Future City Series*, 10, Springer, 197–219.

Hirt, S. A. (2012) *Iron Curtains: Gates, Suburbs and Privatization of Space in the Post-Socialist City*, Chichester: Wiley.

Ignatieva, M., Melnichuk, I. and Bashkirov, A. (2013) *St. Petersburg: Towards Integrated and Sustainable Green Infrastructure. The Nature of Cities*, New York: Sound Science LLC, No. 1, 56–59.

Kabisch, N. and Haase, D. (2013) 'Green spaces of European cities revisited for 1990–2006', *Landscape and Urban Planning,* 110, 113–122. doi:10.1016/j.landurbplan.2012.10.017.

Kabisch, N. and Haase, D. (2014) 'Just green or justice of green? Provision of urban green spaces in Berlin, Germany', *Landscape and Urban Planning,* 122, 129–139.

Kabisch, N., Qureshi, S. and Haase, D. (2014) Urban nature: human-environment interactions in urban green spaces – contemporary issues and future prospects. *Environmental Impact Assessment Review*, 50, 25–34.

Kabisch, N., Haase, D. and Annerstedt van den Bosch, M. (2016a) 'Adding natural spaces to social indicators of intra-urban health inequalities among children – a case study from Berlin, Germany', *International Journal of Environmental Research and Public Health*, 13, 783. doi:10.3390/ijerph13080783.

Kabisch N., Strohbach M., Haase D. and Kronenberg J. (2016b) Green space availability in European cities. *Ecological Indicators*, 70, 586–596. doi.org/10.1016/j.ecolind.2016.02.029.

Kronenberg, J. (2015) 'Why not to green a city? Institutional barriers to preserving urban ecosystem services', *Ecosystem Services*, 12, 218–227. doi:10.1016/j.ecoser.2014.07.002.

Kronenberg, J., Bergier, T. and Maliszewska, K. (2012) 'Overcoming barriers to the use of ecosystem services for sustainable development of cities in Poland', *Ekonomia i Środowisko*, 42, 106–120.

Kronenberg, J., Bergier, T. and Maliszewska, K. (2017a) 'The challenge of innovation diffusion: nature-based solutions in Poland', in Kabisch, N., Korn, H., Stadler, J. and Bonn, A. (eds) *Nature-Based Solutions to Climate Change Adaptation in Urban Areas*, Berlin: Springer, 291–305.

Kronenberg, J., Krauze, K. and Wagner, I. (2017b) 'Focusing on ecosystem services in the multiple social-ecological transitions of Lodz', in Frantzeskaki, N., Castán Broto, V., Coenen, L. and Loorbach, D. (eds) *Urban Sustainability Transitions*, London and New York: Routledge, 331–345.

Łukaszkiewicz, J. (2013) 'Replacement tree planting in cities: key problems related to administrative decisions', in Bergier, T., Kronenberg, J. and Lisicki, P. (eds) Nature in the City – Solutions, Sustainable Development Applications, Krakow: Sendzimir Foundation, 27–37.

Marcińczak, S. and Sagan, I. (2011) 'The socio-spatial restructuring of Łódź, Poland', *Urban Studies*, 48, 1789–1809. doi:10.1177/0042098010379276.

Nesshoever, C., Assmuth, T., Irvine, K. J., Rusch, G. M., Waylen, K. A., Delbaere, B., Haase, D., Jones-Walters, L., Keune, H., Kovacs, E., Krause, K., Külvik, M., Rey, F., van Dijk, J., Vandewalle, M., Inge Vistad, O., Wilkinson, M. E. and Wittmer, H. (2017) 'The science, policy and practice of nature-based solutions: an interdisciplinary perspective', *Science of the Total Environment*, 579, 1215–1227.

Nuissl, H. and Rink, D. (2005), 'The "production" of urban sprawl. Urban sprawl in Eastern Germany as a phenomenon of post-socialist transformation', Cities, 22, 2, 123–134.

Püffel, C., Haase, D. and Priess, J. (2018) 'Mapping ecosystem services on brownfields in Leipzig, Germany', *Ecosystem Services*, 30:A, 73–85.

Rall, E. D. and Haase, D. (2011) 'Creative intervention in a dynamic city: a sustainability assessment of an interim use strategy for brownfields in Leipzig, Germany', Landscape and Urban Planning, 100, 189–201.

Ratajczyk, N., Wagner, I., Wolanska-Kaminska, A., Jurczak, T. and Zalewski, M. (2017) 'University's multi-scale initiatives for redefining city development', *International Journal of Sustainability in Higher Education*, 18, 50–62. doi:10.1108/IJSHE-05-2015-0089.

Rink, D. (2015) Stadt der Extreme, Leipziger Blätter, Sonderheft: Leipzig wächst, Leipzig.

Rink, D. and Arndt, T. (2016) 'Investigating perception of green structure configuration for afforestation in urban brownfield development by visual methods – A case study in Leipzig, Germany', *Urban Forestry,* 15, 65–74.

Rink, D. and Behne, S. (2017) Grüne Zwischennutzungen in der wachsenden Stadt: Die Gestattungsvereinbarung in Leipzig', *Statistischer Quartalsbericht*, 39–43.

Rink, D., Haase, A., Bernt, M., Arndt, T. and Ludwig, J. (2011) 'Urban shrinkage in Leipzig, Germany', Research Report, EU 7 FP Project Shrink Smart (contract no. 225193), WP2, *Helmholtz Centre for Environmental Research – UFZ*, Leipzig.

Schetke, S., Haase, D. and Breuste, J. (2010) 'Green space functionality under conditions of uneven urban land use development', *Land Use Science*, 5:2, 143–158.

Scheuer, S., Haase, D. and Volk, M. (2017) 'Fastest-growing urban areas as hotspots of change: 20th century climate trends and urbanization call for co-management of global change in cities', *PLoS ONE,* 12:12, e0189451. doi: 10.1371/journal.pone.0189451.

Stadt Leipzig (2017) *Freiraumstrategie der Stadt Leipzig – Lebendig grüne Stadt am Wasser.* Available at: www.leipzig.de/news/news/freiraumstrategie-der-stadt-leipzig-vorgestellt/ (accessed 24 July 2017)

Swanwick, C., Dunnett, N. and Woolley, H. (2003) 'Nature, role and value of green space in towns and cities: an overview', *Built Environment*, 29:2, 94–106.

Tsenkova, S. and Polanska, D. V. (2014) 'Between state and market: housing policy and housing transformation in post-socialist cities', *GeoJournal*, 79, 401–405. doi:10.1007/s10708-014-9538-x.

Vierikko, K., Niemelä, J., Elands, B., Buijs, A., Haase, D., Kabisch, N., Kowarik, I., Fischer, L., Luz, A., Olafsson, S. A., Andersson, E., Száraz, L. and Konijnendijk van den Bosch, C. (2017) 'Considering the ways biocultural diversity helps enforce urban green infrastructure in times of urban transformation', *Current Opinion in Environmental Sustainability*, 22, 7–12. doi:10.1016/j.cosust.2017.05.001.

Wolff, M., Haase, A., Haase, D. and Kabisch, N. (2016) 'The impact of urban regrowth on the built environment', *Urban Studies*, 54:12, 2683–2700. doi.org/10.1177/0042098016658231.

8 Moscow urban development

Neoliberal urbanism and green infrastructures

Daniela Zupan and Mirjam Büdenbender

Introduction

Moscow has changed dramatically in recent years (Büdenbender and Zupan, 2017a; Kalyukin et al., 2015). Yet today, less than a decade after Moscow's current mayor Sergey Sobyanin announced a new programme for Moscow's urban development – from construction-driven to more human-focused – the first tensions in this new urban approach can already be observed. Members of the public question the honesty and motives of the agenda in intense public debates, while at the same time the city is increasingly struggling to finance its ambitious plans.

This chapter therefore sets out to systematically examine key aspects of Moscow's current model of urban development and to identify causes for its underlying tensions. To do so, we build on a previous study in which we argued that Moscow's transformation in the past years is a quintessential case of neoliberal restructuring (Büdenbender and Zupan, 2017a). In this chapter, we advance this argument through the lens of green urban infrastructures. While green infrastructures include a broad range of open spaces that a city provides for its population – including parks, sport facilities, cemeteries, green belts, areas for allotment gardens (Rusche et al., 2015) – we will focus exclusively on parks. We do so because parks have developed into new frontiers for commercialization, they are places where neoliberal subjects are forged, 'participatory' urban development is celebrated and cities' global competitiveness is negotiated. This is particularly visible in many of Moscow's flagship projects that we examine here. Considering their centrality in Moscow's neoliberal urbanism, we argue that parks are not only material urban infrastructures performing a variety of urban functions (e.g. recreational, environmental, sanitary), but have also become devices for the expansion of neoliberalism. Therefore, they function as infrastructures in a more metaphorical sense with very real effects for the urban environment and its inhabitants.

This chapter adds two contributions to the existing scholarship on post-socialist cities. First, we interrogate parks as infrastructure for neoliberal urbanization – an aspect that has thus far received insufficient attention.

Here it is important to note that we study both new parks and existing ones that are currently being 'upgraded'. In particular, our examples are Gorky Park, VDNKh and Zaryadye. Second, we engage with the malleability of green urban infrastructures in terms of their socio-material, symbolic and political functions and meanings. The chapter therefore focuses on political agendas, rather than the everyday life dimensions and performances of neoliberal urbanisms. Both foci finally lead back to our initial aim: to interrogate the tensions and contradictions built into the current dynamics of neoliberal urbanization in Moscow.

The study is based on a mix of qualitative research methods. We undertook a document analysis based on secondary literature and primary sources, such as government, professional and media publications (specialized journals on urban planning and design, planning documents, blogs, and published and unpublished reports). We also gathered information in person at the Moscow Architecture Biennale 2014 and the Moscow Urban Forum 2014. Furthermore, we conducted 12 in-depth, semi-structured interviews with academics, urban planning practitioners, policy actors and urban critics in Moscow.

The chapter is structured in five parts. Section 2 engages with the state of the art on green infrastructures and neoliberalism in post-socialist cities. In Section 3, we analyse green infrastructures in Moscow, presenting Sobyanin's park strategy as a key arena of neoliberal urbanism and a stage of its continuous reconfiguration. Section 4 identifies emerging tensions in the contemporary strategy and discusses their underlying causes, while Section 5 makes some concluding remarks.

Theoretical framework

The mobilization of sustainability discourses and associated green policies has been shown to be an important dimension of neoliberal urbanization in cities across the globe (Heynen et al., 2007). 'Green neoliberalism' (Gareau, 2011) opens up new frontiers of capital accumulation and depoliticizes deeper issues surrounding the commodification of nature and human-induced environmental degradation. For instance, environmentally urgent issues such as reforestation and climate change mitigation are separated from the mode of production and class relations that have produced them in the first place. Mechanisms such as carbon trading platforms create new markets but shift attention away from deeper political issues of political responsibility and the (un)desirability of the commodification of nature (Felli, 2015). Active environmental policies and interventions such as river restoration, the clean-up of old industrial sites or 'eco-investment' in public transport have been shown to be important in re-imagining and re-branding cities to open up actual urban spaces for new waves of investment (Heynen and Perkins, 2005; Keil, 2002). Green urban infrastructures in particular are often considered a cheap 'sustainability fix' by which urban governments

and growth coalitions rework urban environments and ecologies to sustain their own dominance and safeguard the interests of capital (Davidson, 2013; While et al., 2004). Indeed, parks and other green infrastructures are considered to make cities more attractive and liveable places, drawing people and investments to urban centres (Gulsrud et al., 2013). Rather than preventing economic development, the green infrastructure idea therefore tends to complement neoliberal agendas (Matthews et al., 2015). While the idea that urban sustainability can serve competitive capitalism is nothing new, recent studies found that it 'gains new momentum in urban politics as the green economy is nowadays considered as a very profitable sector that may replace the previous industrial sector' (Rosol et al., 2017).

Even though green neoliberalism has thus received considerable scholarly attention in the context of Western European and North American cities, there is a relative lack of research within the field of post-socialist urban studies. To be sure, there is significant scholarship addressing the processes involved in public space transformation (for an overview, see Kalyukin et al., 2015) and some works tracing the history and function of green infrastructures in post-socialist cities (Åkerlund and Schipperijn, 2007; Dushkova et al., 2016). Studies on Moscow, for example, tend to focus on the loss or degradation of green urban infrastructures (Blinnikov et al., 2006; Zaykova, 2016). Still, so far there is relatively little critical discussion of the role of green infrastructures in processes of neoliberal urbanization in post-socialist cities. One exception is the work by Kalyukin et al. (2015), in which they analyse the transformation of Moscow's Gorky Park since 2011, presenting it as a case of neoliberal reconfiguration.

This gap is particularly problematic because it can be assumed that the functions of green infrastructures in Russia have undergone fundamental transformations since the inception of market relations. The interplay between neoliberalism and what is mostly referred to as 'socialist legacies' has been framed differently in the literature on post-socialist cities (for an overview, see Büdenbender, 2017, pp. 23 f., 48). We follow Golubchikov et al. (2014, p. 624) who suggest that, in the context of global capitalism, 'the spatial legacy of state socialism should be re-imagined as the very infrastructure of neoliberalization, within which neoliberal capitalism becomes embedded and which it uses for accumulation'. Thus, even when retaining their socialist-era appearances, these legacies 'are now fundamentally subordinated to, and cater for, capitalist immediacies and are, accordingly, rendered a rather different ideology, meaning and significance than in the past' (ibid., p. 623).

While Moscow's parks therefore form parts of the city's actual material infrastructure, they can also become the infrastructures through which dynamics of commercialization and neoliberalization can be unfolded. It is important to note, however, that we do not consider neoliberalism an all-encompassing and totalizing force. Instead we understand neoliberalization to be partial, messy, contradictory and contested. Neoliberalism is both a

conscious elite project and the (un-)intentional performance of everyday life practices, which tend to perform differently from envisaged or expected 'on the ground'. Seen from this perspective, cities are important laboratories and battlegrounds for power struggles and central resistance sites of and to neoliberalism (Leitner et al., 2007; Swyngedouw et al., 2002). Hence, while neoliberalization unfolds in cities – not least through its parks – the context-specific limitations of and to this process might open up opportunities for counter-dynamics.

The politics of parks and Moscow

Parks are not a new topic in Moscow's urban development. Indeed, many of the parks that are currently being restructured have their origins in the Soviet period. The Central Park of Culture and Recreation (Gorky Park), for example, was built in 1928. Gorky Park was regarded as a prototype for a new kind of socialist park and became a model for many of the urban parks that were developed all across the Soviet Union (Kulikov and Ostrogorsky, 2013, p. 108; Shaw, 2011, p. 343). The park was supposed to radically improve the organization of recreation and entertainment – a place for the proletariat to relax, politically develop and socialize with the proletarian collective (Varshaver, 1932, cited in Kulikov and Ostrogorsky, 2013, p. 108). Also, parks were considered stages and media of political agitation and ideological propagation (Kulikov and Ostrogorsky, 2013, p. 108). Thus, emulating the example of Gorky Park, urban green spaces across the Soviet Union were planned as powerful cultural factories, combining political, educational and fitness functions on a mass scale (ibid.).

When socialism collapsed and countries underwent fundamental political and economic restructuring, concerns about urban nature and greening became relegated to the bottom of policy priorities (Dushkova et al., 2016). Indeed, as was the case with public spaces more generally, parks were relatively neglected from an urban planning perspective. They often served as grounds for spontaneously formed informal markets that were selling anything from home-made food to imported goods. In the case of Moscow, this did not automatically mean that green spaces were entirely ignored by the city administration. Instead, the city considered them as underutilized spaces for future construction and commerce (Kulikov and Ostrogorsky, 2013, p. 109). For instance, the city passed a resolution for the construction of a music hall, hotel and underground parking complex in Gorky Park in 2006. When it became clear that the city did not have the capital to realize the project on its own, it developed a concept that would allow external investors to buy up to 75 per cent of the park (ibid.; Aminov, 2007, 2010). Only after public outrage did the city abandon these plans. Instead, it announced its intention to create a platform in the park where representatives of opposition parties and movements could hold discussions and rallies (Aminov, 2010).

In many ways, the popular protest and the officials' intervention in the development of Gorky Park are representative of the changing role of parks in Moscow's urban development in the past decade. Another indicator of such a trend was the 2008 exhibition, Arch-Moskva, which was themed 'Urban Space' and focused on the shift from architecture to the wider urban environment. Foreign experts were invited to showcase experiences from 'the West' with public spaces including fancy parks, bike lanes and river embankments. However, the exhibition did not reflect the interests of Moscow's powerful mayor, Yuri Luzhkov, and his associates in the real estate industry, who were mainly concerned with erecting glass and steel skyscrapers and elite housing. The renovation of the Tsaritsyno Park in Moscow was possibly the greatest investment in green infrastructure and the biggest exception to the general disregard for public spaces under Mayor Luzhkov. Yet, it was framed in populist terms as an adventure destination for families, thus reflecting the mayor's mix of pro-market and populist welfare policies known as the 'Luzhkov compromise' (Büdenbender and Zupan, 2017a; Samutina and Zaporozhets, 2014).

While the first signs of a new appreciation for parks therefore date back to the Luzhkov administration, a real shift in green space policy-making took place when Sergey Sobyanin became Moscow's new mayor. Indeed, it was only then that parks became a strategic element of Moscow's urban development model. This was made explicit when Sobyanin visited neglected parks in Moscow in 2010, stating that the current situation would neither satisfy the needs of tourists and visitors nor reflect the pride of Moscow: 'We should develop world-class parks so that we may pride ourselves on them' (Sobyanin, cited in RIA novosti, 2010, our translation). Further, he stated that a new strategy for parks and recreational zones should be set up, and promised public hearings for the city's largest parks and competitions (ibid.). This can be considered the start of the special city programme for developing parks. Accordingly, the 'Gosudarstvennaya programma goroda Moskvy – Razvitie industrii otdycha i turizma na 2012–2018 gody' (State programme for the city of Moscow: development of the recreation and tourism industry in 2012–2018) was set up first in 2011 and from then on extended and prolonged (Mos.ru, 2011). This programme comprised the aim of creating and renovating more than 100 objects of greenery in the following years, including parks, boulevards and playgrounds (see also Belov, 2013, p. 171). More than 115 billion roubles were allocated from the city's budget for realizing this ambitious programme (ibid.).

This strategy for green spaces was understood as a key element in Moscow's new programme of becoming 'a city comfortable for life' (Pravitelstvo Moskvy, 2014) and can be assumed a central element of Sobyanin's neoliberal urbanism. In our previous work (2017a), we identified three key functions of neoliberal urban policies. Applying this framework to Moscow allowed us to assess the city's evolution over the past two and a half decades from the vantage point of neoliberalization. The three

dimensions comprise: making a city globally competitive (place-making); making the urban economy conducive for investment (space-making); and creating responsible, entrepreneurial city dwellers (scripting). They are also instructive for examining and evaluating Moscow's recent park strategy.

Parks – new icons in the global city competition (place-making)

In the mid 2000s, the lack of a comprehensive urban development vision in Moscow under Mayor Luzhkov, and highly disorderly and unregulated construction, began to undermine Moscow's global image. In the light of the global financial crisis, money became more selective and high-quality urban environments became a central factor for global competition to secure investment (Stanilov, 2007). Mayor Sobyanin sought to maintain Moscow's global competitiveness and attract investment, tourists and the expat community by promoting an image of a city that was comfortable for life. Moscow joined many cities worldwide in integrating the so-called human-friendly and sustainable urbanism propagated with great success by the Danish planner, Jan Gehl, for example. In 2013, Gehl's firm published a report entitled 'Moscow – Towards a great city for people', in which it recommended a makeover for the city including, among others, the reduction of private cars and the creation of walkable and liveable cityscapes. As a follow-up to the project, '*Moya ulica*' ('My Street') was launched in 2014, a huge project that aimed at making Moscow more pedestrian-friendly (Howard, 2016; Mos.ru, 2017a). In the course of this programme, 87 sites, among them streets, boulevards, embankments and squares, are being refurbished (Mos.ru, 2017b).

An analysis of city documents of public events where various parks and other 'green projects' were showcased revealed that green urban infrastructures had become crucial in Moscow's re-branding strategy. Indeed, the city made a conscious effort to present itself as a convenient, eco-oriented, healthy and orderly place. According to Sobyanin (in RIA novosti, 2010), the intention is to create 'world-class' parks to compete with cities like London, Paris or New York. Indeed, green infrastructures seem to have replaced or at least joined the strategy of cultural competitive urbanism with museums (Bilbao strategy) and the cultural capital as the most symbolic icons. In this vein, the Moscow city administration launched a number of iconic projects, among them Gorky Park, Zaryadye Park and VDNKh. International examples no less iconic than Hyde Park in London, Central Park and Brooklyn Bridge Park in New York, Millennium Park in Chicago and Gardens by the Bay in Singapore were presented as role models for these projects. Furthermore, international competitions were held and well-known foreign experts were invited to take part in several of the new projects. The new park strategy was spearheaded by the renovation of Gorky Park of Culture and Leisure in 2011, which was planned in a cooperation with the Strelka postgraduate research school of architecture, design and media and

the British firm, LDA Design. For Zaryadye Park, an international competition was held, the winner of which was Diller Scofidio + Renfro, the American architectural firm responsible for the New York High Line project (for a critical discussion, see Lang and Rothenberg, 2017).

Parks – generating revenue for private capital (space-making)

It was not only its chaotic image that jeopardized Moscow's position in the global economy. Luzhkov's unregulated, opaque and haphazard building bonanza made it increasingly difficult to attract international business investments. To facilitate continuous commodification, urban development had to be regulated and regularized in a way that was favourable for private investments.

On the city level, Mayor Sobyanin made it his priority to put an end to the disorderly pattern of urban development. Among others, he placed a ban on the construction of new commercial properties in Moscow's city centre to reduce the serious traffic jams, which were noted as a key obstacle to the city's aspirations of becoming an international financial centre, highlighting the limitations of unregulated construction-driven growth (Corcoran, 2011). Instead, many plots in the city, some of which had been designated for construction, were turned into or preserved as green spaces. It is noteworthy that many of the flagship park projects are situated in relatively central locations of Moscow, a trend that is reflected in the city's strategy for upgrading public spaces more generally. This is not to say that Moscow's periphery has been entirely neglected, although in comparison with the city centre it has received fewer and more minor efforts to improve its urban environment. It is thought that improvements to Moscow's most vital parts of the city centre will sooner or later spread out to the rest of the city – a logic resembling the notion of trickle-down economics.

On a micro-level, regulation takes place through abolishing illegal traders and removing rather chaotic stands of barbecues, stalls selling goods, etc. Instead, 'high-quality landscapes', designated zones that are designed in line with state-of-the-art trends by well-known international urban planners, are created in which tenants can open fancy coffee chains, restaurants, and amusement and cultural venues. While the parks themselves are predominantly financed by the city, commercialization strategies are set up to get revenues back. For Zaryadye Park, for example, commercial functions operated by private investors will include restaurants, a hotel, a concert hall, amphitheatres and perhaps even an ice cave (Mos.ru, 2017c).

Parks – a political tool (scripting)

Lastly, Sobyanin's strategy involved re-scripting Moscow's relation to its own citizens from a populist megacity into a seemingly more open and democratic one that reflects the tastes of the Western-oriented middle class.

Indeed, the city administration has actively invested in upgrading public spaces to accommodate the 'disgruntled' middle class and please the expat community. When protests erupted all over Moscow in 2011, parks were a quick way of showing that something was actually changing.

This strategy was spearheaded by the renovation of Gorky Park of Culture and Leisure in 2011, which was transformed from a derelict public area into the meeting point for the city's middle-class youth and expats (Kalyukin et al., 2015; Weaver, 2015). This model of low-investment/high-effect upgrading of public space combining international state-of-the-art design, attractive commercial spaces and free WiFi has since then been replicated for the Krymskaya Embankment and the high-profile Zaryadye Park. The renovation of public spaces in line with the tastes and preferences of a certain group is part of what has been referred to as 'aesthetics politics', one element in the toolbox of neoliberal scripting (Walks, 2006, p. 466). Concrete politics are concealed through the adoption of an aesthetic language that reflects the values and identification of the opposition – the Muscovite youth, creative and middle class. At the same time, social outcasts and groups that do not belong to this 'hip', 'creative', 'cultured' and 'Europeanized' lifestyle are made unwelcome, contributing to a wider process of socio-spatial segregation (Kalyukin et al., 2015, pp. 681, 692; Zhelnina, 2014, p. 246). Thus, many of the currently emerging green infrastructures become scripted with the help of urban planning and design to exclude particular functions, practices and people, actually serving a sustained 'fragmentation of the social and material fabric of cities' (Graham and Marvin, 2001, p. 33), which excludes the majority of the population who are not considered part of this 'new comfort'. Indeed, public spaces and parks in particular are discussed as central infrastructure for transforming Moscow into an economically successful, post-industrial city by stimulating competition and exchange among its inhabitants (Revzin, 2017) – or, put another way, that celebrate 'civilized' and 'cultured' consumerism (Kalyukin et al., 2015, p. 692).

Another factor limiting equal inclusion of citizens in the park strategy is their location in the city centre where very few Muscovites actually live. As mentioned earlier, the underlying consideration of this 'trickle-down logic' is 'that market processes produce the most efficient allocation of resources, provide incentives that stimulate innovation and economic growth, reward merit, and consequently are conducive to the greatest good of the greatest number' (Fainstein, 2014, p. 6). This logic of 'maximizing the greatest good for the greatest number' (ibid.), however, completely fails 'to take into account the impacts of policies on minorities and its blindness to questions of distribution' (ibid.). Thus, while these policies are legitimized by the promise of comfort and well-being for everyone in the future, they immediately consolidate the position and wealth of the few who are already better off.

Sobyanin (in RIA novosti, 2010) also promised to include citizens in important park projects. Consequently, (seemingly) open and progressive

tools of urban planning were introduced. This includes new participative planning platforms like 'Aktivny Grazhdanin' (http://ag.mos.ru/), a website that is used to include citizens in the park strategy (Mos.ru, 2017a), or promoted public campaigns inviting Muscovites to share their ideas of what parks should be like or to vote on regulations concerning green infrastructures (Aktivnyy Grazhdanin, 2017). City dwellers are also regularly invited to attend activities, including open-air theatre, sport and gardening activities to produce these public green infrastructures as democratic, open places for the urban community (Kudago, 2017). Yet, the public was excluded from taking part in the planning process of one of the most important projects, Zaryadye Park, even though there was significant popular interest in it: 'The level of interest in the project is off the scale', as one planner noted (Plotkin, in Muratov, 2013, p. 86). Public participation was limited to an online vote about different branding strategies for the park.

Summing up, Sobyanin's park strategy can be considered a key element of his broader approach of transforming Moscow into a more comfortable and human-centred city. Rather than signalling a shift towards sustainable and socially just cities, the green space strategy is aimed at improving Moscow's international competitiveness, further commodifying urban space and polarizing society, thus deepening neoliberal urbanism. Yet Moscow's current urban development paradigm is wrought with tensions. In the following section, we discuss some factors that help explain why Moscow's only recently set-up development model came so quickly under pressure.

Unravelling Moscow's neoliberal urbanism?

There are growing signs that Moscow's current model of neoliberal urbanism is coming to face its limitations. Public debates are increasingly critical of the strategy of urban upgrading – suspecting it to be a new source of illicit profits for the city elite or a stage for 'Stalinesque' ambitions – while professional debates show a growing disappointment with the city's failure to deliver on its promise of open and democratic planning processes. This is particularly visible in the cornerstone of Sobyanin's strategy: green urban infrastructure. While some experts close to the city administration suggest that the mounting challenges are merely a reflection of Muscovites' inability to appreciate 'good urban development' or their suspicion of authorities (Revzin, 2013, 2016; for a critique, see Belov, 2013, p. 171), we consider them an indication of the deeper conflicts underlying Moscow's urban development model, namely contradictions in planning procedures, symbolism and economic viability. In the following, we will consider these conflicts as they unfold in the city's park strategy.

First, openness, transparency and participation have become new buzzwords in Sobyanin's urban development strategy and were meant to replace Luzhkov's opaque decision making. Yet, as time passes, it is becoming increasingly visible that city development under Sobyanin continues to be

publicly unmediated, technocratic and top-down, with small groups of authorized actors determining Moscow's future development.

Indeed, the attempts to engage the public in producing parks in a participatory effort is little more than a short-term fix, 'distracting' Muscovites from the opaque and top-down decision making that continues to be the daily routine in Moscow. But these efforts are barely able to conceal deeper issues, namely the absence of accountability, or rather the impossibility of democratic representation, in the wider context of an increasingly authoritarian regime. Indeed, half-hearted and apolitical initiatives to engage the population in discussions about the city cannot accommodate the types of political encounter and debate that make cities what they are: political organisms. Muscovites increasingly call out these contradictions and question the impact and underlying purpose of the introduced participation measures. Protests and the formulation of alternative civil initiatives (see Argenbright, 2016) are not merely a reflection of citizens' inability to appreciate good development, but rather show that people are very well aware of the deeper contradictions underlying the focus on current superficial participatory initiatives.

At the same time, the increasingly independent and confident young planning community is no longer willing to accept the absence of open negotiation processes and disciplinary debates in urban planning and design. Many question the legitimacy of decisions taken by a small group of political and administrative actors in collaboration with few foreign and domestic experts. In light of this, professional debates are increasingly characterized by open criticism and a disappointment with 'imported' best practices, which in many cases have neither fulfilled their promises nor met the expectations they initially raised. And although many urbanist discussion platforms have been set up in the last couple of years (e.g. Moscow Urban Forum), many of them present highly politically mediated platforms serving ruling authorities and elites instead of being stages for open and creative exchange. Other channels for professional exchange have become relatively uncritical and unreflective supporters of official policies, thus losing the potential to bring up alternative agendas or spur critical discourses. An example is the planning journal, 'Project Russia', which was initially founded in the 1990s to initiate exchange of progressive ideas and practices. Over the years, the publication has become increasingly commercialized and relies heavily on political backing with a growing number of issues dedicated to official city projects (on public and green spaces, see issues 3/2013, 1/2015 and 1/2016).

Second, tensions arise from what can be summarized as conflicts over symbols. Starting with Gorky Park, many existing and new parks in Moscow have undergone a 'facelift' with fancy cafés, global 'state-of-the-art' landscape design and frequently organized sporting and cultural activities – altogether symbolizing open, transparent and progressive urbanism. However, the aesthetics of a modern, 'cool' and internationally minded city ring hollow in the context of growing cultural conservatism and political

repression, revealing these green spaces for what they are – little more than a fix in Moscow's place-making strategy. The image the city administration works hard to promote of Moscow as a modern, democratic metropolis with a human face and state-of-the art green public spaces (Shalina, 2012) does not sit comfortably with Russia's national political development, which is characterized by increasingly repressive social politics and neo-authoritarianism (Umland, 2012). To be sure, the marriage of hyper-modern symbolism with repressive politics is not an impossible one, as examples around the world suggest. However, Moscow's relatively active citizenry, as well as Russia's confrontational stance in international affairs, suggests that the current fix can only be a temporary one.

These contradictions do not only play out between the national and the local scale but are continuously negotiated on the micro-level – for example, in the plurality of partly conflicting identities and symbolic meanings that shape the newly emerging parks in planned and built form. This is especially evident in the case of VDNKh, also referred to as 'Soviet Versailles'. VDNKh has a long and complex post-Soviet history with various attempts to either sell the area to real estate developers – not surprisingly, during the mid-2000s construction boom – and later, under Sobyanin, to revive it as a place of culture and leisure (Basharova, 2013; Schönle, 2016). Yet, while this huge park initially promised to be another playground for Moscow's creative class, its development in recent years is more closely linked to the aesthetic of Russian patriotism than the Gorky-type global design. In particular, Russia's annexation of Crimea has led to a shift in official aesthetics towards 'new patriotic glamour' (Meduza, 2015) or 'hipster Stalinism' (Howard, 2016). In the case of VDNKh, this new patriotic glamour finds expression in the fact that the administration of the park and city government will restore the exhibition to its 1954 condition (Schönle, 2016), a decision that comes not only at the expense of Western design trends but also at the cost of other epochs from the Soviet past, namely the modernist heritage of the 1960s and 1970s, which is threatened with destruction (Archnadzor, 2013; Schönle, 2016). Yet, while this new focus on patriotic themes may resonate with many Russians, it does not reflect the official aesthetics and slogans the city of Moscow continues to promote internationally, thereby undermining the place-making strategy it set out less than a decade ago.

Third, there are economic contradictions: the image of a prosperous global city full of young beautiful people strolling through parks and relaxing in outdoor cafés and bars does not only sit uncomfortably with Russia's conservative and anti-modern cultural and political trajectory but is also increasingly difficult to maintain economically. While parks were initially considered a cheap and quick fix for the contradictions in Moscow's previous model of neoliberalism, excessive competition procedures, Western architectural firms, the maintenance of these parks and continuous events have turned out anything but low cost. Gorky Park, for example, was not envisioned to be very costly to the city. Yet it turned out to be much more

expensive than expected, requiring the city to set up a long-term management and event strategy to maintain it over time. In the case of Zaryadye Park, which is funded by the municipal budget and carried out by the municipally anchored Mosinzhproekt as general contractor, the costs during planning and construction work have already increased more than fivefold – from 5 billion roubles to 27 billion (Aminov and Mercalova, 2015; Pastushin, 2017). One of the reasons for the increase in construction costs is the devaluation of the rouble due to a fall in oil prices and capital outflows since 2015 (Aminov and Mercalova, 2015). To deal with the mounting costs, another competition was launched at the beginning of 2017 to develop a comprehensive cultural concept and business model for Zaryadye Park (Pastushin, 2017).

Commercializing the parks – that is, renting out space for commercial activities – is an important source of revenue for the city, because it funds most of its park strategy with its own budget. Yet Russia's economic crisis has dramatically affected living standards throughout the country, significantly reducing the ability of average Muscovites to spend money on expensive leisure activities in the city's hip parks. Indeed, the limitations of the park strategy become ever more visible as the more affluent middle class, the primary target of Moscow's roll-out neoliberalism, is increasingly suffering the effects of the crisis.

Conclusion

In this chapter, we discussed the role of green spaces in Moscow's urban development and identified limitations and tensions therein. We argued that Moscow's new flagship parks form a key arena and infrastructure of contemporary neoliberalization: they play a central role in positioning Moscow in global intercity competitions, form a stage for the further commodification of urban space and present places of socio-spatial polarization. Yet, we showed that the superficial nature of urban reforms and changes in officially sanctioned aesthetics, as well as deteriorating economic conditions increasingly challenge the current role parks play in Moscow's model of neoliberal urbanism.

These findings contribute to different streams of research. First, they speak to work on parks and green infrastructures in post-socialist cities. To date, studies on this matter insufficiently engage with the politics of parks and urban green spaces. By highlighting the political symbolism and functions of Moscow's parks, this chapter encourages scholars to go beyond 'neutral' accounts of park upgrading and renovations and to explore the *politics of green spaces*.

Second, tracing the transformation in parks' symbolic and material function allowed us to show that infrastructures, despite their durability, are malleable. Specifically, we studied how meanings and functions of Moscow's green infrastructures changed dynamically, reflecting wider political and

economic transformations. These findings speak both to works on urban infrastructures and socialist legacies. Urban infrastructures form the backbone of our cities and are integral in shaping cities' distinct form and character. The literature therefore generally considers them as urban fixtures (see Hommels, 2005, cited in introductory chapter). Yet, as our study revealed, green infrastructures can change significantly, despite their material permanence. Indeed, during Soviet times, parks were key elements of the new socialist city as places of recreation, leisure and political education. While these parks outlasted the Soviet Union, testifying to the enduring character of urban infrastructures, they underwent several transformations, reflecting the changing political and economic context they are embedded in. While having served as spaces of social inclusion and political education in the socialist space economy, parks have since turned into a battleground of elite projects and market forces. This also echoes recent works in urban and economic geography that foreground the expansive nature of capitalism, its ability to develop through different institutional landscapes, and the market-enabling capacity of socialist legacies. For instance, while the development of parks in socialist cities was originally aimed at creating egalitarian public spaces for citizens – rather than consumers – they now enhance intercity competition and socio-spatial polarization. The meanings and functions of socialist legacies, just as of urban infrastructures, are therefore neither distorting nor enabling per se, but depend on the wider environment they are embedded in.

Finally, the understanding of neoliberalism as an intrinsically contradictory, messy and partial project allowed us to point out context-specific limitations that threaten to undermine Moscow's current model of neoliberal urbanism: in terms of *place-making,* the image of Moscow as comfortable and human scale with progressive green spaces of global rank will sooner or later crumble because it stands in direct contradiction to the politically repressive developments on the national level. In terms of *space-making,* the green space strategy is increasingly hard to maintain economically in the context of a protracted economic crisis. Finally, in terms of *scripting*, improving parts of the cityscape through highly scripted green spaces that accommodate the 'disgruntled' middle class and please the expat community cannot lastingly placate an increasingly critical civil society. At the moment, though, it is hard to predict whether these tensions will entail just another round of neoliberal reconfiguration or if the underlying tensions and contradictions might lead to a more profound change in direction.

To obtain the latter and to enable truly progressive and equitable change – and thus make urban green spaces part of a socially and environmentally sustainable urban development – urban planning in Moscow has to be repoliticized and rebalanced (Büdenbender and Zupan, 2017b). First of all, contemporary policies and strategies, such as Sobyanin's 'Moscow, a city comfortable for life', should be subject to public scrutiny: questions, such as 'comfortable for whom?' and 'at whose cost?' must be asked and answered. Research, the professional public, education and journalism could

serve as crucial outlets and platforms for such critical debate. This, however, requires platforms independent of official politics and commercial interests. To rebalance Moscow's urban development would require, first of all, a shift from favouring certain segments of the population toward providing equal conditions for all people. This would, inter alia, include cutting back extensive spending on the beautification of central Moscow and instead aiming towards equal provision of green infrastructures in all parts of the city. Furthermore, it includes the creation of inclusive urban spaces in terms of design, aesthetics and functions. While civic green space initiatives can play a role in this process, they should not offer an excuse for government to shift basic responsibilities to the individual. In our view, the public sector holds responsibility for providing basic infrastructures, including public green spaces, thereby preventing (un-)intentional processes of (semi-)privatization of public space, be it through private developers' projects or – as happens in some instances – through citizens' initiatives.

References

Åkerlund, U. and Schipperijn, J. (2007) 'Urban green space in transition: historical parks and Soviet pustyr in St Petersburg, Russia', in Wlodarczyk, D. (ed.) *Green Structures in the Sustainable City*, Uppsala, Baltic University Press, 57–65.

Aktivnyy Grazhdanin (2017) *Kosit, Nelzya Pomilovat*. Available at: https://ag.mos.ru/news/1403 (accessed 18 July 2017)

Aminov, C. (2007) 'Gorky Park', *Kommersant*, 8 October, p. 1.

Aminov, C. (2010) 'Gorky Disneyland', *Kommersant*, 9 September, p. 1.

Aminov, C. and Mercalova, A. (2015) 'The city pays on top for Zaryade', *Kommersant,* 29 September, p. 7.

Archnadzor (2013) *My v Zaryadye ili gde*. Available at: www.archnadzor.ru/2013/11/15/myi-v-zaryade-ili-gde/ (accessed 18 July 2017)

Argenbright, R. (2016) *Moscow Under Construction: City Building, Place-Based Protest, and Civil Society*, Lanham: Lexington Books.

Basharova, S. (2013) *Moskva Stanet Yedinstvennym Khozyainom VVTS*. Available at: https://iz.ru/news/550047 (accessed 18 July 2017)

Belov, A. (2013) 'Excessive gardening?', *Project Russia,* 69, 170–171.

Blinnikov, M., Shanin, A., Sobolev, N. and Volkova, L. (2006) 'Gated communities of the Moscow green belt: newly segregated landscapes and the suburban Russian environment', *GeoJournal*, 66, 65–81.

Büdenbender, M. (2017) *New Spaces of Capital: The Real Estate/Financial Complex in Russia and Poland*. Thesis (PhD): KU Leuven.

Büdenbender, M. and Zupan, D. (2017a) 'The evolution of neoliberal urbanism in Moscow, 1992–2015', *Antipode,* 49:2, 294–313.

Büdenbender, M. and Zupan, D. (2017b) *How to Transform Moscow into a Just City*. Available at: https://nextcity.org/daily/entry/moscow-urban-planning-just-city (accessed 16 January 2018)

Corcoran, J. (2011) *Blankfein Sees Moscow Traffic Stymieing Finance Hub Plans*. Available at: www.bloomberg.com/news/articles/2011-03-17/goldman-chief-sees-moscow-traffic-deterring-bankers-pankin-says (accessed 24 August 2015)

Davidson, M. (2013) 'The sustainable and entrepreneurial park? Contradictions and persistent antagonisms at Sydney's Olympic Park', *Urban Geography,* 34:5, 657–676.

Dushkova, D., Haase, D. and Haase, A. (2016) 'Urban green space in transition: historical parks and soviet heritage in Arkhangelsk, Russia', *Critical Housing Analysis,* 3:2, 61–70.

Fainstein, S. (2014) 'The just city', *International Journal of Urban Sciences*, 18:1, 1–18.

Felli, R. (2015) 'Environment, not planning: the neoliberal depoliticisation of environmental policy by means of emissions trading', *Environmental Politics* 24:5, 641–660.

Gareau, B. J. (2011) 'Green neoliberalism', in Mulvaney, D. and Robbins, P. (eds) Green Politics: An A-to-Z Guide, Thousand Oaks: SAGE Publications, Inc.

Gehl Architects (2013) *Moscow. Towards a Great City for People*. Available at: https://issuu.com/gehlarchitects/docs/moscow_pspl_selected_pages (accessed 16 January 2018)

Golubchikov, O., Badyina, A. and Makhrova, A. (2014) 'The hybrid spatialities of transition: capitalism, legacy and uneven urban economic restructuring', *Urban Studies,* 51:4, 617–633.

Graham, S. and Marvin, S. (2001) Splintering Urbanism: Networked Infrastructures, Technological Mobilites and the Urban Condition, London, New York: Routledge.

Gulsrud, N., Gooding, S. and Konijnendijk van den Bosch, C. (2013) 'Green space branding in Denmark in an era of neoliberal governance', *Urban Forestry & Urban Greening,* 12:3, 330–337.

Heynen, N. and Perkins, H. (2005) 'Scalar dialectics in green: urban private property and the contradictions of the neoliberalization of nature', *Capitalism Nature Socialism,* 16:1, 99–113.

Heynen, N., McCarthy, J., Prudham, S. and Robbins, P. (eds) (2007) *Neoliberal Environments: False Promises and Unnatural Consequences*, new edition, London: Routledge.

Hommels, A. (2005) *Unbuilding Cities: Obduracy in Urban Socio-Technical Change*, Cambridge, MA, and London: The MIT Press.

Howard, A. (2016) *'Hipster Stalinism': Populist Renewal Projects Come to Moscow*. Available at: www.independent.co.uk/arts-entertainment/architecture/hipster-stalinism-populist-renewal-projects-come-to-moscow-a7150306.html (accessed 18 July 2017)

Kalyukin, A., Borén, T. and Byerley, A. (2015) 'The second generation of post-socialist change: Gorky Park and public space in Moscow', *Urban Geography,* 36:5, 674–695.

Keil, R. (2002) '"Common–sense" neoliberalism: progressive conservative urbanism in Toronto, Canada', *Antipode,* 34:3, 578–601.

Kudago (2017) *Luchshiye Sobytiya Leta v Moskve*. Available at: https://kudago.com/msk/summertime (accessed 18 July 2017)

Kulikov, S. and Ostrogorsky, A. (2013) 'Central Park for Culture 2', *Project Russia,* 69, 108–111.

Lang, S. and Rothenberg, J. (2017) 'Neoliberal urbanism, public space, and the greening of the growth machine: New York City's High Line park', *Environment and Planning A*, 49:8, 1743–1761.

Leitner, H., Peck, J. and Sheppard, E. S. (2007) *Contesting Neoliberalism: Urban Frontiers*, New York and London: Guilford Press.

Matthews, T., Lo, A. Y. and Byrne, J. A. (2015) 'Reconceptualizing green infrastructure for climate change adaptation: barriers to adoption and drivers for uptake by spatial planners', *Landscape and Urban Planning,* 138, 155–163.

Meduza (2015) *Russia's new patriotic glamor: how Vladimir Putin renewed Russian aesthetics*. Available at: https://meduza.io/en/galleries/2015/07/09/russia-s-new-patriotic-glamor (accessed 18 July 2017)

Mos.ru. (2011) *Gosudarstvennaya Programma Goroda Moskvy 'Razvitiye Industrii Otdykha I Turizma Na 2012–2018 Gody'*, Moscow: Pravitelstvo Moskvy.

Mos.ru. (2017a) *How Moscow's green zones will change: city launches park improvement competition*. Available at: www.mos.ru/en/news/item/24715073 (accessed 18 July 2017)

Mos.ru. (2017b) *My street improvement plans include 87 sites, including embankments, squares and boulevards*. Available at: www.mos.ru/en/news/item/22289073 (accessed 18 July 2017)

Mos.ru. (2017c) *Park Zaryadye*. Available at: https://stroi.mos.ru/park-zariad-ie (accessed 18 July 2017)

Muratov, A. (2013) 'Nature and freedom. What do we look for in a modern park? Discussion at Strelka Institute', *Project Russia,* 69, 84–91.

Pastushin, A. (2017) *Moskva Zadumalas Nad Modelyu Raboty Parka «Zaryadye»*. Available at: www.rbc.ru/business/06/02/2017/58948c319a79470d72df1a28 (accessed 18 July 2017)

Pravitelstvo Moskvy (2014) *Programma Razvitiya Moskvy, «MOSKVA – GOROD, UDOBNY DLYA ZHIZNI»*, Moscow: Pravitelstvo Moskvy.

Revzin, G. (2013) 'Moskovskaya Povestka', *Ogonek*, 7 January, p. 32.

Revzin, G. (2016) *Blagoustroystvo Moskvy: My Gotovy Terpet Knut, No Podavites Vashim Pryanikom*. Available at: http://carnegie.ru/commentary/63823 (accessed 18 July 2017)

Revzin, G. (2017) *Kak nam blagoustroit Rossiju*. Available at: https://daily.afisha.ru/cities/6472-kak-nam-blagoustroitrossiyu-parki-i-ploschadi-iz-proekta-aizhk-i-kb-strelka (accessed 21 August 2017)

RIA novosti (2010) *Sobyanin Potreboval Sozdat' Programmu Razvitiya Parkov v Moskve*. Available at: https://ria.ru/moscow/20101204/304472438.html (accessed 18 July 2017)

Rosol, M., Béal, V. and Mössner, S. (2017) 'Greenest cities? The (post-)politics of new urban environmental regimes', *Environment and Planning A*, 49:8, 1710–1718.

Rusche, K., Fox-Kämper, R., Reimer, M. and Rymsa-Fitschen, C. (2015) 'Grüüne Infrastruktur – eine wichtige Aufgabe der Stadtplanung', *ILS aktuell,* 3, 1–8.

Samutina, N. and Zaporozhets, O. (2014) 'Svoy Sredi Drugikh: Antropologiya Normy v Prostranstve Tsaritsynskogo Parka', *Tsaritsyno: attraktsion c istoriey*, Moscow: Novoye literaturnoye obzreniye.

Schönle, A. (2016) *Empire state of mind: how do you update a vast Stalinist exhibition space for the present day.* Available at: www.calvertjournal.com/features/show/6138/vdnkh-andreas-schoenle-past-perfect-buffing-up-stalinist-heritage-at-vdnkh (accessed 18 July 2017)

Shalina, E. (2012) *Megapolis v Masschtabe Cheloveka*. Available at: www.archplatforma.ru/index.php?act=1&nwid=2090 (accessed 18 July 2017)

Shaw, C. (2011) 'A fairground for "building the new man": Gorky Park as a site of soviet acculturation', *Urban History,* 38:2, 324–344.

Stanilov, K. (2007) 'Taking stock of post-socialist urban development: a recapitulation', in Stanilov, K. (ed.) *The Post-Socialist City*, Dordrecht: Springer, 3–17.

Swyngedouw, E., Moulaert, F. and Rodriguez, A. (2002) 'Neoliberal urbanization in Europe: large–scale urban development projects and the new urban policy', *Antipode,* 34:3, 542–577.

Umland, A. (2012) 'Russia's New "Special Path" after the Orange Revolution', *Russian Politics & Law,* 50:6, 19–40.

Varshaver A. (1932) 'Za sosialisticheskiy park', *Kultury i byt,* 12.

Walks, R. A. (2006) 'Aestheticization and the cultural contradictions of neoliberal (sub)urbanism', *Cultural Geographies,* 13:3, 466–475.

Weaver, C. (2015) *Abramovich Brings Midas Touch to Gorky Park*. Available at: http://blogs.ft.com/beyond-brics/2011/07/28/abramovich-brings-midas-touch-to-gorky-park (accessed 15 January 2015)

While, A. A., Jonas, E. G. and Gibbs, D. (2004) 'The environment and the entrepreneurial city: searching for the urban "sustainability fix" in Manchester and Leeds', *International Journal of Urban and Regional Research,* 28:3, 549–569.

Zaykova, E. (2016) 'Landscape urbanism in the center of Moscow: new hybrid models of park areas', *Vestnik RUDN*, 4, 36–44.

Zhelnina, A. (2014) 'Hanging out,' creativity, and the right to the city: urban public space in Russia before and after the protest wave of 2011–2012', *STASIS,* 2:1, 228–259.

9 Bengaluru's urban water infrastructure through the lens of post-socialism

Chandrima Mukhopadhyay and Tauri Tuvikene

Introduction

This chapter discusses Indian water infrastructure actors with regard to the extent to which the concept of post-socialism can be used beyond Central and Eastern Europe. Being inspired by an urge in urban studies and other social sciences to think of post-socialism as not only an Eastern European phenomenon (see also Stenning and Hörschelmann, 2008; Tuvikene, 2016), the study aims to contribute towards what post-socialism is in India, conceptualizing post-socialism in the case of water infrastructures in Bengaluru, India – a case without pronounced socialism. The case under study here highlights a 'shrinking state', where cities are undoubtedly experiencing rapid urbanization while the state finds it difficult to cope with the pace of such unregulated urbanization. Private sector actors intervene in such situations, converting the state's incapability to deliver into business opportunities for themselves both in formal and informal ways (Tiwari and Gulati, 2011). The study discusses the ways in which private sectors fill up the vacuum in infrastructure created by the state, raising the question of whether such a 'vacuum' may be temporary, as the state aims to recover the gap through innovation over time. This study thus highlights the move away from the public sector-provided infrastructure – also known as 'bundle of goods' – that citizens had equal access to, to unbundled and unequally re-bundled infrastructure networks (Graham and Marvin, 2001). In a modernist infrastructure ideal, the state exercised a monopoly on the delivery and maintenance of infrastructures within the bundle. The process of infrastructure delivery remained often black-boxed and the bundle itself unopened as long as no failures occurred. In the context of 'actually existing post-socialism' (see Stenning and Hörschelmann, 2008) as well as developments in India, privatization of infrastructures brought discussions on the 'unbundling' and 're-bundling' of infrastructure to the fore. The unbundling is defined both in terms of separating various sectors of services like water supply and sanitation, and segregating one single sector of infrastructure into different activities, like water generation (or drawing), treatment, transfer and supply to consumers.

One of the most challenging contemporary urban issues in Indian cities is access to fresh water due to a combined impact of rapid urbanization and climate change. The extent of private sector intervention in urban development has been mainstreamed in many ways, which raises many questions regarding who bears responsibility for the provision of public good and even initiates debate on whether water is a public good. The study develops the basic framework on post-socialism in the water sector of Bengaluru based on a public-private nexus and formal-informal-illegal dimensions. Bengaluru is located outside what is usually known as a 'post-socialist region', providing novel insights both on the term itself as well as the governing of water in shrinking state conditions. This intersection of post-socialism and water governance in a place supposedly far away from what is usually considered post-socialism, both geographically and conceptually, is a key challenge of the chapter.

The study is based on qualitative methods complemented by some quantitative data in terms of measuring water demand and supply. The research is based on a case study of water supply, focusing on domestic water supply to the upper and middle classes, using multiple methods: analysis of policy documents, media reports, blogs, other reports and documents, and semi-structured interviews in Bengaluru. The initial secondary source materials were reviewed from August to November 2015. The first visit to Bengaluru was conducted in February 2016. Another visit was arranged in February 2017. A total of 22 interviews were conducted with private sector actors, government officials, academics, activists and residents. Some reflections are based on personal experience of the change in attitudes among the main government actors related to water supply in between two consecutive visits to the city. The change in attitudes clearly shows that citizen participation played an important role in changing the government's perception towards acknowledging the fact that integrated urban water management, including lakes in the city, has an impact on sources of water. It also reflects that the state tried to cope with the water crisis in the city through technological innovation. Reflections on post-socialism were added after initial analysis through collaboration with the second author of the paper.

Understanding post-socialist urban transformation through (water) infrastructure

To define the debate in terms of post-socialism, Pickles (2010) discusses how 'various projects of communism have been and still are being dismantled and replaced by alternative capital market economies and democratic polities' (Pickles, 2010, p. 127). Some of these might be termed 'post-socialist', others better as 'post-collectivist', to use the term by Pickles (2010) for capturing states such as Vietnam or China that remain in many ways socialist despite a move away from state-focused and collective modes of governance. Still others, such as the case here in India, are examples of a country with

little explicit socialism and which cannot be simply termed 'post-socialist' because of its territorial and temporal position. Nevertheless, the chapter proposes to consider provision and management of water infrastructures in the case of Bengaluru through conceptualizations of post-socialism.

There are various insights that post-socialism brings to the fore. First, one of the key tenets of post-socialist studies is the argument that post-socialist cities are in transformation with different elements going through processes at different speeds (Sýkora and Bouzarovski, 2012). For instance, there are significant continuities in material infrastructures, which in many ways affect social processes while being at the same time themselves influenced by social practices and values. Second, because urban transformation takes place through infrastructure, the debate on water also reflects processes of urban transformation (Sailer-Fliege, 1999; Stanilov, 2007) – for instance, how bore wells, private sector water tankers, automated water dispensing units and, recently, waste water recycling systems are integrated parts of newly urbanized areas in Indian cities, and, in return, how they decide future directions of urbanization. Planning for water with its spatial implications is also an integral part of urban planning. Third, the subject of urban transformation through post-socialist infrastructure opens the debate regarding both material and social divides. Through splintering urbanism and premium spaces (Graham and Marvin, 2001), the global actors might be connected to the network, whereas vast masses are left outside functioning infrastructural delivery both in the global North and South.

These three points raise larger questions of intersecting infrastructures with post-socialism, but there is also some empirical research on water in socialist and post-socialist conditions. For instance, Beveridge et al. (2014) write about partial privatization and partial re-municipalization of Berlin's Water Utilities Company. The study focuses on commercialization, privatization, re-regulation, public contestation and re-municipalization, and discusses the dilemma of how the physical property of water supply and sanitation is not really suitable for liberalization, showing also the importance of public preference for collectivized provision of water. Wissen and Naumann (2006) write about the recent trend and opposition to privatization and neoliberalization of water supply and sewage in a European context, showing the political struggles of water governance. Such studies highlight the different practices of governing water, principally showing privatization as well as perceptions among various social groups of water being importantly a public good.

Nevertheless, many of the post-socialist water studies have focused on the conditions of diminishing population, highlighting problems emanating from the situations where the existing infrastructure is underused. There are similar ongoing studies in the US context that raise questions about water affordability due to shrinking population (Susskind and Carolini, 2018). While the withdrawal of the state characterizes those situations as well, the conditions in India differ because its population growth is to an extent

unimaginable in post-Soviet and Central and Eastern European cities. The narrative of how to handle a situation where the large infrastructures remain unused due to population decline is very different from the descriptions of massive water shortages resulting in public outcries in a situation where more than one quarter of the population lack access to pipes at homes and where vast areas of cities rely on water only for some hours of the day or have no access to running water at all (Gandy, 2008). Tiwari and Hingorani (2014) show that the master plans in India are incapable of keeping up with the organic growth of the city. This brings to the fore diverse actors of water provision and highlights a different role of the state within it, beyond being merely a provider of water in pipes – that is, areas outside 'master planned' spaces always depend on private sector water vendors.

The principal way of accessing water for urbanities in 'Western cities' is through the tap in their individual households, which is also the principal expectation of what constitutes access to water in the above-cited literature on post-socialist water utilities, while lower-income or even lower-middle-class communities in Indian cities need to rely on taps in the public space. The urban water supply is understood as functioning through large-scale hard infrastructure like pipes and water treatment plants, generally identified as 'big water' (Bell, 2015), and delivered and maintained by a public sector authority. This is a state-centred approach. However, the demand side or water usage patterns in the household – the 'everyday water' (Bell, 2015) – includes water storage facilities like water tanks and all sorts of vessels besides (or in replacement of) water taps. The privatization of water supply in the global South includes privatization of previous state-owned utilities (Joshi and Houtzager, 2012; Kacker and Joshi, 2016) but there are also various forms of formal and informal water provision by private sector actors, in addition to public sector-provided utilities that depend on surface water. Because of a scarcity of surface water and logistic reasons, only private sector water vendors, both formal and informal, draw and provide water from the ground water table. This is also applicable to informal housing, which would otherwise not have access to water.

Facing the interlinkages of water supply and natural resource management, the proponents of market environmentalism argue that water is an increasingly scarce resource that must be fully priced for its economic and environmental value if it is to be allocated to highest-valued purposes and managed efficiently by private sector companies whose accountability to citizens and shareholders is more direct and effective (Bakker, 2005). Nevertheless, opponents say that water is non-substitutable, essential for life and, hence, the state's responsibility to provide while private sector involvement must be prevented (Bakker, 2005, 2010). While the perception is that private sector participation in water supply is pro-poor, Bakker (2007) shows that in Jakarta, Indonesia, it has essentially benefited mainly middle- and upper-income households, and that disincentives for the municipality, the private sector and the households influenced such an outcome. The lack

of state involvement in water provision is therefore often also associated with social and economic divides.

Such dimensions of spontaneous and unplanned urbanization and dependency on informal actors and 'everyday water' (Bell, 2015) already brings in the divided character of post-socialism both in terms of spatial inequalities and in shifting away from forms of centralized availability in the past to the differentiated ones in a contemporary city. As discussed later, the case of Bengaluru shows that formal development permits are approved on the grounds that such development would have to depend on private sector water vendors and the ground water table. This is the situation where post-socialism might have value in conceptualizing, even though there was no explicit socialism in the formal politics of Bengaluru.

Understanding socialism and post-socialism in India

The case of India would involve a discussion of post-socialism without socialism, because India never had socialism in the sense that countries featured in this book's other chapters did. Nevertheless, after independence from British colonialism in 1947, India ideologically adopted socialism following Nehru but without formal political adoption (Figure 9.1). The formal tie between India and the Soviet Union was the treaty with the Soviet Union in August 1971. A principal economic reform came in 1991 influenced by the Washington Consensus and structural adjustment, as observed in the other chapters on post-socialism in this book. With economic reforms on the one hand, the private sector was allowed to enter many sectors of activity, which had earlier been under state-owned enterprises. On the other hand, there was an effort to decentralize power, including financial power, from the central government to urban local bodies.

After economic reforms in 1991, the 73rd and 74th constitutional amendments were introduced in 1992 and enacted in 1993. Those amendments recommended a three-tier government (central-state-local), and started the Panchayat Raj Institute to empower the urban local body institutes as a first step towards public participation. However, in reality, there has been limited implementation. The Jawaharlal Nehru National Urban Renewal Mission (JNNURM) was one of the prominent central government urban reforms that allotted central government grants to urban local bodies for initiating projects for physical infrastructure development and modernization. The programme was launched in 2005. In the case of Bengaluru, nevertheless, the chief minister of Karnataka had developed an image of 'Singaporization' following a modernization narrative, with the aim of creating an image of a global city (see also Zupan and Büdenbender, this issue). While a major part of the central and state government funds were used to create Bengaluru's 'Singaporization' image, which highlighted state development of neoliberalist urbanism, it was highly criticized as having ignored the local need for service delivery to local authorities (Benjamin, 2008). Thus,

CHRONOLOGICAL EMERGENCE OF POLICIES AND IDEAS

Political stages	Bengaluru-specific milestones
Neoliberalization: Whole hearted adoption under Modi government (since 2013) [Start-ups]	Impact of **climate change** and fast and random urbanization (Unliveable city)
Liberalization and economic reform: Early 1990s under Manmohan Singh as Finance Minister	Water crisis: Dependency on **ground water** table in urban periphery under private sector farmers' ownership [*NOT* on perennial basin]
Signing treaty with Russia (1971)	Proposal of **Singaporization** (Central and state government funding) [Globalization]
Post-independence: Ideologically socialism (1947)	First establishment of IT sector in India in Bengaluru: **Silicon Valley of India** (1990s) [Change in economy]

Figure 9.1 Chronological emergence of policies and ideas
Source: Chandrima Mukhopadhyay

rather than seeking water provision for the masses, infrastructures were part of seeking global city-ness for some rather than for all.

With this political background and history of urban reform, it is argued here that water is an appropriate sector for discussing post-socialism in India, both in terms of process and outcome. In addition, it is also argued that other conceptual frameworks like post-colonialism and neo-colonialism could be applied to explain certain processes, namely the caste system, with which water supply and the sanitation sector has been associated, and which is better described through the lens of post-colonialism. The lower castes were traditionally not allowed to access or draw water from the well, which was one of the main sources of water. The history of colonized countries show that colonizers invested little in services like water supply and sanitation for the benefit of the larger population who were indigenous. Because they were concerned about their own health and hygiene, they invested in safe water supplies for their own communities. The lower castes thus relied on informal ways of provision for their survival. Nevertheless, the value of post-socialism is in the ways in which it draws attention to the post-collective nature of infrastructure governing and highlights the privatized unequal circumstances.

This chapter focuses on urban infrastructures. Because of its environmental and regional dimensions, the 'urban' understanding of water is that municipalities bear responsibility for water supply and management of sanitation sectors within municipal areas, including sorting out technical matters such as water taps, water storage tanks, water treatment plants, water purifiers, water closets, sewage lines and sewage treatment plants. Both hard and soft infrastructure of water governance make water, as urban infrastructure, different from the rural areas.

Public-private nexus in urban water supply in Bengaluru

Bengaluru is a megacity comparable to the size of Moscow by population. The city is located in the southern part of India and is the capital of Karnataka state. It draws its surface water from Cauvery River, which is 100 km away from the city. The state of Karnataka shares its water from Cauvery with the neighbouring state, Tamil Nadu. The hard infrastructure of water treatment and water transfer demonstrates 'big water' in infrastructure, following Feenberg's (1990) technical code, and as discussed by Bell (2015) using the lens of integrated urban water management. However, the 'big water' delivered by the Bengaluru Water Supply and Sanitation Board (BWSSB) constitutes only a small percentage of Bengaluru's domestic and commercial water needs. As shown in Figure 9.2, Bengaluru is served by multiple sources of water, namely BWSSB-delivered surface water, bore wells, rainwater harvesting and greywater harvesting. Such components could be considered 'hard infrastructure' of water supply, but there are also various soft infrastructure components. For instance, there are multiple institutions involved in water provision: from the public sector side, BBMP (Bruhat Bengaluru Mahanagar Palike) and KUSP (Karnataka Urban Services for Poor) are two other institutions that are involved in surface water supply. Besides this, there are licensed private sector water vendors, private sector water producers (those who dig bore wells, extract water, treat and package

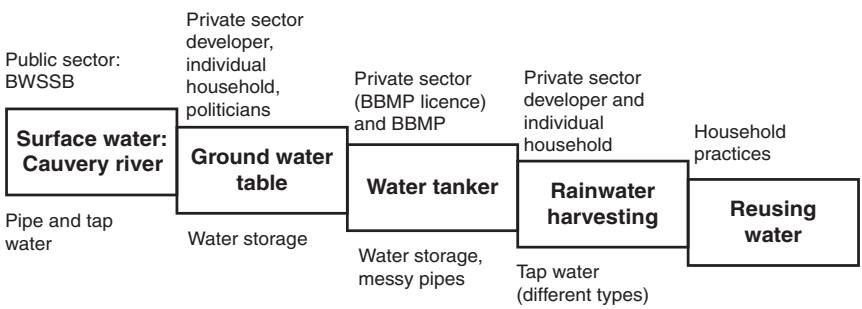

Figure 9.2 Multiple sources of water
Source: Chandrima Mukhopadhyay, influenced by Button (2017)

it), unlicensed private sector water vendors, community bore well suppliers and illegal water mafias. The combination of both hard and soft infrastructure demonstrates a 'pattern' indicating which hard infrastructure is related to which soft infrastructure. Figure 9.2 shows the distribution of such actors in terms of formal-informal and public-private nexus, as well as the potential water sources, thus highlighting the intersection of soft and hard infrastructures. Table 9.1 shows a matrix including a public-private nexus and formal-informal-illegal dimensions. It is important to note that there is a continuum between formal and informal within such a matrix, which is dynamic in the sense that informal private sector actors continue to lobby the public sector actors with authoritative power to formalize their business as they invest in both the establishment of hard infrastructure and the skill required to run the water-vending business. Nevertheless, such investments tend to be small and the state, moreover, prefers to recover its role in service delivery over time, even though it uses informal services to fill up the vacuum in the meantime.

Post-socialism in urban water supply through the lens of commodification: material and social transformations

The rationale behind selecting the water sector in Bengaluru to define post-socialism in India is its position on water commodification within the Indian state on multiple levels. However, with the recent crisis in accessing water in cities, the political position that every citizen should have access to safe water has been contested, mainly because of the state's incapability to deal with the situation, which is affected by an increasing number of warmer days and which remains beyond their control. The government's position on denying responsibility for providing basic services to illegal migrants has been widely criticized. Informal private sector water vendors in the suburbs, who are also known as 'water mafia' in Bengaluru, filled up that vacuum by providing water to illegal migrants at low cost. However, the local governments that struggle with access to water, both because of the impact of climate change on water sources and the increased demand of water due to higher temperatures, deny that it is their responsibility to deliver water to everyone at no cost and point out the lack of public finance sources (interview with BWSSB, February, 2016; see also Thomas et al., 2014). The city authority, mainly in the form of BWSSB, continuously works towards overcoming the gap in its services. In the case of Bengaluru, there has been no case of de-municipalization of water like there has been in Germany as shown earlier (Wissen and Nauman, 2006). However, because a large section of the population depend on the ground water table and only private sector vendors provide packaged or processed water, a large share of water supply is under private sector control. However, over time, as city authorities like BWSSB extend their water supply network, there is also a form of 're-municipalization'. BWSSB also buys services from the private

Table 9.1 Matrix showing range of actors involved in water supply in Bengaluru

	Public	*Semi-public*	*Semi-private*	*Private*
Formal	Bengaluru Water Supply and Sanitation Board (surface water supply from Cauvery River)	PPPs to control water loss during transformation (contractual) No example of asset sale	Licensed private sector water manufacturers and vendors in partnership with the state (private sector-initiated)	Licensed private sector water vendors
Semi-formal				
Semi-informal				
Informal		Politician-funded local bore wells		Unlicensed private sector water manufacturers and vendors
Illegal				Water mafia

Source: Chandrima Mukhopadhyay

sector to deliver water in areas that are under its domain, but they struggle with shortages of water for various reasons. However, there is also an ever-increasing number of private sector providers of water. The case of water privatization shows that technological advancement has played a big role in privatization of infrastructure.

Besides commodification, the case of Bengaluru is also interesting because it demonstrates the importance of integrated urban water management, taking into account various water providers and sources of water. In Bengaluru, nevertheless, there has also been a lack of integrated urban water management that has led to a water crisis in the city.

Water tankers are frequently visible in the urban landscape of Bengaluru and also in many other cities. Such tankers form the new hard infrastructure of water supply. While private sector actors mainly use tankers, BWSSB also uses them at times when it fails to meet its obligations to deliver water. While such tankers form a part of the city's water landscape, especially during summer, there is evidence that, during periods of restricted water availability, corrupt lower-level public sector officials accept bribes to not release water through BWSSB-supplied pipes, thus increasing the demand on the private sector water vendors. Political parties also influence the territorial nature of ground water supply (DNA, 2016). For instance, Electronic City on the periphery of Bengaluru entirely depends on private sector water tankers. Although the development is outside the boundary of the municipality, BWSSB takes responsibility for its water supply because Electronic City is one of the largest contributors to urban economic growth. However, surface water supply does not reach there. BWSSB has an arrangement with the private sector water vendors to buy water from them. In addition, as now mandated by law, Electronic City has adopted rainwater and greywater harvesting systems. Although the development faced a water crisis only a couple of years ago (interview with Electronic City resident, February, 2017), continuous private sector water tanker availability has led to an unlimited supply of water of late. Figure 9.3 shows Electronic City's private sector water vendors who first treat water in a tank and then store it in overhead tanks for supplying apartments. However, for low-income communities, people have to collect water directly from the tankers and their pipes without the service managers in the middle. The low-income communities face an everyday struggle for water in terms of its availability, price and quality.

Packaged water is also an important component in the drinking water landscape of Bengaluru. Since this is a profitable business with little investment, there are many private sector actors involved (interview with private sector operator, February, 2016 and with well-informed citizen, February, 2016). While BBMP issues licences, there are also other, illegal vendors (interview with well-informed citizen, February, 2016). The main problem with such packaged water is that there is no quality control, nor general control on the use of resources that threaten to over-exploit the ground

Figure 9.3 Private sector water tanker delivering water to storage tank in Electronic City

Source: Chandrima Mukhopadhyay

water table. The concept of packaged water provision through the corporate sector has been popular in Bengaluru (interview with well-informed citizen, February, 2016). Nevertheless, the quality of such packaged water is always a matter of negotiation between the private sector vendor and the users, without any form of state intervention.

Findings show that a large section of the population in the greater Bengaluru area, either because of their spatial location or their social class, are excluded from public sector and even formal water supply (whether public or private), and they must depend on private sector and at times even informal private sector actors for their access to water. The public sector, despite having the knowledge of informality-illegality, depends on private sector actors to help them solve the problem of providing water to many communities. However, there is a serious concern about the quality of water in a lack of state regulation. While high-income communities can afford to self-organize themselves in regularly checking the water quality from government-approved agencies, low-income communities do not have access to such checks. It remains a matter of negotiation and trust between the vendor and the consumers. In fact, there is a strong conflict of interests

between actors, both among the private sector competitors (based on who serves a higher number of customers), and among the public-private sector actors (based on the fact that the private sector loses its business if an area is served by the public sector). However, questions are raised on whether it is necessary to make the overall self-organized system legal and formal, because formalizing the sector could impose new bureaucratic restrictions (interview with ground water table expert, February, 2017).

Informal and illegal dimensions in an integrated urban water sector

Water supply and related issues demonstrate varied dimensions of informality and illegality in the urban sector. Bengaluru, being the Silicon Valley of India, experienced rapid unregulated growth. As the city grew, and its economic base shifted from agriculture to the tertiary sector, its ancient man-made interconnected system of lakes and canals, locally known as *Raajkelua*, was neglected (interviews with well-informed citizen, February, 2016, and social activist, February, 2016). In fact, sewer lines were laid inside the box of the canals, ignoring the fact that all lakes in the city were interconnected through those canals. In the absence of agricultural activity, those canals were probably seen as wasted infrastructure. This diminished the possibility of recycling rainwater collected through canals in the future. Moreover, with large-scale, unregulated real estate development in Bengaluru, many developers saved money on construction of a sewage treatment plant by disposing of their untreated sewage directly into the lakes. Belanduru Lake, one of the largest lakes in Bengaluru, was more than once flooded with toxic foam that blew around in the wind and entered the houses of nearby residence complexes (Akshatha, 2015). Recently, Varthur Lake was choked with foam (*The Times of India*, 2017). The lake was also inaccessible to the citizens. Because of the extent and complexity of the problem, as well as various intersecting interests, the day-to-day monitoring of such activities by the state and imposing penalties for breaking the rules is resource consuming.

Media reports show that there were innumerable legal cases related to the blocking of canals and discharging of sewage. Bengaluru used to be known for its lakes, which are part of a discussion on green infrastructure and on integrated urban water management. Over time, the state started neglecting the lakes' importance to the urban water system, which contributed to the water crisis in the city. However, through bottom-up movements by citizen groups, the state was convinced to accept the role of lakes in integrated urban water management as well as their contribution to the growth and health of the city (interview with academic, February, 2016).

The water supply and sanitation sector shows strong dimensions of informality and illegality. Informality indicates any type of service that is provided either by the public or private sector but is not registered as a formal service. The aforementioned discussion presents a case of water vendors, many of

whom do not hold a licence from BBMP. Those services would be called 'informal' because they do not have the formal licence. However, users are probably aware of this fact and still choose to buy water from them at their own risk, because this resolves their problem. 'Informality' is popularly referred to as '*jugad*' (see Mahadevia, 2015) in Hindi, which means 'arrangement'. Because of the shrinking state, the wider population beyond 'master-planned' areas often depends on *jugad* for their day-to-day survival. For Bengaluru, even master-planned areas would not only depend on formal water provision but also on informal private sector water vendors. However, while the disposal of untreated sewage in the lakes by large-scale developments is illegal and there is a law in place that forces developers to treat the sewage before disposal, in the absence of rule and order, the illegal untreated disposal still takes place with such practices heavily contributing towards contamination of the ground water table, affecting water accessibility and producing a generally unhealthy environment.

Within the continuum of formality-informality-illegality, the rights and wrongs of these informal and illegal sectors are not very well defined. For instance, debate remains on whether the right to sell the ground water table belongs to the private sector landowners or to the state, because water is an environmental management factor. Moreover, there is a debate on whether it is the right of the state to deny service delivery to illegal migrants, or whether the presence of informal private sector vendors delivering water at a low cost in support of unregulated growth is a way to solve problems. Although informality could be used as a temporary solution for the state, there must be more inclination towards planned urbanization over time to assure optimum use of resources in the long run.

Conclusion

The case of Bengaluru demonstrates the impact of the lack of an integrated urban water system while also highlighting innovative ways of ensuring a continuous water supply in a city that has restricted access to surface water and public sector-delivered water. Within such an uncoordinated system, large-scale urban development projects have an impact on both water availability, by increasing demand for water, and the state's ability to cope with the need for other services such as sewage treatment. The latter is particularly complicated by illegal disposal of untreated sewage in lakes, which creates toxic foam and contaminates water sources. As discussed earlier, both informality, like unlicensed private sector water vendors, and illegality, like disposal of untreated sewage in the lakes, contribute towards material and social change in the urban areas, raising concerns but also providing solutions (such as relying on informal water vendors as a kind of state supply).

Apart from highlighting an Indian case on informality and illegality in relation to water delivery and management in a megacity, this chapter

also highlights post-socialism. In fact, post-socialism in India is in many ways both similar to and different from the post-socialism in Central and Eastern Europe (CEE). First, post-socialism in Indian cities means primarily 'a shrinking state', and not so much the 'shrinking population' that has characterized many non-capital city regions of the former Soviet Union and CEE. While shrinking states have been noted in literature on other kinds of infrastructures such as public transport (see Weicker and Sgibnev, this issue), the literature on post-socialist water provision has been particularly focused on areas with shrinking populations because the problems emanate from such circumstances. Second, as opposed to the lack of services amid conditions of existing material infrastructure in the context of many instances of water provision in CEE cities, in Bengaluru there is often a lack of material infrastructures in general. Nevertheless, an assemblage of a new kind of hard infrastructure by various formal, informal and illegal private sector actors creates 'an illusion of continuous water supply' (as Button, 2017 says about Mumbai) by the state. Here the illusion has a double meaning, as referring on the one hand to continuous water supply and, on the other hand, to the active role of the state. However, the water supply is neither continuous, nor is it delivered by the state. Moreover, there is a confusion among consumers about who pays taxes on the services and to whom the taxes should be paid. Thus, there is a diverse mix of state and private actors, including formal and informal means of governing. Third, while in the CEE context, even middle classes often find it difficult to afford to maintain and fully use previously existing infrastructure. In the case of Bengaluru, the interviewed medium-income and high-income groups managed to afford the water supply both in terms of quality and quantity. Nevertheless, self-organized usage ends up being quite expensive for low-income groups. Moreover, questions of quality are also pertinent for lower-income groups needing to negotiate with vendors over water quality, which is otherwise centrally provided for those relying on big infrastructures. Still, the similarity with post-socialism includes a mixture of change and continuity in the Indian case much the same way as in CEE post-socialism. First, there is the existence of diverse formal and informal actors related to both small and big infrastructures, highlighting the form of hybridity of past provision and present lack of management in the neoliberal-oriented post-collective conditions, which can be perceived as a form of post-socialist conditions. Second, the high dependency on various formal, informal and illegal private sector water provisions is not necessarily a permanent state of affairs and, considering that the state manages to overcome difficulties through technological innovations, it is quite similar to the post-socialist narratives of infrastructures including the collapse of infrastructures that are accompanied by different means of overcoming the rapid dismantling of the state. As various chapters show in this book, this collapse is less pronounced considering the various practices and activities in which the missing provisions are overcome. Thus, there is a complex

transformation rather than a clear-cut transition from one infrastructural system to another, as highlighted by post-socialism and explicated by the case of Bengaluru water management.

Acknowledgements

The authors would like to thank interviewees in Bengaluru who made time for interviews in spite of their busy schedules. We would also like to thank the academics and practitioners who shared their experience of working on urban water systems.

References

Akshatha, M. (2015) *All you need to know about Bellandur Lake and its problems*. Available at: http://bengaluru.citizenmatters.in/all-you-need-to-know-about-bellandur-lake-and-its-problems-7834 (accessed 20 March 2018)

Bakker K. (2005) 'Neoliberalizing nature? Market environmentalism in water supply in England and Wales', *Annals of the association of American Geographers*, 95:3, 542–565.

Bakker K. (2007) 'The "commons" versus the "commodity": alter-globalization, anti-privatization and the human right to water in the global south', *Antipode*, 39:3, 430–455.

Bakker K. (2010) *Privatizing Water: Governance Failure and The World's Urban Water Crisis*, Ithaca, NY: Cornell University Press.

Bell, S. (2015) 'Renegotiating urban water', *Progress in Planning*, 96, 1–28.

Benjamin S. (2008) 'Occupancy urbanism: radicalizing politics and economy beyond policy and programs', *International Journal of Urban and Regional Research*, 32:3, 719–729.

Beveridge, R., Hüesker, F. and Naumann, M. (2014) 'From post-politics to a politics of possibility? Unravelling the privatization of the Berlin Water Company', *Geoforum*, 51, 66–74.

Button, C. (2017) The co-production of a constant water supply in Mumbai's middle-class apartments. *Urban Research & Practice*, 10:1, 102–119.

DNA (2016) *Shiv Sena is shielding water mafia in Mumbai, alleges BJP*. Available at: www.dnaindia.com/mumbai/report-shiv-sena-is-shielding-water-mafia-in-city-alleges-bjp-2208454 (accessed 20 March 2018)

Feenberg, A. (1990) 'The critical theory of technology', *Capitalism Nature Socialism*, 1:5, 17–45.

Gandy, M. (2008) 'Landscapes of disaster: water, modernity, and urban fragmentation in Mumbai', *Environment and Planning A*, 40:1, 108–130.

Graham, S. and Marvin, S. (2001) *Splintering Urbanism: Networked Infrastructures, Technological Mobilities and the Urban Condition*, New York: Routledge.

Joshi, A. and Houtzager, P. P. (2012) 'Widgets or watchdogs? Conceptual explorations in social accountability', Public Management Review, 14:2, 145–162.

Kacker, S. D. and Joshi, A. (2016). 'In the pipeline: the governance of water supply to urban informal settlements', *International Development Planning Review*, 38:3, 255–273.

Mahadevia, D. (2015) *Limits of informality*. USC Price Lecture. Youtube video. Available at: www.youtube.com/watch?v=R1rOsaTP2ZQ (accessed 30 August 2018)

Pickles, J. (2010) 'The spirit of post-socialism: common spaces and the production of diversity', *European Urban and Regional Studies*, 17:2, 127–140.

Sailer-Fliege, U. (1999) 'Characteristics of post-socialist urban transformation in East Central Europe', *GeoJournal*, 49:1, 7–16.

Stanilov, K. (2007) 'Taking stock of post-socialist urban development: a recapitulation', *The post-socialist city*, 3–17.

Stenning, A. and Hörschelmann, K. (2008) 'History, geography and difference in the post-socialist world: or, do we still need post-socialism?', *Antipode*, 40, 312–335.

Susskind, L. and Carolini, G. (2018) *Achieving water sustainability in America's shrinking city*, MIT Environmental Solutions Initiative organized sustainability lunch, MIT, Boston, MA (15 March).

Sýkora, L. and Bouzarovski, S. (2012) 'Multiple transformations: conceptualising the post-communist urban transition', *Urban Studies 49*, 43–60.

Times of India (2017) *Varthur Lake: after heavy rain, chemical 'snowfall' in Benga*. Available at: http://timesofindia.indiatimes.com/city/bengaluru/after-heavy-rain-varthur-lake-showers-citizens-with-filthy-foam/articleshow/58887567.cms (accessed 20 March 2018)

Thomas, B., Jamwal, P., Lele, S. and Srinivasan, V. (2014) *Thinking about urban resilience: the case of water scarcity and waste water reuse in Bengaluru*, Urban resilience colloquium proceedings, Environmental Governance Group, Bengaluru: Public Affairs Centre.

Tiwari, P. and Gulati, M. (2011) 'Efficiency of urban water supply utilities in India', *Water Resources Development*, 27:02, 361–374.

Tiwari, P. and Hingorani, P. (2014). An institutional analysis of housing and basic infrastructure services for all: the case of urban India. *International Development Planning Review*, 36:2, 227–256.

Tuvikene, T. (2016) 'Strategies for comparative urbanism: post-socialism as a deterritorialized concept', *International Journal of Urban and Regional Research*, 40, 132–146.

Wissen, M. and Naumann, M. (2006) 'A new logic of infrastructure supply: the commercialization of water and the transformation of urban governance in Germany', *Social Justice*, 33:3 (105), 20–37.

Wu, F. (2003) 'The (post-) socialist entrepreneurial city as a state project: Shanghai's reglobalisation in question', *Urban studies*, 40:9, 1673–1698.

10 Public transport in Brno

From socialist to post-socialist rhythms

Ondřej Mulíček and Daniel Seidenglanz

Introduction

Public transportation was at the centre of political and planning concerns in many European socialist countries because it played a crucial role in the everyday travel-to-work mobility of the population (Fuchs and Demko, 1977). Rapid industrialization of socialist cities and generally low rates of private car ownership created the conditions under which extensive development of public transportation infrastructure took place, at least in Central European socialist countries like former Czechoslovakia, often extending and reshaping the pre-socialist networks. Public transport infrastructures developed during socialism have nevertheless survived the decline of this era and have become an unavoidable basis for the recent, post-socialist advance taking place in, of course, significantly transformed political, social and economic contexts. Despite many social changes including transport mode preferences and individual mobility behaviour, the transport systems were and still are active agents co-defining spatiality and temporality of the socialist as well as post-socialist everydayness (Grubbauer and Kusiak, 2012).

When studying urban public transportation, issues of urban space and time inevitably emerge, folded and intertwined in many different ways and scales. Regardless of how we approach public transportation, whether as a materialized technology, routinized everyday practice or subject of planning policies, it represents a specific socio-technical ensemble embedded deeply into the spatial and temporal settings of the city. Transport routes, lines, stops, timetables, vehicles and transport policies thus interconnect the various places of the city in space and time.

The concept of rhythms can help to deeply understand the urban spatio-temporality of a city. Lefebvre (2004, p. 15) contends in this regard that 'everywhere where there is interaction between a place, a time and an expenditure of energy, there is a rhythm'. He gives time the same role that space plays in shaping and structuring the lived experience of the city. Moreover, according to Schatzki (2010, p. 14), everyday life and broader societal reality can be conceptualized as a whole of interacting rhythms of material, living and social bodies or structures. The rhythms representing everyday life include, however,

not only the short-term and visible circadian or circannual recurrent routines like work-commuting, schooling, festivals or holidays, but also less obvious economic and political cycles of longue durée in which linear 'becoming' fuses with repetitive processes in a number of distinct combinations (Schwanen et al., 2012). The whole city can be certainly understood as a polyrhythmical entity produced and reproduced by continuous negotiations between the daily routines of individuals on the one hand and the long-term rhythmicity of grand political, economic, social and planning structures on the other.

This embeddedness of public transportation in urban everydayness, however, is not obdurate and linear, but there are ways and conditions under which the recurrence of social and technical routines is combined with forward movement (Felski, 1999). Different urban structures, regardless of whether they are material or non-material, show clearly distinct 'internal timing', stemming from their functionality, technology, durability and (spatial) configuration (Parkes and Thrift, 1979). However, they also manifest distinct degrees of entrainment with dominating, superior rhythms. The calendar, socially accepted working hours, election periods for municipal politicians or the average time of master plan validity are the superior beats introducing 'outer' time into public transportation or any other urban structure from larger-scale levels. The oscillations in the large scales can substantially disturb the steady everyday cycles as they trigger change, modernization, obduracy or obsolescence – all the attributes that are primarily bound to a linear understanding of time. Terms like 'post-socialism' or 'post-industrialism'[1] can serve as good examples here because their prefix 'post' evokes the idea of linear time composed of non-repetitive succession – that is, the time of linear 'becoming' from socialism/industrialism to post-socialism/industrialism. Šrubař (2001) points out, however, that linearity and cyclicality of social processes are not mutually exclusive. He argues, referring to Braudel and Foucault, that there are cyclical rhythms not only in the scale of everyday mundane life but also in the processes of longue durée. Still, large-scale cyclical rhythms do not necessarily return to the same starting point because they involve a component of linear development. This partial linear change results from the complexity of the grand social structures that carry the rhythms – they are permanently negotiated and remodelled by the interaction of numerous everyday repetitive routines. Šrubař (2001), in this sense, conceptualizes post-socialism as a distinct part of the rhythm of modernization oscillating between etatism and liberalism.

Layering the short-term rhythmicities of daily commuting with the longue durée rhythms of infrastructural materiality, economy and planning, we conceptualize public transportation as a spatio-temporal structure. While some discourses of the post-socialist city emphasize discontinuity and rather quick transformation of urban routines, this study sheds light also on inertias and semi-stability stemming from repetitiveness of urban rhythms. It confronts the linear and recurrent component of urban development and thus traces urban change and obduracy as a multi-scalar, spatio-temporal

phenomenon. In short, we ask for the form and context of obduracies embedded in the rhythms of public transport infrastructure in the socialist and post-socialist city.

The chapter presents a case study of the city of Brno – the second largest city in the Czech Republic and a Central European city in terms of geographic location. Simultaneously, it can be found at a certain point in time. Its temporal coordinates can be thus defined as follows – current Brno can be considered a representative of a metropolis in the second decade of the 21st century or as a representative of a metropolis still transforming from a socialist to a post-socialist period of its existence. The chapter is divided into four sections. The first section briefly describes the broader urban context of Brno. Attention is paid primarily to long-term economic, demographic, construction, social and political progress. This first section enables consideration of the specificities of development of the local public transport system within the framing settings. The attention in the second section of the chapter is paid to the rhythms of the construction process of transport infrastructure and its entrainment with institutionalized political and planning cycles. The dynamism of urban planning documents and political narratives is confronted with repetitive planning objectives and socio-technological normativities. Analysing the timetables of public transport in more detail, we directly compare the different daily rhythmicities of socialist and post-socialist Brno in the third section. We show how public transport transfers the industrial beats of socialist Brno into spatio-temporal configurations of daily human flows and how persistent these rhythms are under the conditions of a post-industrial city. The final discussion attempts to present the public transport system of post-socialist Brno as a result of urban polyrhythmia, in which both human and non-human rhythms interfere and overlap.

Case study Brno: on the way from socialist to post-socialist public transport

The recent development of public transport systems in Brno has been undoubtedly influenced by the broader urban context and economic, social and political changes (Gray et al., 2008; Pucher and Buehler, 2005) that have taken place not only in Brno but also on national and international levels during at least the last two centuries. It covers the modern history of the city, starting from the era of capitalist industrialization at the end of the 18th century and running until the present day. In this chapter, primary attention is given to the eras of socialist industrialization and the post-socialist development since the 1990s.

The era of *gründer* capitalism followed by capitalist industrialization, which was then replaced by the era of socialism with its particular form of industrialization, all have in common rapid population growth in Brno. The population grew from approximately 100,000 inhabitants in 1869 to almost 400,000 in 1991 (Table 10.1). The built-up area of Brno has expanded

Table 10.1 Development of population and employment in basic economic sectors in Brno

	1869	*1921*	*1930*	*1950*	*1961*	*1970*	*1980*	*1991*	*2001*	*2011*
Population (thousands)	105.0	237.7	284.0	299.1	324.2	344.2	371.5	388.3	376.2	385.9
Employment in:										
agriculture (%)	–	2.9	2.0	–	2.0	2.2	1.8	2.7	1.0	0.6
industry (%)	–	42.7	37.2	–	58.0	49.7	47.5	42.1	29.1	22.8
services (%)	–	54.4	60.8	–	40.0	48.1	50.7	55.2	69.9	76.6
Total (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Sources: censuses, Útvar hlavního architekta and Plánovací odbor MěstNV (1966)

significantly over this period because of the construction of many new city neighbourhoods, including panel housing residential units built between the 1960s and 1980s (Table 10.2), and administrative incorporations of adjacent communities into the city. By contrast, the era after the fall of the socialist regime in 1989 has been marked by stagnating population numbers and construction activities within the city itself (Tables 10.1 and 10.2), while the spatial growth has continued on the metropolitan level because of intensive processes of residential and commercial suburbanization.

Building Brno as a modern capitalist industrial city has been associated with the development of the textile and engineering industries since the end of the 18th century (Kunc, 1999). The end of the 18th century and the following 19th century were periods of productive industrialism, a distinct mode of urban reproduction and capital accumulation (Byrne, 2002) that became deeply rooted into daily urban routines, symbolism and social stratification, as well as into the complex of urban technologies serving the fast growing city more effectively. The planning and construction of transport infrastructures, primarily in the form of tramlines, reflected, however, the economic beat of the city, because these served the factories and not the residential areas. Since 1869, private companies have operated the tramway system, aligning it solely to commercial profit generated by the freight transport that used a dense siding system connecting individual factories (Závodná, 2016).

Until 1918, Brno was a part of the Austro-Hungarian monarchy with a significant proportion of German-speaking inhabitants. After the declaration of the independent Czechoslovakia in 1918, the geopolitical position of the city changed substantially, becoming a predominantly Czech urban centre of the new national state. The industrial character of the city remained but was nevertheless filled with new symbolism and topology. The continuous, rapid population growth was increasingly understood as an important parameter of building the 'new Czech Brno'. Questions about the ideal spatial and social organization of the city were raised, and the planning for growth became the focal point of regulatory studies at that time, which argued for expanding the network of public tramways as the skeleton of new territorial development. Preferably, the suburban, predominantly Czech residential neighbourhoods were connected and the rather scattered area of the city was filled in with new housing construction along these transportation axes (Kuča, 2000). Transport infrastructure planning was fully passed under the control of the municipality, which used it as a powerful tool to foster the modern functional zoning of the city and to introduce a social dimension to transport policies, for example by limiting the fares for workers.

The socialist regime reshaped the urban capitalist industrialism after 1948. As local decision making had to reflect the aims of the national economy as a whole (Hoffmann, 1994), the city-based socio-economic narratives were replaced by national or even transnational ideologies of socialist modernization closely linked to industrialization. The post-war socialist industrialization itself did not necessarily mean a fundamental change in the spatial

Table 10.2 Development of housing production in Brno

	Total flats in 2001	*From which flats constructed:*						
		until 1919	*1920–1945*	*1946–1970*	*1971–1980*	*1981–1990*	*1991–2001*	*Un-known*
Number of flats	151,724	14,697	34,216	31,955	34,341	25,479	9,008	2,028
Average number of flats constructed per decade	–	–	13,686	12,782	34,341	25,479	9,008	–

Sources: censuses

and functional organization of the city. The spatial distribution of industrial production in socialist Brno mostly reflected the capitalistic patterns, while only a few new premises were built on greenfield plots. Nevertheless, the volume of labour force employed in industry increased significantly in socialist Brno. Its share of the total employment became even higher than in the previous, inter-war period (approximately 50 per cent, or even more, versus about 40 per cent, Table 10.1).

The provision of housing for the growing number of industrial workers was ensured through massive housing construction based on national urbanization strategies (Musil, 2001). The construction of large housing estates became a key component of socialist modernization, which changed the urban landscape and topology of everyday urban life more significantly. There are many examples of large housing estates constructed in Brno on the greenfield plots (e.g. Lesná, Bystrc and Bohunice), whose population has grown to 20,000–25,000 inhabitants in a relatively short period of 15 or 20 years. As a clear consequence, the average number of flats constructed per decade peaked in Brno precisely during the 1970s and 1980s (Table 10.2). Consequently, the existing mass transport system has been significantly adapted to these enormous shifts in the concentrations of resident population, employing various transport technologies including the key system of fast trams (Seidenglanz et al., 2016; Voráček et al., 1975). Figure 10.1 illustrates this close relationship that socialist urban planning developed with an enlarged public transport system as the backbone of newly constructed residential neighbourhoods and industrial premises.

This development of transport infrastructure in Brno was fully in compliance with national transport policies of socialist countries in general, including former Czechoslovakia, because they preferred public provision of urban transport. Public transport as a collective mode corresponded with socialist ideology and the rigid planning culture (Žídek, 2006) that, in an effort to balance urbanization and industrialization processes (Musil and Link, 1976), sought an economically optimal and socially sustainable modal split in urban transport (Voráček et al., 1975). At the same time, the importance of public urban transport was increased by the rather low availability of passenger cars, a consequence of the quite peculiar relation of socialist regimes to automobiles (Jastrząb, 2011; Siegelbaum, 2011).

After the demise of the socialist system in 1991, Brno was affected by gradual de-industrialization as the employment in the industrial sector decreased significantly and the employment in services grew (Table 10.1). The 'industrial society' was removed from city-related narratives, although not entirely from the materiality, temporality and rhythmicity of the city. Socialist industrialism is still present, visible through more or less tangible differences between relict elements (underused or vacant industrial sites, persisting everyday rhythms of elderly people who worked from 6am till 3pm shifts in factories, etc.) and the new emerging structures (shopping malls, new suburban or in-fill housing developments, floating working hours, etc.).

As Wu (2003) points out, the transition from socialism to post-socialism has to be interpreted with respect to historical, socialist and pre-socialist structures (Enyedi, 1996) in order to grasp the complexity and ambiguity of the post-socialist city.

The rather homogeneous and well-plannable collective time-space of socialist Brno thus inevitably changed into multiple overlying time-spaces as soon as industry lost its position as a dominant employer and whole-city pacemaker. Spatial and transport planning has been confronted with a multiplex model of the city (Graham and Healey, 1999) where the clear topologies and rhythms of socialist public transport were replaced by more complex relational patterns without a unifying planning or political narrative. The number of collective actors relevant to the spatio-temporality of the transport market has increased compared with socialist times, and the still important journeys between places of home and work have been enriched by new topologies including consumption, leisure, research and other sites (Pucher and Buehler, 2005; Urbánková and Ouředníček, 2006). Moreover, the still-dominant radial relations between Brno and its hinterland developed during the eras of industrialization, namely as the materialization of massive centripetal commuting for work has been replaced by a far more complex mix of multi-directional relations during the post-socialist and post-industrial period because of the processes of suburbanization within the metropolitan region of Brno. These elements are strong stimuli to the reconfiguration of the urban public transport network into a regional one. The creation of such a regional integrated public transport system was preceded by the total reorganization of the urban transport system in 2000. It comprised, among others, route changes, the reduction of the total number of lines and the introduction of a transfer tariff model (KORDIS, 2014), thus reflecting the wider transformation of urban and metropolitan time-space and rhythms.

All earlier noted transformations were of course framed by considerable changes in the transport policies of the post-socialist era. The difficult relation of the socialist regime towards passenger cars has been replaced by a supportive attitude, resulting in important investments in road infrastructures, for example. The demand for private cars and their daily use has developed very progressively (Kraft and Marada, 2017) since then. Unlike with roads, investments in urban public transport were heavily curtailed and all responsibility for their planning, construction, operation and maintenance was transferred from the state level to the level of municipal governments (Pucher and Buehler, 2005). These profound policy changes, coupled with the lack of money, expertise and experience at the municipal level, resulted not only in the almost entire suspension of any extensions to key urban transport infrastructures in the past decade of the 20th century but also in the cancellation of services in peripheral areas at off-peak hours or during weekends (Šťastná and Vaishar, 2017). Public transport infrastructure inherited from the socialist era is thus necessarily more or less conserved in

the dynamically developing time-space of post-socialist Brno with its newly emerging destinations like shopping malls and suburban residential areas at the outskirts of the city. The latter are, however, not served well by the existing principal transport infrastructures (Seidenglanz et al., 2016).

Since the beginning of the 21st century, the situation of urban public transport in Central European post-socialist countries has begun to stabilize, or even to partly improve (Seidenglanz et al., 2016). Although this development has many causes, the growing environmental awareness and application of the European transport policy approaches, supported heavily by co-financing from European Union (EU) structural funds are among the most prominent reasons, at least for countries in the EU (Moriarty and Honnery, 2013).

Planning rhythms and materiality of transport infrastructures

Transport planning in Brno has always been closely linked to demographic and economic cycles of different scales. As shown earlier, Brno has been a growing city since the onset of industrialism in the 19th century. The growth continued during socialism and the cycle culminated, in terms of both population and administrative area, in the 1990s when the growth was replaced by population stagnation and decline. This demographic cycle should be considered a frame-setting rhythm enveloping the subtle cycles of production modes, socio-technical formations and planning narratives in the socialist and post-socialist city of Brno. There are differences in how these rhythms are reflected under particular political and economic conditions in specific planning actions.

With the onset of socialism after 1948, the planning cycle shifted towards industrial pragmatism. A total of four zoning master plans were approved in the city of Brno in the socialist period. The plans from 1952 and 1956 focused primarily on the post-war renovation of the housing stock and its distinct separation from the industrial sites, without major ambitions to extend significantly the built-up area of the city. The master plans of 1968 and 1988 utilized the potential of panel technology and proposed locations of large housing estates mainly on the outskirts of the city. Unlike the situation of industrial Brno in the 19th century, the spatial dynamics of the socialist city were tied mainly to the provision of housing. The newly built housing estates represented the novelty and spatial dynamism in contrast with the industrial production premises that remained locked mostly in the pre-socialist locations of the wider inner city. There is one common feature in the plans, namely the zoning approach (rayonization) that is necessarily based on the effective link between the place of residence and the workplace.

This was the default pace-making axis of the socialist Brno determining transport planning narratives and the long-term cycles of chained investments. The national planning document of the 1970s states in this context: '…the main political-economic task of public transport is the transport

of the population for work…in order for public transport to fulfil its function, it must be cheap and efficient…' (VUVA, 1979). The Czechoslovak socialist planning preferred tramways to become the backbone of public transport systems in large metropolises, and partly also in industrial mid-sized cities, according to Voráček et al. (1975). These planning priorities were transferred to the urban level through five-year economic plans and zoning master plans. The local transport planning in socialist Brno, as well as in other industrial cities, was considerably subordinated to the needs of industrial enterprises that not only influenced the location of new lines but also required coordination of line timetables with the rhythm of working shifts. Relatively simple and stable patterns of home-to-work journeys enabled the introduction of a non-transfer tariff in the 1970s with the fare kept at relatively low rates.

The preference for tram transport was fully respected also in Brno. However, because of varying topographical conditions, trams were in some directions supplemented by a trolleybus network. Until the completion of the first large housing estates in the mid-1960s, the transport plans focused on extending the existing tramlines to a few newly built industrial facilities (Figure 10.1). The first new tramline, which was built as a product of socialism, was the short branch opened in 1951 connecting EJF electrical factory in Horní Heršpice in the southern part of Brno to the rest of the tram network. Another extension was implemented in 1961 to connect the TESLA electrical engineering factory in the northern part of the city itself (DPMB and TM, 1980; DPMB, 1989). After the beginning of the construction of the large housing estates, the transport investments were reoriented into these areas. There were five new tramline sections opened in Brno connecting the new housing estates, namely the lines to the residential areas in Královo Pole (1973), Lesná (1973), Bohunice and Starý Lískovec (1980 and 1982), Bystrc (1983 and 1984) and Líšeň (1986 and 1989). The vast majority of lines were constructed in the segregated light rail form. The general goal was to guarantee reliable accessibility of the city centre within 30 minutes to almost all inhabitants of the peripheral housing estates (Útvar hlavního architekta, 1966). Although the construction of the tramlines was planned in coordination with the housing estate construction, in most cases there was a significant delay between the finalization of the housing estate and the completion of the lines because of a lack of investment money (Půlpán, 1993). Accordingly, there are many examples of provisional and temporal bus services in housing estates substituting for still unfinished tramlines – these bus lines were not usually cancelled and often were operated in parallel with the later completed tramlines.

To a large extent, socialist planning in Brno created and reflected the topology of a self-contained industrial city. The beats of the city were industrialized in the broad sense of the word because there were predictable planning rhythms stemming from the recurrent home-work movements as well as from the state-led system based on a cycle of five-year plans. These

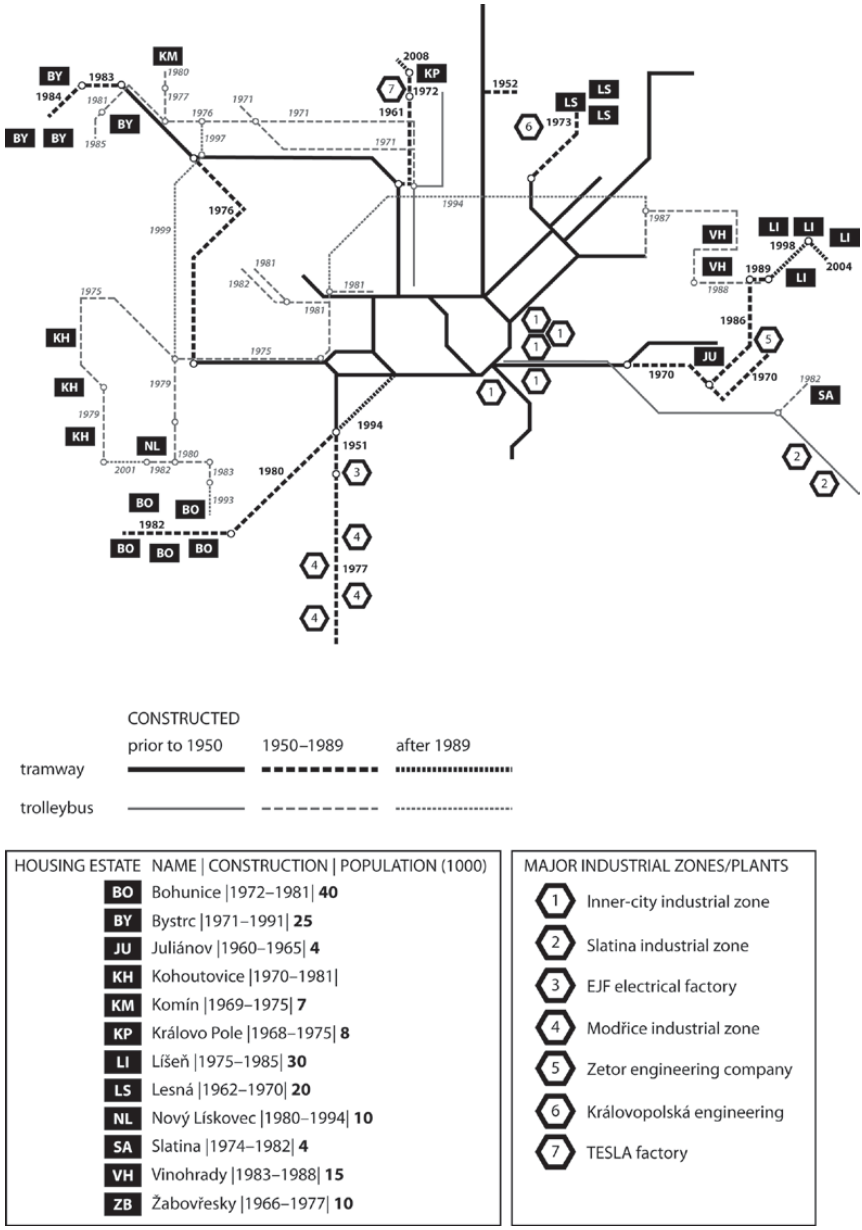

Figure 10.1 Scheme of Brno tram and trolleybus lines development since 1950 to the present

beats were framed and further developed by quasi-regular sequences of new massive housing construction. Socialist public transport played a vital role in making those socialist rhythmicities and topologies through the physical connections of the residential and productive zones of the city. Large and long-term investments in the tram and trolleybus material infrastructures could be interpreted as confidence in the plannability and predictability of the spatio-temporality of a socialist city. Moreover, for at least 35 years, the residents of Brno through their daily routines have repeatedly reproduced the state-preferred transport relation between the city centre and the residential outskirts. The configuration of public transport in Brno thus co-defined the everyday, spatio-temporal imagination of the passengers and planning representation of the city.

All three of the modes of public transport noted earlier – trams, trolleybuses and buses – have been in operation in Brno after the demise of the socialist regime at the end of 1989. No socialist section of tram or trolleybus lines has been closed to the present day. However, the infrastructure development of public transport itself has significantly slowed down because only very few new lines have been opened (Figure 10.1). Most of them have been the completion of older socialist plans only. Examples are the direct tram connection between the central railway station and Bohunice housing estate, opened in 1994, the short extension of tramline in Líšeň (1998 and 2004), and the linking of the two independent trolleybus systems in the western and eastern parts of Brno by a new semi-tangential line opened in 1994.

The urban planning scheme for Brno changed significantly during the 1990s as the clearly articulated rhythms of the socialist industrial city and the cycles of the national plans disappeared. The first (and, at the same time, also last) post-socialist master plan was approved in 1994. It had to cope with the decline and spatial dispersal of new housing construction, the downturn of industrial production and the onset of tertiary urban economy, as well as with an emerging depopulation trend. Planning, more specifically transport planning, thus moved beyond the normative approach based on the good predictability of time-space rhythms to a more reactive, not prescriptive but regulative position. The suspension of investments in large public transport material infrastructures was one of the impacts of the planning 'interpretative uncertainty' about the future spatio-temporal configuration of the city. New important places and post-industrial pacemakers, like suburban shopping malls, industrial/logistical areas or technological parks emerging primarily in suburban localities, thus became outside the reach of tram and trolleybus lines and served by a more flexible bus network.

Instead, the planning focus turned to the non-material aspects of public transport organization while operating the material infrastructures inherited from the socialist period. The massive reorganization of public transport links that took place in 1995 can serve as an example to illustrate the clash between the spatio-temporal image of the city associated with its socialist-industrial era on the one hand and a planning intervention representing

post-socialist rhythmicity on the other. As mentioned earlier, during the socialist period, public transit operated within a clearly defined origin-destination matrix in which the inner city held a prominent role. Radial organization of public transport, however, appeared to be problematic and economically inefficient within a more complicated post-socialist urban configuration. Increasing numbers of intra-city destinations, as well as increasing complexity of everyday rhythms, have prompted the transport company's planners to rebuild the system vigorously. Starting in September 1995, the number of operated tramlines was reduced from 22 to 13, the bus lines were shortened significantly in order to serve as the feeders of the tramway system, and a number of tangential links have been introduced over time. The new model of operations has departed from the industrial image of a uniformly timed city and offered a more connected network. This shift inevitably increased the number of necessary transfers, however, and thus reinforced the importance of time at the expense of space – the non-transfer tariff using single-trip tickets was replaced by a transfer tariff with time-based fares, which introduced new metrics into the time-space of the city. Although there was no significant physical development of immobile infrastructure, it was so far the most fundamental modification of the system after 1989. The familiar and stabilized functional city image, so embedded in the socialist rhythmicities, has been broken and the new topologies of new Brno – neither socialist nor industrial any more – have emerged.

Daily rhythms of public transport services

There are certainly many distinctions between the spatio-temporal regimes of life during socialism and post-socialism reflecting the changed context and conditions for everydayness. First, there is the growing complexity of anchor points such as places of home, work, education, consumption, leisure or fun now distributed in a more scattered manner in the wider space of the Brno metropolitan area. Second, there are significant shifts in the typical times of the beginning and end of working hours, shopping hours and the usual times of many other ordinary activities. The time-space pattern of socialist Brno was heavily dominated by its strong industrial base, which not only employed almost half of workers (47.5 per cent in 1980, Table 10.1) but also embedded many other urban activities including shops, health care, kindergarten, etc. The daily regime was thus set for many people by an early morning start of working hours at 6 a.m. and a quite early afternoon end at 2.30 p.m. After the end of the socialist era, the importance of industrial plants in the life of the city decreased noticeably. The formerly high share of employment in industry has been compensated primarily by the growing significance of a tertiary sector comprising roughly three quarters of workers in 2011 (Table 10.1), with its much less strict requirements for both spatial location and working hours. The spatio-temporal regime of post-socialist Brno is thus characterized by later starts and ends, and also by a higher heterogeneity between various social and professional groups (Kunc, 1999; Mulíček et al.,

2016). The spatio-temporal concentration has changed during the transition from socialist to post-socialist rhythms – a change towards increasing de-synchronization of formerly uniformly rhythmized industrial time-space (Gutiérrez and García-Palomares, 2007; Preston and O'Connor, 2008).

Common everyday life is always strongly connected with varying demands for travel, and it has an impact on the beats of public transport supply. It is thus not stable in time and space, and varies between daily, weekly or seasonally based peaks and off-peaks (Docherty et al., 2008; Kärrholm, 2009). The intimate micro-rhythm of everyday life in Brno thus reflects, modulates and merges even with the very long rhythm of the transition from socialism to post-socialism. The results of merging rhythms are well expressed in gradually changing public transport timetables. In the case of Brno, they are analysed in the study of Mulíček et al. (2016), who compared the distribution of bus connections available on working days in 1989 and 2009 – that is, in the years illustrating the socialist and post-socialist era. The general supply of buses has not changed significantly since then but their temporal distribution did (see Figure 10.2). Although the presence of morning and afternoon peaks is still clearly visible in the daily temporal regime of public transport services supply in Brno, buses were divided more evenly during the working day in 2009 than in 1989, meaning the distinction between peak and off-peak intervals between individual services was evidently smaller in 2009. The ratio of buses operating in peak and off-peak hours was 3:1 in 1989 and 2:1 in 2009. Moreover, both morning and afternoon peaks shifted into the later hours as the high point of bus supply moved from 5–6 a.m. in

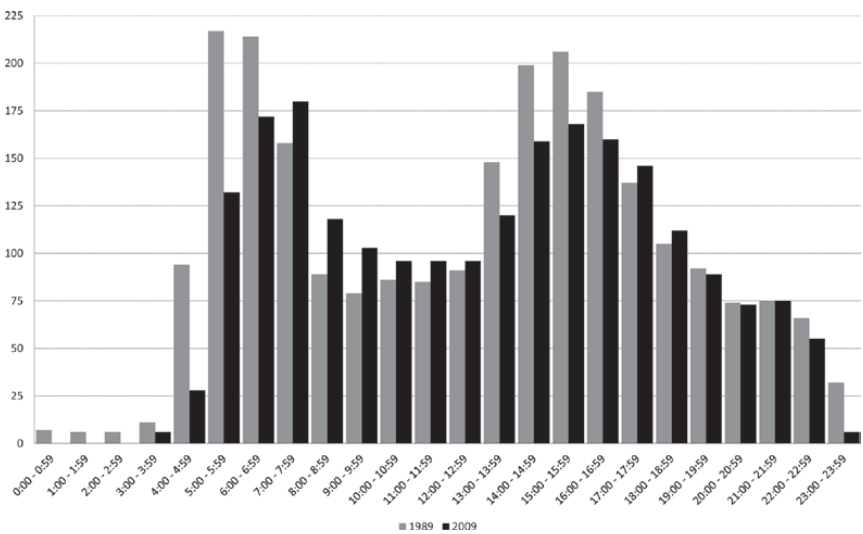

Figure 10.2 Distribution of city bus services during the working day in Brno in 1989 and 2009

1989 to 7–8 a.m. in 2009, and apparently less noticeably in the afternoon during the analysed period.

Although the former socialist temporality is now pronounced in public transport rhythms in a much more relaxed way than 25 or 30 years ago in Brno, it is still present here. Despite the large decrease in employment in industry (only about one fifth of economically active workers in this sector according to the census conducted in 2011, Table 10.1), its legacy cannot be simply and totally excluded from the life of the city. Good examples are surviving spatio-temporal habits and behaviour of mainly older residents who lived out substantial parts of their adult lives in socialism and therefore still consider earlier times of waking and starting their daily activities as a kind of temporal norm. Another reason the industrial rhythms are still noticeable in the public transport timetables in the form of specifically distributed peak hours is the fact that the imprint of the polyrhythmic tertiary sector on public transport scheduling is not so straightforward, even though this sector now dominates in the city economy. Actually, tertiary activities are more dispersed in terms of spatial as well as temporal coordinates, and thus lack the uniform rhythmicity and immense power of the former industrial pacemakers. Moreover, even if there are well-pronounced tertiary pacemakers like shopping malls, they are often located out of the reach of the principal infrastructures of public transport developed during the previous socialist period, so their contribution to the rhythmicity of the entire transport network and general timetable is at least partly limited. In summary, although the imprint of tertiary activities on timetables of public transport in Brno becomes increasingly obvious, it still accounts more for a temporal modification than for a total transformation.

Moreover, the process of merging the individual micro-rhythms with the systemic transformation from a socialist to post-socialist regime is rather complex, and its manifestations are not evenly distributed in the area of Brno. There are some spaces where the socialist temporality in public transport is more obvious and, vice versa, spaces where post-socialist temporality is more evident. We can thus identify some forms of socialist or post-socialist segments in the time-space of the city. The former includes primarily industrial localities or industrial parks, where the older work temporality is still dominant, while large shopping malls or hypermarkets and office parks represent service-driven pockets of gradually emerging post-socialist Brno. Their differing temporality can be illustrated by the rhythms of public transport services departing from representative stops within them, as shown in Figure 10.3 in the cases of stops *Slatina, závod* ('Slatina, factory' in English) and *Modřice, Olympia*. The stop *Slatina, závod* is located in the middle of a large industrial area in Slatina and in the close vicinity of a new industrial park, *Černovické terasy*. It is characterized by the clear distinction of peak hours in comparison with off-peak periods. Besides the morning and afternoon peaks, there is one more peak in the late evening hours, after 10 p.m., in *Slatina, závod*. This peak corresponds exactly to the end of the afternoon shift and to the beginning of the night one in the factory. This type of peak

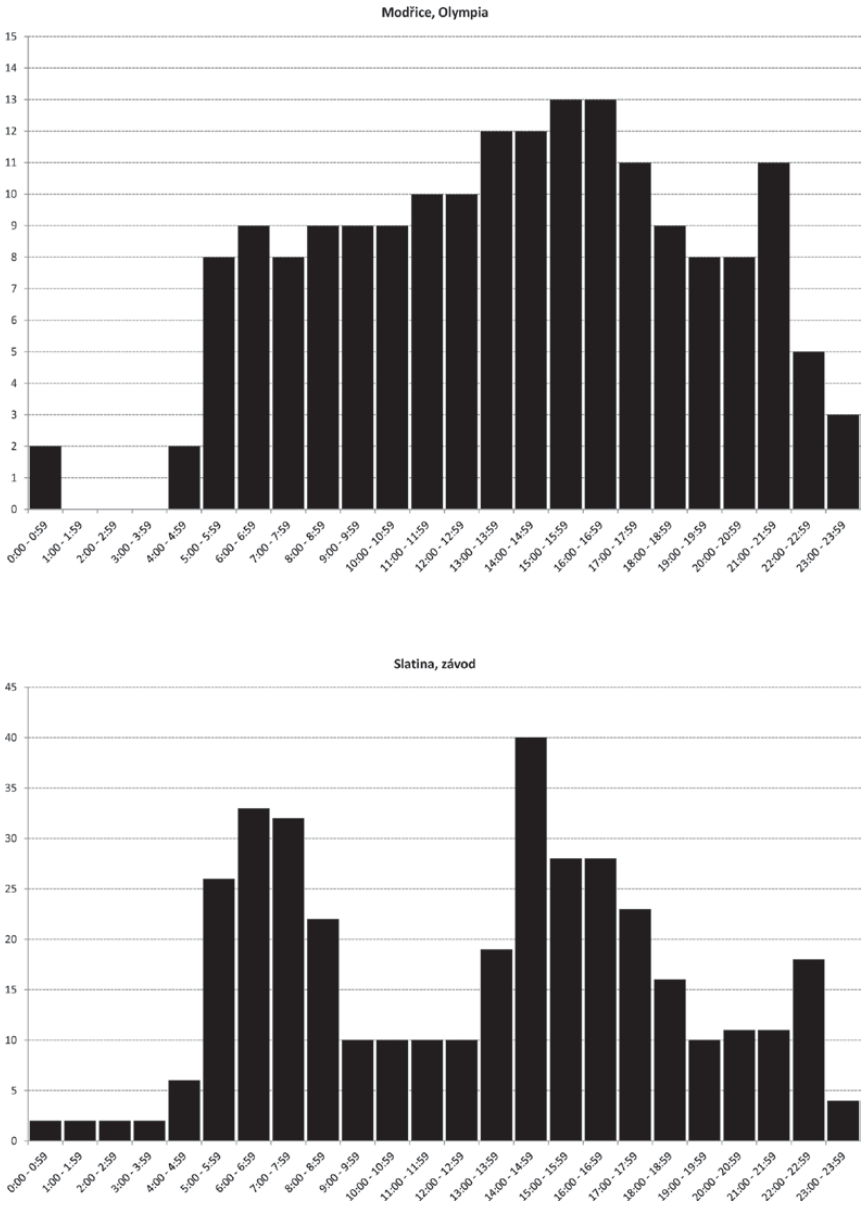

Figure 10.3 Distribution of public transport services departures from stops Modřice, Olympia and Slatina, závod during the workday in 2015

was quite typical of many localities in socialist Brno and has survived until today, but in a very limited number of places. The stop *Modřice, Olympia,* on the other hand, represents a large retail area located in the southern part of the city, a place of consumption equipped with a hypermarket, many brand stores and shops, and also with leisure and entertainment facilities. Temporal distribution of public transport services reflects the highest demand for travel in this area after the end of work hours, i.e. during later afternoon. The demand is low during morning hours, and the morning peak is, interestingly, almost entirely missing. The minor peak after 9 p.m. closely corresponds to the closing time of the majority of shops.

Conclusion

Urban transport infrastructures including public transport systems have never been a prominent theme within studies dealing with the conceptualization and theorization of various forms of post-socialist transformations. However, this omission can be assessed as an undervaluation of their significance both for the spatio-temporal functioning as well as the planning of the cities themselves, and for the spatio-temporal ordering of ordinary daily routines. Reflecting the research question, public transport infrastructure can be viewed contrarily to those discourses of the post-socialist city that emphasize discontinuity of the urban story and the disruption of routinized representations of the city. It is a lively agent contributing not only to urban transformation and change but also to continuity, persistence or even obduracy of urban spatio-temporal features. What is important is the fact that urban transport infrastructure cannot be perceived as a passive recipient only reflecting the ongoing socio-economic and political changes. This chapter employs another, more inclusive view of public transport systems. It stresses their broader embeddedness in the material as well as non-material urban fabric. Transport infrastructure is then seen as an agent that interlinks various urban times, places and meanings, and transfers spatial and temporal fragments of the socialist city into the time-space of post-socialist urban everydayness.

The analytical tool of rhythms is employed here to explore urban public transport and its position in the processes of spatio-temporal transformation with particular emphasis on the socialist and post-socialist periods. The public transport infrastructure is conceptualized as a polyrhythmic entity reflecting the nature of city functioning. Different phases of its development, fast or slow extension, reorganization, reconfiguration, stabilization, and maybe even partial reduction, are deeply embedded into the urban spatio-temporal fabric. They should be perceived as a consequence of specific combinations of different urban rhythms linking particular places in various temporalized topologies. All these merging rhythms are of a very diverse nature: some are very short with daily alterations, some are of a longue durée- type with alterations across decades, some are produced very intimately by individual persons, and some are of a collective nature and produced by non-human actors. The whole public transport system including

its needed infrastructure can be certainly understood as a polyrhythmical entity produced and reproduced by continuous negotiations between repetitiveness of all these rhythmical routines, which also reflect effects induced by grand political, economic, social and planning structures in action.

Post-socialist and also post-industrial transformation of public transport infrastructures and systems in the spatio-temporal context of Brno can be interpreted, therefore, as an effect of a specific mixture of interfering, merging and overlapping rhythms that started to work mutually in the turn from the 1980s to 1990s in Czechoslovakia and are still in action today. Alongside the rhythms of economic conversion from the industrial to post-industrial era, there have also been shifts in the temporality of the users of public transport. There are also planning rhythms in the development of public transport materialities – within them the fast expansion of infrastructure that reflected the spatial and population growth of Brno, which were replaced by their conservation after 1990. We can confirm the obduracy of socialist infrastructure in terms of its materiality. The built transport lines and terminals are clear socialist legacies in which the topology and rhythms of socialist Brno are still imprinted. Conversely, the immaterial dimensions of public transport infrastructure, including planning and operation, have undergone significant development. Although the spatio-temporal enclaves of socialist daily rhythms or the echoes of socialist planning proposals can still be found, the post-socialist economic and planning reality overlays most of such socialist immaterial relicts with a rather different context. The functioning of physical transport infrastructure in new topological frames is thus only allowed thanks to substantial transformations of its immaterial settings consisting in the fundamental change in the organization of the lines related to tariff and timetables modifications.

Note

1 'Socialism' and 'industrialism' are not understood as identical terms in this chapter. Both bear their own meanings on the theoretical level. However, the everyday materialization of socialism in a particular time period has been significantly influenced by the complex interplay of urbanization and industrialization processes (Pickvance, 2002). In this regard, we can consider the post-socialist post-industrial city as a case sui generis and distinctive from the general concept of post-industrial urbanism.

Funding

This work was supported by the Czech Science Foundation [grant number GA17-16097S, project "Spatial injustice of automobility technologies"].

References

Byrne, D. (2002) 'Industrial culture in a post-industrial world: the case of the North East of England', *City,* 6:3, 279–289.

Docherty, I., Giuliano, G. and Houston, D. (2008) 'Connected cities', in Knowles, R., Shaw, J. and Docherty, I. (eds) *Transport Geographies: Mobilities, Flows and Spaces*, Oxford: Blackwell, 83–101.

DPMB and TM (1980) *80 let elektrické dráhy v Brně. 50 let autobusové dopravy v Brně*, Brno: Dopravní podnik města Brna, Technické muzeum v Brně.

DPMB (1989) *Sto dvacet let městské hromadné dopravy v Brně*, Brno: Dopravní podnik města Brna.

Enyedi, G. (1996) 'Urbanization under socialism', in Andrusz, G., Harloe, M. and Szelenyi, I. (eds) *Cities after Socialism: Urban and Regional Change and Conflict in Post-Socialist Societies*, Oxford: Blackwell, 100–118.

Felski, R. (1999) 'The invention of everyday life', *New Formations*, 39, 15–34.

Fuchs, R. and Demko, G. (1977) 'Commuting and urbanization in the Socialist countries of Europe. The ACES bulletin', *Association for Comparative Economic Studies*, 19, 21–38.

Graham, S. and Healey, P. (1999) 'Relational concepts of space and place: issues for planning theory and practice', *European Planning Studies*, 7:5, 623–646.

Gray, D., Farrington, J. and Kagermeier, A. (2008) 'Geographies of rural transport', in Knowles, R., Shaw, J. and Docherty, I. (eds) *Transport Geographies: Mobilities, Flows and Spaces*, Oxford: Blackwell, 102–119.

Grubbauer, M. and Kusiak, J. (2012) 'Introduction: chasing Warsaw', in Grubbauer, M. and Kusiak, J. (eds) *Chasing Warsaw. Socio-Material Dynamics of Urban Change since 1990*, Frankfurt: Campus Verlag, 9–24.

Gutiérrez, J. and García-Palomares, J. C. (2007) 'New spatial patterns of mobility within the metropolitan area of Madrid: towards more complex and dispersed flow networks', *Journal of Transport Geography*, 15:1, 18–30.

Hoffman, L. (1994) 'After the fall: crisis and renewal in urban planning in the Czech Republic', *International Journal of Urban and Regional Research*, 18:4, 691–702.

Jastrząb, M. (2011) 'Cars as favors in people's Poland', in Siegelbaum, L. H. (ed.) *The Socialist Car: Automobility in the Eastern Bloc,* New York: Cornell University Press, 30–46.

Kärrholm, M. (2009) 'To the rhythm of shopping – on synchronisation in urban landscapes of consumption', *Social & Cultural Geography*, 10:4, 421–440.

KORDIS (2014) *10 let IDS JMK*, Brno: KORDIS JMK.

Kraft, S. and Marada, M. (2017) 'Delimitation of functional transport regions: understanding the transport flows patterns at the micro-regional level', *Geografiska Annaler: Series B, Human Geography*, 99:1, 79–93.

Kuča, K. (2000): *Brno – vývoj města, předměstí a připojených vesnic*, Brno: Baset.

Kunc, J. (1999) 'Změny v průmyslu města Brna a jejich vliv na situaci na trhu práce', *Acta Facultatis Studiorum Humanitatis et Naturae Universitatis Prešoviensis XXXII, Prírodné vedy, Folia Geographica*, 3, Prešov, 175–184.

Lefebvre, H. (2004): *Rhythmanalysis: Space, Time and Everyday Life*, London: Continuum.

Moriarty, P. and Honnery, D. (2013) 'The global environmental crisis', in Low, N. (ed.) *Transforming Urban Transport: The Ethics, Politics, and Practices of Sustainable Mobility*, Abingdon: Routledge, 39–53.

Mulíček, O., Osman, R. and Seidenglanz, D. (2016) 'Time–space rhythms of the city – the industrial and postindustrial Brno', *Environment and Planning A*, 48:1, 115–131.

Musil, J. (2001) 'Vývoj a plánování měst ve střední Evropě v období komunistických režimů', *Sociologický časopis/Czech Sociological Review*, 37:3, 275–296.

Musil, J. and Link, J. (1976) 'Urbanizace v socialistických zemích ve světle mezinárodních srovnání', in Musil, J. (ed.) *Otázky urbanizace*. Sborník výzkumných prací kabinetu sociologie, Praha: Výzkumný ústav výstavby a architektury, 9–30.

Parkes, D. and Thrift, N. (1979) 'Time spacemakers and entrainment', *Transactions of the Institute of British Geographers*, 4:3, 353–372.

Pickvance, C. (2002) 'State socialism, post-socialism and their urban patterns: theorising the Central and Eastern European experience', in Eade, J. and Mele, C. (eds) *Understanding the City: Contemporary and Future Perspectives*, Oxford: Blackwell, 183–203.

Preston, J. and O'Connor, K. (2008) 'Revitalized transport geographies', in Knowles R. D., Shaw, J. and Docherty, I. (eds) *Transport Geographies: Mobilities, Flows and Spaces*, Oxford: Blackwell, 227–237.

Pucher, J. and Buehler, R. (2005) *Transport Policies in Central and Eastern Europe*, Transport strategy, policy, and institutions.

Půlpán, K. (1993) *Nástin českých a československých hospodářských dějin do roku 1990*, Díl 1, Praha: Karolinum.

Schatzki, T. (2010) *The Timespace of Human Activity: On Performance, Society, and History as Indeterminate Teleological Events*, Plymouth: Lexington Books.

Schwanen, T., van Aalst, I., Brands, J. and Timan, T. (2012) 'Rhythms of the night: spatiotemporal inequalities in the night-time economy', *Environment and Planning A*, 44, 2064–2085.

Seidenglanz, D., Kvizda, M., Nigrin, T., Tomeš, Z. and Dujka, J. (2016) 'Czechoslovak light rail – legacy of socialist urbanism or opportunity for the future?', *Journal of Transport Geography*, 54, 414–429.

Siegelbaum, L. H. (2011) 'Introduction', in Siegelbaum, L. H. (ed.) *The Socialist Car: Automobility in the Eastern Bloc*, New York: Cornell University Press, 1–13.

Šrubař, I. (2001) 'Longue durée, cyklicita a sociální transformace', *Sociologický časopis/Czech Sociological Review*, 37:2, 149–159.

Šťastná, M. and Vaishar, A. (2017) 'The relationship between public transport and the progressive development of rural areas', *Land Use Policy*, 67, 107–114.

Urbánková, J. and Ouředníček, M. (2006) 'Vliv suburbanizace na dopravu v Pražském městském regionu', in Ouředníček, M. (ed.) *Sociální geografie Pražského městského regionu*, Praha: Univerzita Karlova v Praze, 79–95.

Útvar hlavního architekta, Plánovací odbor MěstNV (1966) *Koncepce rozvoje města Brna*, I. Tvorba životního prostředí, Brno.

Voráček, Č., Holub, Z., Hons, J., Hvízdal, V., Křenek, R., Kronďák, M., Pospíšil, P. and Šmejkal, M. (1975) *30 let socialistické dopravy ČSSR*, Praha: Nakladatelství dopravy a spojů.

VUVA (1979) *Zásady a pravidla územního plánování*, Brno: Výzkumný ústav výstavby a architektury, Urbanistické pracoviště Brno.

Wu, F. (2003) 'Transitional cities', Commentary, *Environment and Planning A*, 35, 1331–1338.

Závodná, M. (2016) *Koleje a město. Problematika městské kolejové dopravy ve vybraných moravských a slezských městech v letech 1850–1918*, České Budějovice, Ostrava: Veduta, Ostravská univerzita.

Žídek, L. (2006) *Transformace české ekonomiky, 1989–2004*, Praha: C. H. Beck.

11 Predictability and propinquity on the Sofia Metro

Everyday metro journeys and long-term relations of transport infrastructuring

Anna Plyushteva

Introduction

Like all infrastructures, the Sofia Metro has both relational and non-relational qualities (Ash, 2013, p. 26). Its material durabilities imply an identifiable object, a bounded space. At the same time, it is defined by multiple human and material relations to the outside and elsewhere. In this latter sense, the metro is not an infrastructure but an entanglement of infrastructural relations that it is party to and which it enables (Amin and Thrift, 2017, p. 17). Thus, through the everyday journeys they undertake, the passengers of the Sofia Metro not only experience particular metro service characteristics but, in so doing, continuously constitute the meanings and practices that shape the metro and the wider Sofia transport system. While the situated experiences of the metro service may be brief and mundane, they contribute to the long-term project of building, maintaining and changing the city's transport infrastructures. The present chapter works with these multiple temporalities of the Sofia Metro's infrastructural relations.

On the one hand, the everyday time-spaces of people, objects, meanings and affects represent a specific and situated 'here and now' of inhabiting Sofia in the late 2010s. These socio-technical entanglements, which I discuss in terms of everyday mobility practices,[1] are substantial in their own right, and not simply a lens through which broader societal and political processes can be read. On the other hand, everyday practices, including those related to reliability and propinquity, both illustrate and continuously modify what is valued in relation to mobility, by whom, and at the expense of what alternative perspectives.

Because the metro project originated in state socialist Bulgaria in the 1960s and was not launched until the late 1990s, the turbulent histories of the past few decades are entangled within it. In connecting the socialist and post-socialist decades of Sofia's history and problematizing the boundary between them, the Sofia Metro case study can respond to the need for greater historical continuity in examining post-socialist cities, a need highlighted by

Ferenčuhová (Hirt et al., 2016). This chapter challenges perceptions of the rapid changes of 'post-socialism' by noting continuities of infrastructural ideals and narratives of automobility that continue to structure transport and mobility practices in Sofia.

In this chapter, I use predictability and propinquity to demonstrate that the Sofia Metro is both part of the urban everyday and an ongoing project that links post-socialism to the many temporalities of transport planning in the Bulgarian capital. While the concepts of predictability and propinquity are widely used in transport planning, they have slightly different meanings here. In its quantitative incarnation, predictability is mainly used to discuss the scheduling and reliability of trip durations. Propinquity often denotes crowdedness on public transport as distinctive from proximities within private cars, which generally involve fixed distances between commuting bodies. In this chapter, predictability and propinquity are explored qualitatively as collective socio-material practices of inhabiting the metro. The chapter suggests that such inhabitation practices are central to the way the metro creates diverse links between the infrastructural city and its inhabitants.

The chapter proceeds as follows. First, I outline the theoretical traditions that inform the way infrastructure, propinquity and reliability are conceptualized in the discussion. The following section provides a brief history of the Sofia Metro and describes the research project on which the chapter draws. The main body of the chapter discusses predictability and propinquity in turn, in terms of the socio-technical configurations that are being generated on the metro and construed through everyday uses and mundane interactions. Using qualitative data from repeated ride-along interviews with a group of Sofia commuters, reliability and propinquity are framed as two dimensions of the relationship between the metro and the city – a relationship that is contemporary and immediate, as well as historical. Through mundane mobility and the meanings and practices it generates, I show that, since 2012, the metro infrastructure and the city have been intermittently connected by links of differentiation, complementarity and inseparability. While propinquity and predictability are made on the metro with the specific materialities such as those of trains, tickets and turnstiles, they also shape broader meanings for Sofia mobility, most notably in relation to automobility. I argue that metro practices should be read as both situated in the metro space and excessive to it, suggesting that meanings linked to the private car are particularly significant in the way metro propinquity and predictability are construed.

Relational perspectives on (post-socialist) infrastructuring

Thinking relationally about infrastructure entails accounting for its multiple spatialities and temporalities, and conceiving of infrastructural flows as more than the movement of matter through matter. The Sofia Metro has material

properties that distinguish it from other transport infrastructures and urban spaces in contemporary Sofia. When discussing the everyday practices of its users, it is important to pay attention to their situatedness. A journey through Sofia by metro is unlike another journey because of the specific socio-material interactions involved (Latour, 1991). The metro is made up of underground track tunnels and stations, as well as some visually distinctive covered overground tracks in the outskirts of the city. Barriers require the validation of tickets on entry and turnstiles define the rhythm of exiting a station. It has a recognizable visual identity through logos, maps and signs. However, these are not uniform but rather constitute a patchwork, reflecting the lengthy and incremental construction of the Sofia Metro.

At the same time, the metro is not just an infrastructural system. It is defined by relations of *infrastructuring*, which bind it to a range of human and non-human actors, from passengers and cars at street level to station staff and train drivers, to car parking bays, trams, cycle lanes, electricity and data cables, and to various urban places with their distinctive and changing meanings and atmospheres. In this sense, a metro is not a 'thing' but a process of making, sustaining, changing and severing relations (Amin and Thrift, 2017; Carse, 2012). It is in these relations that the work of the metro as an urban infrastructure is enacted, because they entail supporting, enabling, disrupting, connecting and fragmenting the multiple ways in which a city is inhabited (Latham and Wood, 2015). One mode of living with the Sofia Metro and its infrastructural relations is to perform mundane metro journeys. Looking closely at the everyday practices of those who regularly ride the metro is particularly helpful in accounting for the spatial 'excess' of infrastructure: the excess is especially visible in the trajectories of mundane journeys, which through repetition make the metro a sustained yet changing part of urban spaces and social interactions. In attending to these everyday uses of the metro, both its intrinsic and relational properties can be drawn upon in order to glimpse the ways in which the decades-old metro project, and its particular socio-material manifestations as they have come to be, shape and are shaped by post-socialist conditions in Sofia.

However, ethnographic research on daily practices is not by definition well suited to accounting for the longer temporalities of infrastructure (Amin and Thrift, 2017, p. 59; Carse, 2012, p. 543). In this sense, the lens of post-socialist urbanism presents a particular opportunity because infrastructural changes of multiple directions and scales have been ongoing over recent decades, and are occurring at present at a rapid pace (Hirt, 2015; Hirt et al., 2016, p. 514). As a result, the post-socialist urban context can lend itself to the ethnographic study of the multiple temporalities of infrastructure – of everyday use, of political projects, of construction, decay and repair, and so on. Arguably, these urban dynamics make Central and Eastern European cities like Sofia more than useful sites for empirically studying the relational nature of infrastructure. They also present an opportunity for further re-theorization of infrastructural relations in a way that is consequential to

urban theory beyond the region (Robinson, 2016; Tuvikene, 2016). Thus, in the case of the Sofia Metro project, the 'everyday' of everyday metro mobility speaks not only to daily repetition and current routine but also to a long history of infrastructuring the city beyond pre-defined periods and milestones.

The Sofia Metro is not simply an arena of the social and political processes of post-socialism, nor is it a material monument to them (Harris, 2013). Partly as a reflection of their sheer scale, complexity and cost, urban metro projects across the globe are inevitably saturated with political and ideological meanings from the earliest stages of their conception (Butcher, 2011; Gibas, 2013; Richmond, 2005; Tomic et al., 2006). The Sofia Metro is no exception, even if the ideological slogans it was intended to embody have shifted multiple times, most notably from a 'modern Socialist city', prior to the change of regime in 1989, to a 'modern European city' thereafter (Plyushteva, 2016). However, the everyday politics of infrastructure are much subtler and more ambiguous than the rhetoric of official documents and slogans might imply. It is these nuances of living with infrastructure that a study of everyday practices can help illuminate.

Crucially, this also reflects an uneasy and intense relationship with the private car, with which the metro project has been entangled throughout its history, well before the sharp increase in car ownership that started in the 1990s (Mott Macdonald, 2011; Pishtachev, 1972). The construction of the metro reflected public and political attitudes towards the private car, as well as economic and technical developments. For instance, freeing up street space for private cars by moving public transport underground was an influential argument among Bulgarian experts in the 1960s and 1970s, a position shared by many of their colleagues worldwide (Sofia People's City Council, 1974). Even if such expectations have been modified since, they are present in local politics and daily practice, necessitating a post-socialist history of infrastructuring construed as relational and ongoing rather than as a linear progression through old and new (Blazek and Šuška, 2017).

Predictability and propinquity are two characteristics of transport experiences that have been present, in many different guises, in the rhetoric around the Sofia Metro since its conception. In the transport planning documents, they take on specific technical and quantifiable meanings.

Predictability refers to the punctuality of transport – that public transport arrives and departs as scheduled, and that private car trips are not delayed by congestion or roadworks more than the expected amount. This characteristic of mobility is recognized by transport experts as being highly valued – passengers often care more about predictable journey times than speediness (Cox et al., 2006).

In the ethnographic account of predictability discussed later, it takes on a different and more nuanced meaning. In qualitative terms, predictability can refer to more than expected journey duration. As will be seen, predictability can refer to expectations around comfortable temperatures or

the dependability of ticket validators. Very often in the case of Sofia, these notions of predictability are contrasted with imaginaries about the past, especially the proximate past of the 'transition years' of the 1990s.

Propinquity, on the other hand, is related to what transport planners might refer to as 'crowdedness'. There are specific numerical values of what is acceptable crowdedness on public transport (often defined as four to five people per square metre; Tirachini et al., 2013), and crowdedness is known to be important to passengers who experience it as a loss of control and compare it unfavourably to what has been termed the 'privacy' of the car (Gatersleben and Uzzell, 2007; Smith et al., 2010, p. 10; Urry, 2004). The notion of propinquity, in the sense of proximity to others' bodies, allows me to expand on the idea of crowdedness to reflect on the experiences, not necessarily negative, of sharing the metro space with strangers (Bissell 2018; Wilson, 2011). As demonstrated later, the same level of crowdedness can feel different in different settings. The proximity proximity of others is a complex sensory experience that is also about seeing the actions of others, hearing their utterances or the sounds from their headphones, and smelling their bodies or their shopping (Sliwa and Riach, 2011).

The question of embodied proximity on public transport contrasted with the privacy of the car takes on a particular meaning in the context of what has been termed the 'growing privatism of post-socialist urbanism' (Hirt, 2007). Whether this trend of withdrawing from public life is indeed present, and whether it can be glimpsed through the changing place of transport modes in urban life, remains a contested issue (Barnfield and Plyushteva, 2015).

Research background and methods

The idea to build an underground rail system in Sofia dates back to the 1960s. The earliest relatively complete plans were approved in 1974. Ground was broken in March, 1978, and construction started and stopped several times in the 1980s and 1990s, with the change of political regime in 1989 representing one of several big challenges faced by the project. The first small section of Line 1 was launched in 1998, and a North-South link started running through the city centre in 2009 – nearly 40 years after the first announcement of a metro project was made. The entire second line was launched in 2012 (Figure 11.1).

In the 1960s and 1970s, urban planning in the city focused on a vision of automobility: the car embodied convenience, modernity and prosperity, and was desired by many while remaining unaffordable for most. In this first phase of metro planning, the key rationale was the creation of an underground transport infrastructure that would remove the increasingly unfashionable tram from the streets, opening up space for unimpeded flows of automobility. These were the origins of the infrastructural vision that came to shape how transport propinquity and reliability in Sofia were lived and construed. This vision was defined by a clear hierarchy of transport modes,

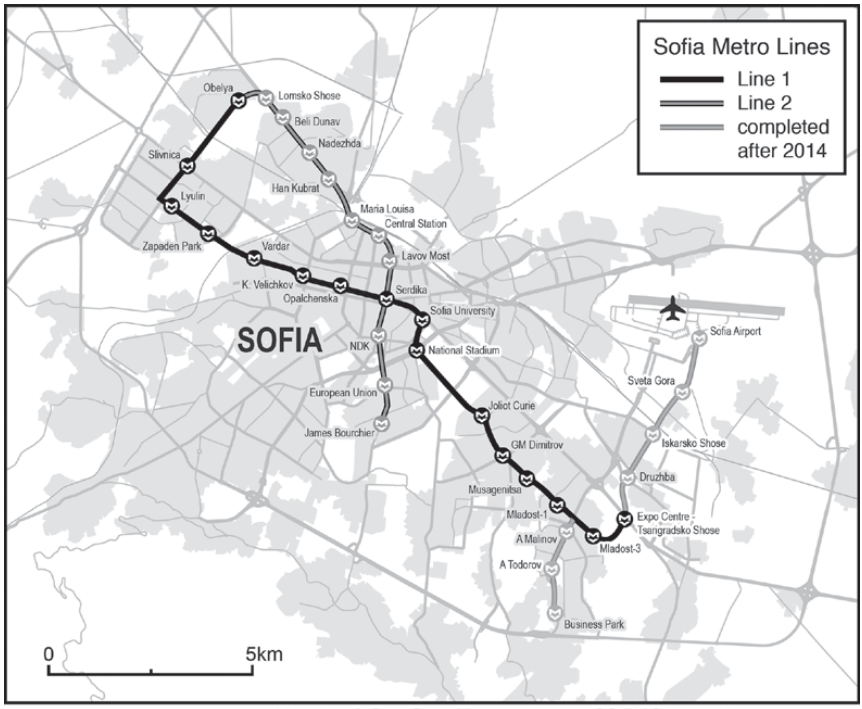

Figure 11.1 Phases of metro construction. Line 1 was launched gradually between 1998 and 2009, and the entire Line 2 was opened simultaneously, in 2012

Source: Map by Miles Irving, UCL Geography Drawing office, using www.openstreetmap.org

with the private car at the top, the metro placed second, and ground-level public transport, walking and cycling attracting little political attention. By the 2000s, however, this rationale had undergone a transformation, at least in terms of discourse. As car ownership finally reached the mass scale that 1970s planners had envisioned, it turned from a utopian societal arrangement to a problem of congestion, a health risk and an environmental threat. The Sofia Metro was now called upon to replace the private car rather than facilitate its unimpeded movement. Nevertheless, this was framed in terms of offering a convenient and reliable alternative to drivers, carefully avoiding antagonizing them (Sofia Municipality, 2009). The hierarchical order was thus barely disturbed – while discourse shifted from substitution to complementarity, the dominance of the private car underwent transformations but seemed resilient both to the collapse of state socialism and the expansion of a large infrastructure such as the metro.

The data presented here originate from my doctoral research and were collected between 2012 and 2015 using repeated ride-along interviews with a group of 20 inhabitants of Sofia. All participants lived or worked near a station along Line 2 of the metro, which opened in August 2012. Over the course of the research, at least four in-depth interviews were conducted with each participant, producing a total of 87 interviews. The ride-along interviews explored changes in everyday mobility, and particularly in commuting to work and further education, before and after the participants started using the newly opened metro line. The sample included six men and 14 women, with ages ranging between 22 and 57 at the start of the study. Participants' accounts are reported here using pseudonyms.

While mobility studies have generated a wealth of qualitative data on everyday journeys, interviews and ethnographic observations producing a 'snapshot' view of the everyday mobility of individuals remain more common than longitudinal approaches (see also Jirón et al., 2016). In the study presented here, the repeated ride-along method made it possible to combine the in-depth study of minute practices of commuting with the longer-term temporal rhythms they are connected to (Kusenbach, 2003). The focus of the discussion that follows is on the way participants' reflections on their everyday mobility shifted and transformed over time, particularly in relation to journey predictability and the proximity of strangers.

The joys and fatigues of infrastructure predictability

Predictability in the sense of a reliable schedule and journeys of foreseeable duration was a concern for the planners of the Sofia Metro from the outset. In 1974, the Sofia People's Council presented the plan for a metro as a solution to the delays that had beset public transport with the expansion of automobility. As per the dominant transport knowledges of the time, the metro was expected to replace the city's tram network altogether:

> With the construction of the metro, the difficulties which have set upon the public transport will be removed. Convenient, fast and reliable connections of the main centre with the entire urban organism will be provided. With the introduction of the metro will begin the gradual removal of the tram transport, which has proven complex and burdensome to the street network.
>
> (Sofia People's City Council, 1974)

By the time Line 1 of the Sofia Metro was completed 35 years later, the importance of the tram had been re-established and practically no tramlines were being removed. However, the delays caused to all ground-level public transport by booming numbers of private cars had reached critical levels, while trams, buses and trolleybuses suffered from chronic underfunding. Few everyday journeys in the late 1990s could be considered predictable

because long delays were commonplace, and breakdowns and accidents were widespread. When the metro opened against this background, its new users enacted various practices related to the predictability of transport, making the notion of predictability part of their everyday mobility. In this context, predictability is not simply an indicator of transport service quality: it is made, invested with meaning and continuously reconfigured through practices of interacting with the metro infrastructure. By travelling on it, passengers wove its connections to the rest of Sofia, taking meanings and expectations outward. However, as the predictability of the metro became part of everyday life, it could also give rise to sensations of tedium and annoyance, and reflections on the sterility of metro infrastructures.

To begin with, most research participants framed predictability in everyday journeys in Sofia as a trait exclusive to the metro and chronically absent from all other modes of getting around the city, including the private car. The most notable aspect of predictability was the way the metro, as the only mode of transport with exclusive right of way, was claimed to arrive exactly on time in nearly all cases. The lack of predictability in car journeys (in terms of trip duration, disruptions due to the behaviour of other drivers, unannounced roadworks and so on) was frequently interpreted as being offset by the privacy afforded by driving (a theme I return to in the next section). By contrast, the way a tram/trolleybus/bus journey seemed to always disrupt one's plans was framed as frustrating and with no compensatory aspects. In this context, the predictability of the metro was repeatedly pointed out by its new users as exceptional and excellent. Participants were keen to praise the service, invariably contrasting it with the annoyances and disappointments associated with using ground-level public transport in Sofia:

> The tram I used to take, the duration of the trip used to vary a lot more. Traffic, traffic accidents, congestion, traffic lights, more cars…
>
> (Bella, 13 January 2015)

This type of argument was often part of a broader narrative of the metro as an exceptional kind of space in Sofia: a 'good' thing, contrasting with the messy city above. Not only did the metro trains run on time, they were also clean, pleasant and air-conditioned, and thus made starker the sense that a bus, or even a street, was a place of unreliability, with significant possibility of dirt and unpleasantness:

> Yesterday I had to make a bus trip for the first time in a while. The bus was so strange and exotic to me. It was so strange. I have been spoilt by the metro, how clean and nice it is. It was brutal on the bus.
>
> (Janna, 15 January 2014)

This reliability of train frequencies and other metro technology enabled a new kind of precision in scheduling and performing everyday mobility.

One participant spoke of looking at the number of people exiting a metro station as she approached it on her morning commute, thus guessing how long ago a train had passed. Several others noted the ability to 'check in' at the entrance gates without removing one's travel card from the bag or jacket pocket: unlike the travelcard readers on trolleybuses and trams, those at metro entrances were reliable enough, allowing an effortless gesture to produce the desired result every time. Overall, the research participants relished the predictability of the metro: having one's morning routine built around the 07:09 metro train came to be seen as an unremarkable thing.

For a long time, the convenience and predictability of the metro, whether it had to do with train departures, temperature or mobile phone signal, occupied a central place in participants' accounts of their journeys. However, the meanings and the practices attached to the reliability of these mundane infrastructural arrangements did not remain static. The first transformation was the acknowledgement, heard more and more frequently, that the metro service was not infallible, and thus possibly not quite the polar opposite of the urban reality outside:

> Well, not that the metro is perfect. I guess sometimes it's actually cold in winter and warm in summer.
>
> (Nell, 7 January 2014)

> It gets so busy, you can't board, really. Just like the trams and buses have always been, the same experience. No difference.
>
> (Emma, 4 February 2014)

> Once there was a suicide, but there is no information then. People stand on the platform and no one is saying how long till the next train, no one is giving updates. Just Big Brother watching us from somewhere keeps saying we mustn't cross the yellow line.
>
> (Bella, 7 January 2015)

Even when the 'veneer' of predictability had not come off in tragic circumstances, the predictability of the metro infrastructure was revealed over time to have more ambivalent significances. It was noted that the daily practices that resulted from it could paradoxically be linked to having to rush and being stressed:

> When I was taking the metro, I always left the house at the last minute. Since moving here, I know exactly how long it takes me to walk everywhere, and I leave on time and I am never late. I am definitely late a lot less. With the metro, you know there is a train every few minutes, and in rush hour, every three minutes. So I used to postpone going out, postpone and postpone, safe in that knowledge. As a result, I was constantly late.
>
> (Maria, 13 June 2014)

Maria was not the only participant who experienced predictability as a reason for daily journeys becoming more last-minute and harried. The predictability associated with the metro also shaped the affective charge of everyday mobility in other ways. As the precise and regulated nature of mundane metro journeys persisted over time, some participants began to experience it not in terms of pleasure and peace of mind but rather in terms of sterility and tedium:

> I do get a bit twitchy in relation to the metro, restless because of how repetitive the routine is. One tires of experiencing the same thing over and over again. The routine and the repetition are just killers for me. Once you pass the level of the mechanical, it becomes really frustrating, it's not nice any more, you are just focused on the fact that nothing changes.
>
> (Tanya, 14 February 2014)

In some cases, participants started to express appreciation for those socio-material interactions on the metro that broke with its rigid predictability:

> I think the train drivers do wait for people. It has happened to me. Once at Mladost-3 it happened to me, it was when I was leaving for work in the morning. I was walking down the stairs, he waited for me, and I got on. It's nice. (…) How much of a difference can this half of a minute make to the schedule, really?
>
> (Anton, 11 October 2014)

Thus, predictability is part of the ongoing shaping of transport practices, but not in the sense that a particular bounded infrastructure such as the metro can be a space of predictability and order against a background of disorder and frustration, which getting around Sofia has often been associated with (as early as the 1970s, but especially after 1989; Capital, 1998). Instead, taking a longitudinal perspective offers a more nuanced view of the weaving-together of the experiences of metro passengers, the predictability of metro infrastructure (which also proved not to be universal, and sometimes enjoyably so, as pointed out by Anton in the quote earlier), and the perceived 'chaos' of Sofia in the 1990s and 2000s. The next section further examines the ways in which the city itself never stopped changing as the metro infrastructure was constructed and expanded. Using the notion of propinquity, the discussion addresses the expectations metro passengers had of each other, and examines the way these expectations reflected ideas (both rapidly changing and deeply entrenched) of mobility and urban life.

Managing the proximity of others

> I dislike the crowdedness of buses a lot more than I dislike the crowdedness of the metro – people who are poorer, worse dressed, badly

> smelling, often angry – all of this creates discomfort. In the metro, the people are different.
>
> (Anton, 11 October 2014)

How space was shared on the metro, and with whom, was an important topic for the research participants. As with predictability, early interviews pointed to a dual exceptionality, a sense that proximate strangers are different on the metro compared with anywhere else and that in any case the metro was less crowded. The former idea is well summarized by Anton in the interview quote earlier, and by Maria in the following account:

> Overall, I see that people interact differently in the metro. In the bus, no one minds talking loudly to each other. But in the metro, it seems less acceptable to be loud. As if there is a kind of culture setting in, the same you would encounter in the West – not to talk loudly, not to shout. Sometimes, even if someone is on the phone, people turn around to them and give them these looks. Something that really surprises me, because this is something new – it is brand new, it never existed in Bulgaria before, and it is as if it is emerging all by itself. […] It's influenced by the physical environment. You show the passengers some respect, they show respect back. By contrast, when you get people into an old Ikarus bus – it's old, it's dirty, the exhaust pipe is damaged and it's full of fumes inside – well, if I am being shown this kind of attitude, how can I show a different one? This is maybe subconscious even.
>
> (Maria, 13 June 2014)

For other participants, however, the heightened expectations of the metro as a technology with predictable behaviour, incomparable to what lies outside, resulted in intense frustration. Thus, Toni would have liked to see interactions on the metro resembling the 'civility' described by Maria, but did not. The daily evidence that Sofians could not be transformed by a transport infrastructure project left her upset and annoyed on multiple occasions:

> Look at them! [Points at the people waiting at the foot of the escalator angrily] Especially in the morning, I can get so annoyed with people. They don't stand on the right. They look like a group from kindergarten. I have had to argue with people so many times. When I am running down the escalator and someone is standing on the left, I point it out that you should stand on the right. They stare at me in a weird way. Or they say: Well, I am standing on the right, aren't I? Or they say: There are the stairs for those who are in a hurry! What kind of logic is that?! If you're in a hurry, you'll pick the thing that is moving, obviously!
>
> (Toni, 25 March 2014)

These kinds of observations are not unique to the metro as a transport mode and could in fact have been uttered by a frustrated commuter anywhere in the world. What is notable is how heightened these emotions were during the first months of confronting a new infrastructure. These early utterances of participants regarding the behaviour of proximate others were often intense and seemed to reflect multiple detailed observations the speaker had carried out in the weeks before the interview, which they were finally able to 'vent'. These reactions bore an uncanny resemblance to the practices and discourses of road rage (Smith and King, 2013), once again inviting reflections on the significance of automobility to understandings of the metro. While social practices tend to persist as well as transform, former drivers and current new metro users could have carried such intensities and utterances with them from a previous transport routine into a new one (Cass and Faulconbridge, 2016). However, not all participants who vocalized such intense frustrations were former car commuters. This subtle dynamic between new public transport infrastructure, the private car and managing the proximity of others warrants further examination.

In the case of the metro, initial expectations were gradually overcome by direct and routine experience. While Toni's frustration with the behaviour of other passengers appeared to persist over time (e.g. she repeatedly referred to the issue of body odour, as if the metro surroundings made it more offensive to her than elsewhere), for most other participants, views of metro co-presence and sociality became less polarized over time:

> I don't pay so much attention to other people's behaviour these days. I don't know. It just becomes routine, doesn't it?
>
> (Janna, 12 March 2014)

This dynamic of gradual acceptance seemed to reflect an accumulation of exposures: over time, the new metro commuters got used to having other metro commuters around them. This was not the case with the drivers I interviewed as part of the project, however. Even very experienced car commuters continued to indulge in comments on who should and should not be on the roads in rush hour, with women drivers, elderly drivers, old cars and single-occupant cars all frequently singled out. Drivers' comments were defined by a sense of the behaviour of proximate others getting worse: while they were separated by 'cocoons' (Sheller and Urry, 2000), the very nature of the activity of driving meant they had no choice but to remain intensely focused on the transgressions of other drivers. Metro commuters, by contrast, could allow the behaviour of others to gradually fall out of focus (e.g. by choosing to become another 'smartphone zombie,' see below). Here, the longitudinal view demonstrated a different narrative to the prevailing view that to commute by public transport means to miss out on the predictability and privacy epitomized by the car. The embodied and socio-technical ways

in which drivers and metro passengers handled propinquity demonstrated that experiences kept transforming over time.

This is further illustrated by the case of mobile phone usage in the context of metro mobility. Digital devices such as mobile phones or smartphones are often intuitively interpreted in terms of their capacity to 'cocoon' the person handling them from the surrounding world (Berry and Hamilton, 2010). In this sense, they are often framed in both popular discourse and research as vehicles for further urban alienation, and for carving out 'private' spaces within public ones. However, as Arnold (2003) notes, technology is rarely unidimensional in its uses and meanings, and can often play multiple, even paradoxical, roles, when considered as part of a social setting. Thus, the work done by the mobile phone on the Sofia Metro was interpreted not only as allowing individuals to remain remote but also as creating a calmer and more pleasant atmosphere. While some participants lamented the zombie-like appearance of smartphone users on the metro, others framed devices as pacifiers that are actually quite helpful in soothing the quarrel-prone space that is Sofia public transport:

> In fact, it's a positive development. People are less likely to push and shove, they are nicer when they are focused on their phones.
>
> (Assya, 12 February 2014)

> Lately people are so absorbed in their phones that they don't have time to argue with each other! [laughs]
>
> (Lilly, 1 July 2014)

These contributions are particularly interesting when read alongside Maria's reflections above. Maria understood change in terms of passengers on the recently opened metro acting differently compared with people on buses because of the better infrastructure they had been provided with. However, thinking relationally about the processes of change in everyday mobility, of which the metro encompasses only one set of interactions, opens up additional possibilities for interpretation. Even if the metro was so frequently framed as exceptional, in fact its recent expansion has been concurrent with an accelerating fleet renewal programme for ground-level public transport (Grozdanov, 2011). As a result, many characteristics so celebrated on the metro (such as electronic displays, air conditioning, cleanliness, e-ticketing) and credited with making the proximity of others more tolerable, were becoming an increasingly common feature on buses, trams and trolleybuses too. Thus, mundane journeys on all public transport modes were becoming less stressful. Those who switched to the metro post-2012 may have interpreted this boost in 'civility' as a characteristic of the metro infrastructure, standing in contrast to the situation elsewhere in the city, but, in practice, all kinds of technologies and experiences related with mobility and urban space were changing, and new types of shared spaces of transport were becoming more common.

Conclusion

What is increasingly evident from conversations with local government and civil society representatives is that the Sofia Metro in its late-2010s incarnation has been drawing most of its passengers from other forms of public transport. The number of drivers who have switched to the metro is small, and the total number of private vehicles in the city continues to grow at a rapid pace (Borisova-Tirkova, 2016). Even if the metro was briefly, near-universally hailed for its comfort, convenience and reliability, the dominance of the car has continued asserting itself. Not least, this is due to the absence of concerted efforts on behalf of local authorities to constrain it. Another reason is the persistence of the trope that frames the metro as the 'only modern kind of public transport'. Despite the gradual technological change across all public transport modes, this discourse and its political incarnations have proved persistent enough to continue to promote the car, at least among those who have a choice. In this hierarchical view of embodied experiences and cultural meanings of urban transport, the metro is far more tolerable than other public transport but, collectively, they are still far less appealing than the car.

The interconnections between the Sofia Metro project and the private car, through narratives of substitution, complementarity, displacement and competition, represent one facet of constructing a relational account of what it means to use and inhabit the metro and the city today. On the one hand, it highlights the way the original plan for the metro infrastructure dates back to the 1960s. On the other hand, reading the metro alongside other transport modes, including the private car, points to the way narratives and affects are layered over weeks, months and years of routine and transformation. For each participant, the everyday practices of inhabiting the metro are entangled in the wider experiences of moving around Sofia. Finally, thinking about the metro as just one mode of habitually moving through the city is a reminder that infrastructure is not only defined by its intrinsic material properties but also by the sheer number of relations to multiple spaces and times that it is part of.

This chapter examined the way in which notions of predictability and propinquity have shaped the way everyday metro journeys have been experienced in Sofia over the past six years. The discussion pointed to the capacity of the metro to add to these notions in return, with its impact on public and individual life spilling beyond trains, platforms and stations. At the same time, by examining the longitudinal and ongoing nature of the mutual shaping of infrastructure, city and inhabitants, I have aimed to qualify two contrasting, and equally problematic, ideas: first, that the Sofia Metro is an infrastructural counterpoint to Sofia's messy reality and, second, that its own complicated history is simply a metaphor of that urban reality. Instead, I sought to use everyday metro mobility as a lens for reading infrastructure relationally. In particular, I have demonstrated that the long-term transformations of

meanings and the contemporary practices of using the metro are interwoven with the meanings and practices associated with ground-level public transport and private cars. Thus, meanings and practices around propinquity and predictability have both endured and continued to change. The multiple temporalities of infrastructure projects, everyday experiences of commuting, and the long and contested history of the private car, are brought together in Sofia's ongoing infrastructural transformations. Finally, I aimed to demonstrate the wider role for ethnographic research on post-socialist urban infrastructure, adding my voice to calls for the critical move from case study to contributing to broader theory-making in urban studies.

Note

1 I use the term 'mobility practices' to denote mobility-relevant social practices, as elaborated by Shove (2003) and Shove et al. (2012). This conceptualization draws attention to the doings and sayings of everyday life that are partly widely shared and recognizable, and partly modified with every individual performance.

References

Amin, A. and Thrift, N. J. (2017) *Seeing Like a City*, Cambridge, UK, MA: Polity.

Arnold, M. (2003) 'On the phenomenology of technology: the "Janus-faces" of mobile phones', *Information and Organization*, 23, 231–256.

Ash, J. (2013) 'Rethinking affective atmospheres: technology, perturbation and space times of the non-human', *Geoforum*, 49, 20–28. doi: 10.1016/j.geoforum.2013.05.006.

Barnfield, A. and Plyushteva, A. (2015) 'Cycling in the post-socialist city: on travelling by bicycle in Sofia, Bulgaria', *Urban Studies*. doi: 10.1177/0042098015586536.

Berry, M. and Hamilton, M. (2010) 'Changing urban spaces: mobile phones on trains', *Mobilities*, 5:1, 111–129. doi: 10.1080/17450100903435078.

Bissell, D. (2018) *Transit Life: How Commuting is Transforming Our Cities*, Cambridge, MA: The MIT Press.

Blazek, M. and Šuška, P. (2017) 'Towards dialogic post-socialism: relational geographies of Europe and the notion of community in urban activism in Bratislava', *Political Geography*, 61, 46–56. doi: 10.1016/j.polgeo.2017.06.007.

Borisova-Tirkova, T. (2016) 'The number of cars with a Sofia registration is growing', *Bulgarian National Television*. Available at: http://news.bnt.bg/bg/a/broyat-na-kolite-ss-sofiyska-registratsiya-se-uvelichava (accessed 22 September 2016)

Butcher, M. (2011) 'Cultures of commuting:the mobile negotiation of space and subjectivity on Delhi's metro', *Mobilities*, 6, 237–254.

Capital (1998) 'Emergency pre-election spending begins', *Capital*. Available at: www.capital.bg/politika_i_ikonomika/redakcionni_komentari/1998/03/07/243392_zapochvat_avariinite_predizborni_harchove (accessed 7 March 1998)

Carse, A. (2012) 'Nature as infrastructure: making and managing the Panama Canal watershed', *Social Studies of Science*, 42, 539–563.

Cass, N. and Faulconbridge, J. (2016) 'Commuting practices: new insights into modal shift from theories of social practice', *Transport Policy*, 45, 1–14. doi: 10.1016/j.tranpol.2015.08.002.

Cox, T., Houdmont, J. and Griffiths, A. (2006) 'Rail passenger crowding, stress, health and safety in Britain', *Transportation Research Part A: Policy and Practice*, 40:3, 244–258. doi: 10.1016/j.tra.2005.07.001.

Gatersleben, B. and Uzzell, D. (2007) 'Affective appraisals of the daily commute: comparing perceptions of drivers, cyclists, walkers, and users of public transport', *Environment and Behavior*, 39:3, 416–431. doi: 10.1177/0013916506294032.

Gibas, P. (2013) 'Uncanny underground: absences, ghosts and the rhythmed everyday of the Prague metro', *Cultural Geographies*, 20:4, 485–500.

Grozdanov, V. (2011) 'Urban mobility problems in Sofia', 20th International Conference on Transport.

Harris, A. (2013) 'Concrete geographies: assembling global Mumbai through transport infrastructure', *City*, 17:3, 343–360. doi: 10.1080/13604813.2013.798884.

Hirt, S. (2007) 'Suburbanizing Sofia: characteristics of post-socialist peri-urban change', *Urban Geography*, 28:8, 755–780. doi: 10.2747/0272-3638.28.8.755.

Hirt, S. (2015) 'Planning during post-socialism', International Encyclopedia of the Social & Behavioral Sciences, 2:18. Available at: https://vtechworks.lib.vt.edu/handle/10919/56666 (accessed 31 July 2018)

Hirt, S., Ferenčuhová, S. and Tuvikene, T. (2016) 'Conceptual forum: the "post-socialist" city', *Eurasian Geography and Economics*, 57:4–5, 497–520. doi: 10.1080/15387216.2016.1271345.

Jirón, P. A., Imilan, W. A. and Iturra, L. (2016) 'Relearning to travel in Santiago: the importance of mobile place-making and travelling know-how', *Cultural Geographies*, 23:4, 599–614.

Kusenbach, M. (2003) 'Street phenomenology: the go-along as ethnographic research tool', *Ethnography*, 4, 455–85.

Latham, A. and Wood, P. R. H. (2015) 'Inhabiting infrastructure: exploring the interactional spaces of urban cycling', *Environment and Planning A*, 47:2, 300–319. doi: 10.1068/a140049p.

Latour, B. (1991) 'Technology is society made durable', in Law, J. (ed.) *A Sociology of Monsters: Essays on Power, Technology, and Domination*, 103–130, London: Routledge.

Mott Macdonald (2011) Integrated Plan for the Organisation of Mobility in the Territory of the Capital Region: Final Report, Sofia, Sofia Municipality.

Pishtachev, S. (1972) Expert Opinion in Response to First Sofia Metro Plans, arch. fund 136, 54:42, Sofia: Bulgarian State Archive.

Plyushteva, A. (2016) *Commuting with New Transport Infrastructure: Change, Cost and Comfort on the Sofia Metro Extension*, London, UK: University College London.

Richmond, J. (2005) *Transport of Delight: The Mythical Conception of Rail Transit in Los Angeles*, Akron, OH: Akron University.

Robinson, J. (2016) 'Thinking cities through elsewhere: comparative tactics for a more global urban studies', *Progress in Human Geography*, 40:1, 3–29. doi: 10.1177/0309132515598025.

Sheller, M. and Urry, J. (2000) 'The city and the car', *International Journal of Urban and Regional Research*, 24:4, 737–757.

Shove, E. (2003) *Comfort, Cleanliness and Convenience the Social Organization of Normality*, Oxford, England, and New York: Berg.

Shove, E., Pantzar, M. and Watson, M. (2012) *The Dynamics of Social Practice: Everyday Life and How It Changes*, London: SAGE.

Sliwa, M. and Riach, K. (2011) 'Making scents of transition: smellscapes and the everyday in "old" and "new" urban Poland', *Urban Studies*, 49:1, 23–41. doi: 10.1177/0042098011399596.

Smith, P. and King, R. D. (2013) 'From road rage to everyday automotive incivility: a routine activities approach to low-level deviance', *The Sociological Quarterly*, doi: 10.1111/tsq.12030/full.

Smith, P., Phillips, T. L. and King, R. D. (2010) *Incivility: The Rude Stranger in Everyday Life*, Cambridge: Cambridge University Press.

Sofia Municipality (2009) *Sofia General Urban Development Plan (original title: 'Общ Устройствен План На Столична Община')*, Sofia: Sofia Municipality.

Sofia People's City Council (1974) *Protocol No 5, Article 4*, arch. fund 65, 7:368, Sofia: Bulgarian State Archive.

Tirachini, A., Hensher, D. A. and Rose, J. M. (2013) 'Crowding in public transport systems: effects on users, operation and implications for the estimation of demand', *Transportation Research Part A: Policy and Practice*, 53, 36–52. doi: 10.1016/j.tra.2013.06.005.

Tomic, P., Trumper, R. and Dattwyler, R. (2006) 'Manufacturing modernity: cleaning, dirt, and neoliberalism in Chile', *Antipode*, 38, 509–530.

Tuvikene, T. (2016) 'Strategies for comparative urbanism: post-socialism as a deterritorialized concept: strategies for comparative urbanism', *International Journal of Urban and Regional Research*, 40:1, 132–146. doi: 10.1111/1468–2427.12333.

Urry, J. (2004) 'The "system" of automobility', *Theory, Culture & Society*, 21:4–5, 25–39.

Wilson, H. (2011) 'Passing propinquities in the multicultural city: the everyday encounters of bus passengering', *Environment and Planning A*, 43, 634–649.

12 Infrastructures as fluidities

How marshrutkas help us to overcome static conceptions of road-based mobility service provision

Tonio Weicker and Wladimir Sgibnev

Introduction

In spite of the recent reception of assemblage and actor-network theories into infrastructure research, public transport is still very much seen as an arena of negotiation between state and society – the former as a benevolent or neglecting provider, regulator and financier and the latter as a paying, enduring or protesting passenger. However, 'informal' or less regulated public transport solutions, both in the global South *(dolmuş, matatu, tro tro* and cognates) and North (Uber, Lyft, etc.) challenge this vision, exploiting liberal laissez-faire regimes and post-colonial state absenteeism, or filling the gap of state failures. Their atomistic structure, elusive definitions, self-employment, low market entry barriers and (at least initially) non-existent legal frameworks, favoured the emergence of bottom-up regulation arrangements and thwarted many top-down attempts to include them in normatively appropriate 'official' and corporate frameworks. The same goes for the infrastructural 'back end' of these public transport options, which cannibalize on pre-existing road surfaces and stations, and largely lack depots and dispatchers, instead relying on customary or ad hoc solutions. Against this backdrop, we propose to conceptualize public transport infrastructures as fluidities where not only vehicles are in motion but also services, facilities and regulations. Actants constantly experience a condition of liminality relating to the qualification of Soviet and post-Soviet life as 'societies of *remont*' (Gerasimova and Chuikina, 2004) – providing a stark contrast with the state-funded public transport services of the Soviet era.

The existing literature on road-based public transport provision in the post-socialist realm is greatly focused on transformation consultancy (Finn, 2008; Grdzelishvili and Sathre, 2011; Gwilliam, 2000, 2002; Hook, 1999; Pucher, 1995, 1999), and uncritically operates with terms such as 'line tendering' – even if it is not clear what a 'line' in a post-socialist context exactly means. On a network map, which in our regional context is hard to come by anyway, a public transport line would be pretty straightforward, stretching out from terminus A to terminus B. But to our understanding, road-based mobility is not just about the roads taken. The proposed

contribution will take on post-Soviet *marshrutkas* – the region's ubiquitous minibuses – in order to empirically substantiate this argument, bringing in material from Tajikistan and Southern Russia. We first propose an introductory framework for placing marshrutkas on post-socialist streets; second, we introduce the notion of assemblage to conceptually grasp the marshrutka mobility phenomenon; third, we present empirical material from recent fieldwork stays in Volgograd and Khujand before coming to a conclusion.

Marshrutkas and post-socialist infrastructures

Drawing on the insights of the 'infrastructural turn', we would like to highlight the mutual relationship between infrastructural means and their users, which reciprocally influence and continuously reproduce the perception, meaning and utility of each other (Graham and Healey, 1999; Murdoch, 1998). Although mostly perceived as something stable in everyday life, at second glance, infrastructures consist of multiple layers with varying durability, changing over time and space on a material as well as a conceptual level (Geels, 2002; Jensen, 2009). This is also true for post-Soviet infrastructures in their characteristic hybrid forms, which continue to be heavily influenced by former Soviet techniques. At the same time, these infrastructural remnants have blended with new forms of neoliberal narratives and market-driven practices (Golubchikov et al., 2013, p. 617).

Considering this, our understanding of post-socialism denies a reductionist ascription of societal determination but emphasizes the multiple, accentuated everyday interaction with still widespread entities claimed or perceived as 'Soviet' or 'socialist'. In this sense, we oppose characterizing state behaviour, practices or infrastructures as 'socialist' just because they remained in charge after the breakdown of the Soviet Union. We also define post-socialism neither as a purely temporal nor as a strictly territorial category. Instead, we conceptualize post-socialist infrastructures as situationally performed arrangements of contrasting and sometimes conflicting legacies, some of them consciously or unconsciously connected to 'Soviet' narratives. This is particularly obvious in the case of socio-technical continuities, which form and influence the everyday practices of urban life solely through their material endurance. A marshrutka ride in itself is nothing other than a half-formalized minibus practice similar to that in many other locations all over the globe. However, a marshrutka replacing a former Soviet bus line, reutilizing persistent infrastructure patterns and reacting to the multiplicity of urban change is of course related to its socio-historical environment. This ongoing negotiation process, not as a matter of fact but as an observable performance within socio-technical assemblages, we would define as 'post-socialist fluidity'.

Despite remarkable and sometimes surprising socio-technical continuities, the collapse of the Soviet Union has had far-reaching consequences for public transport, as it did on many other sectors of society. The

former regime left behind one of the world's largest transport systems, which constituted a heavy burden for states in transition rather than a benefit (Kolik et al., 2015). Because of the ensuing economic crisis, budget resources of most local administrations were so low that municipalities had to shut down most public transport offers (Popov, 2012). In these times of government's inability to act, 'the degeneration and collapse of formal bus systems allowed large-scale minibus operations to become established in large urban areas as the dominant form of transport' (Finn, 2008 p.119). Since then, the marshrutka market constitutes an ever-changing transport sector in almost all post-Soviet cities and regions, a hybrid mobility offer between formal and informal economy and, to a wide extent, an independently acting social network within old and new legacies, using and misusing pre-existing infrastructures in a creative and highly adaptive manner.

In this sense, the emergence and spread of marshrutka mobility must also be analysed in its mutual interdependencies with local municipalities. Therefore, it is worth mentioning that despite the crucial importance of the minibus system and its immense popularity in the 1990s, there was no systematic regulation of the commercial transport sector for a long time (Sanina, 2011). Only since the late 1990s, depending on cities and regions, have local authorities strained to regain at least part of their ability to finance bus vehicle purchase and operations, and to restore at least part of their operating capacity (Finn, 2008), with varying degrees of success. The procedural, very flexible and unsteady character of marshrutka practices gave the impression of a long-term transition technology that mirrored, like all infrastructural changes, the societal developments in other sectors during that time (Jensen, 2011; Tonkiss, 2014). That is also why the marshrutka practice, which actually has its historical roots in early Soviet times,[1] could be called a post-socialist phenomenon, because only then was it reconfigured as a mass transport system with specific social-spatial, economic and societal determinants in an uncertain environment, making this mode of transport worthy of investigation. Today, millions of passengers, drivers, dispatchers, vehicles and entrepreneurs perform and constitute marshrutka practices every day with a strong impact on the contemporary urban life in diverse spheres such as economy, politics or culture. Contrary to other post-socialist materialities like the recently eliminated kiosk-trading in Russian cities (Brade et al., 2007; Markov, 2017), the marshrutka phenomenon is surprisingly long-lasting, and characterized by its high adaptability towards different and changeable socio-spatial settings and structures. It has proven resistant to the decade-long societal tensions and struggles in several cities. Therefore, marshrutkas continue to make post-socialist infrastructure tangible in everyday urban life, which mainly constitutes the perception of urban space and mobility and co-produces the meaning of post-socialist infrastructures relating to mobility provision, street layouts, and connected regulations and practices.

We speak about mutual influences and ascription processes that determine what we define as a 'post-socialist infrastructure' or, in our precise

case, as a 'post-socialist marshrutka'. These perceptions are of course not stable but fluid over time and space. According to Law (2002), fluidity describes the flexible constitution of materiality, which allows an informed majority to recognize the object as such despite a wide range of deviations and significant differences in its individual form (Law, 2002). Even though marshrutkas may have no common vehicle brand, no standardized price regulation, a high number of individually arranged route lines, and different forms of ownership and company structures, the citizens are still able to recognize the mobility offer as such and even to know how to use it properly. Even more complex discrepancies between cities, such as common payment practices during the marshrutka ride, unknown route lines and the different traffic behaviour of drivers can be solved easily by socialized marshrutka users.[2] Meanwhile, these perceptual deviations can only exist within a common understanding of the whole marshrutka assemblage as such. From this perspective, post-socialist infrastructures – seen here through the lens of mobility on urban streets – are themselves extremely fluid. This means that there is a huge back end of used public infrastructure (such as roads, bus stops and parking places), formalized and informally stabilized institutions such as depots, workshops and control centres, or the fluid nature of end/starting points, which are temporarily linked to each other within urban assemblages and therefore contribute to the conceptualization of marshrutkas, streets and infrastructures in various ways.

Marshrutkas as assemblages

An assemblage could be defined as 'a kind of chaotic network of habitual and non-habitual connections, always in flux, always reassembling in different ways' (Potts, 2004, p.19). Following Latour, one could further argue that the setting of a phenomenon, thing or actor is as important as the actor itself. Therefore, actors can only be defined in the way they relate to other actors (Latour, 2005). A marshrutka, in this sense, is not sufficiently defined by its specific design or characteristic equipment but by the way it constitutes related practices and allows people/objects/techniques to perform the marshrutka ride in a specific location on a regular basis. Thus, a marshrutka without passengers, drivers and engines, but also without specific behaviour norms like payment practices, stop requests or communication styles, is hardly imaginable. Summarizing, if the network changes, the actor itself changes. Therefore, one aim of this chapter is to focus on the significant mutual relation between the marshrutka phenomenon and post-socialist infrastructures by referring to local interdependencies and practices within the heterogeneous networks of the southern Russian city of Volgograd and the city of Khujand in Tajikistan.

Using assemblage approaches to describe the post-socialist marshrutka phenomenon sensitizes for the emergence of upcoming or gradually adapting orders without falling into the trap of simplified transition explanations, which often co-produce intended or unintended power asymmetries and

should therefore be stated very carefully. Deleuze's concept of affects and affective flows would help to point out that agency is realized through affects and not possessed by actors or agents (Deleuze, 1988, p. 101). The multi-layered power struggle within assemblages is one of the key points to explore in this approach:

> When you simply have power – in potential – nothing happens and you are powerless; when you exert power – in actu – others are performing the action and not you. [Power] as an effect, but never as a cause.
>
> (Latour, 1986, p. 265)

Thus, rather than determined by the powerful actors involved, assemblages are governed by affective flows, which work like 'affect economies' trying to guide the network 'from one mode to another in terms of attention, arousal, interest, receptivity, stimulation, attentiveness, action, reaction, and inaction' (Clough, 2004, p. 15). Affects are bounded in a space-time determination. Just like materials, affects are fluid in their performance and efficacy. Subsequently, fluidity is the focal point of this study. As Law and Callon argued: '…we are not primarily concerned with mapping interactions between individuals […] but we are concerned with mapping the way in which they define and distribute roles, and mobilize or invent others to play these roles' (Law and Callon, 1988).

In conclusion, assemblage approaches give us a specific perspective about the difficulties within the social settings, such as the flexibility of infrastructures and their institutions and organizations, and the fluidity of space and meaning that 'emphasizes emergence, multiplicity and indeterminacy, and connects to a wider redefinition of the socio-spatial in terms of the composition of diverse elements into some form of provisional socio-spatial formation' (Anderson and McFarlane, 2011).

Insights from Khujand and Volgograd

The southern Russian city of Volgograd and Tajikistan's second largest city, Khujand, share a common Soviet heritage but are clearly two distinct cities with varying patterns of development, different historical influences and current geopolitical preconditions. However, they have in common a predominant public transport mode that lies in private hands – the marshrutkas. We offer a comparison of the mobility performances within these two cities to illustrate that post-socialist developments are less bounded by former borders or socio-historical conditions, and that they become beneficial and empirically rich in their inter-individual reactions to structural deficiencies and in their flexible solutions and adaptation processes. Therefore, we will substantiate the fluidity of post-socialist infrastructures by referring to two particular lines – marshrutka routes No. 3 in Khujand (Figure 12.1) and No. 36 in Volgograd (Figure 12.2).

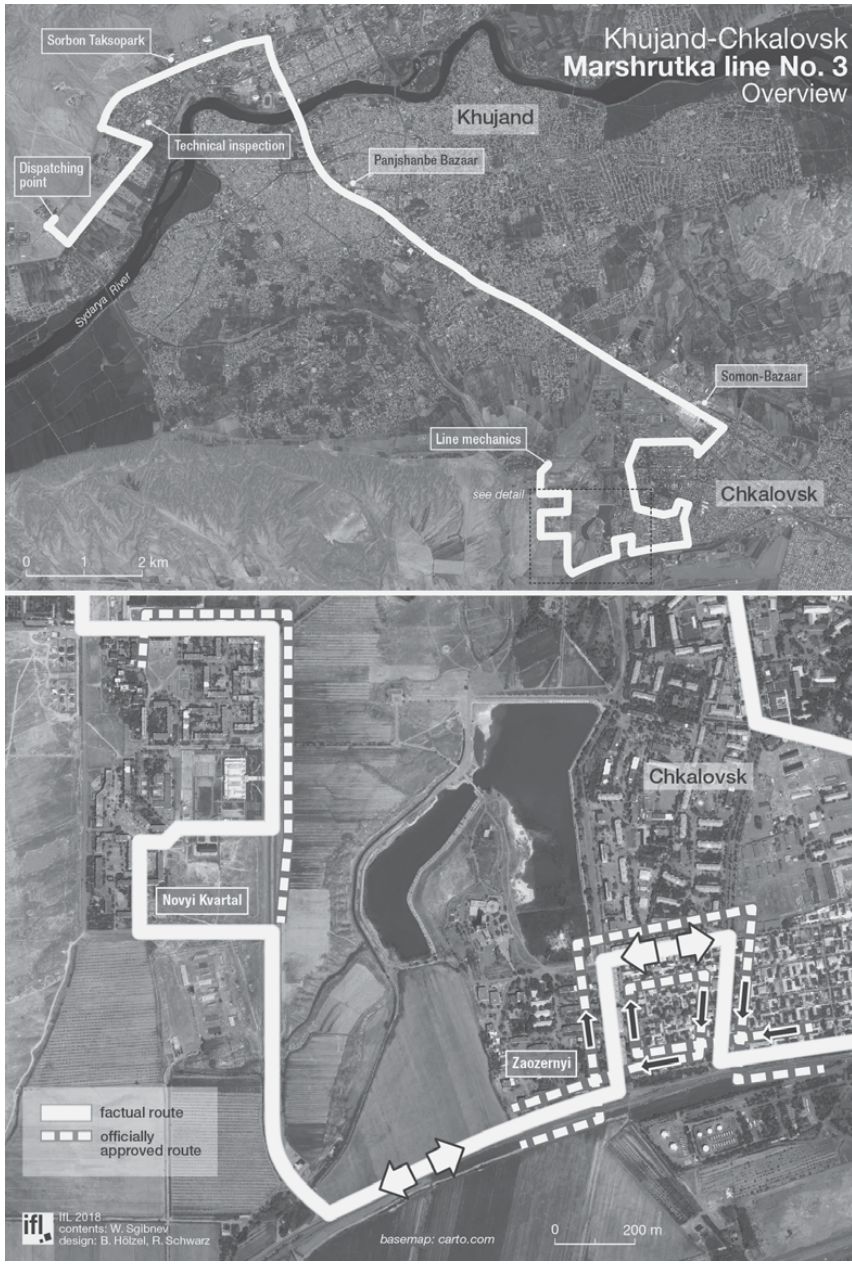

Figure 12.1 Marshrutka line 3 in relation to the Khujand agglomeration and line deviations in Chkalovsk

Source: W. Sgibnev, design by B. Hölzel and R. Schwarz (© IfL)

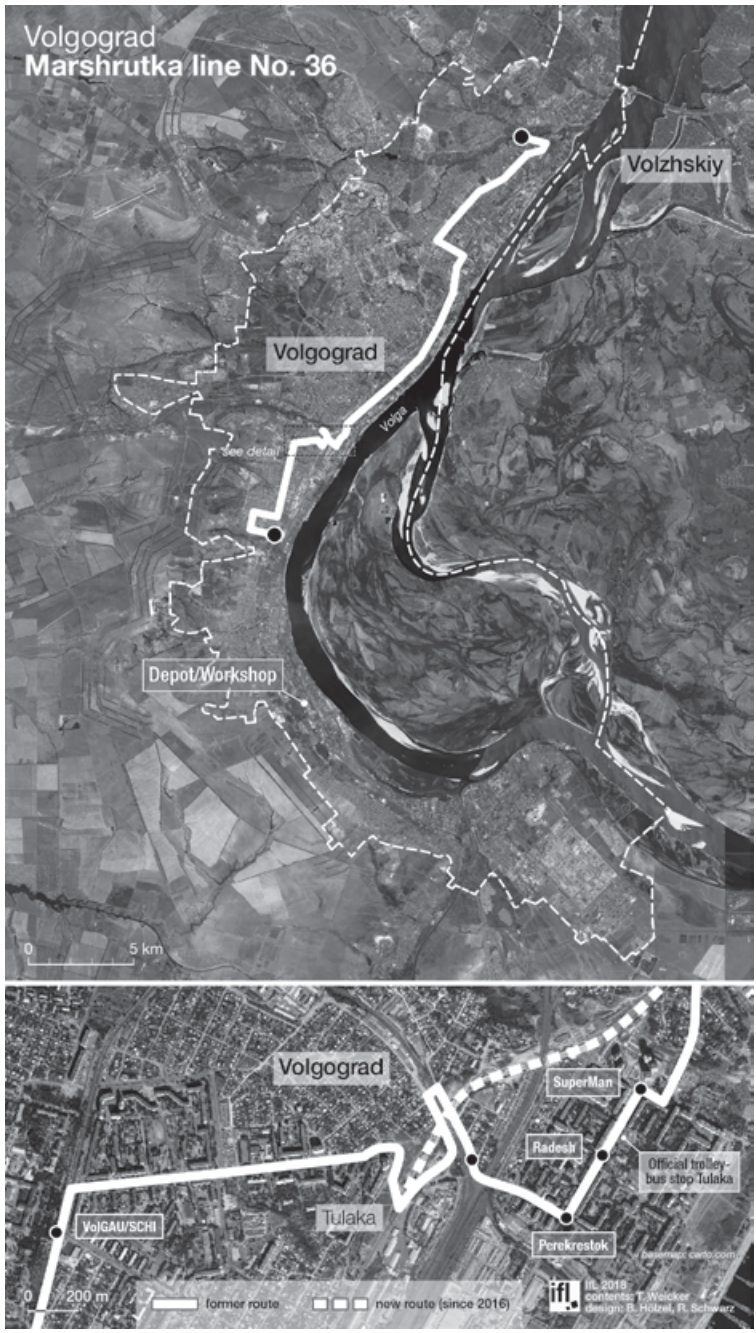

Figure 12.2 Marshrutka line 36 in relation to the Volgograd agglomeration and route alternatives in the Tulaka area

Source: T. Weicker, design by B. Hölzel and R. Schwarz, R (© IfL)

Volgograd's marshrutka line 36 is one of the city's main routes, connecting the northern districts with the city centre and the Sovetsky district in the south. There are nearly 60 official bus stops on the route, although in practice the bus driver will stop anywhere requested. The distance from the starting point to the end point is about 30 km, which is approximately the average of Volgograd's marshrutka lines. Comparably to Volgograd's line 36, Khujand's marshrutka line 3 is one of the oldest, longest and most frequent lines in the agglomeration, stretching for 30 km from the outlying third *microrayon* (a separated large housing estate), through the housing estates on the uphill road, turning southwards on the city's main street, passing the central stops at Univermag and Panjshanbe, then continuing towards the Somon and Atush bazaars, before turning into the satellite city of Chkalovsk (renamed Buston in early 2016) and assuming a serpentine local service in this area.

The enormous distances in Volgograd result from the overall length of the city, which is some 85 km long north to south on the left bank of the Volga River, not including the suburban areas. Volgograd, formerly known as Stalingrad, went through a fundamental reconstruction and industrialization period after World War II, which had left the city almost completely destroyed. Because of limited resources and time pressure during the war and in its aftermath, engineers prioritized industrial plant construction that resulted in a stripe-like city structure where urbanization took place around and in between the industrial plants (Pruglo, 2013). This is why the maximum width of the city centre of contemporary Volgograd is fewer than 10 km. The geographic location of the city, its particular historical and sociopolitical roots, and the interesting mixture of pragmatic and ideology-driven urban planning in post-war Stalin-/Volgograd have fundamentally influenced the shape of the present city. From a transport logistics point of view, the concept of a linear city collapsed, at the latest, with the economic decrease and transition process following the demise of the Soviet Union and the shutdown of the main industrial plants (Krasilnikova, 2014). Today, Volgograd is a city with more than 1 million inhabitants with an economic agglomeration area within the city centre but also an infrastructure that still provides for microrayons (separated large housing estates near industrial sites) – and only one road connecting all estates with the city centre (Trubina, 2010). In this sense, the post-socialist streets of Volgograd determine the emerged, developed and adapted marshrutka practices very significantly, because they mainly rely on the remaining local infrastructure. Similarly, there is a mutual relationship between being structured by infrastructure on the one hand and giving sense to it by performing urban space on the other.

Until recently, marshrutkas were the main transport mode in the city. The privately organized mobility offer was provisioned by 60 operators running 102 different marshrutka lines and served by 2,258 officially registered vehicles per day. According to official statistics of the local administration, approximately 5,000 marshrutka drivers (two drivers usually share a

common vehicle) carry 64 per cent of the general volume of passengers in the city (Karasev and Sudarčikov, 2016). However, the marshrutka business has been put under pressure since an announcement by Volgograd's governor in June 2016 to phase out 85 per cent of marshrutka lines and to re-establish a municipally controlled public transport network consisting mainly of tramways and buses. In spring 2017, the local administration began closing down several marshrutka lines, while keeping others untouched. The government tried to gradually introduce a new bus fleet, as well as a refurbished tramline network. However, the transition process has just begun and it is too early to estimate its long-term consequences in the city. In any case, the current developments, once again, underline the fluidity of infrastructure and mobility offers, pointing to their temporality but also to the manifold societal consequences that a top-down reform of established mobility practices implies.

Khujand may be 3,000 km away from Volgograd, and in an entirely different country, but the development of the marshrutka phenomenon there shares many similarities with the Russian case. In spite of Tajikistan's lower socio-economic indicators, less stable institutions, a distinct historical and cultural background, and the civil war experience of the 1990s, the similarities in marshrutka-related trajectories, practices, policies and materialities provide convincing arguments for speaking of a common, post-Soviet, if not post-socialist, marshrutka mobility phenomenon. Most marshrutka lines extend beyond the city limits of Khujand proper (around 200,000 inhabitants) and stretch out to the densely inhabited suburbs of Ghafurov and Jabbor Rasulov districts in the Tajikistani part of the Ferghana Valley, with some lines even reaching out to villages on the Kyrgyzstani side of the border. After the early Soviet era, main employment centres and points of interest in the region were placed outside the inner city of Khujand – which still mostly consisted of an 'Islamic-oriental' old town, such as the large silk plant which employed up to 20,000 people. Thus, the ore enrichment plant, *Vostokredmet*, was built a dozen kilometres to the south of the city, close to the railway line, with the satellite city of Chkalovsk being established to provide housing for its employees. The neighbouring city of Ghafurov housed the mainline railway station for the metropolitan region. To alleviate housing shortages, construction of mass housing estates began on the then uninhabited right bank of the Syrdarya River. The aforementioned employment centres, however, were mostly located on the opposite bank, which led to a concentration of passenger flows along the main street crossing the river in Khujand's city centre, which in turn led, albeit for different reasons, to a similar outcome of a factually 'linear' city. Bus and trolleybus lines followed this linear layout from the microrayons on the right bank, along Lenin Prospekt (later renamed in honour of Ismoil Somoni, the presumed founder of medieval Tajik statehood) towards Chkalovsk and Ghafurov.

Thus, the main axis is at the same time the most profitable route, serving most passengers, and the most contested one, with some 450 marshrutkas

per hour on the central stretch. Also, longer lines are deemed more profitable because they allow not only for terminus to terminus passengers, as on most overland routes, but also for many intermediate boardings, thus levelling out passenger flows and increasing profitability. The route length also accounts for a multi-tiered price scheme (i.e. 1 Tajikistani somoni [TJS], or approximately 0.15€ as of late 2016, inside Khujand proper, 1.50 TJS to the outlying bazaar, 2 TJS all the way to Chkalovsk or 0.90 TJS for the Chkalovsk urban service – generally rounded up).

Because of the overlapping services on the main street, the competition among different lines is severe. Many marshrutka drivers employ conductors – mostly schoolboys – in order to collect fares, announce stops and process requests, as well as to lure potential passengers at the most frequented stations. This practice does not exist in Volgograd, but is fairly widespread in Central Asia because of lower labour costs and weaker labour rights enforcement. On line 3, there are also 'stationary' conductors working on the Panjshanbe bazaar station's southbound platform, as well as on Somon bazaar's northbound platform, calling out to potential passengers in order to gain a competitive advantage on one of the city's most contested stretches.

In the following section, we further analyse the unique design of marshrutka practices in each city along their gradual interplay of structuralization attempts, from ordering actors like operators or the municipality on the one hand to flexible adaptations and individual implementation strategies by drivers or passengers on the other. Within this field of tension, we observe the notion of fluid routes, fluid depots and rolling stocks as empirical evidence for a negotiated existence of post-socialist infrastructure.

Fluid routes

We will now take a closer look at the fluid character of line termini – that is, the start and end points of lines 3 and 36. The first station in the north of Volgograd is at the maternity hospital in the Traktorsavodsky Rayon. The route is not very precise here. Drivers use the parking facilities of the maternity hospital on Zholudeva Street for breaks and layovers. Here, the drivers may coordinate their routes and schedules, have a rest or use the little kiosks next door to have lunch or just a little chat. The same applies to the official starting/end point in the south near the cardiology centre. The former parking place for visitors and patients is today a huge marshrutka meeting point. It accommodates seven different marshrutka lines and one bus line. You can hardly find private cars in this area, only drivers or dispatchers who control vehicle intervals and coordinate the departure times. Down the road, just two minutes' walk from the cardiology centre, one can see the main building of the Volgograd State University. As a result, a large percentage of the passengers driving to the southern districts are students. However, to accommodate for the high demand on the part of the students,

the drivers extended the route by informally stretching it towards the university. In 2013, a huge shopping mall complex called *Akvarium* opened just next to the Volga River not far from the university. Thus, some drivers started extending their routes once again, from the university down the hill to the shopping mall. These (at least initially) informal extensions – the official last stop of line 36 is still the cardiology centre – are common, and become widely accepted after consultation with local competitors.

As for Khujand's line 3, apart from incidents (such as police stopping drivers for traffic violations), vehicles proceed from the third microrayon all the way to Chkalovsk. As mentioned before, drivers have a financial interest in driving a service along the longest possible line, thus catering to more passengers. Furthermore, there is strict social control and dispatching oversight for vehicles to take turns for entering into service at the respective termini. However, the line 3 layout has seen some modifications at both ends of the line – the latest being the extension from the 8/12 microrayon to the third microrayon in 2002. All extensions have gone through the formal authorization process. However, innovations outside the legal framework did take place en route: at the southern end, there is a slight modification to serve *Novyj Kvartal* more densely than the route documentation provides for, thus driving the route through housing estate courtyards. Yet another modification concerns the *Zaozernyj* service, where the official one-way loop is transformed into a two-way operation on a rather narrow street.

Until recently in Volgograd, a complex line alteration arrangement was in place: once the marshrutka leaves the central district, the drivers meet new challenges concerning the traffic situation. Line 36 follows Lenin Prospekt to Tulaka, a popular residential district, just next to the river, that is quiet but still close to the centre. There are only a few marshrutkas passing by because Tulaka is beside the main streets and surrounded by railways. In spring 2016, the government built and opened a tunnel to give an alternative to the manually operated railroad crossings. The highly trafficked railway was a risk for both passengers and drivers. During peak hours, passengers could decide to take their chance of reaching the city centre faster by avoiding the main road traffic jam, in the event of open railway gates. Otherwise they would be stuck in an even longer queue. The new tunnel gives drivers the opportunity to bypass the crossroad. Yet, it takes some minutes to reach the entrance of the tunnel.

For a couple of months after the opening of the tunnel, drivers had to argue with passengers over which direction to go. The decision was generally met with vehement protests from those passengers missing their expected destinations. In practice, drivers looked out for the gates and communicated with the passengers concerning which direction to follow. Only after some months, when all participants got used to the daily infrastructural challenge, did the administration change the official routes and oblige the drivers to take the tunnel no matter whether the railway gates were open or not. Marshrutka routes are thus not just precise lines

connecting A to B, but subject to negotiation, which vividly underlines the fluid nature of infrastructure.

Hybrid depots

The depot of the vehicle fleet is not located next to the route but placed in another southern suburban district called Kirovsky. Leased marshrutkas must stand at the depot overnight because of insurance restrictions. However, the great majority of the cars are privately owned by the drivers and are therefore largely used as private cars after work. It is a common sight in the suburbs of Volgograd to see a driver in front of his home trying to fix his often outdated car on his own, usually under time pressure to be on the road again as fast as possible. However, all marshrutkas and the responsible drivers have to be in the depots before starting work to go through a technical inspection and a health check in the morning. This means that the drivers must be present early in the morning at Khimzavodskaya Street, just next to the local chemical plant, where the so-called depot is placed (which does not perform other functions apart from providing health checks). From this depot it's a 15-minute ride to the southern start point of route 36. The owner of marshrutka line 36 currently manages three marshrutka routes (36, 71 and 71k), all of which have been registered at Khimzavodskaya for years. At the same place, he runs a car workshop where he works as a mechanical engineer.

Khujand's line 3 is officially managed by Sorbon, which is the largest marshrutka licensee in Khujand, holding 48 out of Khujand's 92 routes as of 2014. The company is the heir to Khujand's (formerly Leninabad's) taxi operating enterprise of Soviet times, which managed to survive as a marshrutka holding company (Sgibnev and Vozyanov, 2016). However, Sorbon directly owns and operates only a fraction of the 60-plus vehicles in service on the line. The vast majority of them are privately owned, driven and maintained. Therefore, the large Sorbon depot (rather known by its old name, *Taksopark*) is nearly empty and only performs administrative functions for the holding and provides space for car repair workshops that are not part of the marshrutka operating business.

The vehicles stay overnight close to their drivers' homes, meaning that the entire city becomes a dispersed marshrutka depot. The same goes for vehicle maintenance, because all drivers refer to workshops they trust all over the city. However, two main clusters stand out – a former neighbourhood garage area in the 35th microrayon and a flock of repair shops in the village of Ghoziyon. On a daily basis, in theory, the drivers have to check in at the technical and medical inspection in the 8/12 microrayon, where a basic check-up of the vehicle is performed along with a breath alcohol test and a blood pressure check. The respective route sheet is often signed retroactively, but this does not invalidate the fact that this 'official' function of the depot, here as well, is detached from some presumed organizational and technical centre.

Termini perform a couple of other depot functions such as social interaction among drivers, who naturally spend their breaks there. It is a place where younger drivers are educated in road safety and technical questions, as well as in proper 'civic' behaviour both by the dispatcher and the older drivers. Furthermore, petty maintenance work may be performed there. Conductors use this time for cleaning the vehicles and are generally not allowed to socialize with the drivers. Dispatching is also essential in creating a sense of community among drivers in that it prevents encroaching on each other's passengers. Line 3 is one of the rare examples where the dispatcher can absent himself for a couple of hours while the drivers take turns in taking scrupulous care of the four-minute interval. In the absence of a control centre, drivers are constantly on the phone informing following vehicles about obstacles, passenger flow and police controls.[3]

Rolling stock innovations

Volgograd's marshrutka line 36 is mostly served by old yellow Gazel' vehicles. But there are some newer vehicles as well, in general privately owned by the drivers (GazelNext, Mercedes-Benz Sprinter, Citroën Jumper). Each driver has their own philosophy about the right choice for a car. Many appreciate the old Gazel' for its low price, robust design and comparably cheap maintenance costs. However, they have a poor reputation among passengers for being uncomfortable and less safe. That is why intercity marshrutka lines started to modernize their fleet years ago in order to get a competitive advantage. These lines also mostly stick to the rule of not carrying standing passengers, and have therefore established an image of being safer, or at least more comfortable. However, the inner-city marshrutkas never entered into the 'comfort' competition, which is curious because some of the inner-city lines in Volgograd do cover longer distances than intercity lines. In addition, some of the line owners introduced specific measures to increase their status on the road and on an administrative level. Only recently, because of the reform attempts of the local authorities, the official requirements for the private mobility providers have also increased. In summary, there are currently two parallel but antagonistic developments concerning the rolling stock. On the one hand, there is an increasing number of relatively new vehicles in good condition, while on the other hand, 'new' non-confirmed minibuses keep appearing, often in bad technical condition and under no administrative control. Once again, a reform attempt to unify the public transport schedule leads at least in the short run towards an increasing diversity of vehicles, business models and practices as such.

As for Khujand's marshrutka fleet, throughout the city, Mercedes-Benz Sprinter vehicles prevail, while Russian-built Gazel' cars may amount to one fourth of the overall fleet. A tiny fraction consists of surviving RAF minibuses serving less profitable routes, most of them without standing passengers.

The comfort argument has gained importance with regard to the aforementioned massive competition on the main street. Passengers may wait for a marshrutka with available seats. If standing is the only option – say, when university classes start or end – a Mercedes Sprinter is the preferred choice. Line 3 has a reputation for being a cutting-edge line in terms of comfort, cleanliness and safety. Therefore, the drivers quite quickly passed on to Sprinter vehicles, all the while abandoning Gazel' minibuses. Back in the mid-1990s, line 3 was the first to pass from RAF to Gazel' vehicles, which started a wave of Gazel' imports into Khujand because of the presence of one, and later many, *usto* (masters) capable of transforming cargo minibuses for passenger service. A similar retrofitting takes place today for imported Sprinter vehicles.

Conclusion

In early 2017, Volgograd's city government abolished a large number of marshrutka lines. Affected were, above all, those running through the city centre. However, line 36 is still in operation, although the route owner lost two other marshrutka lines. The government's decision-making process concerning which marshrutka line was going to be shut down was characterized by a lack of transparency. The competitor lines like 15c, 1c, 2c and 57 have all been closed, as stated in the city council plan – while line 36 seems likely to stay with us in the middle term. Today, the lucky drivers of route 36 enjoy their monopoly, with their only competition being large buses that are twice as slow. As already mentioned, marshrutka practices are characterized by high adaptability, which is once again demonstrated by the fact that, only days after the abolishment of several marshrutka lines, drivers began offering illegal trips, claiming the ride as 'appointed' while actually following former routes (Babanova, 2017). Therefore, it seems too early to confirm the end of marshrutkas as long as the local government is either unwilling or unable to establish usable alternatives. Rather, one can observe a recurring shift of the status of marshrutka practices in the city, dismissing formerly legalized practices as dangerous, corrupt, criminal and therefore illegal.

The reaction to the shutdown of two thirds of Volgograd's marshrutka fleet has been highly diverse. While certain line owners brought legal action, others just accepted the new regulations, and still others supported the drivers in offering illegal trips despite high penalties for both drivers and operators. Currently, the transport mode of illegal trips depends highly on the creativity of the driver: some oblige the passengers to personally sign a contract after entering the marshrutka, others ask for 'compulsory donations' and some drivers just change line numbers during the rides to avoid police controls.

In Khujand, too, the discussion about line closures has been going on for years. The European Bank for Reconstruction and Development has pledged

to provide a credit of US$61.5 million for 600 new buses and trolleybuses. The first hundred Chinese-built buses were due to arrive towards the end of 2011 but these buses never materialized, as of 2018. One reason for this might lie in the personal involvement of bureaucrats who themselves employ marshrutka drivers and fear losing their income, while yet another reason is a discussion between the European Bank for Reconstruction and Development (EBRD) and the city administration on whether to provide the credit in cash or in kind – that is, if buses are to be tendered and ordered directly by the EBRD or if the cash flow should run through the city administration accounts. In 2014, the buses were due to arrive 'this winter', while in mid-2016 they were meant to arrive 'by the end of the year'. This would mean the disappearance of marshrutka line 3, alongside all other marshrutkas running on the main street (i.e. Lenin/Somoni Prospekt). Surprisingly or not, neither drivers nor operators seem to worry. Many drivers have applied for bus driving licences and registered with the city transport administration, while others plan to switch to suburban routes. Operators such as *Sorbon* or *Gazel'passtrans* plan to work with the planned City Unitary Enterprise responsible for the upcoming bus system for depot service provisions, while the city administration is sure to get its proper share of the new system. Fluid practices can therefore be observed in the break-up phase as well, and even the disappearance of marshrutkas as we know them is first of all characterized by fluidity.

This chapter has shown that fluid mobility offers co-produce, as a side effect, very fluid forms of urban space. Not only do they configure the assemblage itself but they also reconceptualize the outside environment, such as streets, barriers, stops and (enforced) traffic rules, buildings and institutions, as a result of the challenge of individual preferences and intersubjective negotiation processes in the collective setting of marshrutkas. Within this assemblage, we must acknowledge the structuring role of regulations that reconfigure the marshrutka market with a different pace and intensity over time – from a waning Soviet-era framework and weak oversight in the early 1990s to the ever-hardening regulatory pressure of the 2010s, and the ever-increasing palpable threat of a shutdown of marshrutka services. The diversity of local policies highlights the role of municipal authorities in holding together the 'marshrutka assemblage'. Therefore, there is much interest in producing in-depth case studies of the marshrutka sector at a micro-level in order to grasp and map out the various actor constellations, power asymmetries and affective flows. This approach also helps in not losing sight of subversive, or unintended, tactics of drivers and passengers, and in taking note of the agency of objects, such as vehicles, stops or maintenance facilities, which, in turn, may also be seen as assemblages in their own right. Assemblage thinking also accommodates a longitudinal perspective that takes a 'situationally performed' post-socialism into account – with regard to both obduracies and innovations of norms, objects or individuals. In summary, we observed the phenomenon 'marshrutka' in different local settings,

and pointed out overlapping similarities and locally adjusted differences. However, multiple post-Soviet mobility practices are here jointly interpreted as an outcome of conflicting negotiations in an assemblage determined by more or less durable infrastructures, legacies and horizons of meaning embedded in hierarchies of social order and spatial distribution, as well as in global discourses of modernity and development. The continuing friction, observed likewise in marshrutka practices in Khujand and Volgograd, might on the one hand be interpreted as the ongoing clash of infrastructural entities and enduring Soviet legacies, but at the same time influenced by neoliberal settings of marketization. On the other hand, marshrutka mobility could be seen as an assemblage of short-term reactive micro-practices heading for flexible solutions, always in flux, always negotiating the liminality of possibilities.

Indeed, marshrutkas create a different consciousness of place-space relations determined by the multiple layers of urban infrastructure but fluid enough to perform flexibility. Maybe it is the omnipresence of broken infrastructures and the collective experience of their maturity (closed plants, unfinished construction sites and insufficient urban supply systems) that most obviously uncover the fluid character of post-socialist infrastructures. However, the way marshrutkas are performing and re-creating post-socialist infrastructures also demonstrates the individual agency within the interplay of structural attribution processes. In this sense, we have tried to contribute to the description of post-socialist infrastructures by following everyday practices of motion through their fluid realizations of space-making.

Notes

1 The first marshrutkas emerged already in the 1930s in the main centres of the USSR. They provided a rather expensive shuttle or express service and connected urban centres to various places of interest (airports, railway stations, tourist attractions, etc.). During Soviet times, marshrutkas always played a marginal role within the transportation system. In contrast to present times, they were highly regarded and represented as an 'upscale' and contemporary mode of transport (Kuznetzov, 2012).

2 Behaviour expectations and action practices indeed differ widely from city to city. In some cities, passengers are encouraged to pay after boarding the minibus. In others, it is common to pay when leaving. Some cities have fixed prices for all marshrutka lines, while others have flexible price systems depending on distance and route line. Car brands, external and internal design, as well as security standards, may differ significantly between two cities and sometimes even among enterprises.

3 The drivers know by heart the four-digit licence plate numbers of their colleagues rather than their names. It is also this very number that is saved on the drivers' smartphones instead of the name of the individual driver, who might at times be replaced by some other person.

References

Anderson, B. and McFarlane, C. (2011) 'Assemblage and geography', *Area*, 43:2, 124–127.

Babanova, M. (2017) 'Maršrutki beznakazanno budut ezdit' pod vidom zakaznyh? *Večernij Volgograd*. Available at: http://vv-34.ru/marshrutki-beznakazanno-budut-ezdit-pod-vidom-zakaznyh.html (accessed 30 May 2017)

Brade, I., Axenov, K. and Bondarchuk, E. (2007). *The Transformation of Urban Space in Post-Soviet Russia*, London: Routledge.

Clough, P. T. (2004) 'Future matters: technoscience, global politics, and cultural criticism', *Social Text*, 22:3, 1–23.

Deleuze, G. (1988) *Spinoza: Practical Philosophy*, San Francisco: City Lights Books.

Finn, B. (2008) 'Market role and regulation of extensive urban minibus services as large bus service capacity is restored – case studies from Ghana, Georgia and Kazakhstan', *Research in Transportation Economics*, 22:1, 118–125, doi: 10.1016/j.retrec.2008.05.012.

Geels, F. W. (2002) 'Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study', *Research policy*, 31:8, 1257–1274.

Gerasimova, E. and Chuikina, S. (2004) 'Obśestvo remonta', *Neprikosnovennyi zapas*, 34.

Golubchikov, O., Badyina, A. and Makhrova, A. (2013) 'The hybrid spatialities of transition: capitalism, legacy and uneven urban economic restructuring', *Urban Studies*, 1–17.

Graham, S. and Healey, P. (1999) 'Relational concepts of space and place: issues for planning theory and practice', *European Planning Studies*, 7:5, 623–646.

Grdzelishvili, I. and Sathre, R. (2011) 'Understanding the urban travel attitudes and behavior of Tbilisi residents', *Transport Policy*, 18:1, 38–45.

Gwilliam, K. (2000) *Private Participation in Public Transport in the FSU*, Washington, DC: World Bank.

Gwilliam, K. (2002) *Cities on the Move. A World Bank Urban Transport Strategy Review*, Washington, DC: World Bank, Available at: http://elibrary.worldbank.org/content/book/9780821351482 (accessed 25 July 2018)

Hook, W. (1999) 'The political economy of post-transition transportation policy in Hungary', *Transport Policy*, 6:4, 207–224.

Jensen, A. (2011) 'Mobility, space and power: on the multiplicities of seeing mobility', *Mobilities*, 6:2, 255–271.

Jensen, O. B. (2009) 'Flows of meaning, cultures of movements – urban mobility as meaningful everyday life practice', *Mobilities*, 4:1, 139–158.

Karasev, A. and Sudarčikov, P. (2016) 'S ulic Volgograda uberut srazu tysâčču maršrutok', *Rodnoj Gorod*.

Kolik, A., Radziwill, A. and Turdyeva, N. (2015) 'Improving transport infrastructure in Russia', *Economics Department Working Papers*, No. 1193.

Krasilnikova, E. (2014) 'Landscape and urban planning transformation of space-planning structure', *Urban Hybridization*. Available at: www.urbanhybridization.net/Elina_Krasilnikova.pdf (accessed 30 May 2017)

Latour, B. (1986) 'Powers of association', in Law, J. (ed.) *Power, Action and Belief: A New Sociology of Knowledge*, Boston: Routledge, 264–280.

Latour, B. (2005) *Reassembling the Social – An Introduction to Actor-Network-Theory*, New York: Oxford University Press.
Law, J. (2002) 'Objects and spaces', *Theory, Culture & Society*, 19:5–6, 91–105.
Law, J. and Callon, M. (1988) 'Engineering and sociology in a military aircraft project: a network analysis of technological change', *Social Problems*, 35:3, 284–297.
Markov, D. (2017) Izderžki ČM: Volgograd lišaetsâ maršrutok i kioskov. In: *Klub Regionov*, 19 April. Available at: http://club-rf.ru/34/detail/1973 (accessed 19 December 2018).
Murdoch, J. (1998) 'The spaces of actor-network theory', *Geoforum*, 29:4, 357–374.
Popov, V. (2012) 'The culture of new mobility in Russia: networks and flows formation', *Mobilities*, 7:1, 151–169.
Potts, A. (2004) 'Deleuze on Viagra (or, what can a 'Viagra-body'do?)', *Body & Society*, 10:1, 17–36.
Pruglo, N. V. (2013) *Narodnyj transport Caricyna – Stalingrada – Volgograda: iz prošlogo v buduśee. K 100-letiû tramvaâ, 50-letiû trollejbusa*, Volgograd: Panorama.
Pucher, J. (1995) 'The road to ruin? Impacts of economic shock therapy on urban transport in Poland', *Transport Policy*, 2:1, 5–13.
Pucher, J. (1999) 'The transformation of urban transport in the Czech Republic, 1988–1998', *Transport Policy*, 6:4, 225–236.
Sanina, A. (2011) 'The marshrutka as a socio-cultural phenomenon of a Russian megacity', *City, Culture and Society*, 2:4, 211–218.
Sgibnev, Wladimir and Vozyanov, Andrey (2016) 'Assemblages of mobility: the marshrutkas of Central Asia', *Central Asian Survey*, 1–16.
Tonkiss, F. (2014) *Cities by Design: The Social Life of Urban Form*, John Wiley & Sons.
Trubina, E. (2010) 'The reconstructed city as rhetorical space: The case of Volgograd', in Fenster, T. and Yacobi, H. (eds) *Remembering, Forgetting and City Builders*, Farnham: Ashgate, 107–120.

13 Conclusion

Infrastructure and post-socialism in theory and practice

Carola S. Neugebauer, Wladimir Sgibnev and Tauri Tuvikene

The chapters of this book have delved into urban infrastructures in the post-socialist world and beyond with the aim of grasping the specificities of the region's infrastructures and to explore the interrelations between infrastructures and post-socialism. The authors have not only addressed post-socialism through infrastructures, but also infrastructures through post-socialism. The intersection of both deepens 'thinking' and enables a more informed 'doing' of (urban) transition and transformation.

This book is among the first to overcome the lack of socio-political perspectives on infrastructures in post-socialist urban development and to approach post-socialism through an infrastructural lens. So far, infrastructures are either hidden in scholarly literature on post-socialism or form part of mainly grey, efficiency-driven economistic readings. The potential for infrastructural thinking to conceptualize cities in the post-socialist realm, and to provide links between academia and practice, has not yet been explored. Moreover, we share the hope to contribute to infrastructure scholarship more generally, showing the value of post-socialist experiences and debates that have been neglected in infrastructure literature so far. This book is thus for everyone who is interested in processes and outcomes of societal change, and its social, material and spatial complexities.

Thinking infrastructures through post-socialism

Recent studies have discussed infrastructures as *linking technologies*, as multi-scalar, multi-sectoral and socio-material means and products of societal and spatial change, reflecting and producing incremental and strategic practices as well as norms and symbolisms that shape the daily lives of individuals and society in turn. The contributions of this book test this conceptual thinking. Dealing with linkages across scales and places, Liubimau's chapter on the nuclear city of Visaginas in Lithuania, for example, focuses on symbolisms and practices attached to the nuclear power plant, which in itself is the infrastructure that brought the city of Visaginas to life. The author traces the multi-scalar relations between local people, the Soviet Union and independent Lithuania, the international community and today's

European Union (EU), and the former Cold War blocks. In doing so, he points to connections between the post-Soviet story of Visaginas and other parts of the world, like US company towns and post-colonial cities. The discussion of post-socialist urban transformation through infrastructures in this chapter and elsewhere in the book thus enriches and revises existing global North- and global South-oriented theories and concepts on infrastructures, as well as the conceptualizations of post-socialism.

The research compiled in this book shows the potential to contribute to current debates on infrastructure, and we wish to revisit two of its key arguments in particular: the equation of urban infrastructure's *material obduracy* and invisibility, and its *normativity* in terms of (un-)changing values, interests and power.

Obduracy and (in)visibility

Infrastructural literature tends to focus on the dichotomy between the existence and function of infrastructures versus the collapse and lack of such materialities, which make the otherwise invisible visible in people's daily lives. Post-socialist experiences clearly oppose this simplification and call for nuanced conceptualizations instead. Indeed, material obduracy is essential, yet the continuity and change of individual and institutional (local) practices are of utmost importance as well: *im*material obduracy and change emerge as a key driver for infrastructural invisibility and visibility respectively.

There is a lot to be found on material obduracy in the chapters of this book. There is obduracy of housing infrastructures, of greenery and of transport systems. Perhaps the strongest experience of material collapse emerged in the case of public transport infrastructures in South Russia and Central Asia as reported by Weicker and Sgibnev. Nevertheless, they put emphasis on fluidity and adaptability of infrastructures thanks to informal local activities stepping in to mitigate the consequences of neoliberalization. Their study contrasts with the Brno case (Mulíček and Seidenglanz), where the urban public transport system – developed across more than a century – has kept its socialist-era material layout almost unchanged. At the same time, the chapter reveals the harsh breaks in daily mobility practices and needs that have emerged through the abrupt and deep de-industrialization processes and the parallel growth of service industries, triggered by neoliberal reforms after socialism. Rhythms of daily mobility, transport planning and construction have changed considerably, while the materiality of the public transport system has remained unchanged. Thus, it becomes apparent that material modifications or even a breakdown of transport infrastructures matter less than shifts in institutional and individual practices.

The chapters by Roth and by Salukvadze and Sichinava, which discuss housing as 'intimate infrastructure' in the South Caucasus, as well as the chapters by Jovanović, and Bouzarovski and Tirado Herrero, which focus on heating infrastructure in Central and Eastern European (CEE) cities,

take on the material obduracy of infrastructures. This rests embedded in institutions and practices that seek to change, modify or 'safeguard' the socialist legacy of tightly bundled infrastructure. While local and national state stakeholders may follow neoliberal values and logics of privatization, decentralization, state withdrawal from welfare and thus an 'unbundling' of infrastructure provision, residents' practices are driven by a continuous interest in receiving housing and heat provision in a quality and quantity they need and are 'used to'. Neither the material collapse nor non-existence of heating or housing infrastructure, but changing institutional and individual practices turn material and otherwise obdurate infrastructure visible. They turn the formerly 'ordinary' infrastructure 'a privilege' and space for production of inequality (Jovanović).

Jovanović reports in her ethnographic study on district heating the residents' 'disenchantment' on feeling the 'social contract' between them and the state cancelled: the socialist state promised a bundled package of infrastructural services including heating (in particular, for all new housing, e.g. in the large housing estates), but after 1990 neoliberal reforms made these services less accessible. The 'shell-and-core form' of new multi-storey housing construction and marketization is a further example of infrastructure unbundling in the cities in the post-socialist realm, as discussed in chapters by Roth, and Salukvadze and Sichinava. Private investors backed up by revised building codes transfer the responsibility for housing-related utilities to new flat owners. The residents, thrown back on their individual or collective agency, feel infrastructure more heavily in their daily lives than was the case under socialism.

Post-socialist experience thus reminds us to be sceptical of simplifications of the infrastructure's material obduracy and visibility. Infrastructure turns visible to users, planners and researchers not only when it is non-existent or has gone through (material or functional) collapse, but also because of institutional and everyday practices that co-create perceptions of service quantity and quality, and relate to the expectations of users based on previous experiences. Similarly, institutional reforms that adapt infrastructural services to new normative settings, such as the privatization of public goods and harsh economic reforms, have resulted in an unbundling of urban infrastructure and produced spaces of 'exacerbated inequalities' (Salukvadze and Sichinava), and thus an intense visibility of infrastructure.

Values and power reconsidered

The contributions in the book emphasize that urban infrastructures are not solely material components of an urban fabric but political projects reflecting and (re-)producing values and interests. Infrastructural literature has acknowledged the normative-symbolic significance of infrastructure (see the Introduction for more details). The imagery of modernity and modernization of space and society has dominated these debates, referring to the

'public sentiments of progress and […] well-being' (Amin, 2014), and ubiquitous access to infrastructure provision. The contributions in this book call for more attention and nuanced thinking about the normative-symbolic significance of infrastructure in terms of *values and interests* and *power relations and techniques* (re-)produced by infrastructures.

The authors show that in CEE and the former Soviet Union (FSU) infrastructures served and serve 'big' normative imageries, particularly in terms of modernity and modernization. Plyushteva traces, for instance, the continuity of this idea throughout socialist and post-socialist periods. In doing so, however, she discloses a prompt and fundamental shift in the values that are communicated and transported by the imagery of modernity in the Sofia Metro. Concordantly, Roth shares a similar observation when analyzing housing in socialist and post-socialist Baku, and the shifted meanings of modernization. These chapters thus lay down, on the one hand, the importance of modernity as a (still) dominating normative imagery of urban infrastructure, and provide links to comparable conceptual frames throughout other urban contexts in the world. On the other hand, they sensitize for changing value and interest settings embraced in 'big' imageries and disclosing (new) power relations in space and society.

Jovanović shows finally the deep penetration of socialist values linked to infrastructure into current thoughts and practices. She makes clear that values of a bygone era imprint on and constitute an inherent part of current value systems, and form a major reference point for current and future agency. With regard to local heating systems, she highlights the residents' interest in receiving heat, and shows that – contrary to socialism – the residents widely adopt and 'insist on a more liberal doctrine of individual choice' (Jovanović, p. 49). This 'new' value hybridizes and intermingles, however, with the residents' ambivalent fundamental convictions about the way to get access to familiar socialist-era infrastructure services: they are simultaneously 'yearning for both the (welfare) state, which ought to provide and for a "proper" capitalist state' that would provide what people pay for (Jovanović, p. 48).

Apart from calling for a distinction between fundamental values and situational interests, the authors draw attention to power relations. In this vein, Zupan and Büdenbender's chapter departs from a seemingly common interest in a greener city, but then reveals how these shared concerns serve economic interests and neoliberal logics to the detriment of ideals of welfare and equality. Similarly, Haase et al. show how green space provision has been on the agenda of urban planning during socialism and thereafter, but has been captivated and sacrificed by economic-political power arrangements driven by predominantly economic interests. With this critical analysis of power relations and techniques, the authors show the vitality and resilience of neoliberal ideology in CEE and the FSU that produces and exacerbates socio-spatial inequality. Conceptually, they point out the necessity to deeply understand the role of infrastructure, infrastructural research

and practice for the pursuit and realization of values and power balances in society and space.

This book thus reminds us of infrastructure's relevance for critical urban research and planning practices oriented towards justice and sustainability. It draws attention to the contents and the interplay of values and interests with power relations and techniques, highlighting the normative-symbolic significance of infrastructure. Infrastructural research in the post-socialist realm seems to be of particular appeal, given the clash of diametrically opposite value systems and power arrangements that mark(ed) socialism and capitalism, and the deep penetration and processing of these experiences at all levels of space and society.

Thinking post-socialism through infrastructures

Approaching cities in CEE and the FSU through infrastructural thinking helps to sharpen conceptual perspectives on post-socialist (urban) change. Recent debates have questioned the use of the term 'post-socialism' itself, as well as the positioning of cities in CEE and the FSU within a global scholarship on cities. Drawing on these debates and the book's empirical and conceptual contributions, we argue for a relational understanding of post-socialism.

Relationality refers to the multi-scalar and multi-rhythmic interdependencies between all dimensions of social, material and spatial production (i.e. social practices and normativity, materialities and space) that are neither static nor predictably changing over time. Rather, all aspects are interlinked, ever-transforming and re-adjusting at different intensities and paces, resulting in various socio-material, time- and space-dependent hybridities. These transformation processes do not follow predefined trajectories. Nevertheless, in CEE and the FSU today, they are greatly driven by neoliberal ideology and regimes. Looking at urban change through the lens of relationality as an interlinkage between the material and immaterial (i.e. ideologies, normative positions, practices and power arrangements) of different times and orders is thus the central merit that infrastructural thinking brings to current debates on post-socialism, and, eventually, to urban transition theories more generally.

The contributions in this book are insightful and structured attempts to capture post-socialist urban change as relational stories. Looking at urban change through infrastructure as linking technology, authors clearly outline the multi-scalar and multi-dimensional character of urban change. Liubimau on the nuclear city of Visaginas, and Jovanović on the contested and changing 'social contract' between individual residents and the state embodied in the materiality of heating infrastructure, are two cases in point. The hybridities of urban change result from overlapping, sometimes mismatching socio-material rhythms as Mulíček and Seidenglanz suggest. Juxtaposing rhythms of daily mobility with the differently paced rhythms

of infrastructural planning, construction and management, as well as economic dynamics of industrialization and de-industrialization, they argue for rhythms that are not cyclic and linear per se but include the inherent changes in relations and dimensions occurring with different speeds. Several chapters in this book highlight the continuity or, rather, the *longue durée* within relations and dimensions of socio-material order. Weicker and Sgibnev trace, for example, the marshrutka phenomenon as a tactic in many ways inspired by socialist practice and normativity, and, conceptually, argue for looking at infrastructures as fluidities in their own right. The two chapters on housing discuss inequality as a longue durée trait of urban development and residential patterns: they show the similarity and continuity in state and residents' practices (i.e. the governance of access to housing), thus (re-)producing this inequality over decades. Simultaneously, the authors make clear that these patterns and practices have been changing in some content and relevance because they are struggling with or serving the norms and values of today's socio-economic orders.

Relational thinking and the awareness of multiple interdependencies emerge as useful tools for capturing any process of urban change globally. Yet, post-socialist urban change offers a particular window of opportunity for conceptual and practical learning. Post-socialist change is marked by the *experiences* that the pretentious ideologies of socialism and capitalism and the clash of both brought about. These experiences are embodied and lived in various socio-material patterns. All chapters in this book show how these legacies may be traced throughout people's norms and feelings (e.g. Jovanović), in institutional and individual practices (e.g. Roth, Salukvadze and Sichinava) and materialities of urban infrastructures (e.g. Mulíček and Seidenglanz). The great diversity of post-socialist socio-material urban patterns is maybe best shown in the book by the comparative and border-straddling chapters of Bouzarovski and Tirado Herrero, Haase et al., and Mukhopadhyay and Tuvikene.

The empirical and conceptual inputs of the book's contributions thus point to the evolving character of experiences that were gathered under socialism and during the harsh, abrupt shift towards capitalism. In doing so, the contributions decode and re-trace the socialist legacies *and* the heritage of the ideological, systemic break that have been inherently changing (and still do change). Socialist legacy is not 'an independent carrier of history' that is 'alienated from history' (Golubchikov et al., 2014, p. 617) to serve and/or oppose the processes and values of the actually dominating capitalist order. Instead, logics of socialist production and practices are being carried on. Thus, the socio-material experiences and memories of socialism *and* its clash with capitalism have hybridized and enriched in meaning.

In these hybridizing and even polarizing forms, the evolving legacies of post-socialism still act as a frame of reference for actual and future urban change, as the chapters of the book show. Post-socialist legacies are imprinting on urban change, be it in the form of materially obdurate

heating infrastructures resisting neoliberalization or in the form of evolving value systems of residents (see also Bouzarovski and Tirado Herrero, and Jovanović in this book), or the combination of both. They contribute to urban developments in CEE and the FSU that Bouzarovski et al. (2016) propose to capture as 'rolling path dependencies' – paths of urban change that are not yet finally defined, even though neoliberal regimes may indeed prefigure future trajectories.

Thus, infrastructural thinking brings some important contributions to post-socialist urban studies: the concept of post-socialism is (still) valuable and is much more than a simple statement about (urban) hybridities. We argue for a consequent relational understanding of post-socialism as non-directional, multi-scalar processes of interdependent social, material and spatial change of varying paces and intensities that draw on and contribute to experiences of socialism and capitalism – processes of urban transition that thus open a particular window of opportunity for conceptual and practical learning.

With such a relational perspective, post-socialism shares a lot with urban transitions in other parts of the world, linking up to theories of urban and infrastructural change in the global North and South. This is particularly true when thinking of 'splintering urbanism' under neoliberalism. Moreover, the post-socialist conditions in CEE and the FSU link to countries like China, Vietnam, Cuba or North Korea. These share – at least to a certain degree – socio-material legacies of state socialism, and its imprints on and modifications to space and society. The chapter by Mukhopadhyay and Tuvikene explores the use of 'post-socialism' beyond its usual borders, and elaborates on its analytical potential in capturing the influence of post-central state individualizing and splintered infrastructural practices. In the context of a shrinking state without a shrinking population but rapid urbanization, informal practices become crucial in infrastructure provision. The case highlights the post-collective nature of infrastructure governing in India, which, following post-socialist conceptualizations, shows the ways in which privatized developments are both cause and result of unequal circumstances.

From theory to practice

The added value that studies of post-socialist urban infrastructure can bring to transition theories and practice are twofold: first, analytically asking *how* transitions are unfolding and, second, normatively asking *where* transition should go (see also Bouzarovski et al., 2017). These questions bear considerable relevance for both critical scholars *and* (planning) practitioners, and various stakeholders beyond academia.

Studies on post-socialist urban infrastructure add to the question of *how* urban transition occurs by its emphasis of and sensitivity towards relationality. We refer here to our arguments when discussing post-socialism and describing the new nuances that post-socialist urban experiences can bring

to infrastructural thinking. They resonate with discussions of transitions in CEE and the FSU, and more generally. In the case of post-socialist transition debates, early commentators were concerned with social, cultural and political barriers to those shifts, whereas anthropologists as well as many other later observers noted the inherent complexity of any large-scale societal change and shied away from simple understandings of 'barriers' to complex transformations. Similarly, literature attending to transitions more generally notes 'the limited space for changes' resulting from 'the huge investments and sunk cost and the dominance of certain paradigms' (Loorbach et al., 2010, p. 1200), despite the preference for radical innovations among many proponents of sustainable development. Nevertheless, the book has shown how an innovation might actually turn out to be a neoliberal city marketing tool (Zupan and Büdenbender), how it might challenge the livelihoods of residents expecting cheaper provision of heat (Jovanović), or how it might challenge the livelihoods of those employed in informal transport systems when a new mass transport system is looming at the horizon (Weicker and Sgibnev).

Our conceptual conclusion postulates that post-socialism is neither a particular problem of infrastructure transition nor a specific case of such transition, but a mix of changes and continuities that do not necessarily have to be tied to a certain territorial region and temporal moment. Post-socialism denotes a perspective of attending to large socio-technical changes as relational infrastructuring with multiple hybridities. With regard to the practice of planning and governing (infrastructural) change, post-socialist experiences recall and emphasize the necessity of comprehensive and coordinated approaches. The approaches should relate the material and social, eventually conflicting sectors (e.g. civil engineering, economy and social policy), in addition to actors in the state, business and civil society, as well as attend to different scales and rhythms. Such nuanced assemblages of policies and planning instruments need to achieve a lot: to stimulate and steer changes, to use (local) capacities of adaptation and modification, and to cope with socio-material continuities, no matter if assessed as 'beneficial' or 'hindering'. Infrastructure planning and governance are thus highly demanding in today's socio-political and economic orders in the FSU and CEE, as well as elsewhere.

Moreover, post-socialist urban infrastructure studies call insistently for exploring *where* urban transitions occur, to whose benefits and costs, and through which power arrangements they are backed and implemented. Again, this question is relevant for critical transition studies as well as for practitioners of infrastructure and urban planning, since planning is per se a political project pursuing selected values.

In many critical fields, there is an outspoken assumption that transition is desirable. Surely, radical change may be normatively advisable and utterly needed. Transitions literature, for instance, defines a sustainable and

low-carbon society as an aim. Early post-socialist sentiment and literature had diverse ambitions for generating a society different from the past, more open to business and private ownership, less state-oriented and more democratic. Yet, this transition may not be desirable and acceptable to everyone. The desirability and acceptability depends on the ways in which transition is brought about, and on the particular constellation of changes and continuities, costs and benefits (Roch et al., 2016). The post-socialist realm witnesses a rich diversity of spatial transitions, as we know from many studies (e.g. Haase et al., Bouzarovski and Tirado Herrero from this issue; Brade and Neugebauer, 2017). However, often missing among practitioners and stakeholders with power are the intentions and courage to critically (self-)reflect and transparently (re-)assess transitory outcomes, and thus to learn from these findings for present and future political agenda-setting and planning practices (Roch et al., 2016). The experiences of deep systemic transitions in post-socialist countries, which 'may allow for path creation to be seen beyond the tropes of technological innovation and economic development that presently dominate much of the literature' (Bouzarovski et al., 2016, p. 639), have often not been fully explored, discussed and – particularly – used in (political) practices.

Nevertheless, we need to be very attentive to the effects of transition and the mechanisms at work: Who is affected and at what cost? Do (infrastructural) investments serve wider societal goals, or contribute to 'splintering urbanism' and deepen social and spatial polarization *and* one-sided power arrangements? Indeed, cost-benefit questions, and thus the issue of desirability and acceptability of transition, remain relative. Here is where political debates, policies and planning that consider the relationality of (infrastructural) change are urgently needed, and where participative processes (with all the problems they entail) appear as crucial components. And here again, post-socialist experiences in the form of evolving, even polarizing value systems come into play, since they (still) constitute the frame of reference for assessing (i.e. contesting, welcoming or mitigating) the effects, costs and benefits of 'urban transition'.

References

Amin, A. (2014) 'Lively infrastructure', *Theory Culture & Society*, 31:7–8, 137–161.

Bouzarovski, S., Sýkora, L. and Matoušek, R. (2016) 'Locked-in post-socialism: rolling path dependencies in Liberec's district heating system', *Eurasian Geography and Economics*, 57:4–5, 624–642.

Bouzarovski, S., Herrero, S. T., Petrova, S., Frankowski, J., Matoušek, R. and Maltby, T. (2017) 'Multiple transformations: theorizing energy vulnerability as a socio-spatial phenomenon', *Geografiska Annaler: Series B, Human Geography*, 99:1, 20–41.

Brade, I. and Neugebauer, C. (2017) *Urban Eurasia – Cities in Transformation*, Berlin: DOM Publishers.

Golubchikov, O., Badyina, A. and Makhrova, A. (2014) 'The hybrid spatialities of transition: capitalism, legacy and uneven urban economic restructuring', *Urban Studies*, 51:4, 617–633.

Loorbach, D., Frantzeskaki, N. and Thissen, W. (2010) 'Introduction to the special section: infrastructures and transitions', *Technological Forecasting and Social Change*, 77:8, 1195–1202.

Roch, I., Banse, J., Leimbrock, H. and Mathey, J. (2016) *Transformationsprozesse und Entwicklungsperspektiven im Dreiländereck Deutschland – Polen – Tschechien*, Berlin: Rhombos-Verlag.

Index

Note: Page numbers in *italic* refer to Figures and page numbers in **bold** refer to Tables.