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 ‘Sadrididdin 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 Tajikistan 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 ‘Sadrididdin 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 (Högborg 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.

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