



## EDITORIAL: THE GEOGRAPHY AND GOVERNANCE OF INFRASTRUCTURE PROVISION

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**Abstract.** Infrastructure matters for regional development as well as for the individual wellbeing of people. This not only became painstakingly obvious since the outbreak of the Covid-19 pandemic in early 2020. Thus, the phases of ‘lock-down’ during the pandemic became an eye opener for the condition of infrastructural fundamentals of our cities and regions. Debates about systemic infrastructure for maintaining the functioning of our societies and economies – in scientific terms ‘Services of General Interest’ or the ‘Foundational Economy’ – received wide societal and political attention since the outbreak of the pandemic. Yet, already before the outbreak of this most severe global health crisis, discourses in applied social sciences have experienced an ‘infrastructural turn’, putting technical, social and green infrastructures into the centre of attention of social research, theory building and dissemination. This has led to different understandings of ‘infrastructure’ coexisting in academic and professional debates today. This introductory paper to the issue on ‘The Geography and Governance of Infrastructure Provision’ aims at giving an overview of current debates about infrastructure provision in Regional Science and Planning while introducing the six papers included in this theme issue of *Europa XXI*.

**Keywords:** governance, infrastructure provision, regional disparities, Services of General Interest.

### Introduction

Infrastructure ‘generate the ambient environment of everyday life’ (Larkin, 2013, p. 328). Even though often invisible, infrastructure literally structures our ‘being in the world’. Usually taken for granted, we notice their relevance for the functioning of our daily lives only when they fail (Graham & Thrift, 2007). In the same way, crisis situations can highlight the relevance, on the one hand, and the fragility of the infrastructure, on the other. This became clear not least since the outbreak of the Covid-19 pandemic in early 2020.

Infrastructure provision became a central socio-political concern during the Covid-19 induced health crisis. First and foremost, the pandemic uncovered the state of national health systems in several ways. According to a study on the ‘Geography of Covid-19 outbreak and first policy answers in European regions and cities’ (ESPON, 2020), regions with a low quality of the health system are more likely to have a more significant mortality associated with Covid-19. To limit the spread of the Sars-CoV-2 virus, governments are further dependent on healthcare infrastructure to detect, diagnose, and report new infections.

While healthcare infrastructure became the central means to overcome the pandemic, accompanying lockdown measures virtually affected every other type of infrastructure. European states, regions, and cities have introduced partly severe public restrictions, in order to delimit physical contact between people and to control the spread of the Sars-CoV-2 virus. This concerned the use of social infrastructures such as public spaces, schools, recreation, sports and culture facilities, commercial infrastructures such as restaurants, hotels, retail and other shops, as well as transport infrastructures. In some places, the restrictions hampered nearly all relevant activities of daily life. The phases of 'lockdown' during the pandemic thus became an eye-opener for the state of the infrastructural foundations in our cities and regions (Schorn, Franz, Gruber & Humer, 2021). This reached far beyond technical matters and economic calculations, also including societal impacts. The requirement of staying at home highlighted how much the provision of infrastructure matters for our individual wellbeing.

Hence, the Covid-19 pandemic and its wide effects on our daily lives demonstrated that the basic services to keep up our healthcare, food supply, as well as education and training matter much more for our welfare, than mainstream economic discourses long have argued. The Covid-19 pandemic has helped to reconsider what (regional) development could mean. Instead of focussing solely on neoliberal principles of competitiveness and growth, scholars in Regional Sciences are now taking a more holistic perspective that focusses on societal progress in general, instead of simply on economic indicators. Not only since the Covid-19 pandemic, but already since the rising discourse on 'left behind places' (Rodríguez-Pose, 2018), the foundational economy (FE) is getting more and more attention in Regional Sciences (Engelen, Froud, Johal, Salento & Williams, 2017; Coenen & Morgan, 2020; MacKinnon et al., 2022). While 'traditional' discourses in Economic Geography focus on export-based economies as a matter for regional development, current discussions argue for including those goods and services, 'which are the social and material infrastructure of civilized life because they provide the daily essentials for all households' (Coenen & Morgan, 2020, p. 18). Welfare can only be represented in its entirety if we include these basic services into our theoretic considerations.

Here, the discourse on the foundational economy links well to the discussion on the provision of the so-called 'Services of General Interest – SGI'. The discourse on SGI is strongly linked to the European integration process (Humer, 2014; Fassmann, Rauhut, da Costa & Humer, 2015a, p. 11). SGIs serves as a legal term for the provision of services of public interest for which the European Union (EU) competition law only partly applies (Colomb & Santinha, 2014). The provision of basic services is a sensitive matter. Therefore, the responsibility to define and enforce public service obligations and to organise the provision of SGI in the EU context lies with public authorities in each member state, be it competent national, regional and local authorities (Ludlow & Rauhut, 2013, p. 71). The provision of SGI is also at the core of debates on territorial cohesion within the EU. The concept's relevance for European integration has been covered in an issue in *Europa XXI* (Komornicki, 2013) a few years ago. The findings of the issue's underlying ESPON SeGI-project (e.g. Fassmann, Rauhut, da Costa & Humer, 2015b) are ever more relevant today.

As the Covid-19 pandemic's measures and its impacts on our daily lives have promoted the reconsideration of the relevance of the provision of basic services and infrastructure for our wellbeing, we want to take this opportunity and collect up-to-date evidence on infrastructure provision across Europe. The present issue gives an insight into recent dynamics and trends of infrastructure provision, focussing on different spatial scales (national, regional, urban) as well as on different types of infrastructure that matter for the organisation of our daily lives. Challenges and approaches in the governance of infrastructure provision are specifically emphasized.

Introducing the topic, this paper gives a brief overview of current issues in the debate on infrastructure provision. The following section of this paper is dedicated to compare the two coinciding scientific debates about 'infrastructure' and 'Services of General Interest' and to carve out the similarities as well as differences between both discourses. Following that, the paper outlines existing regional disparities in the provision of infrastructure. Hereafter, underlying political mechanisms in and discourses about alternative modes of infrastructure provision will be highlighted. The final section guides the reader through the six contributions of this issue.

## Similar yet different: Scientific discourses on 'infrastructure' and 'Services of General Interest'

Infrastructure lies at the centre of scientific debates in the social sciences already before the Covid-19 pandemic's-induced focus on the relevance of infrastructure for regional development and resilience. Social sciences have experienced an 'infrastructural turn' since the early 2000s 'generating a new wave of interdisciplinary enquiry into how the functions and impacts of infrastructure are shaping urban and regional space' (Glass, Addie & Nelles, 2019, p. 1651). Scholars coming from different disciplines such as STS, Sociology, Human Geography or Social Anthropology have acknowledged that 'infrastructure is a central element that makes the urban possible in myriad forms' (Addie, Glass & Nelles, 2020, p. 11).

In their widest sense, infrastructure can be understood as 'built networks that facilitate the flow of goods, people, or ideas and allow for their exchange over space' (Larkin, 2013, p. 328). Originally a French engineering term, infrastructure as a keyword transitioned 'to a generic term used by bureaucrats pursuing projects of spatial integration to a word describing a wide range of projects' (Carse, 2017, p. 29). Today, infrastructure studies cover several types such as technical (cables, pipes, sewage), social (health care, education, social housing) or green infrastructures (parks, recreational zones).

The functioning and relevance of infrastructure has been studied along several perspectives. Studies on infrastructure revolve around topics such as the power mechanisms behind infrastructure provision (Reeves, 2017; Rogelja, 2020) or on infrastructure as wellsprings of (state-) power themselves (Meehan, 2014), on aspects such as repair and maintenance (Graham & Thrift, 2007) or the phenomenon of cost-overruns in large infrastructural projects (Flyvbjerg, 2009), but also on the significance of infrastructural projects for regional, urban or rural development and individual wellbeing more generally (Grimes, 2003; Latham & Layton, 2019; Monstadt & Coutard, 2019; Cowie, Townsend & Saleminck, 2020; Humer & Granqvist, 2020). To highlight the interdependence between infrastructure and regional development, Addie et al. (2020) recently came up with the notion of 'infrastructural regionalism'. This approach helps to apply a geographic perspective to the *infrastructure turn* ('thinking about infrastructure through the region') but also to engage infrastructure as empirical and conceptual problem to interrogate regional processes ('thinking about the region through infrastructure') (Addie et al., 2020, p. 11). With their approach of 'infrastructural regionalism' Addie et al. (2020) link a territorial and a substantial perspective more closely.

Just as the built environment in general, infrastructure as well experienced an increasing move towards financialization in the last decades. Not least since the era of Margaret Thatcher, utility privatization is a common political objective – even beyond the UK. Furthermore, infrastructure

is often at the core of austerity measures. Furlong (2020) characterises two ‘promises’ behind the financialization of infrastructure: wealth generation and wealth extraction. While, in the first case, ‘cities generate wealth through the engagement of government enterprises (like utilities) in financial activities and in infrastructure projects that mobilize finance capital’ (Furlong, 2020, p. 574), in the second case infrastructure is converted into an ‘asset class’. Around Europe, an increasing liberalisation and outsourcing of formerly state-provided infrastructure such as public transportation, healthcare or social housing can be observed even in traditional (former) welfare states (Ahlqvist & Moiso, 2014). Processes of uncontrolled utility privatization came with under-investment and structural problems because profit-oriented companies invested only in those areas that promised profit distribution (Salento & Pesare, 2016); in geographical terms this results in urban areas getting better-off than rural areas do (Humer & Granqvist, 2020). Therefore, the state serves as a relevant actor to ensure the provision of basic services, especially under conditions of economic efficiency and austerity to hamper increasing regional disparities.

Here, the discourse on Services of General Interest comes into play. Originally a legal concept in EU law (Milstein, 2015), the term has gained importance in regional planning debates since the early 2010s. Recent contributions from the field of Regional Science have especially focused on the relevance of the accessibility of SGIs regarding urban and rural territorial cohesion (Malý, 2018; Gruber, Rauhut & Humer, 2019; Sá Marques et al., 2020; Wiśniewski, Stępniaak & Szejgiec-Kolenda, 2021).

Generally considered as ‘necessary services’ labelled with universal access and human rights conditions’ (Fassmann et al., 2015a, p. 16), Services of General Interest should, in the understanding of EU policy making, be provided outside of ‘normal’ market channels to guarantee their provision to everyone. A detailed definition of what should be included or excluded, nevertheless, relies on the individual member states and the competent political actors involved. Traditionally, SGIs have been provided by publicly owned firms with the exclusive right to provide a given service. Liberalisation, privatisation and outsourcing have been dominant public political trends in most European countries since the 1980s (Bjørnsen, Foss & Johansen, 2015, p. 51) and ‘the provision of SGI has been increasingly carried out in cooperation with the private sector or entrusted to private undertakings’ (Colomb & Santinha, 2014, p. 470).

Whether a certain infrastructure applies to the EU competition rules and the principle of the European Single Market depends on the type of infrastructure. The European Commission identifies two main types of Services of General Interest: Services of General Economic Interest (SGEI) and services of non-economic interest, which are mostly so-called Social Services of General Interest (SSGI). If an SGI is identified as being of economic interest, it is subject to the principles of the European Single Market and competition law. This applies for infrastructure such as telecommunications and ICT, postal services, electricity, gas and water supply, waste management and transport. Social services that are based on welfare policy and solidarity principles, such as education, healthcare, or social care, are largely excluded from economic activities (Milstein, 2015, p. 32).

While the discourse on SGI focusses on the responsibility of the provision of certain infrastructure and therefore takes a normative perspective, infrastructure studies rather apply an explorative approach (cf. Table 1). As infrastructure studies and debates on SGIs often touch similar topics, these two can be considered as different, but complementary discourses. Even though the relation between the two discourses is inherent and all types and forms of SGIs can equally be labelled as infrastructure, not every infrastructure can be labelled as SGIs. Whereas SGIs should be provided in accordance with the principle of ‘universal access’ (Bjørnsen et al., 2015, p. 62), this is no obligation for the wider term of ‘infrastructure’.

**Table 1.** The discourses on ‘infrastructure’ and ‘Services of General Interest’ in comparison

	<b>Infrastructure</b>	<b>Services of General Interest</b>
<i>types</i>	<ul style="list-style-type: none"> <li>• technical infrastructure</li> <li>• social infrastructure</li> <li>• green infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>• Services of general economic interest (SGEI)</li> <li>• Social services of general interest (SSGI)</li> </ul>
<i>topics</i>	<ul style="list-style-type: none"> <li>• functioning of infrastructure</li> <li>• infrastructure as non-human agent</li> <li>• infrastructure planning</li> <li>• interdependence of infrastructure and (re-regional) development</li> <li>• (latent) power mechanisms behind infrastructure provision</li> <li>• financialization of infrastructure...</li> </ul>	<ul style="list-style-type: none"> <li>• relevance of the accessibility of public services for territorial cohesion</li> <li>• disparities in SGI-provision</li> <li>• governance processes involved in SGI provision</li> <li>• legal aspects in the provision of SGI</li> </ul>
<i>disciplines (most relevant)</i>	<ul style="list-style-type: none"> <li>• Science and Technology Studies (STS)</li> <li>• Geography (human, urban, critical)</li> <li>• Urban/Transport Planning</li> <li>• Social Anthropology</li> </ul>	<ul style="list-style-type: none"> <li>• Regional Science</li> <li>• European Policy</li> <li>• Public Administration</li> <li>• European Law</li> </ul>

Source: author’s own elaboration.

Indeed, both discourses on ‘infrastructure’ and ‘Services of General Interest’ share the perspective on the social construction of infrastructure and the political mechanisms behind infrastructure provision. Both discourses invite for a critical investigation of the underlying ideas and political processes involved. Either applying an ‘infrastructure’ or an ‘SGI’-lens can help to reveal the uneven distribution of basic services and therefore of unequal chances for individual and territorial development. Hence, the uneven distribution of infrastructure serves as a societally and politically relevant research field for the different traditions of infrastructure studies.

## The Geography of Infrastructure Provision

Infrastructure is unevenly distributed; that is a longstanding fact. Studies highlight the uneven provision of infrastructure alongside several scales – from global, to European and regional – as well as between centres and peripheries. Overall, the uneven distribution of infrastructure is part of the core-periphery concept and a matter of vertical relevance of places in the urban hierarchy. Christaller’s ‘Central place theory’ (CPT) investigates exactly this (uneven) distribution of services in accordance with the urban hierarchy. One of its central arguments is, that, the larger the settlement, the higher the amount of (high-order) services provided for the city and its hinterland. Besides its analytical relevance for Spatial Research, the CPT is a normative guiding principle for the regional provision of infrastructure, e.g. in German regional planning. Humer & Granqvist (2020) have reconfirmed the today’s relevance of the central place concept for regional infrastructure planning; in combination with urban network theory and polycentric planning models.

Even though there might be objective reasons for the uneven distribution of public services, ‘the question must be asked where the “natural” spatial distribution of a given phenomenon ends and where is the point beyond which the spatial accessibility system becomes “unfair”’ (Wiśniewski et al., 2021, p. 57). Spatial injustices become obvious when places affected by demographic and/or economic shrinkage experience an excessive removal of public service facilities that, in turn, precipitates the downturn of the affected regions. Under-provision of public services means a locational disadvantage and can lead to further processes of peripheralization. As a consequence, feelings of resistance can arise in these ‘places that don’t matter’ (Rodríguez-Pose, 2018), which, in further consequence,

can promote the opposition towards political decisions made in distant (urban) centres of power (Mattila, Purkarthofer & Humer, 2020; Rauhut & Humer, 2020).

The Covid-19 pandemic emphasized how the policy measures to limit the spread of the Sars-CoV-2 virus were experienced differently by people living in different places. The lockdown of public life unveiled and reproduced spatial inequalities in the provision of infrastructure for both, urban and rural areas. Through the lockdown of cultural facilities, restaurants, parks, public transport networks and so on, cities were suddenly lacking their urban qualities. In Vienna, for example, big national administered public parks were closed in the period of the first lockdown between Mid-March and Mid-April 2020. The lockdown of a park probably does not affect people living nearby a large recreational area. But it matters to people living in dense urban neighbourhoods with a lack of public green space. On the other hand, peripheral location as well as spatial distance became obstacles for those who are not provided with the means of individual mobility. Digital space may, to some extent, replace social spaces of everyday life. But not every part of a society enjoys equal access to e-solutions. Here, the Covid-19 pandemic emphasized the uneven distribution of digital infrastructure. Digital infrastructure is relevant for the temporal adaption to lockdown measures, as is for the future regional competitiveness in the digital society more general. In this regard, the Covid-19 pandemic operated as a magnifier for the uneven provision of infrastructure and emphasized some of the most pressing issues for policymaking.

The experiences made during the Covid-19 pandemic confirmed digitalisation to be a key opportunity for the repopulation of shrinking rural regions. However, the basic conditions for it have yet to be rolled out in many rural regions. Economic geographer Seamus Grimes already stated in 2003 that ‘the provision of adequate telecommunications infrastructure is but the first step of a series of necessary “translations” before rural areas become effective participants in the digital economy’ (Grimes, 2003, p. 189) – while the technology has evolved immensely since the early 2000s, the general statement still holds true twenty years later. Today, broadband infrastructure is one (even though not the only) fundamental prerequisite for remote regions to benefit from possibly new economic development paths – expressed in visions such as ‘creative countryside’ or ‘smart countryside’. Nevertheless, to exploit the potentials of digitalisation in rural areas in their entirety, infrastructural issues need to be solved on beforehand.

While regional development is strongly dependent on infrastructure provision, the provision of infrastructure itself is substantially affected by demographic factors. Demographic trends such as shrinkage and ageing but also social trends such as pluralisation and individualisation have produced new patterns of SGI demands. As these demographic and social trends are unevenly distributed, demands of public services vary between spatial categories (Gruber, Fassmann & Humer, 2015, p. 152):

*Declining regions are facing problems sustaining the critical mass that is necessary for SGI provision, while urban areas are reaching levels of capacity, easily shown on the example of traffic infrastructure: daily traffic jams can be experienced in most metropolitan areas of Europe, while rural areas suffer from reduction of public transport infrastructure.*

Wiśniewski et al. (2021, p. 70) recently have made similar observations for Poland. The authors summarize that ‘the greater the intensity of adverse demographic processes, the lower the accessibility of SGI’. Findings from several countries around Europe suggest that the provision with the ‘right’ infrastructure is not only a difficult task to fulfil under processes of shrinkage, but also of growth. Actors involved into the planning process therefore need to act reflexively and should consider social, demographic and political trends equally. In addition, geographic conditions (accessibility/remoteness) must be taken into account.

Infrastructure is not only unequally distributed between urban and rural areas, but also between European countries. The ESPON SeGI project (Fassmann et al., 2015b) unfolded the uneven distribution of SGIs across the European territory. The project's findings support the proposition that the wealthier the region, the better equipped with public services the region is (Humer & Palma, 2013). Nordic countries, France, Austria and the Benelux countries show the highest SGI expenditures per capita (da Costa, Palma & da Costa, 2015, p. 95). Disparities in SGI provision can be related to territorial dynamics such as demographic structure and population density, but also to geographical and political factors such as accessibility or political-administrative organisation (da Costa et al., p. 101). Da Costa et al. (2015, pp. 114-118) identified four clusters in the provision of SGI in Europe. Major European cities such as London, Paris, Amsterdam, Brussels, Stockholm, Vienna, Munich or Prague belong to the first cluster of the best equipped regions including a dense motorway system and a widespread broadband provision, as well as a high level of tertiary educational enrolment and a high provision of medical and nursery personnel. An overall good level of service provision, especially with medical and nursery personnel as well as broadband provision showed, amongst others, German and Scandinavian regions as well as regions in the South of France and the North of Italy, all of which count to the wealthier regions in Europe. The third cluster with lower service provision mainly includes regions from Iberia, Southern Italy, Greece, Czechia and Eastern Germany. The fourth cluster subsumes those regions with the lowest GDP per capita, an elderly population, long-term unemployment and more rural areas. These areas show lower accessibility, lower broadband access, and lower health personnel provision. Here, mainly regions in Eastern Europe and the North of Portugal can be found. Hence, the four clusters once again highlight the correlation between infrastructure provision and regional development.

It is not simply the provision of infrastructure but, more specifically the quality of the infrastructure provided in a certain region that is vital to reduce regional disparities. Having high-quality infrastructure is a prerequisite for being able to survive in the competition for companies and human capital. What kind of infrastructure gets built and where is a deeply political concern. Thus, the geography of infrastructure provision is a social product and a matter of multi-level governance.

## **The Governance of Infrastructure Provision**

The political dimension of infrastructure provision is at the core of applied scientific debates. Especially the discourse about 'Services of General Interest' focusses on the question of *who* plans and provides these basic services. How SGIs are organised depends on several factors: Humer, Rauhut and Fassmann (2015) have conceptually identified SGIs as (i) a result of provider and user interaction, (ii) dependent on spatial conditions and time dimension, (iii) embedded into policy and governance structures, and (iv) driven by grand trends of society, demography, global economy, technological advancement, and environmental conditions. Overall, SGI provision must comply with standards of secured availability, accessibility, affordability, quality, and variety. These EU-based standards are constantly put into question and renegotiated real politically.

The distinction of SGEI and SSGI has its origin in the question of who is in charge for the provision of these services. On the one hand, SGEI are often provided through Public-Private-Partnerships, but also include commodified private market services of systemic importance for economy and society such as banks, notaries and retail businesses. SSGI, on the contrary, 'comprises services that are still largely exempted from free-market competition and EU public procurement rules'



(Franz & Humer, 2021, p. 220). How the infrastructure provision is organised in each EU member state relies on the conception of the welfare state each country follows.

Hence, different systems on how to organise SGIs can be identified within Europe (Świątek, Komornicki & Siłka, 2013). The provision of SGIs is a complex task involving multi-level actors and public-private collaborations. Several actors following different interests are involved in this issue. Actors are either following the idea of economic competitiveness and growth of cities or of territorial cohesion and equal living conditions (Gruber et al., 2019). The main objective of both principles is the equal distribution of resources and opportunities among regions and their populations and to ensure the sufficient access to public services, regardless of where people live. To realize this objective, the EU as well as some member states have started funding programs over the past few decades. The EU has a steady tradition in the funding of infrastructure projects through the powerful European structural and investment funds. Additionally, countries such as Germany have created own instruments to support equal living conditions in regions under threat of peripheralization.

Besides the relevance of EU and national actors, infrastructure provision increasingly became a sphere of political action for global players. China, for example, is heavily investing into big infrastructural projects in European and Asian countries in recent years through its Belt and Road Initiative (BRI) (Rogelja, 2020; Sielker & Kaufmann, 2020). The BRI is dedicated to fulfilling China's vision of becoming a greater leader on a global scale. Embedded into a larger strategy, infrastructural investments are made in several countries covering a variety of infrastructure such as rail, road, sea and airport networks, energy and water infrastructure, or digital infrastructure (Sielker & Kaufmann, 2020). Investments are made especially in those European regions that have a traditionally weaker provision of infrastructure, e.g. Portugal or countries in Central and Eastern Europe. Through the BRI, China is becoming a new and powerful player in the field of infrastructure provision in Europe.

Finally, infrastructure is not only an objective of governance but equally operates as (non-human) agent of governance. In the last decade, a growing relevance of 'smart' technologies in urban and regional policymaking can be observed. An increasing digitalisation of all aspects of our daily lives has promoted the rise of visions of 'smart cities', 'smart regions' or 'smart countryside'. The application of ICT infrastructure should support the development of sustainable, green and inclusive areas. Nevertheless, the utopian thinking of smart cities sometimes took on massive proportions that one could already speak of a 'fetish'. Therefore, the promises that come with concepts of 'smartness' should not be accepted nonreflectively. Despite all justified criticism, these visions also emphasize the relevance of infrastructure for overcoming the most pressing challenges ahead. Indeed, the provision of infrastructure will serve as a promising research and policy field still in the future.

## **Brief description of the main rationale of the papers in this issue**

This issue is dedicated to the opportunities and challenges in the provision of infrastructure. The six contributions cover different types of infrastructure, either technical or social, and operate with both theoretical lenses – 'infrastructure' as well as a 'Services of General Interest'. Five of the six contributions were delivered by Early Career Researchers – which demonstrates the topicality of the infrastructure research. Empirical cases cover the energy provision in an EU context, the application of the smart city concept in urban logistics, the opportunities and risks of digitalisation



for regional development in Austria, strategies of delivering SGIs in rural areas in Europe, the relevance of pilot schemes for infrastructure provision in Germany, and actions of the Berlin Senate to protect homeless people during the Covid-19 pandemic. The order of the papers in this issue follows the logic of types of infrastructure and the pressing issues in their provision. The first three papers by Lacher (2021), Santinha et al. (2021) and Stroissnig (2021) deal with issues of technical infrastructure, covering different spatial scales and categories (European, national, urban, rural). The following two papers by Tent et al. (2021) and Adam-Hernández & Schneider (2021) cover the specific challenges of infrastructure provision in rural areas, while the last paper by Meier (2021) emphasises the relevance of urban social infrastructure.

The contribution by Lacher (2021) deals with a Service of General Economic Interest that perfectly represents the efforts by the EU during the last 20-30 years to arrive at a European Single Market: the governance of electricity provision. She comparatively revisits the four large legal packages of the EU of 1996, 2003, 2009, and 2019, which each brought new elements of governance and liberalisation of energy provision. The ESPON SeGI drivers' model provides the basis of her conceptual discussion, which centres around the five consecutive standards of provision – availability, accessibility, affordability, variety, and quality – and how these standards changed in course of the four packages. The latest package of 2019 dissolves the duality of producer and consumer. It enables the role of 'prosumers' and thus significantly increases the standards of variety and quality – which can be for the better of climate-neutral renewable energy provision. However, one must not forget to co-secure the more basic standard of secured availability, which becomes more difficult with an increasing number and variety of suppliers.

In the second contribution, Santinha et al. (2021) undertake a systematic review to identify the most relevant applications supported by smart cities' infrastructure with an impact on urban logistics transport. Their review of, in total, 39 papers aims at examining how literature on smart cities' infrastructure is addressing urban logistics transports and identifying the IT applications being used. Their findings offer useful insights for policymaking and scientific research on future possibilities for the provision and governance of urban logistics transports. The systematic literature review unveils the variety of topics discussed in smart cities infrastructure research, with 'waste management' and 'improvement of the last mile logistics' as the domains with the highest number of publications in this field of research. The authors further found that literature on smart cities infrastructure and urban logistics is, in general, one of growing interest. Hence, the relevance of research on smart cities technology for sustainable urban development becomes obvious.

Stroissnig (2021) discusses the impact of digitalisation, which is a most innovative and, admittedly, most large topic of contemporary debates around infrastructure provision. She narrows the topic geographically by focusing on the territorial type of small-town regions, on the example of Austria. The added value of her contribution is to identify a well-argued list of sectors of regional development policy, which transform under the influence of digitalisation: mobility, economy, tourism, environment, social infrastructure, local governance and planning. She lists the various opportunities and risks of each sector, which arise through digitalisation. Generally speaking, the opportunities outweigh the risks. This is particularly the case for small-town regions in a peripheral location – compared to urban regions in central locations. Future research on the (relative) impact of digitalisation on regional development is called for and Stroissnig's contribution provides a fertile ground for that.

Staying with the challenges of delivering Services of General Interest in rural areas, Tent et al. (2021) review the challenges and strategies of delivering SGIs in European rural areas, taking Austria, Germany, Sweden and Scotland as cases. The challenges posed by shrinking/ageing popu-

lation and uncertain economic futures call for the redesign of SGIs in the affected regions. Focusing on medical and nursing care, fire and rescue services, and post-school education, the authors highlight possible solutions for securing the provision of SGIs in Europe's rural areas. The authors found a variety of strategic and operative approaches to maintain and adapt the quality of SGIs applied in the four countries researched, ranging from restructuring and resizing infrastructure, to redesigning the accessibility to infrastructure or redefining the coordination for coproduction. Even though similar approaches could be found in the four countries, the authors also highlight the place- and context-specificity of the measures applied. A key conclusion of their analysis, valid for all different types of infrastructure in all of the four countries, is the relevance of civic engagement for maintaining SGIs in rural areas where market logics often fall short and governmental bodies run on tight budgets. Thus, co-production is an indispensable process in addressing the challenge of maintaining SGIs.

Likewise, the contribution authored by Adam Hernández & Schneider (2021) focusses on opportunities for rural public service and infrastructure provision, investigating German pilot schemes for funding innovative approaches. The authors assess the pilot schemes and funding programmes with an experimental character carried out in the last two decades that show a clear thematic reference to public services and infrastructure in rural areas. Pilot schemes have become a popular instrument in Germany for testing innovative solutions in the provision of public services and infrastructure in recent decades. These pilot schemes are embedded in Germany's multi-level administrative and planning system, offering Federal ministries the governance capacities in policy fields, which are traditionally located outside their competences. Even though the authors highlight the opportunities of these pilot schemes for safeguarding rural public services and infrastructure, they also point out some necessary improvements. The authors emphasize the need for optimising the transfer of findings out of these pilot schemes towards federal and state legislation as well as of adapting approaches to the new orientation of regional funding policy. Further, they highlight the need for specific collaborative and innovative projects in contrast to mere strategic policy and planning documents. Finally, they argue for longer-term support of the projects, which started under the umbrella of the pilot scheme in order to ensure their sustainability.

The last paper, authored by Meier (2021), focusses on measures applied to protect a specifically vulnerable group during the Covid-19 pandemic. Homeless people were specifically exposed to the Sars-CoV2 virus as 'stay at home' and 'social distancing' measures do not apply to people lacking a shelter. What made it even more difficult was that some of the municipal emergency assistance services have broken away due to the focused pandemic emergency measures. Meier traces the emergency responses set by the Berlin Senate to people experiencing homelessness in the light of the Covid-19 pandemic in the period of March 2020 to April 2021. The author reveals the different actions that the Berlin Senate undertook to protect this vulnerable group during the pandemic. The three main strategies observed were the provision and expansion of shelters, the realization of preventive care and treatment and the implementation of tenant protection through rent moratoria and eviction halt for tenants of communal housing associations. With his contribution, Meier highlights the exceptional relevance of housing as a social infrastructure, especially for the most vulnerable groups – and how this type of infrastructure is further complicated by the impacts of a global pandemic. Here, once more, the engagement of several stakeholders is crucial for ensuring the provision of this Service of General Interest.

This brief overview made clear that the contributions of this issue are not intending to cover all aspects of the recent debates on the geography and governance of infrastructure provision. Instead, they take a detailed look into particular sides of this topical and relevant field of regional

science and policy. Presumably, they will further the debate in a European context and trigger new policy relevant research.

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