

## INTRODUCTION

# Infrastructural Thinking in China: A Research Agenda

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### Abstract

Despite China's leading role in the construction of infrastructure over the past decades, the most influential paradigms for the study of infrastructure in the social sciences originate from research conducted elsewhere. This introduction to the special section "Chinese Infrastructure: Techno-politics, Materialities, Legacies" seeks to address this apparent gap, and contributes to building an innovative research agenda for an infrastructural approach in the China studies field. To do so, it pushes forward an understanding of infrastructure as both an empirically rich material object of research and an analytical strategy for framing research questions. We draw from two strands of inquiry: recent efforts to rethink the materiality of infrastructures not as an inert or stable basis upon which more dynamic social processes emerge, but rather as unstable assemblages of human and non-human agencies; and scholarship that explores the often hidden (techno-)political dimensions of infrastructures, through which certain intended and unintended outcomes emerge less from the realms of policy and implementation and more from the material dispositions and effects of infrastructural formations. These strands of inquiry are brought together as part of our effort to recognize that the infrastructural basis of China's approach to development and statecraft deserves a more concerted theorizing of infrastructure than we have seen thus far.

### 摘要

尽管中国过去几十年在基础设施建设方面发挥了主导作用，但社会科学研究中最具影响力的基础设施研究范式仍来自其他地区。这篇对“中国基础设施：技术政治、物质性、遗产”专题的介绍旨在弥补这一明显差距，并为在中国研究领域建立基础设施研究新议程做出贡献。为此，本文将基础设施同时视为具有丰富实证意义的物质研究对象和构建研究问题的分析策略。我们从两个研究方向汲取了经验。一为近年来重新思考基础设施物质性的尝试，它们不再将基础设施视为孕育更具活力社会进程的惰性或稳态基础，而是作为人类与非人类能动要素的不稳定集群。二为探索基础设施经常被隐藏的（技术）政治维度的学术研究，这些维度让我们认识到，预期成效和非预期后果往往产生于基础设施形成过程中的物质倾向性及效应，而非完全取决于政策及其实施过程。通过归总这些研究成果，本文希望达成一种共识，即我们需要比迄今为止所见更协同的基础设施理论来理解其在中国发展和治国方略中的作用。

**Keywords:** infrastructure; techno-politics; materiality; development; statecraft; China model

**关键词:** 基础设施; 技术政治; 物质性; 发展; 治国方略; 中国模式

In the early weeks of the COVID-19 pandemic, Wuhan authorities pledged to build two field hospitals – Huoshenshan 火神山 and Leishenshan 雷神山 – in a matter of days. The move was intended as a (belated) attempt to cope with the growing threats of widespread contagion. To fulfil this task a team of seven thousand worked around the clock. The structures, authorities promised, would be able to host and treat over a thousand patients. The news immediately made the rounds in the local, national and international media. In China, millions of people followed the construction

of the hospitals via livestreaming platforms (*zhibo pingtai* 直播平台).<sup>1</sup> Fellow migrant construction workers, temporarily unemployed due to virus containment measures implemented throughout the country, cheered along the speedy delivery of the hospitals. For leaders in Beijing, and at least some observers around the world, this was an example of China's correct path in fighting the virus. For others, it was indicative of the state's eagerness to showcase its tremendous mobilizing power to draw attention away from how the virus exposed key lapses in the CCP model of governing.<sup>2</sup> But even for those who remained critical of Beijing's handling of the situation, the successful construction of these hospitals at "Chinese speed"<sup>3</sup> was never questioned. If the Chinese political-economic system has proven one thing in recent decades, it is its ability to deliver stunning infrastructure against all odds. From the Qinghai–Tibet Railway and the nation-wide high-speed railway network of which it is a part to the Three Gorges Dam, examples of China's "infrastructure power" abound.

The construction of the Wuhan hospitals was not the first instance in which Chinese leaders responded to a crisis by turning to infrastructure. In 2003, during the SARS outbreak, Beijing authorities built a hospital in seven days. In 2009, at the time of the global financial crisis, Chinese leaders injected into the economy a stimulus package of US\$586 billion over two years, or the equivalent of 13.4 per cent of China's GDP – specifically targeting infrastructure development. Following the dramatic train crash in Wenzhou in 2011, which sent shock waves through the Chinese internet in a rare moment of collective criticism of the party-state, the Chinese government responded by investing more into China's high-speed railway network, which is now globally celebrated as state-of-the-art and a source of national pride. Following China's early containment of the COVID-19 virus, moreover, the government turned again to heavy investments in infrastructure to inject new life in a struggling economy. Infrastructure, then, seems to speak to a very particular way in which state power is deployed, enacted, mediated and experienced in China today.

Moving from such observations, this special section revolves around two key questions. First, what novel understandings can be had by thinking infrastructurally about China's development over the past few decades? Second, in what sense is state power in China infrastructural?

Over the past two decades an "infrastructure turn" in the social sciences and humanities has opened up new analytical spaces for thinking about a diverse array of topics, including state power,<sup>4</sup> subaltern agency,<sup>5</sup> categories and standardizations,<sup>6</sup> scale-making capacities and ontological transformations,<sup>7</sup> and the social imaginaries and discursive power of material development projects.<sup>8</sup> What emerges from this diverse body of literature is an understanding of infrastructure as integral to social life, institutions and power relations more broadly.<sup>9</sup> Infrastructure is a process that emerges from relationships among people, activities and structures, encompassing both technological systems and social forms, based on cultural practices and political work.

If the study of infrastructure as a socio-technical assemblage with diffuse political and cultural effects has attracted growing interest within the academy, the "infrastructure turn" has been slow to fully engage with what Bach once called the world's paradigmatic infrastructure state.<sup>10</sup> Indeed, close to half of China's entire state investment goes towards infrastructure, amounting to some US\$2.3 trillion in 2013. As Zhang and Barnett note, this amounted to 14 per cent of

1 See Chen 2023.

2 Ren 2020.

3 Zhao Lijian (@zlj517), "What is Chinese speed? How long do you think the Chinese spend on overhauling a giant bridge in Beijing? Watch how the Chinese miracle unfolds," Twitter, 11 July 2019, <https://twitter.com/zlj517/status/1149287719698407424?lang=en>. Accessed April 2023.

4 Elinoff 2017; Ghertner 2017.

5 Elyachar 2010; Simone 2004.

6 Star and Ruhleder 1996; Bowker 1994; Carse and Lewis 2017.

7 Edwards 2003; Larkin 2013.

8 Anand, Gupta and Appel 2018; Harvey and Knox 2015.

9 Rankin et al. 2017; Wilson 2004; Hetherington 2018; Mostowlansky 2017; Ripa, Murton and Rest 2020.

10 Bach 2016.

China's GDP that year.<sup>11</sup> The equivalent figure for the United States was 2 per cent. Between 2016 and 2020, China targeted US\$2.2 trillion for investment in domestic transport infrastructure alone. Under Xi Jinping 习近平, China also made infrastructural investment a cornerstone of its foreign policy, establishing the Asian Infrastructure Investment Bank, the Silk Road Fund, and launching the Belt and Road Initiative in 2013. These developments have garnered significant attention,<sup>12</sup> particularly for their geopolitical implications, and yet infrastructure development itself is often taken for granted in China studies, or is viewed as analytically uninteresting. China's own "infrastructure turn" remains understudied and of little impact both within and outside the China studies field. Tellingly, a 2017 "companion" volume promising a comprehensive empirical and analytical assessment of the state of the field of infrastructure studies did not feature a single chapter on China or its broader infrastructural orbit within Asia.<sup>13</sup>

Despite China's leading role in the construction of actual physical infrastructure over the past three decades, the most influential paradigms for the study of infrastructure in the social sciences originate from research conducted elsewhere. To be sure, important groundwork has been laid for critically engaging the "China model" of development,<sup>14</sup> as well as for appreciating the socio-political dimensions of how people experience infrastructure provision and demolition in China.<sup>15</sup> But a more complete rendering of the "infrastructure turn" in China studies is yet to be developed. For this reason, the China Made project, funded by The Henry Luce Foundation (2018–2023), organized a series of workshops to explicitly interrogate Chinese infrastructure and the so-called China model of development. In so doing, the project emphasized three key issues. First, regarding the assertiveness of China's foreign policy under Xi Jinping – anchored by its capacity for infrastructure provision – we sought to shift attention from national-scale, or even supranational-scale, questions of geopolitical strategy or international relations to more local-scale analyses of the infrastructures themselves, and the social, cultural and political relations and effects those infrastructures have in the places where they are being built. Second, we proceeded from a conviction that China's export-oriented development model of infrastructure provision is fundamentally informed by – and may even be viewed as an extension of – a process of infrastructure development that has emerged within China itself over the past several decades. Finally, we aimed to develop a set of analytical and methodological tools for approaching infrastructure as both an object of inquiry and an analytical lens for understanding state building, urbanization, regional development, social welfare provisioning, and a host of other factors central to the study of contemporary Chinese society and politics.<sup>16</sup>

Building upon the Second China Made Workshop that took place at the University of Hong Kong in January 2020, this collection of papers moves towards developing a theoretical and methodological agenda for bringing infrastructure studies into conversation with China's domestic infrastructures. Building on the argument that "the question 'what is infrastructure' must be addressed and experimented with, in registers at once conceptual and empirical,"<sup>17</sup> papers in this special section focus on how to conceive, theorize and research China's infrastructural developments. In so doing, this collection shifts our focus to a finer-grained examination of the material properties of infrastructures themselves, how these relate to on-the-ground social, political and cultural formations, and how such a grounded focus can in turn encourage a rethinking of conventional understandings of China's domestic infrastructures.

11 Zhang and Barnett 2014.

12 Oliveira et al. 2020; Lin, Shimazu and Sidaway 2021; Sidaway et al. 2020; Hirsh and Mostowlanski 2023.

13 Harvey, Bruun Jensen and Morita 2017.

14 Lee 2017; Driessen 2019.

15 Chu 2014.

16 Oakes 2019.

17 Harvey, Bruun Jensen and Morita 2017, 6.

In this introduction, we lay out the main theoretical and methodological innovations that an infrastructure approach to China's development can achieve, before outlining the various papers and how they contribute to a new understanding of infrastructural power in China. In doing so we have a twofold aim: to bridge a gap between studies of Chinese infrastructure and the broader "infrastructure turn" outlined above; and to encourage further inquiries into the nature of infrastructural power in China.

### Thinking Infrastructurally about China, the State and Power

Beyond China and China studies, interest in infrastructure emerged from a confluence of several intellectual and social developments during the early 2000s. Boyer has suggested that one of these developments involved a return of academic interest in public developmentalism in response to three decades of social analysis saturated by market-centred frameworks.<sup>18</sup> This interest was fuelled by both the increasingly apparent neglect of public infrastructure in many post-industrial countries, particularly the United States, and the increasingly apparent infrastructural prowess demonstrated, in comparison, by China. It also came at a time when the discursive excesses of the "cultural turn" were generating a growing interest in what we might call the *matter* of culture. In various disciplines – including science, technology and society (STS) studies, anthropology, human geography, architecture, and related fields – interest in infrastructure thus came to be framed around a broad set of socio-technical themes, interrogating not simply the infrastructural nature of state formation, but more fundamentally the ways politics, societies and subjectivities are bound up in material infrastructural forms.<sup>19</sup>

We might summarize the intellectual energies within the broad and amorphous field of infrastructural studies as driven in large part by two related strands of inquiry. One involves an interest in rethinking the materiality of socio-cultural formations.<sup>20</sup> As Coole and Frost note, this interest has been spurred by a sense of inadequacy in the cultural turn's privileging of language, discourse and representation for understanding current environmental and bioethical challenges.<sup>21</sup> Drawing on developments in theoretical physics, bioethics, biopolitics and critical materialism, this work has increasingly questioned the distinctiveness of the human and the autonomy of the social. Out of this conceptual turbidity came an understanding of infrastructures not as the inert or relatively stable foundations for dynamic social processes, but rather as unstable assemblages of human and non-human agencies.<sup>22</sup>

A second strand of inquiry draws on efforts to rethink "the political" in terms of a more diffuse and relational conception of power in which ontological divisions and hierarchies between material and immaterial, or between the human and non-human realms, are "flattened."<sup>23</sup> The implications for how we think about power and the political lies in an openness to considering how power relations get produced through the configurations of elements that constitute any particular apparatus-assemblage network. The political in this sense then becomes an effect of these diffuse relations. Extending from this, there has been considerable interest in exploring the oftentimes hidden political (or "techno-political") work of infrastructural forms.<sup>24</sup> These relational perspectives are baked into the study of infrastructure. Larkin defined infrastructure as matter that enables the movement of other matter.<sup>25</sup> He also noted the relational ontology of infrastructures as both material objects of inquiry *and* relations among those material objects. The study of infrastructures thus compels us to understand them *as systems*. Increasingly, they are viewed as systems that

18 Boyer 2018.

19 Appel, Nikhil and Gupta 2018.

20 Whatmore 2006; Ingold 2007.

21 Coole and Frost 2010.

22 Bennett 2010; Bennett and Joyce 2010; Rest and Ripa 2019.

23 Bennett and Joyce 2010.

24 Amin 2014; Anand 2015; Barry 2013; Easterling 2014; Larkin 2008; Mitchell 2002; Von Schnitzler 2016.

25 Larkin 2013, 329.

produce their own political effects. This techno-political focus challenges the common-sense understanding of infrastructures as the neutral, apolitical platform upon which analytically separate socio-political processes operate.

Infrastructure development is officially viewed in China, for instance, as a technical platform, an apolitical basis for pragmatic inter-state relations.<sup>26</sup> Indeed, China's commitment to infrastructural development among its Asian neighbours has been firmly couched in a rhetoric of non-ideological pragmatism: infrastructures represent, for China's leaders at least, a "no-strings-attached" approach to development that purposefully counters efforts by the United States and Western European states to tie development aid to the promotion of democracy and human rights. Recognizing this, our approach seeks to, first, challenge the notion of a clean separation between what are commonly thought to be inert non-human infrastructures and dynamic, political social processes and, second, to draw our attention to the often unnoticed political work of infrastructures themselves. This approach is anticipated by Otter, who notes that "sewers, roads, airports and railways can no longer be regarded simply as the backdrop for social relations, the effect of capital or cultural constructions."<sup>27</sup> As noted by Larkin, infrastructures rather "reveal forms of political rationality that underlie technological projects and which give rise to an 'apparatus of governmentality'."<sup>28</sup>

For China studies, one particularly relevant implication of these intellectual strands is the way they invite alternative approaches to conceiving of the state and state power. A relational approach to power focusing on the social relations that swirl around material-technical formations helps us situate, both methodologically and conceptually, the state as a potent force in people's everyday lives without reducing the political to state presence. While in China it may be a truism that "everything is political," the techno-political implications of a focus on infrastructure suggest that the political cannot be reduced solely to the actions of the state as an actor conceptually distinct from society. Particularly at this current moment of ascendancy of state power in China, we insist on maintaining analytical space for a less state-centric and more diffuse politics of everyday life. Infrastructural configurations offer an important framework around which to analytically construct such a space.

That said, it is also important to acknowledge the ways in which state power in China is constituted infrastructurally. On the one hand, the Chinese state operates on a fundamental belief that "infrastructure expansion propels broad-based economic growth and *needs to run ahead of actual demand* for it."<sup>29</sup> This has led to the result that China's level of infrastructure seems to *exceed* its level of economic development.<sup>30</sup> From 1998 to 2005, the annual increase in investment for infrastructure soared to 23.3 per cent, almost twice the rate of overall economic growth.<sup>31</sup> Over-investment in infrastructure is baked into the state system, due to its structural organization (i.e. the *tiao-kuai* 条块 system), the fragmented nature of state authority, the role of the Party and the way it promotes its personnel, and the competitive nature of the policy process among localities. Every 1 per cent increase in earmarked transfers from the centre is associated with a 5 per cent increase in local spending on infrastructure.<sup>32</sup> While unsustainable, this pattern of local state expenditure has produced a phenomenal amount of infrastructure in a relatively short period of time. As a consequence, China's excess construction capacity has incentivized massive infrastructure exports.

On the other hand, infrastructure is not simply a by-product of China's particular system of statecraft. It is itself a field of power through which the state wields authority and asserts domination over society. Lampton, Ho and Kuik have argued that Beijing believes "infrastructure provides the pathways along which power in its coercive, economic, persuasive, and ideational forms moves.

26 Tang 2020.

27 Otter 2010, 47.

28 Larkin 2013, 328.

29 Lampton, Ho and Kuik 2020, 57, emphasis added.

30 Fan and Wan 2016; Ma 2022.

31 Tang 2020, 866.

32 Fan and Wan 2016.

Infrastructure is the grid through which all forms of power move. Infrastructure lies at the core of China's future power and welfare.<sup>33</sup> But here we would argue for a more relational approach to infrastructural power, one that derives from thinking infrastructurally, by foregrounding the materialities and techno-politics of infrastructures themselves. In these terms, infrastructural power might be thought of as a materialist reframing of what Foucault called "biopower."<sup>34</sup> If biopower involves tactics and mechanisms of power that focus on life, infrastructural power involves the technologies that shape access to basic goods and services, to systems of provision and mobility. Infrastructural power, in other words, determines who and what is authorized to move; whose lives and what materials are valued (by the state).<sup>35</sup>

Through infrastructural power infrastructure states build themselves into the lives of citizens in fundamental ways, shaping access to the city, to transport, to public goods, to work. Michael Mann offered one version of this idea in his analysis of the historical shift from despotic states to infrastructural states. For Mann, infrastructural power is the state's capacity to penetrate (rather than oppress) civil society and autonomous social life.<sup>36</sup> The state does this via transport and communication infrastructures, standards and regulations, provision of education, and so on. The extent to which the state can control the infrastructures of social life is the extent of its infrastructural power. Keller Easterling offered a very different version of infrastructural power, in which she counterposed the logics of infrastructure, particularly in special economic zones, with the logics of statecraft. Infrastructural power constitutes a form of what she called "extrastatecraft."<sup>37</sup> While distinct in many ways, both of these approaches share an understanding of infrastructural power as distributed, as emerging not from the state per se but rather from the social relations that revolve around infrastructure development and provision. Both, in other words, offer a fundamentally *relational* understanding of infrastructural power, of power emerging in the socio-technical relations that constitute infrastructural systems and assemblages.

This means that infrastructural power does not itself emerge from the state but rather that state power is co-constituted through infrastructural configurations. Thus we might consider how the state in China has sought to capture infrastructural power and direct it to its own benefit. Just one example would be the ways the state seeks to capture the "datafication" capacities of digital platforms in China and use them towards its governance ends. This might then be called an "infrastructuralization" of platforms.<sup>38</sup> The implications of this are important, since it means that we cannot only assume a policy-driven process, or even a centrally driven one, when considering China's infrastructure development. Instead, we might consider a complex diversity of actors. More significant is the implication for how we conceive of state control. The relational nature of infrastructural power means that while the state may be able to wield and benefit from this power in many ways, it can never fully control it. Infrastructural power always exceeds the state and, at times, can produce contradictory effects and outcomes.

The papers in this special section in various ways grapple with how to understand these contradictory effects and outcomes of China's infrastructure development in non-reductive ways. Collectively, they also make clear how a focus on China can provide a much-needed counterweight to the dominant neoliberal frame of reference within which infrastructure studies emerged. Much of the critical impetus in infrastructure studies to date has been directed at questions regarding structural adjustment, privatization, uneven access and the consequent appropriations of infrastructure by the weak in the nooks and crannies of the neoliberal state.<sup>39</sup> A focus on China's infrastructural ambitions challenges this neoliberal frame with a very different configuration of state power.

33 Lampton, Ho and Kuik 2020, 57.

34 Foucault 2004.

35 Byler 2020.

36 Mann 2003.

37 Easterling 2014.

38 De Kloet et al. 2019.

39 See, for example, Chattopadhyay 2012; Graham and Marvin 2001.

Infrastructural thinking can unravel a very different sort of state–society relationship than what is often assumed. Infrastructures have been referred to as the built forms around which publics thicken;<sup>40</sup> they focus our attention on the mundane politics of everyday life, and offer a way of thinking about how the state materializes as a potent force in people’s everyday lives. Infrastructures thus mediate the relationship between state and citizen<sup>41</sup> and function as a materialization of biopower.<sup>42</sup> While this allows for an innovative and grounded understanding of state and social formation in China’s infrastructure developments, much of the infrastructure studies literature is premised on a normative assumption of civil society as the fulcrum upon which the politics of infrastructure balances. Such assumptions often contribute to misunderstandings of the Chinese state–society context, where “civil society” assumes a state–society separation that in many ways does not exist.

Beside arguing for the need for more critical attention to China in relevant debates in the infrastructure studies field, these papers collectively suggest a new approach in the China studies field itself – one geared towards an appreciation of the material and techno-political components of Chinese governance today. Taking cue from Ching-Kwan Lee’s argument that the “globality” of China today requires the abandonment of the field’s methodological nationalism,<sup>43</sup> we argue that infrastructural thinking forces us to reconsider the intersections of networks and territory, the transformation of places, and multi-scalar linkages between states, citizens, and many of the institutions that mediate relationships in between.

### Techno-politics, Nature, Blockages: How to Think Infrastructurally in China Today

The papers in this special section trace infrastructure development within China and interrogate how it has become a key feature of China’s political economy. They do so through case-study investigations of China’s domestic infrastructure, including its political, social, cultural and environmental dimensions. Collectively, the authors view infrastructure as a significant theoretical orientation and methodological tool for better understanding social, cultural and political change in China. As Harvey, Bruun Jensen and Morita note, “a focus on infrastructure can cut across the tensions between surface and depth that mark social theory.”<sup>44</sup> These tensions are, we believe, precisely what current scholarship on China’s political economy is challenged to overcome. The study of infrastructure can help link abstract processes and ideas to on-the-ground material conditions in important new ways. The papers also demonstrate that the study of the political effects of infrastructure in China upends assumptions formed in more liberal governing contexts. Finally, they problematize the popular narrative of the “China model,” which tends to misunderstand the contexts within which infrastructures emerge, which are often highly local and enmeshed in the everyday lives of many different actors.

While the papers engage with these approaches to understand the infrastructural nature of state power, they also suggest alternative ways for addressing everyday politics in contemporary China. Adam Liebman, for instance, shows how “phantom urbanization”<sup>45</sup> is constitutive of social and economic relations. By focusing on scrap workers in Kunming, Liebman shows how they seek out and achieve for themselves a certain independent form of social mobility – one irreducible to the standard image of the exploited rural migrant. In this way, Liebman shows how the socio-technical relations of “high metabolism” infrastructures in China’s urban development drive migrant entrepreneurialism. While rapid urbanization is often seen as an expression of state infrastructural

40 De Boeck 2012.

41 Anand 2015; Anand et al. 2012; Collier, Mizes and von Schnitzler 2016.

42 Collier 2011; Gandy 2014.

43 Lee 2017, 166.

44 Harvey, Bruun Jensen and Morita 2017, 6.

45 Sorace and Hurst 2016.

power, the material nature of the infrastructures themselves – in this case their often temporary and short-term qualities – create social, cultural, economic and political effects for migrant communities that challenge state control. Liebman takes an approach to “infrastructure time”<sup>46</sup> in which the ongoing circulation, recycling and repurposing of infrastructure materials is constitutive of new socialities, economies and publics. The narrative of waste captures merely one particular phase of “infrastructure time,” one which reflects a lack of concern for the material qualities of infrastructures themselves.

An infrastructural approach to urbanization in China is also explored in Tim Oakes’s contribution, which focuses on national new area experimental urban development zones as “infrastructure spaces.” With a case study of Gui’an New Area, Oakes shows how in China’s urban development zones, infrastructural power is wielded through large-scale grids of transportation and communication that are indiscriminately overlaid on top of older infrastructural networks. Such grids become platforms for a radically new scale of urbanization and for hyper-planned eco-cities, smart-cities and “sponge-cities.” Yet the infrastructural configurations have their own socio-technical effects that sometimes fail to align with planned outcomes. While new areas often aim at building well-functioning, almost utopian new cities, the infrastructural urbanism driving their construction produces another set of outcomes that lies somewhere in between the planned-for city and the demolished and left-behind countryside.

Infrastructure also plays a crucial role in China’s implementation of its vaguely defined “ecological civilization” (*shengtai wenming* 生态文明) principles. This is the case both in terms of the development of so-called “green” technologies, such as hydropower and solar, as well as in the “return” of built spaces to “nature.” In his contribution, Tyler Harlan shows how the development of renewable energy technology in China’s underdeveloped “frontier” cannot be thought of outside of the country’s political-economic system and is ultimately negatively impacting local communities. Furthermore, as part of this process Yunnan is re-made into what Harlan calls a “low-carbon frontier”: a site of energy extraction which is then transmitted to wealthier coastal provinces, thus fostering longstanding inequalities. Here, in other words, renewable energy infrastructures form a potential source of state infrastructural power but one which local states have difficulty capturing. This is because of the complex socio-technical relations that swirl around these infrastructural forms: “renewable energy infrastructure is not inherently beneficial – or politically neutral – but is wrapped up in socio-spatial processes of development in China.”<sup>47</sup> Paying attention to the local dynamics of renewable energy infrastructure provision yields a story of infrastructural power that is complex and contradictory.

Speaking to a similar set of issues, Emily Yeh shows how the construction of natural infrastructure in the context of Xi Jinping’s call for “ecological civilization” is often forced upon local communities in rural areas. Drawing on Carse<sup>48</sup> and Gordillo,<sup>49</sup> Yeh addresses the “destructive production” taking place under the label of ecological civilization through a close analysis of calculative tools for ecosystem services and their role in establishing functional zoning and ecological red lines. She further demonstrates how one of the aims of this managerial approach is to turn the built environment into a particular kind of natural environment that can be understood as infrastructure space, in that it provides particular services. In the process, the article ties in with a broader discussion over how environmental policies can be harmful and coercive, and largely based on a systematic misrepresentation of the environmental and social conditions of a particular place.<sup>50</sup> Thus while China’s infrastructural power is often viewed in terms of a war on nature<sup>51</sup> or a displacement of

46 Appel 2018.

47 Harlan 2023.

48 Carse 2012.

49 Gordillo 2014.

50 For example, Peluso 1993; Shah 2010.

51 Li and Shapiro 2020.



natural processes by infrastructure, China's pursuit of ecological has resulted in the state's efforts to *extend* infrastructural power into the realm of nature itself. While this form of infrastructural power is then wielded over local communities whose livelihoods depend on their own control of natural resources, it is also contested and subject to unintended outcomes.

Growing ethnographic research on connective infrastructures, from roads to railways and wireless networks, has indeed shown the *unexpected* ways in which such infrastructures change lives. In particular, such work consistently suggests how enhancing connectivity is far from straightforward, and can rather contribute to manufacturing a certain sense of isolation.<sup>52</sup> The co-production of connectivity and blockage that these studies point to is also evident in the case of digital technologies. Attempting to untangle the complexities of China's surveillance infrastructure, a few papers in this special section deal with various forms of everyday control, containment and blockage. Darren Byler draws on his long-term ethnographic fieldwork among Uyghurs in China's north-west, as well as recent testimonies and reports about carceral infrastructure in the region, to argue that Xinjiang's "re-education" facilities produce state-directed, Han-exclusive corporate power over Uyghur and Kazakh life, which deepens the alienating effects of factory labour across ethnic and class differences. In doing so, Byler re-casts techno-political infrastructures in Xinjiang as spaces of exception and "an archipelago of total institutions" in which walls and surveillance systems shape daily life along ethno-racial lines. In doing so, Byler shows how the camp system results from the state seeking to wield infrastructural power by appropriating and extending existing commercial infrastructures of labour control and surveillance that have been developed throughout China. State power in Xinjiang is thus understood to be co-constituted infrastructurally through a system of walls and surveillance technologies that has emerged elsewhere in China but takes on devastating techno-political effects when wielded against an ethno-racialized class of incarcerated workers.

Focusing on the history of wireless technology in China, Jianqing Chen shows how wireless and mobile network infrastructures produce infrastructural power that is similarly difficult to contain. While conventional narratives in the West depict a state wielding this infrastructural power in authoritarian ways, the infrastructures themselves – an amalgamation of "interoperable systems mixing old and new, wireless and wired networks"<sup>53</sup> – produce socio-technical relations of interdependence that are not easily controlled by either the Chinese or US governments. In so doing, her paper offers a timely reminder that wireless communication was initially tied to the needs of industrialization and economic reform, more than state security and surveillance, with these latter priorities only later adapted to this infrastructure. Central to Chen's paper is also the trans-national history of China's wireless technology infrastructure, and the role that international experts and government officials played in its development. Representatives of the state, here, are important "translators" of government policies for a variety of local contexts – more often than not with unpredictable and contradictory outcomes.

Notably, the role of mediators plays a crucial role in Max Hirsh's paper. By focusing on the role of international experts in the development of China's airport infrastructure in the post-reform period, Hirsh fills a crucial gap in our understanding of the development of expertise and standards in the Chinese context. The story that emerges is one of international exchanges spanning Hainan, France and Japan, thus showing how large-scale infrastructure projects operate not only as emblematic manifestations of multilateral cooperation, but also as economic vessels for channelling reciprocal cross-border investments between multiple state actors. When addressing the "China model" of infrastructure development, scholarship such as Hirsh's is fundamental for re-casting national aspirations within the broader – global – framework from within which they have emerged.

The emergence of infrastructural power in China is certainly related to political economies of party-statecraft that are in many ways unique to China. Yet the socio-technical nature of

52 Cf. Heslop and Murton 2021; Rippa 2020; Zhu and Hu 2019; Pedersen and Bunkenborg 2012; Demenge 2013.

53 Chen 2023.

infrastructural configurations are often transnational in scope (as Chen's article in this special section also makes clear, and as Byler and others have pointed out elsewhere<sup>54</sup>). They also involve various non-state actors whose expertise shapes infrastructure construction in certain ways. Here we are reminded that infrastructures involve more than physical constructions but also standards, training programmes, cooperative agreements, joint-venture negotiations and management practices. For megaprojects certainly, but even for everyday infrastructures such as urban public transportation or drinking water provision, these assemblages of expertise, technical standards and know-how are typically international in scale, making the wielding of infrastructural power even more complicated. As Hirsh's research reminds us, China's "model" of infrastructural exports is itself already a global amalgamation of actors and technologies.

In conclusion, these papers suggest that paying attention to infrastructures themselves as complex and difficult-to-contain socio-technical assemblages yields valuable perspectives that can challenge some of our assumptions about the nature of statecraft, state power and state-society relations in China. Drawing on this perspective, we offer two final observations. First, while an emphasis on infrastructure investment has been popularly associated with the "China model" of development, our approach in this collection has not sought to define such a model or even make claims to what makes China's infrastructural development unique.<sup>55</sup> While clarifying the specific political and economic distinctiveness of China's infrastructural development is always important and necessary, the approach suggested here seeks to instead demonstrate how a focus on the material dispositions and socio-technical nature of infrastructures themselves complicates many of our assumptions about what the "China model" in fact entails.

Second, this collection of papers complements well the recent turn towards "global China" as not only a critical engagement with Chinese infrastructural power beyond China's borders,<sup>56</sup> but as a methodological approach and epistemological orientation.<sup>57</sup> While on the one hand "global China" is being driven by the Chinese state's over-investment in infrastructure, on the other hand an infrastructural approach offers a critical perspective on the assumption that China's global presence is orchestrated and controlled by Beijing. We would therefore argue that the approach demonstrated in these articles also suggests a research agenda for engaging with China's development projects abroad and offers an analytical guide that does not reduce those projects to the policy initiatives – such as the Belt and Road Initiative – that seek to contain them within the Chinese state's infrastructural power.

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54 Cf. Byler, Franceschini and Loubere 2022.

55 Cf. Tang 2020.

56 Lee 2017.

57 Franceschini and Loubere 2022.

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