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Timothy Moss

Remaking Berlin

A History of the City through Infrastructure, 1920-2020

Remaking Berlin

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Remaking Berlin

A History of the City through Infrastructure, 1920–2020

Timothy Moss

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Abbreviations

AL	Alternative Liste (Alternative List)
Bewag	Berliner Städtische Elektrizitätswerke (Berlin electricity utility)
BKL	Berliner Kraft- und Licht (Bewag) (partially privatized Berlin electricity utility)
BOD	biochemical oxygen demand
BRD	Bundesrepublik Deutschland (Federal Republic of Germany)
BUND	Bund für Umwelt und Naturschutz Deutschland (Friends of the Earth Germany)
BWB	Berliner Wasserbetriebe (Berlin water and wastewater utility)
BWW	Berliner Wasserwerke (Berlin water utility)
CDU	Christlich-Demokratische Union (Christian Democratic Union)
CHP	combined heat and power
COD	chemical oxygen demand
CWI	Charlottenburger Wasser- und Industrierwerke (a private water utility)
DDP	Deutsche Demokratische Partei (German Democratic Party)
DDR	Deutsche Demokratische Republik (German Democratic Republic)
DG	Deutsche Gasgesellschaft (a private gas utility)
DNVP	Deutschnationale Volkspartei (German National People's Party)
DAF	Deutsche Arbeitsfront (German Labor Front)
DVP	Deutsche Volkspartei (German People's Party)
ERP	European Recovery Program
ESA	Elektrizitätswerk Südwest (a power utility)
EU	European Union
FDGB	Freier Deutscher Gewerkschaftsbund (Free German Trade Union Federation)
FDP	Freie Demokratische Partei (Free Democratic Party)
GARIOA	Government Aid and Relief in Occupied Areas

Gasag	Berliner Städtische Gaswerke (Berlin gas utility)
GBI	Generalbauinspektor für die Reichshauptstadt (Inspector General for Buildings in the Reich Capital)
IBA	Internationale Bauausstellung (International Building Exhibition)
ISA	Institut für Städtebau und Architektur (Institute for Urban Planning and Architecture)
IWW	Institut für Wasserwirtschaft (Institute for Water Management)
KPD	Kommunistische Partei Deutschlands (Communist Party of Germany)
KWB	Kompetenzzentrum Wasser Berlin (Berlin Center of Competence for Water)
LDP	Liberal-Demokratische Partei Deutschlands (Liberal Democratic Party of Germany)
LTS	large technical systems
MEW	Märkisches Elektrizitätswerk (an electricity utility)
MLP	multi-level perspective
NSBO	Nationalsozialistische Betriebszellenorganisation (National Socialist Factory Cell Organization)
NSDAP	Nationalsozialistische Deutsche Arbeiterpartei (Nazi Party)
SED	Sozialistische Einheitspartei Deutschlands (Socialist Unity Party of Germany)
SERO	Sekundärrohstoffe (secondary raw materials)
SPD	Sozialdemokratische Partei Deutschlands (Social Democratic Party of Germany)
StEP V+E	Stadtentwicklungsplan Ver- und Entsorgung (Urban Development Plan on Utility Services)
StEW	Städtische Elektrizitätswerke (Berlin electricity utility)
STS	science and technology studies
SVZ	Sekundärrohstoff-Verwertungszentrum (material recycling center)
USPD	Unabhängige Sozialdemokratische Partei Deutschlands (Independent Social Democratic Party of Germany)
VEB	Volkseigener Betrieb (state-owned enterprise)
VVB	Vereinigung Volkseigener Betriebe (association of state-owned enterprises)
WAB	Wasserversorgung und Abwasserbehandlung (East German water and wastewater utility)
Wassag	Berliner Städtische Wasserwerke (Berlin water utility)
WEW	Groß-Berliner Wasser- und Entwässerungswerke (East Berlin water and sanitation utility)

Preface

Big projects often need a nudge to get going. In this case, it was a call for papers to an international conference held in July 2004 in Deutschlandsberg, Austria. The conference title was “Urban Infrastructure in Transition: What Can We Learn from History?” At that time, I had been working for over a decade on contemporary transitions to urban infrastructure in a reunited Germany, exploring the impacts of unification, deindustrialization, privatization, and liberalization on energy and water services. Although a trained historian, I had been drawn to the study of the dramatic events following the fall of the Berlin Wall. Living in Berlin in the early 1990s, history in the making had a stronger appeal than history itself. The call for papers in 2004, building a bridge between historical and contemporary research, was, for me, a call for reflection on how I could connect my ongoing research to what had inspired me into scholarship in the first place. It created an opportunity to study something that had always puzzled me, but which I had never had the chance to investigate in depth: the impact of the political division of Berlin in 1948–1949 on the city’s infrastructure systems. On the basis of some hurried research, I penned an abstract for the call which, eventually, developed into an article entitled “Divided City, Divided Infrastructures: Securing Energy and Water Services in Post-War Berlin.” I am very grateful to Harald Rohrer and the organizers of the event in Deutschlandsberg for giving me what turned out to be that nudge over the edge.

The idea of writing a book on Berlin’s infrastructure history since the creation of Greater Berlin germinated at this time. Initial steps were made possible with a partial sabbatical from my post as department head at the Leibniz Institute for Regional Development and Structural Planning (IRS), Erkner, in 2007. A number of journal articles emerged from this initial foray into the field. The breakthrough came, though, with a fellowship awarded for this purpose by the Gerda Henkel Foundation (GHS) in 2017–2019. Preceded by a one-year guest professorship at the Humboldt University of Berlin,

where I head a research group at the Integrative Research Institute for Transformations of Human-Environment Systems (IRI THESys), this gave me the time to conduct the in-depth archival research, literature analysis, and expert interviews essential for the book. I am greatly indebted to IRS, GHS, and IRI THESys for making this possible.

If the institutional setting provided the necessary space for researching and writing this book, the ideas informing it have emerged from discussions with many colleagues over the years. First and foremost, I thank Simon Marvin and Simon Guy. Since our first European Union project in 1996, both have inspired me immeasurably with wisdom and insight, strategic vision and friendship. It is no exaggeration to say that, without them, my career would have taken a very different path and this book would never have been conceived. Then, it was the roundtable events on urban infrastructure held in Autun, Burgundy, that provided an exquisite setting for testing out my findings in the company of leading historians and geographers. I would like to say a huge thank you to Olivier Coutard and Jon Rutherford for organizing these unforgettable events and for their patience with my obsession for Berlin.

I would like give a special thanks to all my former colleagues in our department at IRS Erkner. For thirteen years we worked closely together on fascinating research into contemporary environmental governance in Germany and the European Union, ranging from water resources management and infrastructure policy to the energy transition. Ludger Gailing was a constant source of support and intellectual sparring partner throughout. At IRS I found huge inspiration on infrastructure issues from Matthias Naumann, Ross Beveridge, Sören Becker, Jochen Monstadt, Frank Huesker, and Markus Wissen, as well as—more widely—from Andrea Bues, Natália Garcia Soler, Ute Hasenöhrl, Kristine Kern, Katharina Krause, Andreas Röhring, Frank Sondershaus, and Carsten Zehner. Thanks go also to Martina Leppler for keeping things going.

Since moving to IRI THESys in 2016 I have benefited hugely from the supportive and stimulating scholarly environment of this interdisciplinary venture. I would like to give special thanks to Jörg Niewöhner and Patrick Hostert for giving me the break and encouraging me since. Other people at the institute who have helped me greatly are Gretchen Bakke, Anne Dombrowski, Kathrin Klementz, Sebastian van der Linden, Axel Klie, Olof Krüger, Tobias Krüger, Ourania Papasozomenou, and Dimitris Zikos.

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in dealing with my enquiries over the years. I would like to thank especially Andreas Matschenz, Monika Bartzsch, and Bianca Welzing-Bräutigam. I have been very well supported by the staff at the Gerda Henkel Foundation, in particular Angela Kühnen and Anna Kuschmann. I am indebted to the Foundation also for providing financial support for this book and funding a series of short films about my research, freely available on its scientific portal L.I.S.A. (https://lisa.gerda-henkel-stiftung.de/das_unsichtbare_berlin?nav_id=8405&language=en). Stephan Zengerle and Martin Pogac made a great job of producing these films. Many thanks also to go to the many practitioners and researchers of Berlin's infrastructure who kindly agreed to be interviewed for this book. Respect for their anonymity prohibits me from naming them, but their contribution has been hugely valuable. The staff at the MIT Press have been highly supportive throughout the production process, in particular, Justin Kehoe, Katie Helke, María García, and Susan Clark. I thank also Sherry Gerstein and Michael Durnin for excellent copyediting.

In addition to those mentioned above, the following people are also due thanks for the varied ways in which they have assisted and improved my work over the years: Dana Abi Ghanam, Christoph Bernhardt, Christine Bichsel, Dorothee Brantz, Vanesa Castán Broto, Harriet Bulkeley, Morten Elle, Harald Engler, Maria Francesch Huidobro, Itay Fischhendler, Kathryn Furlong, Frank Geels, Günther Grassmann, Håvard Haarstad, Jan Hansen, Conor Harrison, Lior Herman, Mike Hodson, Joseph Hoppe, Jonathan Hummels, Andy Karvonen, Astrid Kirchhof, Jens Libbe, Andrés Luque Ayala, Will Medd, Martin Melosi, Jan-Henrik Meyer, Peter Mollinga, Susanne Balslev Nielsen, Julia Obertreis, Rob Raven, Gillad Rosen, Siddharth Sareen, David Saurí, Dieter Schott, Elizabeth Shove, Adrian Smith, Philipp Späth, Erik Swyngedouw, Joel Tarr, Helmut Trischler, Bernhard Truffer, Eric Verdeil, Gordon Walker, and Pia Wolfram.

I thank all these people for the various ways they have supported this venture. All the remaining errors are, of course, mine.

Last but not least, I am hugely indebted to my wife, Ulrike Grassau, for all the love and sustenance she has provided along this journey.

Berlin and Hayton, March 2020

Note: All translations from the German original into English are by the author.

1 Introduction: Berlin's Invisible Infrastructures

When you are next in Berlin take a 109 bus to the bridge over the River Spree. Instead of following the tourists toward the famous Charlottenburg Palace, walk east along the leafy river bank, passing the city's characteristic mix of turn-of-the-century and postwar apartment blocks until you reach the Charlottenburg power station, dominating the waterfront. There unfolds before you a panorama of electricity-generation technology through the ages. It begins with the original power plant dating back to the Kaiserreich, easily identifiable with its ornate brick decoration. Further to the left is a building housing a control room from the Weimar era in typical modernist style. Wedged between them is a boiler hall built in the 1950s and to the far left a huge denitrification plant dating from the 1980s. This roll-call of energy architecture is a material testimony to the history of municipal electricity provision in the city once renowned as the "electropolis" of Europe. Its visual appearance evokes a powerful imagery of adaptive continuity, with each new building representing a more modern way of transforming raw fuel into electrical current. From this vantage point, on the bank of the Spree, the history of Berlin's electricity supply appears as a continuous story of technological progress. This is the narrative that has been told and retold by generations of civil engineers engaged in building, operating, or studying these edifices to urban modernity.

If you then cross the river over the aptly named Siemens footbridge and go to the back of the power station on Quedlinburg Street, the impression is strikingly different. Instead of architectural icons jostling for attention, you are faced with a disorderly collection of buildings of uncertain function. Some are being dismantled, others appear no longer in operation or are being used for purposes other than power generation. A high, white wall around the complex obscures your vision and lends an aura of secrecy. In contrast to the front of the power plant that calls out to be looked at, the back is a statement of concealment. The certainty and confidence exuded by the power plant's facade is challenged by the ambiguity and disorderliness of its rear.

These contrasting impressions gained from a stroll around a power station are a metaphor for this book. Taking a fresh and unusual look at something we all take for granted is what the book is all about. It is a history of Berlin's infrastructures, certainly, but one that differs hugely from the familiar perspective of civil engineers and urban planners. While they have presented impressive accounts of technological advances to the city's infrastructures, I direct attention toward the less visible, but equally significant ways in which urban technology has acted as medium and manifestation of political aspirations.¹ This political dimension to infrastructure is largely invisible in popular narratives. Revealing this hidden underbelly of the city's energy and water systems and subjecting it to critical scrutiny is central to my venture. Metaphorically speaking, you need to explore the back as well as the front of a power station if you want to appreciate how infrastructure works and how it is made to work.

Conduits of Modern Urbanism

This book interprets Berlin's turbulent twentieth-century history afresh through the lens of its networked infrastructures. It reveals how the policies, plans, and practices surrounding the city's energy and water/wastewater services changed (or did not change) in response to the regime diversity, geopolitical interventions, and socio-economic volatility that have pitted Berlin's recent history and what this says, on a more fundamental level, about the relationship between a city and its infrastructure. Exploring how infrastructure systems, generally renowned for their obduracy, were affected by dramatic regime shifts—from the Weimar Republic, the Nazi dictatorship, socialist East Berlin, capitalist West Berlin to the reunified city—reveals attributes of sociotechnical configurations hidden in other cities by the patina of familiarity. Taking Berlin as an exemplar, the book demonstrates what infrastructure history can tell us about a city: in terms of how it was envisioned, structured, and governed in the past and what these legacies can mean for urban and infrastructure transitions today.

Berlin's infrastructures have, at different times over the past 100 years, been myth, model, and medium of the modern city. By the 1930s, Berlin had come to symbolise *the* networked city in Europe. Mythologized on film and paper as the "electropolis," by virtue of its pioneering role in electricity technology and supply, Berlin enjoyed a public image as the "technological city through and through."² This is powerfully reflected in contemporary films, such as *Metropolis* or *Berlin: Symphonie einer Großstadt*. After the war, other myths came to shroud Berlin's infrastructures. Local power plants and gas works came to symbolize the resilience of West Berlin against enclosure and intervention by the Soviet Union and East Germany. Integrated infrastructure plans

promised the materialization of a truly socialist modernity in East Berlin. While these myths often failed to live up to expectations, the models which Berlin represented to other cities had a far-reaching impact. In the 1920s, cities from across the globe looked to Berlin for ideas on how to provide public services to a growing metropolis.³ It was termed the “training ground of modernity” (*Exercierfeld der Moderne*), a hothouse for innovations in urban infrastructure.⁴ In the late 1980s, West Berlin became a pioneer of urban environmentalism, inspiring energy efficiency and water conservation technologies in cities worldwide. Today, the re-municipalization of the city’s water and energy utilities, accompanied by popular pressure to render them more transparent, environmentally sustainable, and socially equitable, is attracting global attention as an alternative model to corporatism. No history of Berlin, however, can highlight the positives while ignoring the negatives. The iconic status which Berlin enjoyed at several times during the twentieth century contrasts sharply with the city’s image as the nerve-center of National Socialism, symbol of wartime devastation, and victim of Cold War division.⁵ The Nazi era, in particular, is rife with instances of abuse, rather than use, of the networked city. Here, infrastructures became harbingers of impending destruction and oppression.

This book sets out to tell the history of Berlin through the prism of its infrastructures with four core objectives in mind. First, it analyses the coevolution of Berlin and its piped infrastructures over a period of 100 years, spanning five highly diverse political regimes. Second, it examines how municipal, national, and international politics and policies have manifested themselves in Berlin’s infrastructures since 1920. Third, it explores the tensions between obduracy and change to the city’s infrastructures across a century witnessing multiple political ruptures and dramatic socioeconomic transformation. Fourth, it reveals the distinctive trajectories of, and interdependencies between, five infrastructure sectors—electricity, gas, district heating, water, and sanitation—in a single city.

The book’s ambition, therefore, is to tread new ground in the study of urban infrastructures in Berlin and beyond by covering a long time period (from the creation of Greater Berlin in 1920 to the present day), encompassing diverse political regimes (from democratic to socialist and fascist), and comparing multiple infrastructure sectors (from energy to water). Alongside this empirical originality it also aspires to enrich ways of conceptualizing the multiple temporalities and spatialities of urban infrastructures. To this end, three overarching research questions guide the narrative: First, in what ways does Berlin’s infrastructure history raise our understanding of how the city was envisioned, structured and governed in the past? Second, what can this history tell us about the nature of change and continuity to sociotechnical systems and of relations

between a city and its infrastructure? Third, what do these legacies from the past mean for urban and infrastructure transitions today?

This story is about how urban infrastructures have helped “remake” Berlin over the past 100 years. The book’s title—“Remaking Berlin”—draws on a popular meme of the city’s fluidity and malleability that has fascinated commentators from the 1920s to the present day. Writing in 1929, Franz Hessel spoke of Berlin being “always on the move, always on the point of turning into something different.”⁶ Echoing this sentiment in 2006, Allan Cochrane wrote that “Berlin’s histories past and present are always in the process of being made, always provisional, never finalized.”⁷ In this volatile and ephemeral history, what role did infrastructures play? Did energy and water infrastructures act as a stabilizing force in the face of so much volatility? Was there, to quote Dirk van Laak, “a striking discrepancy between the discontinuity of political history [of Germany] on the one hand and the continuity in building and expanding infrastructures on the other”?⁸ Or did infrastructures mirror, and even reinforce, regime change and geopolitical intervention? This book sets out to uncover the various ways in which infrastructures have contributed to the “remaking” of Berlin over the past century, enabling and limiting options for shaping the city. The “remaking” at stake has never been purely physical, but also social. It has involved the propagation through infrastructure of, for instance, new political entities, social compacts, or urban imaginaries. Networked infrastructures, I will argue throughout, were conduits not merely of water and energy, but also, more fundamentally, of modern urbanism.

This is, essentially, a political history of Berlin’s infrastructures. It targets primarily how energy and water services were planned and provided, rather than how they were used. The principal (human) actors in the narrative are, therefore, utility managers, city politicians, municipal government officials, and—more recently—civil society organizations. It is important to note that the book does not aspire to being a cultural history of infrastructure. It does not explore the user’s perspective.⁹ Nevertheless, issues of infrastructure use and resource consumption are considered when they had a particular impact upon service provision. Three user/consumer aspects recur throughout the book: first, how consumption patterns adapted to socioeconomic trends and political interventions; second, what criticism of utility services was voiced by users; and, third, how the energy and water utilities perceived of, and engaged with, user communities to shape demand.

A second caveat is required in mapping out the scope of this venture: the book does not treat infrastructures of transportation, waste disposal, or communication. This is not because these sectors are less significant, but because studying more than five infrastructure sectors over a whole century would have posed serious limits to the depth of

analysis. It was important, therefore, to focus on a group of technical infrastructures that have much in common. The five sectors selected—electricity, gas, district heating, water, and sanitation—are all piped infrastructures, in that they are characterized by networked pipes, cables, and ducts that distribute material flows or currents across space. This distinguishes them from transportation or waste disposal. In Berlin they have been owned and operated primarily by municipal utilities, unlike communication networks, with substantial influence by city administrations. These similarities offer fruitful ground for exploring interdependencies, mimicry, and competition between the five sectors. A further factor influencing the selection has been to rectify the bias toward transportation that has characterized most treatments of infrastructure in the city's historiography. There already exist a number of works that tell the history of Berlin's rail, road, and air transport systems, whether as forces of urbanization, expressions of political instrumentalization, or symbols of urban identity.¹⁰ Its piped infrastructures, by contrast, have received little attention in the city's histories.

The book deliberately targets an audience of diverse disciplinary backgrounds, challenging monodisciplinary approaches and stimulating cross-disciplinary debate between science and technology studies, urban studies, and urban history. On the one hand, it encourages historians of technology and urban historians to rethink how networked infrastructures shape, and are shaped by, urban structures and processes over a long time period and across shifting contexts. On the other, it provokes geographers and political scientists to consider in a more nuanced way where today's urban energy or water transitions are coming from, historically speaking. The book aspires also to reach beyond the academy to professionals working in the fields of urban planning, infrastructure management, and the urban environment who are interested in learning about the relevance of Berlin's infrastructure history for modern-day transitions. Given the powerful appeal Berlin exerts on the public imagination, it is hoped the book will strike a chord with the general reader fascinated by the turbulent past and contested, yet liveable, present of this unique city.

Histories of Berlin and Its Infrastructures

Why does Berlin matter? How can a city with such an unusual past deliver insight that is relevant to academic and professional debates? These are questions which have been raised in the wake of a veritable hype surrounding Berlin in the reunification era. Since 1989, social scientists have been drawn to the city as a melting pot of West and East in a globalizing world, producing a rich tableau of scholarship on the post-unification period. Berlin has become, in the words of Andreas Huyssen, "a prism through which

we can focus issues of contemporary urbanism.”¹¹ This has prompted warnings of “exoticizing Berlin’s situation”¹² and generated an intriguing debate on whether Berlin today constitutes an “exceptional case”¹³ or an “ordinary city.”¹⁴ The charge of exceptionalism is even more pertinent to an historical analysis covering the past 100 years. During this period of time Berlin has experienced a greater diversity of political rule, a greater intensity of economic disruption, and a greater vulnerability to geopolitical intervention than, arguably, any other city in the world. Of course, it is these extremes which make Berlin’s story so captivating. Yet, while these can generate powerful narratives, their wider relevance to scholarship needs justifying.

The core argument made by scholars in favor of studying the unfamiliar is that atypical or extreme cases can reveal phenomena otherwise concealed by routinized practices, institutionalized procedures, and taken-for-granted structures.¹⁵ Referring to infrastructures in particular, Jane Summerton’s exhortation to focus on times and places of radical disruption is worth quoting in full: “It is well known that analyzing extreme situations—system failure, periods of rapid growth or structural transformation—often help [*sic*] us to elucidate ‘the normal’ in different expressions of technology. By studying phases in which technical systems undergo radical change, we might expect to gain new insights into basic dynamics and properties of these systems.”¹⁶

This applies to Berlin not simply for one particular event, but—to a greater or lesser degree—throughout the past century. During this period Berlin has witnessed multiple critical junctures, including the hyperinflation of 1923, the Nazi seizure of power in 1933, wartime destruction, political division in 1949, the building of the Wall in 1961 and reunification in 1990. It has experienced highly diverse political regimes, ranging from democratic to fascist and state-socialist, as well as military occupation. To quote Huyssen once more: “There is perhaps no other major Western city that bears the marks of twentieth century history as intensely ... as Berlin.”¹⁷ It is precisely this rich diversity and continuous instability which can deliver such fresh insight into the relationship between a city and its infrastructure. As Erik Swyngedouw has demonstrated in his history of water in twentieth-century Spain, fascist rule and geopolitical interventions reveal properties and dynamics of hydropolitics “in a clear and unambiguous manner.”¹⁸ Berlin is interesting, therefore, not because it is a representative case, but because it is such an insightful one.

Given the recent scholarly interest in Berlin, it is extraordinary how incomplete and fragmented the city’s historiography remains. Astonishingly, there exist very few book-length urban histories that cover the entire period from the creation of Greater Berlin in 1920 to even the recent past.¹⁹ Some periods of Berlin’s history have been subjected to intense study, while others languish untouched or under-researched. Best

studied from a political history perspective is West Berlin between political division and reunification.²⁰ Municipal politics in the Weimar era has also received significant attention.²¹ By contrast, we know very little at all about how the city government operated in East Berlin under state socialism. Even the Nazi era has, surprisingly, not received the attention it deserves. Recent publications on Berlin under National Socialism lament the lack of systematic studies of this period and the absence of any history of the city government at this time.²² Historical research of Nazi Berlin has focused instead on dramatic or harrowing stories, such as Goebbels's campaign to control Berlin, the persecution of the city's Jews, Speer's plans for Germania, the local Nazi Party, and the resistance movement. This book represents an attempt to redress these imbalances in the city's political historiography, providing fresh insight into how municipal government operated under fascist and state-socialist, as well as democratic, regimes. It represents an initial foray into a long-term, cross-regime analysis of the city's history, using infrastructure as the lens of choice.

In the histories of Berlin that do exist, piped infrastructures are largely invisible.²³ A recent edited volume on Berlin under Nazi rule characteristically addressed infrastructure only in terms of transportation.²⁴ A pioneering study by Otto Büsch of Berlin's municipal enterprises—with detailed analysis of the city's electricity, gas, and water utilities—was written in 1960 and is limited to the Weimar era only.²⁵ Thomas Hughes's seminal book on the emergence of electricity systems in Germany, Britain, and the United States does include a case study on Berlin, but only for the period 1880–1915.²⁶ An edited collection on Berlin's industrial heritage, published in 2020, dedicates at least some chapters to urban infrastructures.²⁷ While political histories of urban infrastructures have recently been published for Hamburg and Munich, nothing comparable exists for the German capital.²⁸

This has meant that the history of Berlin's infrastructures has been left, largely, to civil engineers and urban planners. Their contribution to our knowledge of the technical design, capacity, and performance of the city's energy and water systems is highly valuable. Hilmar Bärthel, an engineer and long-standing employee of the East Berlin planning department, has produced a series of volumes documenting the detailed history of the city's gas works, power stations, water works, and sewage treatment plants from their early beginnings to the present.²⁹ Heinrich Tepasse has written several books on the relationship between urban technology and urban planning in Berlin's history from an engineering perspective.³⁰ Thorsten Dame has studied Berlin's electricity industry through its architectural history.³¹ Other works, by Shahrooz Mohajeri and Christian Eiden, focus on the formative period of Berlin's water and sanitation systems in the late nineteenth and early twentieth century.³² These works are dedicated to

mapping technological trajectories in Berlin from innovation to consolidation. They present a powerful imagery of linear progress to urban modernity and continuity. The politics of infrastructure, if addressed at all, is characterized largely as an external disturbance.³³ This book, in sharp contrast, foregrounds the politics of Berlin's infrastructures. It sets out to challenge the notion of infrastructure being somehow apart from political discourse and contestation, arguing that urban, national, and even international politics were played out and, indeed, manifested themselves in the fabric of the city's energy and water systems.

In doing so, the book draws on recent research about today's transformations to Berlin's infrastructures. Since reunification, the city's energy and water utilities have acquired a new visibility. Initiatives to privatize them in the 1990s to help offset the city's chronic debt and then to re-municipalize them since 2010 following popular protest have spawned high-profile debates on the purpose and future of infrastructure in the city. Together with climate change, these pressures are challenging long-standing assumptions, logics, and practices underpinning infrastructure policy and management. They have brought infrastructure out into the public domain, revealing quite how political it can be. Urban scholars are today uncovering the contestations over Berlin's infrastructures and the alternative visions they are generating.³⁴ This book acknowledges the way they are opening up the city's infrastructure to critical social science perspectives and makes the case for extending this politically sensitive analysis to a 100-year history of the city's infrastructures. The fundamental argument is that exploring how the city's energy and water systems got enrolled in, resisted, or sustained five hugely diverse political regimes can shed important new insight on the dynamic relationship between a city and its infrastructures. The very uniqueness of Berlin's crisis-ridden twentieth-century history can, it is argued, reveal dimensions to this relationship concealed elsewhere by the veil of routinized processes and path-dependent structures.

Histories of Urban Infrastructure

Inspirational to this work is a veritable "infrastructural turn" in the social sciences and humanities today.³⁵ Infrastructures are being used in recent research as a window on human-environment relations in general, and the urban condition in particular. They have become a medium of choice for scholars working on the history or anthropology of technology, urban or climate governance, and environmental history. It is at this intersection of science and technology studies (STS), history of technology, and human geography that new understandings of infrastructures have emerged that reach far beyond the technical bounds of civil engineers. Today, infrastructures are perceived

in the social sciences as complex and dynamic networks that always comprise both the social and the technical. This is well expressed in a recent definition of infrastructures as “socio-technical assemblages of materiality, discursive, fiscal, and organizational forms and relations.”³⁶ Their value to society is regarded as pivotal, despite their general invisibility. Infrastructure, in the words of Paul N. Edwards, “is the invisible background, the substrate or support, the technocultural/natural environment, of modernity.”³⁷ Their invisibility, indeed, conceals deep-rooted embeddedness in society, as Jörg Niewöhner argues: “Infrastructure seeps into the background, it sediments out and disappears from view. And with it disappear all the technical, social, political, and ethical choices that are necessarily made during the design, construction, implementation and maintenance of any infrastructure.”³⁸

This book is about revealing these kinds of choices made in the past that have shaped Berlin’s infrastructures and have rendered them largely invisible to public scrutiny until very recently. It seeks to unpack the visions underpinning infrastructure policy and strategy, their materialization in technical networks, and the functions performed by infrastructure for the city.

Today’s scholarly interest in infrastructures was pioneered in large measure by historians. The importance of infrastructures to state building and state hegemony has been acknowledged since the work of Karl Wittfogel on “hydraulic civilizations” in Oriental societies and Donald Worster on “rivers of empire” in the American West.³⁹ Since then, historians of technology have demonstrated the multifarious ways in which infrastructures become imbued with power relations in industrial, colonial, and postcolonial societies.⁴⁰ Today, the coevolution of large technical systems and the societies they serve has become a popular meme for historical analysis.⁴¹

Urban and environmental historians applied this approach to cities, generating powerful insight specific to urban infrastructure. An early example was the work of Joel Tarr, Gabriel Dupuy, and others about the effects of technology on urban form and of urban politics on technology.⁴² William Cronon set a milestone in 1991 by illustrating how Chicago and its natural hinterlands were coproduced by means of new technologies that mobilized physical substances essential for the city’s growth.⁴³ Martin Melosi’s book *The Sanitary City* of 2000 traced the trajectories of wastewater technologies and the institutions that supported them in US cities from their municipal beginnings to the present day.⁴⁴ In Germany, Dieter Schott revealed the contested relationship between urban technology and urban politics in three medium-sized cities prior to the First World War.⁴⁵

Urban scholars have since drawn on debates in human geography to enrich the conceptual and critical framing of infrastructure politics.⁴⁶ Pathbreaking monographs on urban infrastructures include Stephan Graham and Simon Marvin’s *Splintering Urbanism*

on the coproduction of liberalized utility services and urban fragmentation, Matthew Gandy's *Concrete and Clay* on the urban governance of natural resources in New York City, and Maria Kaika's *City of Flows* on the celebration and subsequent concealment of water infrastructures in Athens.⁴⁷ Interestingly, all three books, although written by human geographers, are powerfully historical in their scope and argument.

As will be revealed in more detail in the following chapter, this rich literature at the interface of STS, human geography, and the history of technology is generating a new genre of scholarship on the co-constitution of cities and their infrastructures. This book is positioned precisely at this intersection of disciplines and is designed to enrich ongoing debates on this complex relationship. Its novel contribution is, essentially, fivefold. First, the book represents a long-term study of urban infrastructures that is not limited to past eras of emergence and stabilization or present phases of reconfiguration, but spans 100 years of sociotechnical history. It thereby addresses mature infrastructure systems that have received little attention by infrastructure historians in the past.⁴⁸ Second, the book does not assume that infrastructures are inherently stable or obdurate, but focuses rather on the ways in which infrastructures are made or become obdurate and how they get destabilized. Particular attention is paid here to the non-linearity of sociotechnical trajectories, the layering of old and new technologies, and alternative pathways that presented themselves during the course of Berlin's 100-year history.⁴⁹ Third, the book compares and connects multiple infrastructure sectors in a single city. This is still unusual in infrastructure studies, representing a significant gap in the literature.⁵⁰ The dimensions of connectivity to be covered will include physical interdependence, as between wastewater treatment and electricity supply, common governance arrangements, and competition between different utilities, for instance between electricity and gas utilities over district heating. Fourth, the book explores the multi-scalar politics of infrastructure, ranging from disputes over local air pollution and municipal strategies for infrastructure expansion to national policy interventions and geopolitical constraints. How these factors on different scalar levels interacted and manifested themselves in systems of energy and water provision is of prime interest. Finally, the book eschews simplistic notions of the city as a single, bounded entity. Just as it understands infrastructure as a sociotechnical configuration, so too does it conceive of the city in relational terms, with multiple geographies emerging out of heterogeneous associations.⁵¹

Researching Berlin's Infrastructures

The interdisciplinary thrust of the book, encompassing both historical and contemporary analysis and drawing on a wide range of scholarly debates, has posed particular

challenges in conducting the research. The overarching task has been to access diverse sources of empirical material and to interpret this data with the help of different, but complementary, conceptualizations of urban infrastructure history. The risk has always been, in terms of theory, to avoid combining the incompatible and, with regard to the empirics, to resist writing a history that traces back the present.

Conceptually, the book is framed by sociotechnical approaches to the study of urban infrastructure, as indicated above and elaborated in the following chapter. This has required in-depth analysis of secondary literature on ways of theorizing the relationship between continuity and change to sociotechnical systems as well as the relationship between cities and their infrastructures. Sources have been sought within the fields of STS, history of technology, and urban studies. They have been assessed in terms of their contribution to each of these key relationships, identifying gaps in research for this book to fill. This has demanded sensitivity toward the epistemological roots of each field of scholarship.

The empirical research has needed to be extensive by virtue of the long period under study, the intensity of Berlin's recent history, the range of infrastructures studied, and the dearth of secondary literature on certain periods of time. The empirical chapters which form the backbone of this book derive from the analysis of a wide variety of published and unpublished material, as well as oral history. Secondary literature on the political and economic history of Berlin since 1920 has provided background knowledge on how each of the five political regimes were constituted, how they worked, to what ends and by what means. This has been essential to contextualize infrastructure politics in each era. General literature has also been drawn on to reveal important socioeconomic trends and crises of relevance to utility service provision and use. The available secondary literature on the city's infrastructures, written largely by civil engineers and planners, has been gleaned to provide details on the technologies applied, infrastructure built, and resources used in each service sector over the 100-year period. Particularly valuable has been the published primary literature dating from the early 1920s to the present day. For the purpose of this book all relevant professional journals for electricity, gas, heating, water, and sanitation published in Germany since 1920 have been searched for articles relating to Berlin, written primarily by utility directors, prominent civil engineers, and municipal officers. This has produced a rich source of data that has been supplemented with statistical reports, policy documents, and local newspapers also dating from the whole period of study.

The principal source for primary data has been unpublished material deposited in archives. Above all, the State Archive of Berlin (Landesarchiv Berlin) has proved a treasure trove of documents and correspondence relating to the period between 1920 and 1990, housing some 250 files of direct value to the book. The principal files used are

those of the city government (Magistrat until 1949, then senate in West Berlin and Magistrat in East Berlin until 1990). The archive of the municipal gas utility Gasag is deposited at the State Archive. Unfortunately, the archive of the water utility Berliner Wasserbetriebe was not accessible during its current transfer to the State Archive. Nor was the archive of the municipal power utility Bewag (now Vattenfall) accessible to the author, despite repeated requests to the utility. These limitations did not prove serious, however, since the correspondence and documentation of all the city's utilities are well represented in the city government files for most periods. Additional material on environmental nongovernmental organizations (NGOs) in East Berlin was acquired in the archive on opposition in East Germany run by the Robert Havemann Society.

For first-hand accounts, interviews were held with around forty stakeholders of infrastructure policy and management. These interviews were conducted between 1993 and 2018 with former as well as active utility managers, city government officials, consultants, researchers, and environmentalists operating in Berlin—East and West—since the 1970s.⁵² The interview partners were selected to provide insight on recent developments not covered by archival material, to yield diverse perspectives on Berlin's infrastructure systems, but also to reflect on the city's infrastructure history with the benefit of hindsight.

Structure of the Book

The book is structured around a largely chronological analysis of Berlin's infrastructure history over the past 100 years, introduced by a conceptual chapter that frames the research and concluded by a chapter drawing out the key findings. Chapter 2 positions the book within the rich literature on urban infrastructures and their histories, and develops a framework to guide the analysis. It sets the scene by challenging superficial impressions of obduracy and linearity to Berlin's infrastructure history before elaborating on what it means to treat infrastructures as sociotechnical configurations. The chapter then sets out the analytical framework of the book, structured around the value of taking infrastructural, long-term, political, cross-sectoral, and ecological perspectives on Berlin's history and—by extrapolation—cities in general. These themes are used to interpret findings in the subsequent empirical chapters and guide the conclusions in the final chapter.

Chapter 3 sets the scene for the empirical research by introducing Greater Berlin as a territorial entity created in 1920 by a new democratic alliance to unify the metropolitan area and promote equitable living conditions. It demonstrates how, from the earliest days of the enlarged city, urban infrastructures were enrolled in a municipal quest

for unitary and affordable services in the face of hyperinflation. Chapter 4 explores how, following currency stabilization in 1924, the city's electricity, gas, water, and sanitation utilities—as major players of Berlin's municipal economy—were used to weave the fabric of a networked municipalism. It assesses how far the utilities were able to deliver on the political agenda of unifying and improving service standards across the city and to enrol consumers in this venture. The chapter concludes by revealing how the expansionist plans for urban infrastructures became the target of criticism in and beyond the city, contributing to the destabilization of the democratic order.

Chapter 5 presents an unfamiliar history of Nazi Berlin: one viewed through the lens of its energy and water services. It explores how Nazi rule changed the way Berlin's infrastructure systems were managed and owned, the political goals they pursued, the roles ascribed to their consumers, and the resource flows they mediated. It describes how, after 1933, the “networked city” became gradually and insidiously enrolled in national agendas of repression, racism, autarky, and militarization. Chapter 6 addresses the impact of wartime destruction, military occupation, and political division on the city's infrastructures, spanning the decade between the beginning of the war in 1939 and the creation of two separate German states in 1949. It analyses how resilient Berlin's infrastructures proved in the face of urban vulnerability, but also how infrastructural vulnerability and resilience were used as political tools in the increasingly divisive climate of postwar Berlin.

The following two chapters study the experience of political division from an infrastructure perspective in East and West Berlin, respectively. Chapter 7 describes how East Berlin's municipal utilities became subordinated to a state-socialist planning and management regime and how this affected services for energy and water/wastewater. It addresses the thorny relationship with West Berlin, exploring different realms of interdependence and how East Berlin authorities dealt with them. Above all, it highlights the gap that emerged between an emergent socialist infrastructural ideal and the poor performance of under-resourced infrastructures. Chapter 8 explores the urban and geopolitical contexts within which West Berlin strove to sustain its insular existence, assessing how the city's infrastructures were enrolled in a strategy of urban autarky. It reveals how this strategy needed adapting to suit the sociotechnical constitution of each infrastructure sector and how it affected utility management, consumerism, and the urban environment. When the limits to urban autarky became increasingly apparent from the 1970s onward, alternative strategies of regional cooperation and resource efficiency gained credence.

Chapter 9 takes Berlin's infrastructure odyssey up to the present day. It traces a volatile period which began with the euphoria of reunification in 1990 and the enrollment

of the city's infrastructure systems in Berlin's aspiration to regain world-city status. This gave way to despondency as Berlin's economy collapsed, its public debt soared, and the city's electricity, gas, and water utilities were privatized during the late 1990s. The chapter explores how privatization affected infrastructure services and their urban governance. It concludes by describing the emergence of social movements campaigning to re-municipalize the city's infrastructures and assessing their impact on the form and substance of infrastructure governance today.

The final chapter reflects upon the legacies of Berlin's infrastructure history for research and policy. Looking across the whole book, it interprets the findings in terms of the objectives formulated in chapter 1 and the conceptual framing of chapter 2. It revisits the five analytical themes developed in chapter 2, illustrating them with examples taken from across the 100-year panorama and highlighting their implications for research on urban infrastructure history. Particular attention is paid to what the Berlin case can tell us about the relationship between sociotechnical continuity and change, as well as between a city and its infrastructure. The chapter concludes with observations on the value of Berlin's infrastructure history for urban sociotechnical transitions today.

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2. Two members of infrastructure planning unit, Berlin Senate Department for Urban Development and Environmental Protection, April 8, 1993.
3. Senior member of energy unit, Berlin Senate Department for Urban Development and Environmental Protection, May 5, 1993.
4. Member of planning unit of Berlin Water Company BWB, June 9, 1993.
5. Senior member of energy unit, Brandenburg Ministry for Economics, Business, and Technology, June 22, 1993.
6. Three members of infrastructure planning unit, Berlin Senate Department for Urban Development and Environmental Protection, October 1, 1993.
7. Two senior members of infrastructure planning unit, Berlin Senate Department for Urban Development and Environmental Protection, October 24, 1995.
8. Member of energy unit, Berlin Senate Department for Urban Development, Environment, and Technology, August 22, 1996.
9. Member of directors' office of Berlin power utility Bewag, August 23, 1996.
10. Member of water unit, Berlin Senate Department for Urban Development, Environment, and Technology, September 6, 1996.

11. Senior employee at Technology Foundation Berlin, October 12, 2004.
12. Senior member of integrative environmental protection unit, Berlin Senate Department for Urban Development, October 21, 2004.
13. Senior member of technology unit, Berlin Senate Department for Economics, October 2004.
14. Water consultant and former BWB employee, June 4, 2018.
15. Former head of a Bewag power station in West Berlin, June 6, 2018.
16. Former member of energy unit, Berlin Senate Department for Urban Development and Environmental Protection, June 6, 2018.
17. Former member of the Institute for Ecology at the Technical University of Berlin, June 13, 2018.
18. Press officer at gas network company NBB, June 21, 2018.
19. Energy researcher, Technical University of Berlin, July 2, 2018.
20. Press officer at Berlin Water Company BWB, July 3, 2018.
21. Energy researcher, Free University of Berlin, July 4, 2018.
22. Former member of infrastructure planning unit, East Berlin administration, July 5, 2018.
23. Water specialist for environmental NGO Grüne Liga, July 5, 2018.
24. Energy researcher, formerly IZT research institute, July 12, 2018.
25. Senior member of water management unit, Berlin Senate Department for Environment, Transport, and Climate Protection, July 16, 2018.
26. Senior member of underground gas storage facility Berliner Erdgasspeicher GmbH, November 22, 2018.

