INTRODUCTION

Historicizing Sustainable Urban Mobility

Frank Schipper, Martin Emanuel, and Ruth Oldenziel

Introduction

In 1979, the local chapter of the First and Only Dutch Cyclists' Union (Eerste Enige Echte Nederlandse Wielrijdersbond, or ENWB) took to the streets of the town Amersfoort, posing as cyclists, pedestrians, car drivers, and bus passengers for a series of eight photographs titled "Use of Space" (see figure 0.1). By juxtaposing the eight street images, shown on our book cover, the activists were making a simple point. From a spatial perspective, designing city streets for cars makes no sense. It is unsustainable. Cycling, walking, and public transit are more efficient ways to use valuable urban space. Such photographic intervention—reenacted many times in other parts of the world since—has become iconic. The 1970s contest for what constitutes sustainable urban mobility was not new, however, as the issue had been debated earlier and elsewhere— also by policymakers.

London's expansion in the 1950s was spectacular. To house the capital's overflow, neighboring county Buckinghamshire appointed Frederick Bernard Pooley as chief planner in 1953. Articulating the emerging dominant view at the time, Pooley was convinced that automobility demanded a new kind of city. He rejected the car-based sprawl of Los Angeles as a model for the so-called North Bucks New City. Instead, he felt a monorail-based mobility system would be a much better way to inhibit the negative impacts of cars on the urban landscape.[1] In the end, neither North Bucks New City nor its monorail ever got off the ground.

We tend to think of the 1950s as the era of inevitable development of car-centered cities, which corporations like General Motors projected at the highly popular 1939 Futurama exhibition and planners like Robert Moses achieved. We also often position the 1970s countermovement as a singular and clear-cut moment of resistance. The examples of Pooley and the ENWB remind us how social actors in the past considered the full range of urban mobility beyond automobility. By offering stories that
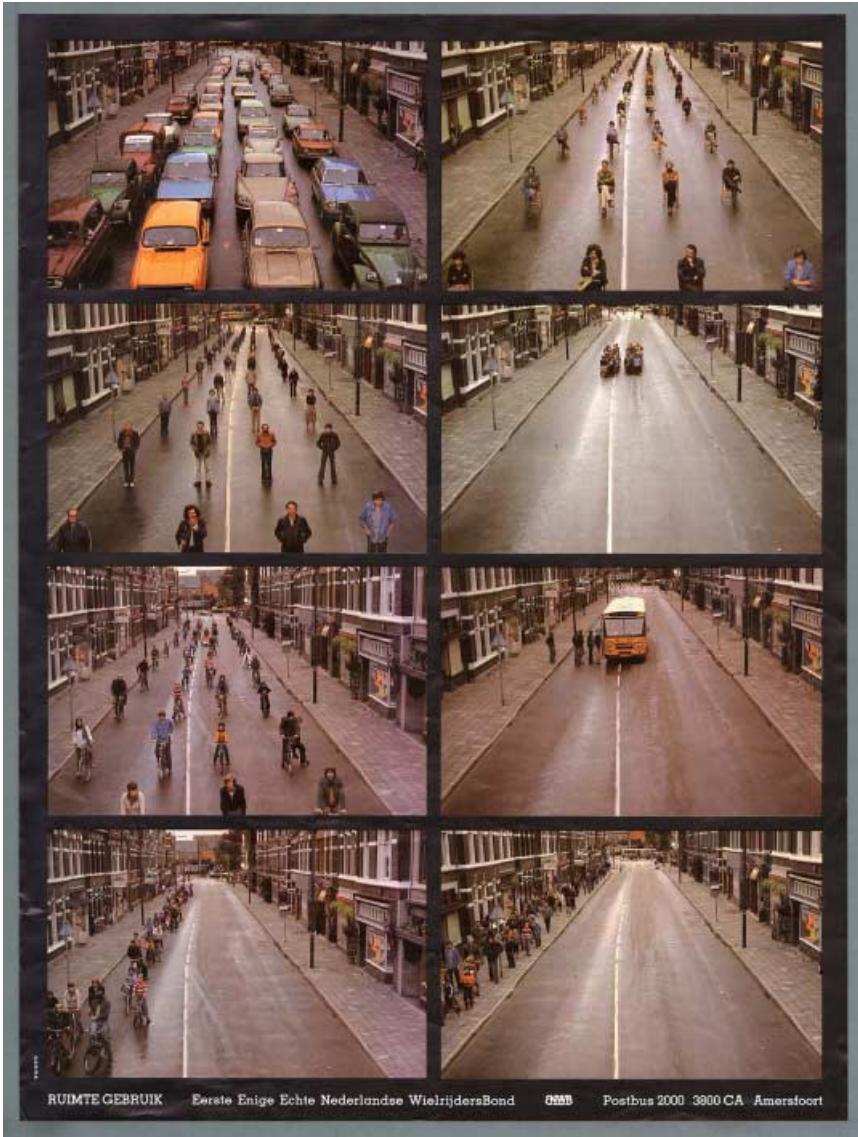
Figure 0.1. Poster, "Ruimtegebruik," made by the Eerste Enige Echte Neder-
landse Wielrijdersbond, 1979.
Source: In collection IISG Amsterdam. Permission by Fietsersbond.

narrate the roads-not-taken, we avoid a Whig view of history limited to
the plans that were realized. To understand the historical process, we
also need to consider the countertradition of the incisive critiques from
Lewis Mumford and Jane Jacobs embracing the walkable city, or the
many social movements they inspired.[2]

Contestations and alternative visions have always been part of the way our cities developed. Indeed, the search for alternative narratives points to the longer trajectory of current debates on how best to shape our cities. This collection of essays offers historical discussions and concepts to deal with today's grand challenge of sustainable urban mobility.

In current visions of future cities, mobility looms large. In the twenty-first century, more people will live in cities. The United Nations Sustainable Development Goals include the ambition to realize sustainable cities and communities by 2030.[3] To achieve truly sustainable urban mobility, we will have to disengage from motorized mobility.[4] This might be even more challenging for cities in the Global South. There, motorbikes fill mobility gaps whenever authorities fail to provide transit systems for the working poor, and cars are still welcomed as middle-class status symbols or as a convenient and safe mode of mobility to move through more dangerous parts of the city unhindered.[5] Still, the days of petroleum-and-steel motorized mobility are numbered. Cars everywhere put pressure on public spaces—the urban Global North treats cars in the city increasingly as merely guests or bans them altogether.[6] The current destabilization of the automobility regime may open up the possibility of post-car futures.[7] To some, electrification of automobility suffices to make the transition; for others, a more radical break is necessary to achieve mobility deserving the qualification "sustainable." Nevertheless, the challenge is how to provide urban citizens with accessible, affordable, and safe mobility that is at the same time sustainable.

In *A U-Turn to the Future*, we posit that historians have a role to play in this discussion. Exploring the sustainability challenge from a long-term perspective is vital for at least three reasons. First, Article 2 of the United Nations Framework Convention on Climate Change (UNFCCC) has set the long-term basis for our current global challenge. It stipulates that global average temperatures should not reach 2°C higher than pre–Industrial Revolution levels. In order to achieve such a goal, we need to know precisely how much our ecological world has changed in the past 150 years. The Intergovernmental Panel on Climate Change estimates that the transport sector produced 14 percent of global greenhouse gas emissions in 2010, and this level is projected to rise in the coming decades. In the European Union, urban mobility is responsible for some 40 percent of transport-related carbon dioxide emissions, and a staggering 70 percent of other transport-derived pollutants.[8] This long-term perspective of the climate challenge emphasizes a historical framework in the current discussions.[9]

Second, urban mobility systems have a long lifespan. Consequently, the systems we have today do not reflect current ideals, but rather those of the past. It takes decades to build—and by the same token to

unbuild—systems that include infrastructures (from bridges to airports) and vehicles (from trams to planes), as well as the institutions (from semi-governmental transport agencies to powerful lobbies) sustaining them. Making cities less car-centered means changing the supporting coalitions of vested interests built around them over decades. Transforming these systems requires the kind of long-term thinking that comes naturally to historians. Understanding the past is key to envisioning the future and changing the present.[10]

Third, the past is an inspiring place, demonstrating how things could be different and revealing the roads-not-taken. Such alternative roads can be an inspiration. Moreover, the past harbors persistent but neglected paths—usually ignored—offering future possibilities for innovation, rediscovery, and re-use. The history of urban cycling is a case in point: once modern before becoming old-fashioned, even obsolete, cycling as an ecologically sustainable practice has been resurrected as the most promising urban mobility mode for the future. Historians are well positioned to identify such pockets of persistence over time and show how these can be mobilized to facilitate transitions to sustainability today.[11] Historical analysis helps us understand the divergent development paths of innovation and issues of continuity and change. Such historical perspectives offer insights into how to break from undesirable development paths and shift course toward a more sustainable future.

For these reasons, the contributing authors believe that the past holds valuable insights for the present as well as for the future. Historical insights suggest a "usable past," in the famous phrase coined by American historian Van Wyck Brooks in 1918. In the aftermath of his country's tradition of nationalist storytelling about winners, he called for a history that would incorporate a more complete story: covering both the achievements and regrets that highlight the struggles of a more communal aspiration.[12] This volume contributes to our contemporary aspiration for sustainable urban mobility by providing historical analyses and concepts. A better understanding of the long trajectories of urban mobility systems serves as a stepping-stone to what is needed and feasible for future sustainable urban mobility. All the authors of this volume seek to solve three simple sets of questions, corresponding with the first three sections of this book. First, why did the mobilities we presently deem environmentally and socially unsustainable come to dominate many cities? Who shaped these mobilities in our cities and why? What were the mechanisms for selling unsustainable urban mobility? Second, how can historians accurately account for and recover the city's sustainable mobilities, above all walking and cycling? Third, what use can we make of persistent patterns of the past in a transition

to more sustainable urban mobility? How do material and nonmaterial mobility legacies impact us today? Before introducing the contributions in this volume, we discuss our working terms and identify historians' critical contribution to the thinking about making our urban mobilities more sustainable.

Sustainable Urban Mobility: Definitions

A U-Turn to the Future focuses on mobility in the city. The prospects for sustainable mobility are looking relatively bright in urban environments. The compactness of cities makes active modes like walking and cycling combined with public transit viable—despite the dominance of urban automobility in many highly mobile cities. Hong Kong, for example, is already well below the energy threshold (energy consumption per passenger kilometer) that sustainable passenger transport requires.[13] Furthermore, cities more often than nation-states are showing the political will to curb automobility. Some urban policymakers have embarked on ambitious agendas to mitigate climate change in their cities. Until recently, proposing such measures equaled political suicide. That is changing quickly.[14] The late political scientist Benjamin Barber asserted that for cities—and their mayors—global issues ranging from terrorism to sustainability are their best governance opportunities. Cities are key sites of change: they are part of the global economy, home to over half the world's population, and the primary incubators of innovations. Many mayors have become the agents of change, Barber argued, because they interact with their electorates more directly and effectively than national politicians.[15] These observations highlight sustainable urban mobility as a critical issue of our age.

The timeframe of this volume begins with the industrial and urban revolutions in the 1850s and covers the century when the unsustainable consumption of fossil fuels skyrocketed, particularly since the 1950s.[16] We see urban mobility primarily as the movement of people within the perimeter of the city. While the city is our unit of analysis, we are aware of—and equally interested in—the position of cities in urban regions, as well as in provincial, national, and global frameworks.[17] Cities typically do not operate in isolation; they interact. Large cities have often been at the forefront of the transnational circulation of urban planning ideals and sustainable mobility.[18]

Urban policymakers, active members of international networks when they first met at World Fairs since 1851, shared best practices globally and implemented them locally.[19] The transnational circulation of urban

planning and sustainable urban mobility ideas produced similar developments with many local variations.[20] For example, state projects to re-engineer traffic patterns or transform cities according to high-modernist visions had a worldwide impact.[21] Planners sought to impose order on what they considered the "chaos" of organically grown historic cities, built grids as an antidote to urban disorder, and created cities like Brasília and Chandigarh from scratch.[22] The protest against and demise of modern large-scale urban planning share the same story.[23] The worldwide circulation of ideas and protests suggests the need to examine sustainable urban mobility in a wider global governance context.

In social geographical terms, we see cities as large and relatively dense human settlements, serving functions distinctive from those of rural areas. Administrative borders define the city's perimeter, including what counts as "urban mobility." In absolute terms, cities have large ecological footprints: they depend on large swaths of territory outside their administrative borders. For example, historian William Cronon showed—a year before William Rees published his landmark article on the "ecological footprint"—how Chicago was intimately linked to, and appropriated the carrying capacity of, its hinterland, drawing natural resources from it and returning waste to it.[24] At the same time, thanks to their compact land use, cities can also support more sustainable mobility practices. In economic sustainability terms, compactness enables urban transit operators to run profitable enterprises. In ecological sustainability terms, compact cities allow more people to walk and to cycle. Sustainable urban mobility, however, does suffer from rebound effects. Cycling urbanites may jump on a plane for a weekend trip elsewhere. We must somehow examine urban sustainability practices taking place "here" and "elsewhere" in one analytical frame.[25]

The sustainability question also goes beyond the concerns of our own times. We use sustainability in this volume as defined by the UN Brundtland Commission: "the development that meets the needs of the present without compromising the ability of future generations to meet their own need." Its criterion of intra- and intergenerational equity takes a long-term perspective: one person's mobility should not come at the expense of another's mobility in present or future generations. In this vein, today's concern for sustainability involves, as Smits and Veraart argue in this volume, the tradeoff between "now" and "later."[26] In his seminal article on the "sustainable mobility paradigm," David Banister focused on ways to achieve environmentally sustainable mobility: through modal shifts, land-use planning, ICT technologies to reduce people's need to travel, and increased transport and fuel efficiency.[27] Such strategies aim to improve efficiency, shift from less to more sus-

tainable modes, and reduce mobility overall. The Brundtland definition, however, not only covers ecological, but also social and economic aspects of sustainability. It means we also need to focus on social justice and accessibility—key to transport justice.[28] Sustainable mobility within development theory often seeks to satisfy current consumption levels while not compromising future consumption.[29] Yet, future scenarios are often based on the premise that mobility will continue to grow, and they ignore low mobility.[30] Throughout the world, significant numbers of people—including in highly mobile societies—are not, cannot, or do not want to be mobile. Sustainable mobility then involves social sustainability (mobility justice) as well as ecological sustainability (cleaner air, livability).

We are fully aware that the use of the term "sustainability" is not neutral—and even may be considered anachronistic. In the German-speaking world, sustainability was already coined in the eighteenth century. In 1713, Hans Carl von Carlowitz, responsible for managing mines on behalf of the Saxon court in Freiberg for decades, observed the dire impact of timber shortages on the metallurgy industries and introduced the term sustainability (*Nachhaltigkeit*).[31] "Sustainable use" of a forest could only be achieved by not extracting more wood than could be regrown through reforestation management. His work was an early response to the limits to growth.[32] From a historical perspective, we observe that citizens have worried for centuries about urban mobility issues because of what we would nowadays call ecological and social sustainability concerns. Although Google Analytics books (Ngram viewer), for example, show that the terms "sustainability" and "durabilité" were not in the actor category in the English and French-speaking world until the 1990s—we also note that contemporaries used terms like "waste" (constant since 1800), "unhealthy cities" (since the 1830s), "traffic jams" and "traffic accidents" (since the 1920s), and air pollution (since the 1970s), while several urban planning movements (City Beautiful, 1880s–1914; Garden City, 1900–1950; regional planning, 1920s–1970s) sought to offer solutions for the grand challenge. As a category of analysis, the term "sustainability" allows us to build bridges between present-day concerns and past challenges that people faced.

Indeed, the concern for sustainable urban mobility is not new. Piles of horse manure on streets were identified as a disease hazard by the late nineteenth century.[33] Roadbuilders asphalted American streets because it was then easier to remove horse manure.[34] The pounding of hooves on the street produced noise and stone-powder, further nuisances for urbanites. Mobility could come to a complete standstill when large numbers of horses fell ill or died.[35] For many contemporaries, the

horse-based economy was unsustainable, and they welcomed the fossil fuel alternative. Today, we realize that the fossil fuel–based urban mobility systems that replaced horse-drawn traffic have generated pollution and other problems of their own as unintended consequences.[36]

Neither is the concern for social (in)justice in urban mobility systems new. Rapid growth rates in cities created—and continue to create—divisions between rich and poor. Cities generate an unequal distribution of wealth and persistent socio-spatial segregation. Mobility has a major effect on this inequality and the related competition over land, labor, and capital. Poor transport planning resulted in segregation by cutting off neighborhoods where the less well-off happen to live, from Chicago's South Side to Amsterdam's Bijlmer.[37] Transport poverty limits some social groups' access to urban mobility. Racial hierarchies were a feature of urban mobility systems in segregated societies like South Africa and the American South in the nineteenth and most of the twentieth century. Even in Philadelphia, policymakers preserved racial order at the cost of delays in its streetcar service.[38] Car-less individuals abound even in so-called "car societies." As car-oriented postwar transport planners focused on commuting, they neglected the mobility needs of children, married women, and the elderly. Moreover, they sought to secure traffic safety not by slowing down motorized traffic, but by removing pedestrians and cyclists through traffic separation schemes.[39] The great social costs for the urban poor and society are the result of decisions made over many decades, as UN-Habitat also acknowledged in 2008.[40]

By analyzing the trajectory of urban mobility from a long-term perspective, historians lay bare the trade-offs between different aspects of sustainability. As a discipline sensitive to issues of power, history helps us understand the political issues and the cultural definitions involved in shaping urban mobility and analyze how powerful social actors have pushed through their preferred trade-off, while sidelining the wishes and needs of others. The triumph of car-based urban mobility—or motordom as contemporaries called it—is a case in point.

History and Sustainable Urban Mobility: Toward a Usable Past

In this collection of essays, we offer insights to help analyze sustainable urban mobility in a long-term perspective in the same way that Van Wyck Brooks understood the usable past. Transport and urban planning scholars have been concerned about the environmental unsustainability of urban mobility systems.[41] Changing urban mobility in a sustainable direction demands a broad social change, however. Mobil-

ity scholars in the social sciences have analyzed how the "politics of mobility"—ranging from a focus on struggles at street level, to showing how car-oriented developments became the norm—are bound up in a global system of automobility. These scholars are exploring how our current mobilities can best transition to a more sustainable future.[42]

What do historians have to offer? History can be useful when discussing future mobilities, as Colin Divall, Julian Hine, and Colin Pooley have shown elsewhere.[43] Built-in resistance may prevent change: once a society settles on a particular mobility such as trains or cars, it becomes more difficult to shift course. The social and material norms around dominant mobility systems benefit certain future urban mobility scenarios over others.[44] Historical research, though, helps situate today's trendy and technology-oriented visions (e.g., "smart mobility") in the long tradition of how people envisioned the future to deal with the challenges of their time. Such "past futures" enable us to reflect critically on present-day promises that technology can solve sociocultural challenges.[45] Historical inquiry most of all helps counter the exceedingly short time spans, breathlessness, and gullibility typical of current expectations about innovative, smart solutions, which are rampant in urban mobility scenarios for the future.[46]

We distinguish three different manifestations of the usable past in this book. Providing a long-term perspective first of all helps explain the cultural politics of successfully "selling" unsustainable mobility in the city; second, it paints an inclusive picture of the mobile past, reconstructing those urban mobilities that have left few historical traces and are as a result "forgotten" in the histories of urban mobility; third, it enables us to discuss how persistent remnants of the past provide barriers and opportunities to transition toward more sustainable urban mobility. One particular obstacle is that dominant cultural representations play a key role in policymaking.[47] Policymakers have made many—unsuccessful—attempts to change people's mobile behavior. As current transport studies observe, we also need to consider persistent sociocultural factors in mobility that impede a sustainable mobility transition.[48]

The first usable past approach shows how unsustainable urban mobilities have been successfully promoted. Today's omnipresent automobility was never the inevitable outcome of progress. What we now see as sustainable mobility practices, such as walking and cycling, have long been contested or even delegitimized as mobilities of a different age, and as dangerous—tactics that allowed automotive interests to successfully transform the street into thoroughfares for motorists. Initially, streets were shared spaces where all modalities could travel and claim as theirs—and car drivers were held accountable for the victims they

made in road traffic. Until automotive interests—worried about their prospects in American cities—employed a broad set of discursive practices (media campaigns, theatrical public safety parades in the street) that ridiculed pedestrians as "jaywalkers" unless they crossed the street at designated spots. These campaigns effectively taught pedestrians not to hinder the flow in the street, which was redefined as a motorized traffic thoroughfare along which cars traveled speedily in an even flow at the expense of all other traffic.[49] Moreover, this transformation of the street into thoroughfares for motors has been translated in ostensibly objective assessments of urban mobility options that masked the extraordinary car-oriented biases in traffic policy.[50]

Selling automobility involved narrating a future with its own past. In the United States, automotive interests promoted "motordom" as the inevitable future—a vision also exported abroad. On their visit to the United States, Swedish experts saw what they thought their country's mobility future could—and should—look like in both technical and cultural terms.[51] Narrating the future often involved suppressing others' stories by relegating them to the dumpsite of history. Realizing one future often dismisses—and marginalizes—other possible futures.[52] Since the 1920s, the boosters of automobility excluded pedestrians and cyclists by choice and political design, to cast them as "slow traffic" and modes of the past.[53] As innovation scholars point out, mobilizing the future is a powerful weapon. When a novelty first comes on the scene, its promoters offer a so-called technological promise: the innovation is the "fix" for all society's problems.[54] Such technological fixes are particularly appealing because they suggest no behavior change is required to reap the full benefits. Today techno-tales dominate again the current debates about car-bound futures of "smart mobility" and "smart cities"—with promises of the driverless-car future being just around the corner for over half a century.[55] The opposite is also true. To break away from single-driver automobility that consumes too much energy also requires an alternative vision. The point is not to go back to a pre-car, nineteenth-century urban world—after all, automobility has shaped contemporary societies too profoundly—but to imagine what a car-less society looked like. Such a historical analysis points out alternative pathways or—from today's perspective—the opportunities we missed.

A second usable past approach helps to reveal such alternatives by drawing a more accurate picture of their continued existence alongside the dominant urban (auto) mobility paradigm. As a result of high technology narratives dominating our view of the past, we have lost our ability to accurately gauge the significance of walking and cycling in cities. Our comparative research in over fifteen European cities showed

that from the 1920s until the 1950s, urban cycling had a far larger modal share (40 percent and above) in most European cities and continued far longer, in many places well into the 1960s.[56] While most mobility studies have focused particularly on motorized and rail-based modalities at the expense of histories of cyclists and pedestrians, the modal split analysis considers cycling in relation to—rather than in isolation from—other modalities.[57] Such insights not only uncover "slow" or "active" modes like pedestrianism and cycling, but consider them in the context of sustainability. The second approach foregrounds the methods to reconstruct these mobilities that were relatively invisible in the past.

A third usable past approach analyses how persistent past practices could be employed for a mobility transition toward sustainability. Actions in the past often turn into lock-ins that restrict change, induce inertia against the call for sustainability, and become "monuments of unsustainability."[58] Yet older practices persist. The continued presence of cycling also has theoretical implications. According to Elizabeth Shove, innovation studies should not focus exclusively on novel things at their point of innovation. They should also look at reviving the more durable practices of the past in order to achieve sustainable urban mobility. Based on historical case studies of urban cycling, she argues that older technologies and more sustainable pastimes like walking and cycling in the park may present opportunities for shifting course through rediscovery and re-use.[59]

A U-Turn to the Future explores these three manifestations of the usable past: showing how unsustainable urban mobility systems acquired preeminence; making invisible sustainable low-tech alternatives visible in the historical records; and suggesting how path dependencies may facilitate or hinder sustainable urban mobility. A more comprehensive historical account of urban mobility thus includes the contestation between the mobilities that came into being and the mobilities that were considered low-tech (like cycling) or not technological (like walking). Historical analysis uncovers how dominant narratives, masking other (more sustainable) features, came about.[60] Our efforts are first and foremost exploratory.

Exploring Sustainable Urban Mobility: Our Contributions

Three sections of the book offer approaches on how to recover past sustainable urban mobility. The final section offers pathways for future research and policy applications. The authors aim to build a research agenda for the long-term dynamics of sustainable urban mobility.

Section I, "Selling Unsustainable Urban Mobility," focuses on how automobility became dominant in the twentieth century and created path dependencies at the expense of other mobilities. The three contributions in this section offer explanations for the success of private automobility, showing how powerful actors managed to overcome the diversity of mobility that had characterized cities in the second half of the nineteenth century.

Ruth Oldenziel, Pieter van Wesemael, and Luísa Sousa cast a wide net. They focus on transnational actors to understand how ideals, ideas, and tools spread and shaped urban mobility over two centuries, shifting from a pedestrian to a car-dominated norm. Their purpose: to understand how modes of urban mobility we consider today as sustainable—walking, cycling, and public transit—have been contested, sidelined, and reinvented. They examine three transnational organizations: l'Union Internationale des Villes (UIV), the International Federation of Housing and Planning (IFHP), and the Permanent International Association for Road Congresses (PIARC). Initially part of the "Urban Internationale" movement promoting international socialism and urbanism, both UIV and IFHP lost some ground in the aftermath of World War I when nation-states came to dominate policies pushing automobility at the expense of walking, cycling, and public transit. PIARC successfully promoted cars and roads for cars—even in cities—as vital for national economic growth. Only at the end of the Cold War in the 1990s when nation-states retreated from urban governance, have new city networks re-emerged as alternatives to national agendas—some with major commitments to sustainable urban mobility—by resuscitating old practices for new purposes.

No book on urban mobility covering the twentieth century can ignore the dominant role of automobility and especially the United States in successfully hailing the inevitability of the car. Peter Norton addresses how "motordom" developed the account of the United States as a car-loving nation, effectively downplaying the conflicts surrounding the car's arrival in American cities. He suggests that control over the public's former vision of the relationship between Americans and their automobiles enabled motordom to construct a powerful narrative that nurtured the U.S. car market. Based on case studies of the interwar period, the 1950s, and the 2000s, Norton reconstructs how motordom was able to transform the car's image in America from a necessity to the object of a love affair. The persistence of this powerful narrative about America's love affair with the car effectively hinders the route to more sustainable urban mobility today. The two other contributions in this section show the enormous impact of the narrative beyond U.S. borders.

In the nineteenth century, Britain stands out as key player in the Industrial Revolution, with the railroads as the engines of that transformation. Railroads lost out to the dominance of automobility in the twentieth century. From his case study, Colin Divall draws lessons from the tensions between regional and local politics and policymaking in facilitating or impeding sustainable mobility. Analyzing the debates around railway closures in a British district in the 1960s, he shows how national elites mobilized the term "modernization" to justify axing the area's non-profitable railways, while regional government and advocacy groups tried to frame the same routes as more sustainable and thus valuable parts of the area's transport system. Automobility as symbol of modernity proved hard to beat, however, and helped secure a decisive policy shift toward highway construction. Divall claims that sustainability is a similarly flexible and contestable term today as modernization was in the 1960s. In his reading of present-day mobility policy documents and their implementation in the same area, he finds that in spite of lip service to ecological sustainability, in practice, economic concerns remain at the top of the agenda.

Section II, "Recovering Sustainable Mobilities of the Past," provides a bottom-up counterpoint to section I. The authors take novel methodological approaches to reconstruct pedestrians' everyday mobility using visual sources and diaries. The chapters help us capture mobilities that were not counted in official statistics. The resulting histories on pedestrianism—combined with other studies on cycling—are an important reminder that the most sustainable form of urban mobility is omnipresent, yet rendered invisible. Methods of data collection, such as traffic counts, are never neutral, but framed by those who commission and undertake them. Believing the future belonged to cars, postwar urban and traffic planners stopped counting cyclists (pedestrians were hardly ever counted) to focus almost exclusively on motorized vehicles, particularly cars. Their numbers reinforced the feeling of urgency to provide for motorists: car parking, wider streets, ring roads—far ahead of actual need, or "demand." Concerns about the economic growth of businesses in cities had short-term social effects (e.g., destruction of the urban poor's housing) and long-term environmental effects (e.g., air pollution).

Colin Pooley introduces diaries as key evidence for everyday mobility patterns. He presents the ebbs and flows of a century of urban walking by investigating how, in postwar Britain, walking lost ground as a universal mode of mobility, while "modern" planning models led to car-oriented cities. His analysis focuses on three factors he deems essential for explaining the downward trend: walking's normality declined; its convenience nose-dived; and the risks associated with it increased

significantly in car-centered cities. The greater trends notwithstanding, his contribution, like the following two, help capture the continued significance of walking in the urban mobility mix and question its loss of normality as an urban mobility mode.

In their chapters, Tiina Männistö-Funk and Frank Cochoy and his co-authors employ visual analysis, showing how past traffic counts failed to capture social practices in the street. Using street photographs from the Finnish city of Turku in the postwar period, Tiina Männistö-Funk highlights how close reading of individual photographs offers a better understanding of people's mobility experiences. For example, even at data points where cars did not outnumber pedestrians and cyclists, their sheer size and speed would give the feeling of a higher "presence" than the traffic counts conveyed. Moreover, her visual analysis of geographical and gendered distribution shows more women walking and cycling—often near working-class streets and districts—who had to yield when streets were remodeled into car-traffic corridors in the 1960s. While urban and traffic planners found the motorized commuter patterns of mainly (breadwinning) men socially desirable, they ignored women's mobility practices. The traffic plans promoting large-scale motorization thus created not only environmental but also socially unsustainable mobility, she argues.

Franck Cochoy, Roland Canu, and Cédric Calvignac apply a close reading of photographs from Toulouse over a century to show how mundane things like carrying technologies—bags, rucksacks, plastic bags—helped sustain green modes of walking that competed with supposedly more "comfortable" modes of driving. Their chapter looks at the transport of goods, but challenges the notion that only trucks carried stuff. They also imply people neither stopped walking nor passively accepted urban designers' and transport planners' schemes. For example, they shifted to using bags with straps and backpacks that helped them to carry more goods without hindering their freedom of movement. And here is a lesson for policymakers and planners: to achieve sustainable "consumer logistics," as the authors call it, container technologies and the comfort of carrying things while walking are important. Such mobility presents a far simpler way to render city centers commercially and ecologically viable than building external shopping centers.

Section III, "Persistence and Sustainable Urban Mobilities," offers potential pathways toward sustainable futures. In a blend of bottom-up and top-down perspectives, the section spotlights how some urban mobilities have persisted that may either facilitate or hinder sustainability in urban mobility. Issues of path dependency come into play. This section discusses how the communist legacy of public transit and the

persistence of sustainable mobility practices in urban green spaces may help nurture sustainable urban mobility today in the face of "monuments of unsustainability."

Alexandra Bekasova, Julia Kulikova, and Martin Emanuel pose the question whether there is a divergent and potentially more sustainable urban mobility development trajectory in the former communist world. Taking St. Petersburg during tsarist and communist Russia as a case study, they investigate whether the communists' seizure of power in 1917 brought a more inclusive approach to providing mobility services. The authors reconstruct the shift from the walkable to a tram-based city during the tsarist regime before it invested in subways during the communist period and car-based planning since the collapse of the Soviet Union. They end on the hopeful note that the broad public transit legacy of earlier times may still be an asset for today's urban mobility challenge.

In his chapter, Martin Emanuel narrates the biography of an emergent livable street in Stockholm. A closer look reveals how its redesign followed a century-long effort to plan and construct a parallel underground route for motorized traffic that continued to encourage car traffic into the heart of the city, but was realized at the cost of demolishing working-class neighborhoods. Further complicating matters, the tunneling solution became an issue by the early twentieth century, when the urban elite's houses were deemed too valuable to allow for street leveling and widening. Only by uncovering such "hidden unsustainabilities" will it be possible to start unbuilding the path dependencies of large infrastructures.

Frank Schipper, in turn, notes the divergent trajectories of mobility in the green parts of cities and the city overall. In proposing a research agenda for the future, he questions whether we should consider parks as "pockets of persistence" that might be mobilized to make urban mobility more sustainable today. He traces the history of urban parks and their mobility since the 1830s, when they changed meaning in urbanizing, industrializing societies, and explores the pockets of persistence hypothesis with Singapore and Washington, D.C., as possible sources of inspiration. Schipper's exercise suggests that in order to substantially support a transition to sustainable urban mobility, we need a networked approach to urban green spaces so that the infrastructures associated with sustainable urban mobility benefit from these pockets of persistence.

Section IV, "Research Agendas for the Future," offers three important elements for scholarship and policymaking when working toward a future-oriented research agenda. First, the mobility justice problems

emanating from ecologically sustainable bike programs in North America serve as a reminder that it is crucial to prevent a clash between social and ecological sustainability. Second, we need to provide a quantitative basis to assess the sustainability performance of mobilities in the city. Third, a policy perspective helps us consider the feasibility of a sustainability transition in urban mobility from a governance perspective.

Mimi Sheller compares her concept of mobility as a commons to modal-split analysis. Her chapter shows how social and ecological well-being are intricately related—and sometimes even clash. Cleaner vehicles and fuels, as well as bicycle lanes and bus rapid transit systems, will do little to promote sustainability unless the underlying power relations are also considered. Cycling infrastructures may have been intended to encourage green mobility, but as U.S. scholars and activists point out, today's cycling policies are racialized and framed as "white lanes": they typically run through traditionally white, middle-class, gentrified neighborhoods from which minority groups have recently been displaced. Drawing on present cycling activism in the United States, Sheller elaborates the concept of mobility commons to sensitize us to the profound policies of inclusion and exclusion that are at work. The comprehensive notion of mobility commons should encompass all three aspects of sustainable urban mobility: ecological, social, and economic.

Jan Pieter Smits and Frank Veraart present a measurement framework for sustainable mobility and discuss what sources are available for historians to understand trends in sustainability from a long-term perspective—a most welcome outlook on two centuries of energy-intensive developments in mobility. They highlight how quantitative and qualitative analyses of sustainable urban mobility can inform and strengthen each other. Qualitative historical analysis helps debunk myths and hidden assumptions, for example, by challenging the collection and interpretation of powerful actors' quantitative mobility-related data. Quantitative methods may help create a more stringent analysis of the trade-offs occurring between different kinds of wellbeing in the past. Smits and Veraart's chapter is a call to historians of urban mobility for a truly mixed method approach, pointing to the strengths and limitations of the present volume. At the same time, they find qualitative historical sources like photographs useful to counter omissions in statistical data collection and for their own understanding of sustainable urban mobility.

Finally, Hans Jeekel and Bert Toussaint discuss the value of the historical contributions in this volume for policymakers today. Working in settings where infrastructural projects can take decades to materialize, policymakers appreciate the long-term perspective that historians provide. Historical inquiry, Jeekel and Toussaint argue, raises an awareness

of how statistics have been constructed differently over time, underscoring the importance of good numbers. It raises awareness of how "sustainability" has been defined differently over time and of the need to unpack and discuss its specific criteria. It underscores the importance of preserving "pockets of persistence" for present-day purposes and provides insights into the power relations that shape what is possible by supporting or blocking certain types of mobility. Finally, Jeekel and Toussaint point to how historical analysis makes clear that it is essential to take actual practice into consideration as part of any scientific analysis of mobility.

Together these essays may bring insights from a usable past. Our contributions focus on the Atlantic world, Europe in particular, in a context of transnational circulation and globalization. We believe the themes are useful for a more global approach. Most importantly, they help us avoid retelling versions of history that present automobility as the inevitable future for our cities and help us envision an alternative future of more sustainable urban mobility.

Frank Schipper, an independent scholar specializing in mobility and infrastructure studies, has researched the history of roads, telegraphy, and tourism. Currently he is working on pedestrians and cyclists in cities and nature. He is author of *Driving Europe: Building Europe on Roads in the Twentieth Century* (Amsterdam University Press, 2008), co-author of *The History of the European Travel Commission* (European Travel Commission, 2018), and *Cycling Cities: The Rotterdam Experience* (SHT, 2019), and has edited special issues on infrastructure-related topics for the journals *Comparativ*, *History and Technology*, and *Métropoles*.

Martin Emanuel, historian of technology and researcher at the Departmnt of Urban Planning and Environment, KTH Royal Institute of Technology, Stockholm, works at the intersection of mobility, urban, and environmental history, including tourism history. His research is on wide-ranging historical dimensions of cycling culture, urban planning, and traffic management. He has published several articles on the history of cycling and sustainable mobility, as well as the 2012 monograph *Trafikslag på undantag: Cykeltrafiken i Stockholm 1930–1980* (Excluded through planning: Bicycle traffic in Stockholm 1930–1980). He coedited and authored *Cycling Cities: The European Experience* (Stichting Historie der Techniek [SHT], 2016).

Ruth Oldenziel, professor in the history of technology at Eindhoven University of Technology, is editor in chief of *Technology and Culture*.

She has published in American, transatlantic, gender, technology, and mobility studies including *Cycling Cities* (coeditor with Martin Emanuel, Adri Albert de la Bruhèze, and Frank Veraart; SHT, 2016), *Cycling and Recycling* (coeditor with Helmuth Trischler; Berghahn, 2016), *Consumers, Tinkerers, Rebels* (Palgrave, 2015), *Hacking Europe* (coeditor with Gerard Alberts; Springer, 2014), *Cold-War Kitchen* (coeditor with Karin Zachmann; MIT, 2009), *Gender and Technology* (Hopkins, 2003), *Crossing Boundaries, Building Bridges* (with Karin Zachmann and Annie Canel; Routledge 2000), and *Making Technology Masculine* (AUP, 1999).

Notes

1. Guy Ortolano, "Planning the Urban Future in 1960s Britain," *Historical Journal* 54, no. 2 (2011): 477–507.
2. Cliff Ellis, "Lewis Mumford and Norman Bel Geddes: The Highway, the City and the Future," *Planning Perspectives* 20, no. 1 (2005): 51–68; Scott Larson, *"Building Like Moses with Jacobs in Mind": Contemporary Planning in New York City* (Philadelphia: Temple University Press, 2013). Counterfactual history provides another way to engage with historical alternatives; see Colin G. Pooley, "Landscapes without the Car: A Counterfactual Historical Geography of Twentieth-Century Britain," *Journal of Historical Geography* 36, no. 3 (2010): 266–75.
3. United Nations, "About the Sustainable Development Goals," http://www.un.org/sustainabledevelopment/sustainable-development-goals/ (accessed 25 November 2019).
4. Frank Geels, René Kemp, Geoff Dudley, and Glenn Lyons, *Automobility in Transition: A Socio-Technical Analysis of Sustainable Transport* (New York: Routledge, 2012).
5. Eduardo Alcântara Vasconcellos, *Urban Transport, Environment and Equity: The Case for Developing Countries* (London: Earthscan, 2001); Harry T. Dimitriou and Ralph Albert Gakenheimer, *Urban Transport in the Developing World: A Handbook of Policy and Practice* (Cheltenham: Edward Elgar, 2011).
6. John Urry, "The 'System' of Automobility," *Theory, Culture & Society* 21, nos. 4–5 (2004): 25–39.
7. Dennis Kingsley and John Urry, *After the Car* (Cambridge: Polity Press, 2009).
8. IPCC, *Climate Change 2014: Synthesis Report* (Geneva: IPCC, 2015), fig. 1.07-01; European Commission, "Urban Mobility," https://ec.europa.eu/transport/themes/urban/urban_mobility_en (accessed 25 November 2019).
9. Paul Edwards, *A Vast Machine: Computer Models, Climate Data, and the Politics of Global Warming* (Cambridge, MA: MIT Press, 2010).
10. Gerardo Marletto, "Car and the City: Socio-Technical Transition Pathways to 2030," *Technological Forecasting and Social Change* 87 (2014): 164–78.
11. Elizabeth Shove, "The Shadowy Side of Innovation: Unmaking and Sustainability," *Technology Analysis & Strategic Management* 24, no. 4 (2012): 363–75. On this point, see also the introduction in Ruth Oldenziel and Helmut Trischler, eds., *Cycling and Recycling: Histories of Sustainable Practices* (New York: Berghahn Books, 2015); Schipper, this volume; Oldenziel, Sousa, and Van Wesemael, this volume.
12. Van Wyck Brooks, "On Creating a Usable Past," *Dial*, 11 April 1918, 337–341.

13. Erling Holden, Kristin Linnerud, and David Banister, "Sustainable Passenger Transport: Back to Brundtland," *Transportation Research Part A: Policy and Practice* 54 (2013): 67–77.
14. Frank W. Geels, "A Socio-Technical Analysis of Low-Carbon Transitions: Introducing the Multi-Level Perspective into Transport Studies," *Journal of Transport Geography* 24 (2012): 471–82.
15. Benjamin R. Barber, *If Mayors Ruled the World: Dysfunctional Nations, Rising Cities* (New Haven: Yale University Press, 2013).
16. See Christian Pfister's qualitative analysis, "The '1950s Syndrome' and the Transition from a Slow-Going to a Rapid Loss of Global Sustainability," in *Turning Points in Environmental History*, ed. Frank Uekötter (Pittsburgh: University of Pittsburgh Press, 2010), 90–117; and recently Harry Lintsen, Frank Veraart, Jan-Pieter Smits, and John Grin, *De Kwetsbare Welvaart van Nederland* (Amsterdam: Prometheus, 2018), for statistical evidence of the 1950s take-off.
17. Divall, this volume.
18. Pierre-Yves Saunier, "Taking Up the Bet on Connections: A Municipal Contribution," *Contemporary European History* 11, no. 4 (2002): 507–27. See also Oldenziel et al., this volume.
19. Hans Buiter, "Constructing Dutch Streets: A Melting Pot of European Technologies," in *Urban Machinery: Inside Modern European Cities*, ed. Mikael Hård and Thomas J. Misa (Cambridge, MA: MIT Press, 2008), 141–62.
20. For transnational circulation, see the book series with Palgrave Macmillan *Inventing Europe,* particularly Helmuth Trischler and Martin Kohlrausch, *Building Europe on Expertise: Innovators, Organizers, Networkers* (Houndmills: Palgrave Macmillan, 2014); Wolfram Kaiser and Johan W. Schot, *Writing the Rules for Europe: Experts, Cartels, International Organizations* (Houndmills: Palgrave Macmillan, 2014); Ruth Oldenziel and Mikael Hård, *Consumers, Tinkerers, Rebels: The People Who Shaped Europe* (Houndmills: Palgrave Macmillan, 2013).
21. James C. Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven: Yale University Press, 1998).
22. Kate Brown, "Gridded Lives: Why Kazakhstan and Montana Are Nearly the Same Place," *American Historical Review* 106, no. 1 (2001): 17–48.
23. Christopher Klemek, *The Transatlantic Collapse of Urban Renewal: Postwar Urbanism from New York to Berlin* (Chicago: University of Chicago Press, 2011).
24. William Cronon, *Nature's Metropolis: Chicago and the Great West* (New York: W.W. Norton, 1991); William E. Rees, "Ecological Footprints and Appropriated Carrying Capacity: What Urban Economics Leaves Out," *Environment and Urbanization* 4, no. 2 (1992): 121–30.
25. Peter H. G. Berkhout et al., "Defining the Rebound Effect," *Energy Policy* 28, nos. 6–7 (2000): 425–432. See also Smits and Veraart, this volume.
26. Smits and Veraart, this volume.
27. David Banister, "The Sustainable Mobility Paradigm," *Transport Policy* 15, no. 2 (2008): 72–80.
28. Karel Martens, *Transport Justice: Designing Fair Transportation Systems* (London: Routledge, 2016). See also Hans Jeekel, *Inclusive Transport: Fighting Involuntary Transport Disadvantages* (London: Elsevier, 2018); Mimi Sheller, *Mobility Justice: The Politics of Movement in an Age of Extremes* (London: Verso, 2018).
29. A. D. Basiago, "Economic, Social, and Environmental Sustainability in Development Theory and Urban Planning Practice," *Environmentalist* 19, no. 2 (1998): 145–61.

30. Patrick Moriarty and Damon Honnery, "Low-Mobility: The Future of Transport," *Futures* 40, no. 10 (2008): 865–72.

31. Carl von Carlowitz, *Sylvicultura oeconomica oder Haußwirthliche Nachricht und Naturmäßige Anweisung zur Wilden Baum-Zucht*, ed. Joachim Hamberger (Munich: Oekom Verlag, 2013 [1713]).

32. Ulrich Grober, "Von Freiberg nach Rio—Carlowitz und die Bildung des Begriffs "Nachhaltigkeit," in *Die Erfindung der Nachhaltigkeit: Leben, Werk und Wirkung des Hans Carl von Carlowitz* (Munich: Sächsische Hans Carl von Carlowitz-Gesellschaft, 2013), 13–30; Franz Josef Radermacher, "Die Ressourcen der Erde setzen uns Grenzen—vom sächsischen Bergmann Hans Carl von Carlowitz 1713 bis zum neuen Report an den Club of Rome 2052," in ibid., 141–56.

33. Horse manure, however, also represented an asset sold off to farmers to fertilize their fields, reminiscent of the circular economy debate today. Clay McShane and Joel Tarr, *The Horse in the City: Living Machines in the Nineteenth Century* (Baltimore: John Hopkins University Press, 2007).

34. Clay McShane, "Transforming the Use of Urban Space: A Look at the Revolution in Street Pavements, 1880–1924," *Journal of Urban History* 5, no. 3 (1979): 279–307.

35. Ralph Turvey, "Horse Traction in Victorian London," *Journal of Transport History* 26, no. 2 (2005): 38–59.

36. Joel Arthur Tarr, *The Search for the Ultimate Sink: Urban Pollution in Historical Perspective* (Akron: University of Akron Press, 1996). For concerns about "sound" pollution, see Karin Bijsterveld, *Mechanical Sound: Technology, Culture, and Public Problems of Noise in the Twentieth Century* (Cambridge, MA: MIT Press, 2008).

37. Shane Ewen, *What Is Urban History?* (Cambridge: Polity, 2016), 3–5; Anique Hommels, *Unbuilding Cities: Obduracy in Urban Socio-Technical Change* (Cambridge, MA: MIT Press, 2005).

38. Geoff D. Zylstra, "Whiteness, Freedom, and Technology: The Racial Struggle over Philadelphia's Streetcars, 1859–1867," *Technology and Culture* 52, no. 4 (2011): 678–702.

39. Martin Emanuel, "Constructing the Cyclist: Ideology and Representations in Urban Traffic Planning in Stockholm, 1930–70," *Journal of Transport History* 33 (2011): 67–91; Per Lundin, *Bilsamhället: Ideologi, expertis och regelskapande i efterkrigstidens Sverige* (Stockholm: Stockholmia, 2008); Ruth Oldenziel, Martin Emanuel, Adri A. Albert de la Bruhèze, and Frank Veraart, eds., *Cycling Cities: The European Experience* (Eindhoven: Foundation of the History of Technology and LMU Rachel Carson Center, 2016).

40. UN-HABITAT, *State of the World's Cities 2010/11: Cities for All: Bridging the Urban Divide* (London: Earthscan, 2008), xix.

41. Some notable examples are Peter Newman and Jeffrey R. Kenworthy, *Sustainability and Cities: Overcoming Automobile Dependence* (Washington, DC: Island Press, 1999); David Banister, *Unsustainable Transport: City Transport in the New Century* (London: Routledge, 2005); Katie Williams, *Spatial Planning, Urban Form and Sustainable Transport* (Aldershot: Ashgate, 2005); Martens, *Transport Justice*; David Banister, *Inequality in Transport* (Marcham: Alexandrine Press, 2018).

42. On the politics of mobility, see Tim Cresswell, "Towards a Politics of Mobility." On the "system" of automobility, see Urry, "The 'System' of Automobility." A standard work on mobility studies is Peter Adey, David Bissell, Kevin Hannam,

Peter Merriman, and Mimi Sheller, *The Routledge Handbook of Mobilities* (Milton Park: Routledge, 2013). Examples of other social science approaches to sustainable urban mobility are Nicholas Low and Brendan Gleeson, *Making Urban Transport Sustainable* (Basingstoke: Palgrave Macmillan, 2002); Alan Walks, *The Urban Political Economy and Ecology of Automobility: Driving Cities, Driving Inequality, Driving Politics* (London: Routledge, 2015). Specifically on the issue of transitioning away from automobility, see Frank W. Geels et al., *Automobility in Transition?*

43. Colin Divall, Julian Hine, and Colin G. Pooley, *Transport Policy: Learning Lessons from History*; Colin Divall, "Transport History, the Usable Past and the Future of Mobility," in *Mobilities: New Perspectives on Transport and Society*, ed. Margret Grieco and John Urry (Farnham: Routledge, 2011), 305–319.

44. See how path dependencies affect the success of public transit systems in Geraldine Pflieger et al., "How Does Urban Public Transport Change Cities? Correlations between Past and Present Transport and Urban Planning Policies," *Urban Studies* 46, no. 7 (2009): 1421–37.

45. Hans-Liudger Dienel and Helmuth Trischler eds., *Geschichte der Zukunft des Verkehrs: Verkehrskonzepte von der Frühen Neuzeit bis zum 21. Jahrhundert* (Frankfurt am Main: Campus, 1997); Carlos López Galviz, *Cities, Railways, Modernities: London, Paris and the Nineteenth Century* (New York: Routledge, 2019), particularly chapter 1, "Past Futures." Also see Reinhart Koselleck, *Futures Past: On the Semantics of Historical Time* (Cambridge, MA: MIT Press, 1985).

46. Jo Guldi and David Armitage, *The History Manifesto* (Cambridge: Cambridge University Press, 2014).

47. Colin Divall and George Revill, "Cultures of Transport: Representation, Practice and Technology," *Journal of Transport History* 26, no. 1 (2005): 99–111.

48. Colin Divall, "Mobilizing the History of Technology," *Technology and Culture* 51, no. 4 (2010): 938–960.

49. Peter D. Norton, "Street Rivals: Jaywalking and the Invention of the Motor Age Street," *Technology and Culture* 48, no. 2 (2007): 331–59.

50. Oldenziel et al., this volume.

51. Lundin, *Bilsamhället*.

52. Norton, this volume.

53. Ruth Oldenziel, "Accounting Tricks: How Pedestrians & Cyclists Were Thrown under the Bus, 1910s-1940s," Presentation T2M Philadelphia, 25 September 2014; Oldenziel et al., *Cycling Cities*; Norton, "Streets Rivals"; and *Fighting Traffic: The Dawn of the Motor Age in the American City* (Cambridge, MA: MIT Press, 2008).

54. Harro van Lente, *Promising Technology: The Dynamics of Expectations in Technological Developments* (Enschede: Universiteit Twente, 1993), 145–73; Harro van Lente and Arie Rip, "Expectations in Technological Developments: An Example of Prospective Structures to Be Filled In by Agency," in *Getting New Technologies Together*, ed. Cornelis Disco and Bart van der Meulen (Berlin: Walter de Gruyter, 1998), 195–220.

55. Fabian Kröger, "Automated Driving in Its Social, Historical and Cultural Contexts," in *Autonomous Driving*, ed. Markus Maurer et al. (Berlin Heidelberg: Springer, 2016), 41–68; Divall, "Mobilizing."

56. In their pioneering 1999 book, historians Albert de la Bruhèze and Veraart compared cycling practice and policy in nine European cities in relation to public transit and automobility since the 1920s. Adri A. Albert de la Bruhèze and

Frank Veraart, *Fietsverkeer in praktijk en beleid in de twintigste eeuw* (Eindhoven: Stichting Historie der Techniek, 1999). The subsequent book, Oldenziel et al., *Cycling Cities*, expanded and elaborated this work further.

57. Gijs Mom, "The Crisis of Transport History: A Critique, and a Vista," *Mobility in History: The Yearbook of the International Association for the History of Transport, Traffic and Mobility* 6, no. 1 (2015): 7–19.

58. Martin Emanuel, "Monuments of Unsustainability: Planning, Path Dependence and Cycling in Stockholm," in *Cycling and Recyling: Histories of Sustainable Practices*, ed. Ruth Oldenziel and Helmuth Trischler (New York: Berghahn Books, 2015), 101–21. There is also a close link with the notion of momentum in Thomas Hughes's work on LTS as introduced in *Networks of Power: Electrification in Western Society, 1880–1930* (Baltimore: Johns Hopkins University Press, 1983). Hommels highlights these factors as reasons for obdurate resistance to urban change, even though these refute commonsense explanations of obduracy (e.g., change would be too expensive) and the idea that urban change alone will be decisive. She also stresses cultural factors. Hommels, *Unbuilding Cities*.

59. Shove, "The Shadowy Side of Innovation"; James Mahoney, "Path Dependence in Historical Sociology," *Theory and Society* 29, no. 4 (2000): 507–48; Emanuel, this volume.

60. Männistö-Funk; Pooley; and Emanuel, this volume.

Bibliography

Adey, Peter, David Bissell, Kevin Hannam, Peter Merriman, and Mimi Sheller. *The Routledge Handbook of Mobilities*. Milton Park: Routledge, 2013.

Albert de la Bruhèze, Adri A., and Frank Veraart. *Fietsverkeer in Praktijk en Beleid in de Twintigste Eeuw*. Eindhoven: Stichting Historie der Techniek, 1999.

Banister, David. *Inequality in Transport*. Marcham: Alexandrine Press, 2018.

———. "The Sustainable Mobility Paradigm." *Transport Policy* 15, no. 2 (2008): 72–80.

———. *Unsustainable Transport: City Transport in the New Century*. London: Routledge, 2005.

Barber, Benjamin R. *If Mayors Ruled the World: Dysfunctional Nations, Rising Cities*. New Haven: Yale University Press, 2013.

Basiago, A. D. "Economic, Social, and Environmental Sustainability in Development Theory and Urban Planning Practice." *Environmentalist* 19, no. 2 (1998): 145–61.

Berkhout, Peter H. G., et al. "Defining the Rebound Effect." *Energy Policy* 28, nos. 6–7 (2000): 425–32.

Bijsterveld, Karin. *Mechanical Sound: Technology, Culture, and Public Problems of Noise in the Twentieth Century*. Cambridge, MA: MIT Press, 2008.

Brown, Kate. "Gridded Lives: Why Kazakhstan and Montana Are Nearly the Same Place." *American Historical Review* 106, no. 1 (2001): 17–48.

Buiter, Hans. "Constructing Dutch Streets: A Melting Pot of European Technologies." In *Urban Machinery: Inside Modern European Cities*, edited by Mikael Hård and Thomas J. Misa, 141–62. Cambridge, MA: MIT Press, 2008.

Cresswell, Tim. "Towards a Politics of Mobility." *Environment and Planning D: Society and Space* 28 (2010): 17–31.

Cronon, William. *Nature's Metropolis: Chicago and the Great West*. New York: W.W. Norton, 1991.

Dienel, Hans-Liudger, and Helmuth Trischler, eds. *Geschichte Der Zukunft Des Verkehrs: Verkehrskonzepte von Der Frühen Neuzeit Bis Zum 21. Jahrhundert*. Frankfurt am Main: Campus, 1997.

Dimitriou, Harry T., and Ralph Albert Gakenheimer. *Urban Transport in the Developing World: A Handbook of Policy and Practice*. Cheltenham: Edward Elgar, 2011.

Divall, Colin. "Mobilizing the History of Technology." *Technology and Culture* 51, no. 4 (2010) 938–60.

———. "Transport History, the Usable Past and the Future of Mobility." In *Mobilities: New Perspectives on Transport and Society*, edited by Margret Grieco and John Urry, 305–19. Farnham: Routledge, 2011.

Divall, Colin, Julian Hine, and Colin G. Pooley. *Transport Policy: Learning Lessons from History*. Burlington, VT: Ashgate Publishing Company, 2016.

Divall, Colin, and George Revill. "Cultures of Transport: Representation, Practice and Technology." *Journal of Transport History* 26, no. 1 (2005) 99–111.

Edwards, Paul. A *Vast Machine: Computer Models, Climate Data, and the Politics of Global Warming*. Cambridge, MA: MIT Press, 2010.

Ellis, Cliff. "Lewis Mumford and Norman Bel Geddes: The Highway, the City and the Future." *Planning Perspectives* 20, no. 1 (2005): 51–68.

Emanuel, Martin. "Constructing the Cyclist: Ideology and Representations in Urban Traffic Planning in Stockholm, 1930–70." *Journal of Transport History* 33 (2011): 67–91.

———. "Monuments of Unsustainability: Planning, Path Dependence and Cycling in Stockholm." In *Cycling and Recycling: Histories of Sustainable Practices*, edited by Ruth Oldenziel and Helmuth Trischler, 101–21. New York: Berghahn Books, 2015.

European Commission, "Urban Mobility," https://ec.europa.eu/transport/themes/urban/urban_mobility_en (accessed 25 November 2019).

Ewen, Shane. *What Is Urban History?* Cambridge: Polity, 2016.

Geels, Frank W. "A Socio-Technical Analysis of Low-Carbon Transitions: Introducing the Multi-Level Perspective into Transport Studies." *Journal of Transport Geography* 24 (2012): 471–82.

Geels, Frank W., René Kemp, Geoff Dudley, and Glenn Lyons, eds. *Automobility in Transition? A Socio-Technical Analysis of Sustainable Transport*. New York: Routledge, 2012.

Grober, Ulrich. "Von Freiberg nach Rio—Carlowitz und des Begriffs "Nachhaltigkeit." In *Die Erfindung der Nachhaltigkeit. Leben, Werk und Wirkung des Hans Carl von Carlowitz*, 13–30. Munich: Sächsische Hans Carl von Carlowitz-Gesellschaft, 2013.

Guldi, Jo, and David Armitage. *The History Manifesto*. Cambridge: Cambridge University Press, 2014.

Holden, Erling, Kristin Linnerud, and David Banister. "Sustainable Passenger Transport: Back to Brundtland." *Transportation Research Part A: Policy and Practice* 54 (2013): 67–77.

Hommels, Anique. *Unbuilding Cities: Obduracy in Urban Socio-Technical Change*. Cambridge, MA: MIT Press, 2005.

Hughes, Thomas P. *Networks of Power: Electrification in Western Society, 1880–1930*. Baltimore: Johns Hopkins University Press, 1983.

IPCC, *Climate Change 2014: Synthesis Report*. Geneva, 2015.

Jeekel, Hans. *Inclusive Transport: Fighting Involuntary Transport Disadvantages*. London: Elsevier, 2018.

Kaiser, Wolfram, and Johan W. Schot. *Writing the Rules for Europe: Experts, Cartels, International Organizations*. Houndmills: Palgrave Macmillan, 2014.

Kingsley, Dennis, and John Urry. *After the Car*. Cambridge: Polity Press, 2009.

Klemek, Christopher. *The Transatlantic Collapse of Urban Renewal: Postwar Urbanism from New York to Berlin*. Chicago: University of Chicago Press, 2011.

Koselleck, Reinhart. *Futures Past: On the Semantics of Historical Time*. Cambridge, MA: MIT Press, 1985.

Kröger, Fabian. "Automated Driving in Its Social, Historical and Cultural Contexts." In *Autonomous Driving*, edited by Markus Maurer et al., 41–68. Berlin: Springer, 2016.

Larson, Scott. *"Building Like Moses with Jacobs in Mind": Contemporary Planning in New York City*. Philadelphia: Temple University Press, 2013.

Lintsen, Harry, Frank Veraart, Jan-Pieter Smits, and John Grin. *De Kwetsbare Welvaart van Nederland*. Amsterdam: Prometheus, 2018.

López Galviz, Carlos. *Cities, Railways, Modernities: London, Paris and the Nineteenth Century*. New York: Routledge, 2019.

Low, Nicholas, and Brendan Gleeson. *Making Urban Transport Sustainable*. Basingstoke: Palgrave Macmillan, 2002.

Lundin, Per. *Bilsamhället: Ideologi, expertis och regelskapande i efterkrigstidens Sverige*. Stockholm: Stockholmia, 2008.

Mahoney, James. "Path Dependence in Historical Sociology." *Theory and Society* 29, no. 4 (2000): 507–48.

Marletto, Gerardo. "Car and the City: Socio-Technical Transition Pathways to 2030." *Technological Forecasting and Social Change* 87 (2014): 164–78.

Martens, Karel. *Transport Justice: Designing Fair Transportation Systems*. London: Routledge, 2016.

McShane, Clay, and Joel Tarr. *The Horse in the City: Living Machines in the Nineteenth Century*. Baltimore: JHU Press, 2007.

McShane, Clay. "Transforming the Use of Urban Space: A Look at the Revolution in Street Pavements, 1880–1924." *Journal of Urban History* 5, no. 3 (1979): 279–307.

Mom, Gijs. "The Crisis of Transport History: A Critique, and a Vista." *Mobility in History* 6, no. 1 (2015): 7–19.

Moriarty, Patrick, and Damon Honnery. "Low-Mobility: The Future of Transport." *Futures* 40, no. 10 (2008): 865–72.

Newman, Peter, and Jeffrey R. Kenworthy. *Sustainability and Cities: Overcoming Automobile Dependence*. Washington, DC: Island Press, 1999.

Norton, Peter D. *Fighting Traffic: The Dawn of the Motor Age in the American City*. Cambridge, MA: MIT Press, 2011.

———. "Street Rivals: Jaywalking and the Invention of the Motor Age Street." *Technology and Culture* 48, no. 2 (2007): 331–59.

Oldenziel, Ruth. "Accounting Tricks: How Pedestrians & Cyclists Were Thrown under the Bus, 1910s–1940s." Presentation T2M Philadelphia, 25 September 2014.

Oldenziel, Ruth, Martin Emanuel, A. A Albert de la Bruhèze, and F. C. A Veraart, eds. *Cycling Cities, the European Experience: Hundred Years of Policy and Practice*. Eindhoven: Foundation for the History of Technology, 2016.

Oldenziel, Ruth, and Mikael Hård. *Consumers, Tinkerers, Rebels: The People Who Shaped Europe*. Houndmills: Palgrave Macmillan, 2013.

Oldenziel, Ruth, and Helmut Trischler, eds. *Cycling and Recycling: Histories of Sustainable Practices*. New York: Berghahn Books, 2015.

Ortolano, Guy. "Planning the Urban Future in 1960s Britain." *Historical Journal* 54, no. 2 (2011): 477–507.

Pfister, Christian. "The '1950s Syndrome' and the Transition from a Slow-Going to a Rapid Loss of Global Sustainability." In *Turning Points in Environmental History*, edited by Frank Uekötter, 90–117. Pittsburgh: University of Pittsburgh Press, 2010.

Pflieger, Geraldine, et al. "How Does Urban Public Transport Change Cities? Correlations between Past and Present Transport and Urban Planning Policies." *Urban Studies* 46, no. 7 (2009): 1421–37

Pooley, Colin G. "Landscapes without the Car: A Counterfactual Historical Geography of Twentieth-Century Britain." *Journal of Historical Geography* 36, no. 3 (2010): 266–75.

Radermacher, Franz Josef. "Die Ressourcen der Erde setzen uns Grenzen—vom sächsischen Bergmann Hans Carl von Carlowitz 1713 bis zum neuen Report an den Club of Rome 2052." In *Die Erfindung der Nachhaltigkeit: Leben, Werk und Wirkung des Hans Carl von Carlowitz*, 141–56. Munich: Sächsische Carlowitz-Gesellschaft, 2013.

Rees, William E. "Ecological Footprints and Appropriated Carrying Capacity: What Urban Economics Leaves Out." *Environment and Urbanization* 4, no. 2 (1992): 121–30.

Saunier, Pierre-Yves. "Taking Up the Bet on Connections: A Municipal Contribution." *Contemporary European History* 11, no. 4 (2002): 507–27.

Scott, James C. *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*. New Haven: Yale University Press, 1998.

Sheller, Mimi. *Mobility Justice: The Politics of Movement in an Age of Extremes*. London: Verso, 2018.

Shove, Elizabeth. "The Shadowy Side of Innovation: Unmaking and Sustainability." *Technology Analysis & Strategic Management* 24, no. 4 (2012): 363–75.

Tarr, Joel Arthur. *The Search for the Ultimate Sink: Urban Pollution in Historical Perspective*. University of Akron Press, 1996.

Trischler, Helmuth, and Martin Kohlrausch. *Building Europe on Expertise: Innovators, Organizers, Networkers*. Houndmills: Palgrave Macmillan, 2014.

Turvey, Ralph. "Horse Traction in Victorian London." *Journal of Transport History* 26, no. 2 (2005): 38–59.

UN-HABITAT. *State of the World's Cities 2010/11: Cities for All: Bridging the Urban Divide*. London: Earthscan, 2008.

United Nations, "About the Sustainable Development Goals," http://www.un.org/sustainabledevelopment/sustainable-development-goals/ (accessed 25 November 2019).

Urry, John. "The 'System' of Automobility." *Theory, Culture & Society* 21, no. 4–5 (2004): 25–39.

Van Lente, Harro. *Promising Technology: The Dynamics of Expectations in Technological Developments*. Enschede: Universiteit Twente, 1993.

Van Lente, Harro, and Arie Rip. "Expectations in Technological Developments: An Example of Prospective Structures to Be Filled In by Agency." In *Getting New Tech-*

nologies Together, edited by Cornelis Disco and Bart van der Meulen, 195–220. Berlin: Walter de Gruyter, 1998.

Vasconcellos, Eduardo Alcântara. *Urban Transport, Environment and Equity: The Case for Developing Countries*. London: Earthscan, 2001.

Von Carlowitz, Carl. *Sylvicultura oeconomica oder Haußwirthliche Nachricht und Naturmäßige Anweisung zur Wilden Baum-Zucht,* ed. Joachim Hamberger. Munich: Oekom Verlag, 2013 [1713].

Walks, Alan. *The Urban Political Economy and Ecology of Automobility: Driving Cities, Driving Inequality, Driving Politics*. London: Routledge, 2015.

Williams, Katie. *Spatial Planning, Urban Form and Sustainable Transport*. Aldershot: Ashgate, 2005.

Zylstra, Geoff D. "Whiteness, Freedom, and Technology: The Racial Struggle over Philadelphia's Streetcars, 1859–1867." *Technology and Culture* 52, no. 4 (2011): 678–702.