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NIMBY Bonanzas: European Infrastructures and Local Protest as System-Building

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Chapter 8

NIMBY Bonanzas

European Infrastructures and Local Protest as System Building

Vincent Lagendijk

In the second decade of the twenty-first century, there is a widespread belief that infrastructures need updating and rejuvenating in the Western world. This seems strongest in the United States, where several governmental and engineering institutions have raised the alarm about the dire state of American infrastructure.[1] But in Europe as well, the need to rejuvenate infrastructures is pronounced. For example, adhering to the sustainability aims of the European Union requires substantial alterations to existing energy and transportation systems.[2] This requires extensive engineering works that will have an impact on residential areas, nature reserves, and other spaces that already have acquired meaning for many people.

For planners and policymakers, infrastructure building is often about weighing costs and benefits. But at the same time, attempts to upgrade and update infrastructures do not occur in a sociopolitical vacuum. As a consequence, many such technological projects meet considerable societal opposition. Prominent examples like the Keystone Pipeline across Canada and the United States, the train corridor annex urban hub Stuttgart 21, or the Franco-Iberian electricity lines come to mind here. As planning practices often focus on the financial and material pros and cons of infrastructures only, societal values seem to be left out of the equation in most instances. That being the case, nevertheless, local protests are often framed as setbacks to building infrastructures, and as standing in the

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way of a modernizing vision. Protesters are accused of being narrow-minded and selfish, and often labeled NIMBYs (Not In My Backyard).[3]

In this chapter I argue that in many instances such local protests are more powerful than previously expected, that they should be seen as forms of system building, and that they can lead to a more mixed outcome through compromises and mutual adaptations. I do so by looking at two cases. In the first, local protests help to explain the breaking points of the 2006 European blackout. In the second, local opposition to planned power lines in the city of Delft helped formulate possible alternatives, leading to the resolution of the conflict. While the current literature on system building has a good grasp of the "view from above," the image from "below" is limited. Despite this being such a prominent problem for contemporary infrastructure building and policymakers, we know little about how the collision between system builders and local protesters have coshaped infrastructural systems as a whole. Yet at the same time, such clashes lead to learning and knowledge creation at the local as well as the system-building and governing levels. The main question I put forward in this chapter is thus: What if we study protests against infrastructure not as alleged acts of irrational opposition but instead as acts of system building? While doing so, I propose to take a symmetrical approach to infrastructure construction, offering insights into social shaping, social construction, social deconstruction, and identity formation at various levels. Sociologists of knowledge argue that "failure" is often explained by social factors.[4] In response, the symmetry principle argues that "success" and "failure" need to be explained in similar ways. Scholars of infrastructures often view protests as a social process leading to failure. Taking such a symmetrical approach thus allows for superseding the dichotomy between planning modernists and traditional NIMBYs.[5]

In this chapter I therefore argue that local protests over infrastructure should be seen as bonanzas (both lay and scientific) for at least two reasons. First, from the perspective of knowledge creation, new forms of local and regional knowledge are forged in the smithy of protest. This is exemplified in the Delft case. The possible destruction or disruption of old land- and cityscapes often leads to a rediscovery and reappreciation of local culture and the immediate environment. At the same time, locals protesting infrastructure projects often formulate alternative approaches, using new assemblages consisting of technological, organizational, and social elements. The local knowledge generated over the course of such conflicts represents an understudied bonanza. Taking citizens' concerns seriously potentially adds to our understanding of local protests and standoffs, and allows scholars and policymakers to better assess the importance of opposition.

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Second, a focus on infrastructure protests adds to our knowledge about system building, and thus presents a bonanza from the viewpoint of the analyst. These moments of conflict allow students of infrastructure to gain new insights on the sociotechnical nature of infrastructural systems. The blackout case is a good example of this. Standoffs on the local level expose the range of actors involved, including the usual system builders but also local and regional agents. In sum, from an analytical point of view, seeing protest as a form of system building—including coshaping the route, technology, and governance of the system—allows for a more textured analysis of the constellation and functioning of the system. As we know relatively little about how the collision between system builders and local protesters coshaped infrastructural systems as a whole, such an approach provides new scholarly knowledge and complements the already good grasp of the top-down planning of infrastructural systems.

In order to do so, in this chapter I build upon several conceptual notions. For one, I use parts of Thomas Hughes's large technological systems (LTS) framework, most notably the idea of sociotechnical systems and the notion of system building. I combine this with Sheila Jasanoff's concept of civic epistemology, which seeks to give credit to the agency of citizens in responding to science and technology, and thus helps to overcome the gap between top-down and bottom-up system building in LTS approaches.[6] I build on the work by Michel Callon, Pierre Lascoumes, and Yannick Barthe, who emphasize the positive effect of protests and clashes between citizens, experts, and authorities.[7]

Conceptualizing Local Protest as Part of Large Technological Systems

Local opposition to large infrastructure projects is omnipresent in Europe. Local opposition seems to be the main cause of delays, budget overruns, or even postponement with infrastructure projects today.[8] Yet it makes little sense to understand this protest simply as disturbance. The idea that local opposition is the main the cause for delays in infrastructure construction is true in a moral sense, as it is at the core of pluralist democracies that they not only allow for participation but encourage it. But it is also true conceptually. If we see this protest "everywhere," we need to understand it in historical research and the social sciences as a fundamental part of the multilayered process that is the construction of large infrastructures. This makes it all the more surprising that not just planners but also scholars (of infrastructure, and others) have largely missed this societal angle.

That being said, over the last decade or so, a genuine effort has been made to study European infrastructure building. In 2005 Tom Misa and Johan Schot introduced the term *hidden integration* to describe the role of technology in European history and European integration.[9] Characterizing Europe's technological history as hidden integration leads to three observations, on different analytical levels. First, for historians the vast role of technology for modern European society and cooperation has hardly been noticed, let alone scrutinized. Only in recent years, spearheaded by work from the Tensions of Europe network, has this begun to change gradually, and the dynamics and inertia of plans and technological structures come under study.[10]

The second observation relates to system builders—a Hughesian term referring to those in charge of the building of the systems.[11] System builders more often than not intentionally hid the process of interconnection, applying principles derived from technocratic internationalism. This, among other aspects, involves depoliticization strategies and technification tendencies, thereby almost ruling out public participation.[12] "Hidden" here thus implies a conscious attempt to remain in the background. Engineers, planners, and policymakers involved refrained from taking the limelight, and choose to work backstage.[13] For consumers, much of the network building and interconnecting has happened with little awareness and involvement. Over the course of the twentieth century, the construction of television relay networks, international railway connections, gas pipeline networks, and telephone systems has facilitated cross-border exchange of people, goods, and ideas.[14] Yet at the same time, the construction of such vast grids, networks, and interconnected systems hardly made headlines or raised many eyebrows—until those systems came to span places people appreciate.

A third observation does relate to users. Citizens and consumers (not the same but overlapping categories) happily and eagerly used infrastructures, and our (social) lives are increasingly fused with them. Not only do these systems compose an envirotechnical element of our daily lives but changing them would involve adjusting our ways of life.[15] Defining the importance of modern infrastructures can be best done in a negative way, argues Paul Edwards: once they stop working, their wide incorporation into society is exposed, and their crucial performance in virtually all layers of modern society is revealed.[16] In recent decades, with growing attention for the negative impact of modern infrasystems—road, electricity, aviation—mumbles of opposition have slowly been developing into a whisper, and louder.

In studying such systems, in this chapter I follow the definition of Arne Kaijser, who sees infrastructures as technologies enabling flows of energy, information, people, and goods.[17] The term *infrastructures* is similar to the notion of "systems" as described by Hughes, namely as being composed of more than just "hard" technology. In his seminal study of electricity grids as large technological systems (LTS), Hughes argued that systems (or infrastructures, for that matter) also consist of legal, institutional, and human elements.[18] Seeing systems as an assemblage of the social, economic, cultural, and technological warrants the label "sociotechnical systems."[19]

Despite the focus of the scholars mentioned primarily on the top-down perspective on the nontechnical, in many ways scholars continue to "see like a state," to use James C. Scott's well-known phrase.[20] By and large, most studies of infrastructures focus on what Hughes has labeled system builders.[21] If there is attention for contestation, it is usually within the realm of these system builders.[22] As a result, many studies following his LTS approach have assumed a top-down approach, examining the intentions of system builders, like planners, engineers, organizations, and policymakers.[23] According to Scott and others, top-down planning by states and supranational institutions tend to make "thin simplifications," thereby brushing over the interests of local actors.[24]

This is not to argue that there was no societal influence on the development of such systems. Particularly in the early stages of adopting technologies, users have been able to exert extensive influence. Historians of technology are well aware of this. David Nye's work on electricity, Claude Fischer's on the telephone, and similar findings are put forward by various authors in the field of *Alltagsgeschichte*, which focuses on the cultural history of electricity and its symbolism in daily life.[25] Also in later stage of the system's development, societal influence remains at work, but at a higher aggregated level. Nye's pioneering work underlined the importance of the nontechnical. In his *Electrifying America* he shows that electricity network development was not "a 'natural' or 'neutral' process; everywhere it was shaped by complex, political, technical, ideological interaction."[26] He also shows the salience of ideological and cultural factors, often brought by locals and early adopters of technologies, and not just system builders. All point to the importance of ideas and expectations that come with and guide the construction of electricity systems.

Yet the focus on system building seems to remain at the aggregated level, taking primarily the intentions of planners, policymakers, and engineers into consideration. Even when looking at notions of contestation, scholars still tend to focus on system builders only.[27] One is able to scrutinize technological systems from this point of view, but one loses sight of individual users and consumers, and their interactions and ideas. In sum, combining the LTS approach courtesy of Hughes with a social shaping of technology perspective like that of Nye seems to be difficult, as studies seem to be either of a top-down or bottom-up nature. In this chapter I propose an alternative way to deal with this gap.

Studying Local Protests

To bridge this gap between a more micro and macro perspective, other insights need to be used, too. Misa has argued that a macro perspective—in this case the top-down view—almost underwrites the view that technology shapes society, while actors appear as rational and purposeful. When assuming a more micro perspective, this image is harder to uphold.[28] Other science, technology and society studies (STS) scholars have long pointed out the importance of the power of users to coconstruct artifacts and space,[29] network building between human and nonhuman actors,[30] and how technologies help to reweave narratives of spaces.[31] Other disciplines offer useful perspectives as well. For example, nationalism and identities scholars have long emphasized the role of the "local" and local space in constructing self-identities.[32] According to sociologists studying the "new" movements of the 1970s, new bonds stem from grassroots political issues and loosely cooperate with similar movements within the same country.[33] Citizens thus coshape technologies and society, and at least partially derive their identities from that. Local protests and locals' sense of belonging thus seem to be intimately tied.

But when it comes to local protests, neither sociologists, social historians, nor historians of technology studying protests can sufficiently account for their rise. STS has focused by and large on particular contested forms of technology, such as nuclear energy and wind turbines.[34] Students of social movements have by and large zoomed in on national case studies or siting issues.[35] As for the study of systems, the scrutiny of protests and social movements is also dominated by a macro perspective, predominantly post-1945 cases. Oftentimes the focus is on nations or more global forms of opposition, for example in the realms of antiglobalism.[36] To bridge the micro/macro gap and scrutinize local protests as forms of system building, one needs to capture policymakers, experts, and citizens in the same symmetrical frame of analysis.[37] To do so, I build upon the concept of technical democracy, as developed by Callon, Lascoumes, and Barthe.[38] This notion prioritizes moments of clashing interests, or "overflow." These are instances where interests (bottom-up and top-down) are at loggerheads, and Callon, Lascoumes, and Barthe stress the need to "collective experimentation and learning" by enriching political decision making on science and technology by including laypersons' opinions. The "overflow" principle thus stresses the confluence of citizens and elites in decision-making processes.

Another person who has argued that civil society is an ever-better-informed public sphere worth taking into consideration is Sheila Jasanoff. She argues that in many controversies decision making is influenced and shaped by alternative forms of expertise and knowledge. Jasanoff has labeled this *civic epistemology*.[39] Her idea of coconstruction—the notion that producing science and technology equals producing society and vice versa—is also important here.[40] The LTS approach is, rather, focused on the production of systems. Using Jasanoff's idiom and zooming in on identities, institutions, discourses, and representations allow us to broaden that scope, and also include how such systems are perceived and related to—not just by users but by citizens more broadly.

As stated, one scientific bonanza lies in seeing protest as a form of system-building; that is, coshaping the route, technology, and governance of the system. This allows for a better analysis of the constellation and functioning of the system. The idea here is to look at not just the micro or macro level but how the more traditional system-building practices have been touched by local opposition.

Building a Blackout from Below

In 2006 millions of households went dark because of a major disruption in the European electrical system. This originated in north Germany but quickly spread, dividing the system up in three temporarily separately operated zones. The blackout started with a planned disconnection of an extra-high-voltage line over the Ems River in northern Germany to allow the passage of a cruise ship. Normally other lines would compensate, but a combination of events caused sufficient overload in a tie-line, triggering the line's automatic protection. As electricity sought alternative pathways, in an astounding fourteen seconds a cascade of power line trips spread through Germany. In the next five seconds the failure reached as far as Romania to the east, Croatia to the southeast, and Portugal to the southwest.[41] As can be seen in figure 8.1, the continental network no longer operated at the common frequency of 50 Hz; overloads and underloads proliferated throughout the subcontinent, causing more lines and generating units to fail. The incident affected electricity supply in about twenty European countries, and supply was cut selectively to some fifteen million households.[42]

The blackout clearly provided a "negative definition" of the importance and scope of the integrated European electricity system. This interconnected system was the outcome of a largely technocratic effort by a technical elite that had been mandated by national (and subregional) authorities to forge it. The key organization dealing with electricity integration in Europe was the Union for the Coordination of Production and Transmission of Electricity (UCPTE). Established in 1951, and virtually unknown, it aimed to coordinate the construction and operation of a European power pool.[43] In 1955 a member argued that the UCPTE should "continue to work silently and effectively for Europe and therefore for the greater good of humanity and of peace."[44] In many respects the UCPTE thus seemed to represent Misa and Schot's concept of "hidden integration." The general public thus had little knowledge of or influence on this process, which can hardly be labeled a technical democratic process.

Ironically, however, parts of Europe's population did have a stake in the breakdown of the system. The breaking points in 2006 were not arbitrary. The

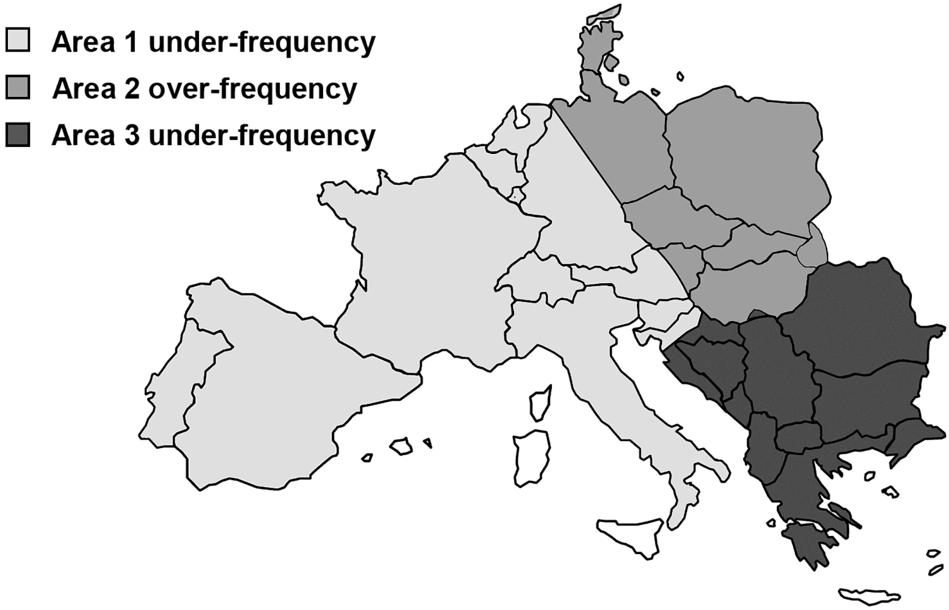

Fig. 8.1. The European system falling apart in three separate frequency zones. UCTE, *Final Report System Disturbance on 4 November 2006* (Brussels: UCTE, 2007), 21, http://www.entsoe.eu/_library/publications/ce/otherreports/20040427_UCTE_IC_Final_report.pdf.

points of rupture represent the weak links in the system, caused by instances where local opposition had been very successful. The major fracture lines ran through Germany, from northern Germany to Slovenia dividing both Germany and Austria, and between Slovenia and Croatia. While electricity systems were being built over the course of the twentieth century, little widespread protest could be noticed during the first four decades of network building. This would change after the Second World War. The 1950s and 1960s represented the "wonders of modernity" to most, especially in Western Europe, as it went through the longest economic boom in history thus far.[45] An influential interpretation of the huge postwar shifts in economy, and consequently, ecology comes from Christian Pfister. He used the label "1950s syndrome" to signal an acceleration (or take-off) in global energy and raw material use. This led to structural changes in consumer behavior, including mass tourism, the ownership of more electrical appliances, and mobility as exemplified by car ownership.[46] This technological optimism, and the proliferating consumption culture in Western Europe aligned very well with pre–Second World War network-building technopolitics. The postwar era, however, included a strict separation between East and West due to Cold War tensions. Hence, no connections across the Iron Curtain existed (or were shut down). This partially accounts for the split through Germany, representing the historical contingencies of the division into the Federal Republic of Germany and German Democratic Republic. In Western Europe, network operators used load-balancing, interconnected networks to ensure mutual assistance in time of need, and took advantage of the particular characteristics of the various energy forms. In the post-1945 period, the main aim was to balance hydropower surpluses and shortages, and to save on coal. By the 1950s most Western European consumers were connected to the grid, and could afford a growing range of electrical appliances.[47]

But this also started to create friction. Economic historian Harold James has argued that at this point in time modernization, technological innovation, an increasingly educated population disenchanted with left-wing politics, and generational conflicts led to growing societal criticism. The first oil price shock, together with the *The Limits to Growth* report, created a wider environmental awareness in Western societies.[48] Still, the 1970s signaled not so much the scarcity of energy sources but rather the "abundance of cheap sources."[49] To continue with this expansive energy consumption pattern, the European Commission saw no other viable alternative to fulfill energy needs but investing heavily in nuclear energy.[50] By 1985 the European Commission envisioned a nuclear power capacity of 200 gigawatts electrical, representing nearly half of the expected electricity needs of the European community.[51] Nuclear energy was seen as a more economically efficient unit of electricity generation. Especially since electricity consumption grew faster than total energy use, the expected cheaper price of nuclear energy was more than welcome. It was seen as more environmentally friendly than conventional thermal power stations. Nuclear energy was regarded as more fuel efficient, leading to less heat waste, and lacking the emission of sulfur. The commission also hoped to improve the security of supply by using electricity generated in nuclear power stations as an alternative to imported oil. In the commission's eyes, nuclear energy was "regarded as an indigenous source of energy."[52]

Although European politics embraced nuclear energy, the broader public did not necessarily do so. The initial fascination with the atom was replaced with widespread anxiety, if not outrage.[53] Whereas some countries warmly embraced it, with France and Belgium as the most notable examples, other countries simply rejected it. Austria is a good case in point. In the late 1970s Austria's electricity supply allegedly came under threat due to a growing number of out-of-date thermal power plants, and problems surrounding the nuclear power plant Zwentendorf an der Donau.[54] The plant had cost 18 billion Schillings (about 1 billion in current-day Euros), but was not put into operation because of societal opposition to atomic energy as a whole.[55] As Zwentendorf stood finished yet idle (it was eventually retooled to a conventional thermal power plant), other sources of energy had to be found to cover Austria's needs. Czechoslovakia, Poland, and the Soviet Union were targeted as possible energy suppliers to meet Austrian demands.[56]

Another alternative measure was constructing two new thermal power plants, which, due to the intervention of the Green Party, were equipped with the best possible technologies to minimize polluting effects.[57] Interestingly enough, the coal fired in these newly built plants largely came from Poland. Through an arrangement made in 1980, Austrian imported large quantities of hard coal from Poland at an indexed price. In addition, in September 1983 an interconnection station in Dürnrohr, Austria, became operational, connecting the country with Czechoslovakia. Austria thus extended its network east in order to cover its energy needs, as it was impossible to build new generation facilities at home. With that, Austria was the first country to structurally cooperate across the Iron Curtain. This would set a trend for other Western European countries to follow.[58] Flashing forward to the blackout of 2006, this long-standing cooperation between Austria and its eastern neighbors also helps account for the fact that the eastern part of Austria remained in sync with Poland, the Czech Republic, and Slovakia.

But building new vast plants (itself already contested) also involved building new transmission lines. Opposition to high-voltage transmission lines gained momentum beginning in the 1960s, not only in order to protect nature but also because of perceived health issues. The UCPTE coordinated electricity transmissions in Western Europe but, as previously stated, operated largely under the radar and far away from the general public (and voters). In internal memos and reports, the organization noted that popular opposition to network building was growing over the course of the 1960 and 1970s particularly. The increased awareness about environmental pollution and societal opposition to new projects in general, which can be ascribed to Pfister's 1950s syndrome, led to "painfully slow approval procedures, sharpened environmental regulations, and drastic price hikes," making "the construction of new generation units and expansion of the transmission network increasingly more difficult."[59] Those new regulations should be seen as a political response to the growing fears and objections of civil society.

As a result, the electricity supply industry increasingly faced difficulties obtaining approval for expanding generation capacity and the network. These difficulties, in turn, had an effect on the system's architecture and performance. An example was provided in the 1976 Annual Report of the UCPTE. In April 1976 a 220-kilovolt line between Kelsterbach and Uberach (both in the Federal Republic of Germany) short-circuited following a brushfire. Local electricity supply failed immediately, and other adjacent lines overloaded and shut off as well. This situation overburdened even more lines, resulting in large parts of Bavaria and Austria experiencing a blackout lasting between eight minutes and two hours. According to the UCPTE, this interruption would not have taken place if a proposed 380-kilovolt line had been completed. This transmission line, originally scheduled to enter operation in 1972, was stymied by opposition of municipalities, landowners, and action committees.[60]

Two interconnection bottlenecks in particular have been stalled because of local opposition. Within a united Germany after 1989, popular resistance to the extension of transmission lines remained significant. Hence very few transmission lines run from east to west, leaving the technological legacy of a divided past firmly in place, and affecting the network structure. In Austria, where the environmental movement is historically strong, a national ring-structures network was on the planning table since the late 1940s. The lack of sufficient transmission lines from east to west through the country also has to do with the location of Austrian cities and their energy resources. The latter lie mainly in the western part of the country, where the Vorarlberg and Alps are located. Most of the major cities, however, are in the east—with Vienna as the main example. Already in the late 1940s and early 1950s American officials of the Marshall Plan observed this problem, and tried to strengthen the connection between Austria's western sites of Alpine hydropower production to its eastern centers of consumption. For the last three decades, an Austrian network ring has been under construction. Its completion in the southern part of Burgenland and east of Styria has been delayed due to local and regional protest groups opposing the impact of transmission towers on the landscape and requesting underground cabling.[61] Protesters see the natural environment as part of their identity, in which there is no place for such iron towers and dangling lines. Without this line, which is prioritized in the European Union Trans European Networks plan for electricity, only one 380-kilovolt line is in place. It is this line that tripped in November 2006, causing the Austrian grid to fall apart into two halves.

Apart from the "regular" system-building work, these local instances of opposition have coshaped the European grid and its governance as well. While clearly not intending to pin the blame of the extent of the 2006 blackout on local protests, local opposition obviously had a crucial role in producing the outcome. By recognizing the role of local opposition, without taking a normative "blaming" position, local opposition to nuclear energy, new power plants, and transmission lines should be seen as acts of system building and having an influence on system operation. These protests exerted influence on system architecture, just as the Austrian decision to connect across the Iron Curtain did.

Digging for DC in Delft

Local protests often also acquire their own momentum, and with that, new forms of knowledge and senses of belonging are created. This is the second bonanza that I address in this chapter. Expert-dominated activities of network building have always met opposition, rooted in an appreciation of the local landscape in the broadest possible sense. The construction of the Gotthard line between 1928 and 1930 met opposition from *Heimatschutz* (nature protection) organizations, whose members found it very hard to "imagine the vast solitude of the St. Gotthard with idyllic viewpoints, disturbed by the towering iron masts and the cables" of a high-voltage transmission line.[62] The scale and impact of such efforts were mostly local, and although successful in demanding some concessions, they were unable to redirect the large-scale network extensions.

As seen in the previous example, after the Second World War such protests became more pronounced, extensive, and influential. Arguably the best example of this is the case of the Franco-Iberian high-voltage line, unearthed by historian Renan Viguié. On the planning board since at least the 1950s, the proposed trajectory traversed a highly valued nature area. Local protests reached a pinnacle in the 1980s and 1990s, mobilizing up to fifteen thousand people, and leading to spinoffs in Spain and other parts of France. As Viguié shows, these protests rejuvenated the appreciation of the Pyrenean landscape and local villages. While the need for the interconnection seemed bigger than ever, following engineering logic, any progress to tie the French and Spanish grids was stalled. It took until 2008, and the involvement of prominent politicians including a special European Union mediator, to break the deadlock; instead of traversing the highly valued "natural" landscape, the system would go underground, using more expensive direct-current technology and a 8.5-kilometer tunnel.[63]

Spurred by local protests, planners thus opted to solve the issue by using a different technology. The moment of "overflow" was thus contained by a technology-based compromise, which allowed the line to be built while safeguarding the appreciated landscape. This came at a significant financial cost, though, as underground direct current requires specialized insulated cables, and extensive drilling. Also, inserting a 220- or 380-kilovolt direct-current line in an alternating-current system requires changes in grid operations, and comes with more network insecurities.[64] It also became an inspiration for similar conflicts elsewhere.

A local case in the Dutch city of Delft followed a similar development. In the early 2000s, a new extension of the 380-kilovolt Dutch network was planned in the heavily urbanized western part of the country (the so-called Randstad,

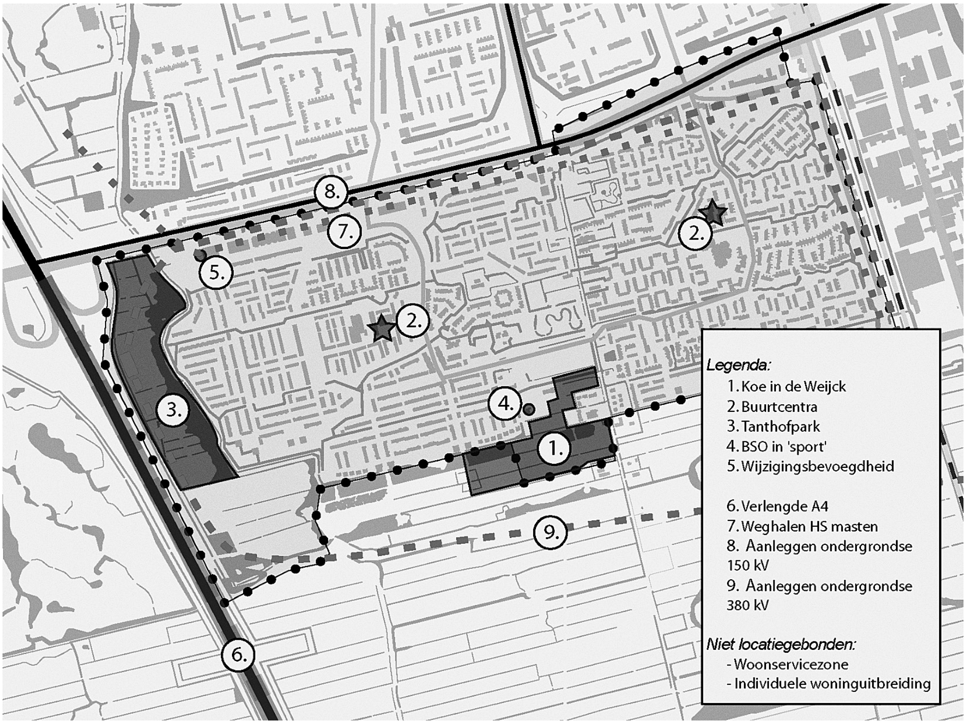

Fig. 8.2. Overview of existing and proposed power lines in Delft. Number 8 is the place of the existing 150-kilovolt lines, which was also proposed to go underground. Number 9 is the proposed trace of the underground 380-kilovolt lines, which was eventually built. "Zuidwest 3 Tanthof," NL.IMRO.0503.BP0015-2001, 2001 Zoning Plan (2001), https://www.planviewer.nl/imro/files/NL.IMRO.0503.BP0015-2001/t_NL.IMRO.0503.BP0015-2001_4.3.html.

including major Dutch cities like Amsterdam, The Hague, and Rotterdam). This new line would run parallel to an existing 150-kilovolt one. The Dutch government and the Transmission System Operator (TSO) TenneT argued that the new capacity was required because of the increase in power traffic on the network, partially resulting from liberalization. Building new lines was necessary to improve the security and integrity of the Dutch system, and to "enable greening while at the same time living up to the energy addiction of modern life."[65] As the TSO expected popular resistance, it opted for a particular kind of mast—of the so-called Wintrack type—that was less harmful to the landscape and had smaller magnetic fields—the latter often linked to increased rates of leukemia, other cancers, and other serious illnesses for those living nearby, but still subject to academic study.[66] This already shows that the more "traditional" system builders are taking potential local opposition into account when planning new facilities.

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Fig. 8.3. "Trashman, can you take these 5 masts as well?" "Vuilnisman, kunnen deze 5 masten ook mee?," *Delft zegt NEE tegen bovengronds 380kV* (blog), 2001, https://web.archive.org/web/20100731021217/http://www.delftgaattegendestroomin.com/.

Yet not all inhabitants of Delft were not satisfied with this. The new 380-kilovolt line would cut across a recently upgraded park in the neighborhood of Tanthof, and the addition of new masts close to living quarters raised even more concerns. A foundation was brought into being—the Stichting Delft zegt NEE (Delft Says NO)—to voice these grievances to the TSO, the Dutch ministry of economic affairs, and the municipal government. Delft Says NO organized a petition for the minster of economic affairs with 1,500 supporting signatures, several information sessions with specialists on the potential risks and representatives of electrical equipment manufacturers, and a trip to the Dutch parliament discussing the power line in November 2007.

In doing so, the foundation also proposed its own alternative, which was sent to the municipality in July 2010. This grassroots action committee, led by a local architect, argued that the pylons and wires distorted the landscape. The committee wanted a "park-like entry with allure" for the neighborhood, instead of the current "public green" designed to divert attention away from the pylons. It thus opted for a solution similar to the Iberian power line. It also pushed for removing existing 150-kilovolt lines that stood parallel to a regional road, and place these underground as well (see figure 8.2 for both proposed routes). Going underground would give this part of the city an entry point to the newly recreational area with more allure, the committee argued. Placing as many parts of the route underground as possible would help make the local neighborhood more beautiful. To that end, the committee itself proposed a full-blown plan in order to protect the cityscape.[67]

Eventually, the Delft administration and the Ministry of Economic Affairs both caved and agreed to build the 380-kilovolt line underground through the populated part of Delft. In the end, this underground cabling was presented by TenneT as striking "an optimal balance between innovation and security of supply."[68] One could easily claim that respecting the wishes of those living in the vicinity of the network should be part of the equation, too. The network operator now sees the Delft case as an example to use in other places, too. This again shows how local protest can affect the system's architecture—in this case more positive than in the previous example.

Most citizens in Western Europe use technological systems daily without even consciously noticing them, unless those systems either fail or are to be constructed through our local neighborhoods and backyards. Recent studies have highlighted how users play a role in attributing (new) meanings to infrastructures in their introduction phase, but also how today's systems are critical for a proper functioning of society. These studies leave the impression that a majority of citizens have accepted new infrastructures, even if they ran across their backyards and communities. But it is during the planning and construction phase that locals do become aware, and via their protests influence if not become part of the system-building process. When such plans are being made, local protests are often launched in order to preserve the local settings and landscape, or to propose an alternative trajectory. In these instances, people no longer are mere users of these infrastructures or consumers of the services provided, but activate their rights as citizens.

Studying local protests thus necessitates us to go beyond user studies. It also requires going beyond designating local opposition as sheer NIMBYism and characterizing opponents as narrow-minded and selfish citizens.[69] It therewith contributes to the fields of history of infrastructures and social movements, but also a better understanding of local infrastructure conflicts—thus speaking to policymakers and protesters as well. The examples presented here suggest that scrutinizing local protests more structurally offers many merits, not least in two related types of scientific bonanzas. First, such a perspective allows us to reopen the sociotechnological system, and better assess how civil society has continued to play a role in how the system was built, where it was not built, and how it should be, and can be operated. Local as the conflicts may be, they are often tied into larger (societal and technical) debates, and groups elsewhere. Studying local protests also allows us to challenge the often seemingly inherent logic of LTS, in terms of momentum and growth, but also the often excluded role of users and citizens.

Second, and apart from the technological components, seeing local protests as arenas (or moments of overflow) of system building also allows us to reassess the social. Hughes posited the study of infrastructures as sociotechnical systems, but most scholars prioritize the more elitist viewpoint of planners and policymakers. I suggest seeing local protest as moments of system building by looking at how protesters generate alternative knowledge (Jasanoff's civic epistemology) or identify themselves, and position themselves relative to new technologies but also to their local surroundings and landscape. This gives the protests momentum, and often allows local opponents to influence the system-building process.

In sum, these local forms of protest have agency and hold political clout. Local opposition can bring about a redefinition of the infrastructure systems' trajectory, technology, and even its composition and governance. Sometimes the top-down planning protest also preemptively incorporates expected criticism—like the innovative types of masts in Delft. Local protests also have repercussions for the self-perception of local communities. While protesting is a political activity, it also challenges reigning authorities, and could potentially strengthen other (including local and regional) allegiances.

(Moscow: izdatel'stvo MGUP, 2006). The transfer of irrigation knowledge can be tracked back to British engineers working in Egypt, Syria, and Iraq who were hired by the Russian authorities at the turn of the twentieth century to work in Central Asia—Antony C. Sutton, *Western Technology and Soviet Economic Development, 1930 to 1945* (Stanford: University of California Press, 1971), 32–43; Maya K. Peterson, "Engineering Empire: Russian and Foreign Hydraulic Experts in Central Asia, 1887–1917," *Cahiers du Monde Russe* 57, no. 1 (2016): 125–46.

73. The respective protocols are collected in ARAN f. 1699 op. 1 d. 38, 39.

74. In his preparations for the Tenth International Conference in Moscow, Kovda noted that in the USSR about five million hectares of soil had been lost to secondary soil salinization alone in the past years—ARAN f. 2081 op. 1 d. 35, l. 27. In 1977, he even estimated the affected area at eight million hectares (139).

75. ARAN f. 2081 op. 1 d. 50, ll. 3–4.

76. Piers Blaikie and Harold Brookfield, "Land Degradation in Socialist Countries," in *Land Degradation and Society*, ed. Piers Blaikie and Harold Brookfield (London: Methuen, 1987), 208.

77. Bernd Stevens Richter, "Nature Mastered by Man: Ideology and Water in the Soviet Union," *Environment and History* 3, no. 1 (1997): 73.

78. Of course, this insight was not new, as several generations of scholars had already pointed out the inefficiency of Soviet planning and production—most prominently Alec Nove in the various iterations of his economic history of the USSR (see above); see Paul R. Gregory, *The Political Economy of Stalinism: Evidence from the Soviet Secret Archives* (Cambridge: Cambridge University Press, 2004).

79. Douglas R. Weiner, *A Little Corner of Freedom: Russian Nature Protection from Stalin to Gorbachëv* (Berkeley: University of California Press, 1999), 423–24.

80. Sergei Zalygin, *Povorot* (Moscow: Mysl,' 1987). The title can be understood as *turn*, *diversion*, or *reversal*. Sadly, the pun is lost in translation here.

81. L. P. Iarmak: "Ėkologicheskaia situatsiia v Krasnodarskom krae: problemy i perspektivy ee uluchsheniia" [The ecological situation in the Krasnodar Region: problems and perspectives for its improvement], in *Aktual'nye ėkologo-gigienicheskie problemy Severnogo Kavkaza* [Contemporary ecological-hygienic problems of the North Caucasus], ed. Krasnodarskii kraevoi komitet okhrany okruzhaiushchei sredy i prirodnykh resursov (Krasnodar: KubGMA, 1995), 3; GAKK f. R-506 op. 1 d. 265, l. 1.

82. Christine Bichsel, "Water and the (Infra-)Structure of Political Rule: A Synthesis," *Water Alternatives* 9, no. 2 (2016): 362. Since the publication of his book *Oriental Despotism: A Comparative Study of Total Power* (New Haven, CT: Yale University Press, 1957), Wittfogel's ideas have been widely discussed and heavily criticized, mostly for being ideologically and culturally biased, deterministic, and empirically unsound—see Bichsel, "Water and the (Infra-)Structure of Political Rule," 360.

Chapter 8: NIMBY Bonanzas

1. American Society of Civil Engineers, "2017 Infrastructure Report Card: A Comprehensive Assessment of America's Infrastructure"; Aaron M. Renn, "Rebuilding American Infrastructure," *American Affairs*, Summer 2017, https://americanaffairsjournal.org/2017/05/rebuilding-american-infrastructure/.

2. European Commission, "A European."

3. Michael J. Dear, "Understanding and Overcoming the NIMBY Syndrome," *Journal of the American Planning Association* 58, no. 3 (1992): 288–300.

4. David Bloor, *Knowledge and Social Imagery* (Chicago: University of Chicago Press, 1998).

5. Donatella della Porta and Massimiliano Andretta, "Changing Forms of Environmentalism in Italy: The Protest Campaign on The High Speed Railway System," *Mobilization* 7, no. 1 (2002): 68.

6. Hughes, "The Evolution of Large Technical Systems"; Jasanoff, *Designs on Nature: Science and Democracy in Europe and the United States* (Princeton, NJ: Princeton University Press), 250.

7. Michel Callon, Pierre Lascoumes, and Yannick Barthe, *Acting in an Uncertain World: An Essay on Technical Democracy* (Cambridge: MIT Press, 2011).

8. More substantial data seems missing on this, but various reports hint at this. See for example Slowey, "The Protest 'Nightmare.'"

9. Thomas J. Misa and Johan Schot, "Inventing Europe: Technology and the Hidden Integration of Europe," *History and Technology* 21, no. 1 (2005): 3.

10. For more on this network, see www.tensionsofeurope.eu. The first major trailblazing volume was Erik van der Vleuten and Arne Kaijser, eds., *Networking Europe: Transnational Infrastructures and the Shaping of Europe, 1850–2000*.

11. This of course relates to the seminal work of the late Tom Hughes and his conception of the large technical system (LTS). These LTSes more often than not were the result of efforts of so-called system builders, either people or institutions. See Hughes, "Evolution of Large Technical Systems"; Renate Mayntz and Thomas Hughes, eds., *The Development of Large Technological Systems* (London: Routledge, 2019); Hughes, *Networks*; Erik van der Vleuten, "Infrastructures and Societal Change: A View from the Large Technical Systems Field," *Technology Analysis and Strategic Management* 16, no. 3 (2004): 395–414. See also Van der Vleuten et al., "Europe's."

12. Johan Schot and Vincent Lagendijk, "Technocratic Internationalism in the Interwar Years: Building Europe on Motorways and Electricity Networks," *Journal of Modern European History* 6, no. 2 (2008): 196–217.

13. The concept of "backstage" is derived from Stephen Hilgartner, *Science on Stage: Expert Advice as Public Drama* (Stanford, CA: Stanford University Press, 2000).

14. Anastasiadou, "In Search"; Per Högselius, *Red Gas: Russia and the Origins of European Energy Dependence* (Basingstoke: Palgrave Macmillan, 2013); Laborie, "A Missing Link?"

15. The term *envirotechnical* has been used by Sara Pritchard in her *Confluence: The Nature of Technology and The Remaking of the Rhône* (Cambridge, MA: Harvard University Press, 2011). A similar point is raised in White, *The Organic Machine: The Remaking of the Columbia River* (New York: Farrar, Straus and Giroux, 2013).

16. Edwards, "Infrastructure."

17. Arne Kaijser, "Redirecting Infrasystems towards Sustainability," in *Individual and Structural Determinants of Environmental Practice*, ed. Anders Biel; Bengt Hansson; Mona Mårtensson (London: Routledge, 2003), 152–56. It is important to keep in mind that there is no consensual definition of LTS. See Benjamin K. Sovacool, Katherine Lovell, and Marie Blanche Ting, "Reconfiguration, Contestation, and Decline," *Science, Technology and Human Values* 43, no. 6 (2018): 3; Erik van der Vleuten, "Understanding Network

Societies: Two Decades of Large Technical System Studies," in van der Vleuten and Kaijser, *Networking Europe*, 281; Bernward Joerges, "Large Technical Systems: Concepts and Issues," in Mayntz and Hughes, *Development of Large Technological Systems*, 16–22; Gökalp, "On the Analysis," 58.

18. See Hughes, *Networks*.

19. Thomas P. Hughes, "The Seamless Web: Technology, Science, Etcetera, Etcetera," *Social Studies of Science* 16, no. 2 (1986): 285–87.

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

21. For organizations as system builders, see Van der Vleuten et al., "Europe's."

22. Sovacool, Lovell, and Ting, "Reconfiguration, Contestation, and Decline," 13.

23. See among many more, for example, Vincent Lagendijk, *Electrifying Europe: The Power of Europe in the Construction of Electricity Networks* (Amsterdam: Aksant, 2008); Myllyntaus, *Electrifying Finland: The Transfer of a New Technology into a Late Industrialising Economy* (Basingstoke, Hampshire: Macmillan, 1991); Van der Vleuten, "Electrifying"; *A Gap in the Grid*; Coopersmith, *The Electrification of Russia, 1880–1926* (Ithaca, NY: Cornell University Press, 2016).

24. Scott, "State Simplifications"; Richardson, "The Thin."

25. See David Nye, *Electrifying America: Social Meanings of a New Technology, 1880–1940* (Cambridge: MIT Press, 1992); Claude S. Fischer, *America Calling: A Social History of the Telephone to 1940*. Notable works include Beate Binder, *Elektrifizierung als Vision: zur Symbolgeschichte einer Technik im Alltag* (Tübingen : Tübinger Vereinigung für Volkskunde, 1999); Coutard, "Imaginaire"; Ronald R. Kline, *Consumers in the Country: Technology and Social Change in Rural America* (Baltimore: Johns Hopkins University Press, 2002).

26. Nye, *Electrifying America*, 138–39.

27. Sovacool , Lovell, and Ting, "Reconfiguration, Contestation, and Decline," 13.

28. Thomas J. Misa, "Retrieving Sociotechnical Change from Technological Determinism," in *Does Technology Drive History? The Dilemma of Technological Determinism*, ed. Merritt Roe Smith and Leo Marx (Cambridge: MIT Press, 1994), 117–19.

29. W. E. Bijker, *Of Bicycles, Bakelites, and Bulbs: Toward a Theory of Sociotechnical Change* (Cambridge: MIT Press, 1995).

30. Fischer, *America Calling*; Bruno Latour, *Reassembling the Social: An Introduction to Actor-Network-Theory* (New York: Oxford University Press, 2005).

31. David E. Nye, *Narratives and Spaces: Technology and the Construction of American Culture* (New York: Columbia University Press, 1997).

32. Confino, *The Nation*; Brubaker and Cooper, "Beyond 'Identity.'"

33. Cohen, "Strategy or Identity"; Donatella della Porta and Gianni Piazza, "Local Contention, Global Framing: The Protest Campaigns against the TAV in Val di Susa and the Bridge on the Messina Straits," Environmental Politics, 16 no. 5 (2007): 864–82.

34. Richard F. Hirsh and Benjamin K. Sovacool, "Wind Turbines and Invisible Technology: Unarticulated Reasons for Local Opposition to Wind Energy," *Technology and Culture* 54, no. 4 (2013): 705–34; Dick van Lente, *The Nuclear Age in Popular Media: A Transnational History, 1945–1965* (New York: Palgrave Macmillan, 2012).

35. della Porta and Andretta, "Changing Forms of Environmentalism in Italy"; Dieter Rucht, "Mobilization against Large Techno-Industrial Projects: A Comparative Perspective,"

Mobilization 7, no. 1 (2002): 79–95; Daniel P. Aldrich, *Site Fights: Divisive Facilities and Civil Society in Japan and the West* (Ithaca, NY: Cornell University Press, 2008).

36. David J. Hess, *Localist Movements in a Global Economy: Sustainability, Justice, and Urban Development in the United States* (Cambridge: MIT Press, 2009).

37. Mark Bevir and Frank Trentmann, "Introduction: Consumption and Citizenship in the New Governance," in *Governance, Consumers and Citizens Agency and Resistance in Contemporary Politics*, ed. Mark Bevir and Frank Trentmann (Basingstoke: Palgrave Macmillan, 2007), 1–22; Charles Tilly, *Social Movements, 1768–2004* (Boulder, CO: Paradigm, 2004).

38. Michel Callon, Pierre Lascoumes, and Yannick Barthe, *Acting in an Uncertain World: An Essay on Technical Democracy* (Cambridge: MIT Press, 2009).

39. Sheila Jasanoff, *Designs on Nature: Science and Democracy in Europe and the United States* (Princeton, NJ: Princeton University Press, 2005), 249–55.

40. Sheila Jasanoff, *States of Knowledge: The Co-production of Science and Social Order* (New York: Routledge, 2004), 14.

41. UCTE, "Final Report System Disturbance on 4 November 2006" (Brussels: UCTE, 2007), http://www.entsoe.eu/_library/publications/ce/otherreports/20040427_UCTE_IC_Final_report.pdf. UCTE, "Final Report System Disturbance."

42. Erik van der Vleuten and Vincent Lagendijk, "Transnational Infrastructure Vulnerability: The Historical Shaping of the 2006 European Blackout," *Energy Policy* 38, no. 4 (2010): 2042–52."

43. Lagendijk, *Electrifying Europe*, 147–48.

44. UNIPEDE, *Compte-Rendu 1955*, 126–27.

45. Giuliano Garavini, *After Empires: European Integration, Decolonization, and the Challenge from the Global South, 1957–1986*, trans. Richard R. Nybakken (Oxford: Oxford University Press, 2021), 60.

46. Patrick Kupper, "From the 1950s Syndrome to the 1970s Diagnosis: Environmental Pollution and Social Perception: How Do They Relate?," Preprints zur Kulturgeschichte der Technik, Zurich (ETH, 2001).

47. See for example Victoria de Grazia, *Irresistible Empire: America's Advance through 20th-Century Europe* (Cambridge, MA: Belknap Press of Harvard University Press, 2005), chap. 9.

48. Harold James, *Europe Reborn: A History, 1914–2000* (Hoboken, NJ: Taylor and Francis, 2014), 305ff, 341–42.

49. This of course mostly true for the developed world. See Joachim Radkau, *Nature and Power: A Global History of the Environment* (Washington, DC: German Historical Institute, 2009), 251.

50. Commission of the European Communities, "Guidelines for the Electricity Sector in the Community: The Role of Electricity in a New Energy Policy Strategy," (Communication from the Commission to the Council), November 27, 1974, 3.

51. Commission of the European Communities, "Community Energy Policy Objectives for 1985" (Brussels, November 27, 1974), 3.

52. Commission of the European Communities, "Guidelines," 14; Commission of the European Communities, "Progrès nécessaires de la politique énergétique communautaire" (Brussels, October 4, 1972), 31.

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53. Dick Van Lente and Mogens Rüdiger, "A Tamed Shrew? Images of the Atomic Age in Dutch Popular Culture, 1945–1957," in *The Culture of Energy* (Newcastle: Cambridge Scholars, 2008), 136–57.

54. "Verbundgeneral Fremuth: 'Mister 100.000 Volt,'" *A3 Volt. Das Österreichische Magazin für Elektronik und Elektrotechnik*, November/December (1980), 14.

55. See, for example, Helmut Hirsch and Helga Nowotny, "Information and Opposition in Austrian Nuclear Energy Policy," *Minerva* 15, no. 3–4 (1977): 316–34.

56. Austria was already in business with the Soviet Union on gas. See Per Högselius, *Red Gas: Russia and the Origins of European Energy Dependence* (New York: Palgrave Macmillan, 2013).

57. Interview Fremuth, March 8–9, 2007.

58. Lagendijk, *Electrifying Europe*, 190ff.

59. UCPTE, "Rapport Annuel 1981–1982" (Rhode-St. Genese: UCPTE, 1983),305.

60. UCPTE, "Rapport Annuel 1975–1976" (Arnhem: UCPTE, 1977), 91.

61. ICF Consulting, "Unit Costs of Constructing New Transmission Assets at 380kV Within the European Union, Norway and Switzerland (Prepared for the DG TREN/European Commission)," (ICF Consulting Ltd, October 2002), 41; Lagendijk, *Electrifying Europe*, 171.

62. Letter from Naturschutzkommission des Kantons Uri to Bundesrat, n.d., folder 53/35 Gotthardleitung, 53/13, Allgemeine Akten 1930–1940, 27, VED/AEW, 8190 (A) 3, Schweizerisches Bundesarchiv, Bern.

63. Renan Viguié, *La traversée électrique des Pyrénées: histoire de l'interconnexion entre la France et l'Espagne* (Brussels: Peter Lang, 2014).

64. TenneT, "Position Paper: Aanleg Ondergrondse 220- En 380 KV-Kabels" (Arnhem: TenneT, 2015).

65. Koos Schwartz, "Er komen nieuwe masten: Beheerder van hoogspanningsnet Tennet werkt ook aan aanleg van superkabel," *Trouw*, March 9, 2016. Author's translation from Dutch.

66. See "Randstad—Noordring 380 kv," http://www.randstad380kv-noordring.nl.

67. See letter Stichting Delft zegt NEE tegen bovengronds 380kV to Delft Municipal Council, July 21, 2010. Retrieved from https://ris.delft.nl/document.php?m=1&fileid=40357&f=64987ca15e08a9818fa67dfb53458a58&attachment=0&c=20739, last accessed 12/16/2019. Author's translation from Dutch.

68. See 'TenneT: verantwoord en innovatief ondergronds in de Randstad,' http://www.tennet.org/tennet/nieuws/ondergrondsrandstad.aspx, via the Way Back Machine at http://web.archive.org/web/20120623083856/http://www.tennet.org/tennet/nieuws/ondergrondsrandstad.aspx, last accessed 07/24/19.

69. Katie McClymont and Paul O'Hare, "'We're Not NIMBYs!': Contrasting Local Protest Groups with Idealised Conceptions of Sustainable Communities," Local Environment 13, no. 4 (2008): 321–35; Yves Pepermans and Ilse Loots, "Wind Farm Struggles in Flanders Fields: A Sociological Perspective," *Energy Policy* 59 (2013): 321–28.

Chapter 9: Detour along the Way

1. Albena Yaneva, *Mapping Controversies in Architecture* (Farnham, UK: Ashgate, 2012).

2. Hayden White's critique of the historical narrative suggests that the literary, rhetorical aspects of writing bear upon the epistemological status of works of history as objective

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Christian Kehrt is professor of history of science and technology at Technical University Braunschweig. He studied history and philosophy at the University of Tübingen and the State University of New York at Stony Brook. His dissertation at Technical University Darmstadt was on military pilots in the two world wars.

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Christian Zumbrägel is a postdoctoral researcher at Technische Universität Berlin. His areas of expertise include the history of technology and environmental history, with a particular focus on histories of renewable energies, hydraulic engineering, raw materials, and maintenance and repair. He obtained his PhD from Darmstadt University of Technology in 2018. His PhD thesis "Viele Wenige machen ein Viel '–Eine Technik- und Umweltgeschichte der Kleinwasserkraft (1880–1930)," won book prizes from the Association of German Engineers, the Georg-Agricola-Gesellschaft, and the Gesellschaft für Geschichte der Wissenschaften, der Medizin und der Technik e. V.