

## Frontiers of Modernity: Infrastructures and Socio-Ecological Transformations

Wagner, Peter

Veröffentlichungsversion / Published Version

Zeitschriftenartikel / journal article

Zur Verfügung gestellt in Kooperation mit / provided in cooperation with:

GESIS - Leibniz-Institut für Sozialwissenschaften

### Empfohlene Zitierung / Suggested Citation:

Wagner, P. (2022). Frontiers of Modernity: Infrastructures and Socio-Ecological Transformations. *Historical Social Research*, 47(4), 327-340. <https://doi.org/10.12759/hsr.47.2022.49>

### Nutzungsbedingungen:

Dieser Text wird unter einer CC BY Lizenz (Namensnennung) zur Verfügung gestellt. Nähere Auskünfte zu den CC-Lizenzen finden Sie hier:

<https://creativecommons.org/licenses/by/4.0/deed.de>

### Terms of use:

This document is made available under a CC BY Licence (Attribution). For more information see:

<https://creativecommons.org/licenses/by/4.0>

---

# Frontiers of Modernity: Infrastructures and Socio-Ecological Transformations

Peter Wagner\*

---

**Abstract:** »Frontlinien der Moderne: Infrastrukturen und sozio-ökologische Transformationen«. The preceding contributions to this special issue bring together, from different angles, research on infrastructures with the currently urgent concern of transforming our societies with a view to achieving greater sustainability of modes of production and living. This closing essay does not add further analyses but rather reflects on proposed conceptualizations and the rich array of examples for investigated infrastructures. This is done with a view towards understanding what can and what cannot be accomplished in terms of enhancing possibilities for sustainability in the Anthropocene by analyzing infrastructures and their transformations. Or in other words, this essay selectively draws on and connects the preceding articles to sketch the historicity of the infrastructures of modernity.

**Keywords:** Capitalism, energy, modernity, money, revolution, social structure.

---

## 1. Introduction

---

The preceding contributions to this HSR Special Issue try to bring together, from different angles, research on infrastructures with the currently urgent concern of transforming our societies with a view to achieving greater sustainability of modes of production and living. This closing essay will not add further analyses but rather reflect on proposed conceptualizations and the rich array of examples for investigated infrastructures. This will be done with a view towards understanding what can and what cannot be accomplished in terms of enhancing possibilities for sustainability in the Anthropocene by analyzing infrastructures and their transformations. Or in other words, this essay will selectively draw on and connect the preceding articles to sketch the historicity of the infrastructures of modernity.

The reasoning will proceed in six steps: First, the term “infrastructure” will be set into the context of the lasting concern of the social sciences with “structures” of various kinds. Second, it will be argued that the term infrastructure

---

\* Peter Wagner, Catalan Institute for Research and Advanced Studies (ICREA); University of Barcelona, Spain; University of Central Asia; [peter.wagner@ub.edu](mailto:peter.wagner@ub.edu).

emerged in the context of what I elsewhere called the first crisis of (European) modernity during the late 19th century, which gave rise to a major socio-ecological transformation. Against this background, third, I will suggest that the current use of the term should remain conscious of this context and of the meaning it was given at its origins. In the fourth and fifth steps, this suggestion will briefly be applied to the cases of money and energy as modern infrastructures. Finally, sixth, I will return to the question of our current understanding of both (infra-)structures and major socio-ecological transformations, looking in this light at the frequent invocation of “capitalism” and “revolution.”<sup>1</sup>

---

## 2. Structure? What Structure?

---

From the guest editors in the introduction (Degens, Hilbrich, and Lenz 2022) onwards, several of the contributors reflect on the very term and concept of infrastructure, often in relation to the supposed “infrastructural turn” in the social sciences and humanities. None of them, though, unless I overlooked something, opens an explicit reflection on the relation of this term to its relatives “structure” and “superstructure” and their fate in successive intellectual turns.

“Structure” is arguably a key term in the social sciences, in particular as “social structure” in sociology (see Merton 1968 [1949]). Broadly referring to a stable relation of elements that form a whole, structure has been employed to underline, on the one hand, a certain stability of social configurations over time and, on the other, the determination of human behaviour and action by their position within a structure. While hardly any serious scholar can be found who completely denied any possibility of social change and of human action escaping from full social determination, the term “structure” served to underpin the search for stable intelligibility and regularity as the core objective of the social sciences.

An early and key contributor to this endeavour was obviously Karl Marx, who merits mention here because he inaugurated a conceptual differentiation of “structures” that helps understanding the place of the supposed

---

<sup>1</sup> At times, the following reflections will be critical of proposals provided in the preceding contributions, an angle made possible not least by the privileged vantage-point of reading them all together. Such criticism is voiced in a spirit of communicative exchange meant to further this important and necessary investigation and debate. Given the rich bibliographies already provided, references in this essay are kept to a minimum, mostly to additional works that may stimulate further discussion. Most of the following reflections address several contributions simultaneously and rather generally, thus without further specific reference. Exceptions are the discussions of money (Bazzani 2022) and energy (Symons and Friederich 2022; Suckert and Ergen 2022). My overall approach resonates maybe most with the one taken by Szerszynski (2022), though less so in the conclusions.

infrastructural turn in recent theoretical debate. Beyond focussing on the class structure of capitalist societies, he introduced the distinction between “base” (also translatable as “substructure” or “foundation”) and “superstructure” to grasp the transformative dynamics of those societies. More clearly visible in the original German terms “Basis” and “Überbau,” he thus provided social scientists with an architectural metaphor of social life, in which buildings protect and stabilize as well as constrain human action through walls and locks and enable it selectively through doors and windows. Max Weber’s more visually concrete metaphor of the modern “steel dwelling-place” or “steel case” (“stählernes Gehäuse,” conventionally but misleadingly translated as “iron cage”) follows up on this usage.

With structural functionalism and structuralism, the early post-Second World War decades witnessed the heyday of thinking in terms of such structures. From the 1960s onwards, though, both of these structure-centred approaches were subjected to multiple and forceful criticisms. Without need to go into much detail here, one can distinguish a more philosophical critique – often based in phenomenology and soon labelled post-structuralism, with Jacques Derrida as a key contributor – and a more sociological one – often based in hermeneutics and leading to the “agency-structure debate,” with Anthony Giddens as a key contributor, who explicitly criticized thinking of structures as the “girders of a building.”

Arguably, the numerous “turns” in the social sciences start at this point. In as far as Marx’s term “superstructure” refers to culture, social institutions, and ideology, the “cultural turn” and the “linguistic turn” may well partly be redescribed and summarized as a “superstructural turn.” More significantly, though, what one could call the “agential turn” – which is not a common expression and goes beyond the agency-structure debate – is not limited to re-focusing on other spheres of social life as determinants of social action and social change. Rather, it suggests that social life is much less determined than the social sciences used to assume. It is open to contingencies, shaped by unexpected events, and can be redirected through human creativity.

By now looking at infrastructures, we move, so to say, to the other side or aspect of structures. Broadly following Marx’s use of “base/substructure,” infrastructures seem clearly more “material” than superstructures, which are more social. Spontaneously, one would think of railway or motorway networks as infrastructures, today also of electricity grids and oil and gas pipelines. But the contributors are certainly right in undermining the rigidity of this distinction by insisting that infrastructures have both material and social aspects, implicitly employing an analogy to the “girders of a building” argument: no infrastructure meaningfully continues to exist if it is not enacted in present actions and interactions. Nevertheless, some distinction between the material and the social will need to be maintained, particularly if we are

interested in infrastructures in view of sustainability in the Anthropocene (we will come back to this below).

Furthermore, it may appear as if the move to infrastructures means focusing on “underlying” – to employ a similar metaphor – features of social life, which are less visible and consciously reflected upon than those of the superstructures, thus bringing the infrastructural turn close to the “practice turn” with its interest in routines and ongoing activities. While there is something to this reasoning, one should not overstretch the conceptual comparison. If superstructures include ideologies and what Cornelius Castoriadis called “imaginary significations,” these are also phenomena that often escape the conscious grip of those who are held by them. One should also not forget that the very term structure was a core tool in the time-honoured sociological enterprise of discovering social phenomena that are not recognized in lay or everyday knowledge. Lastly, even proponents of the agential turn such as Giddens or Pierre Bourdieu coined terms such as “practical consciousness” and “practical sense” for agency without reflexive consciousness.

These brief conceptual reflections are meant to suggest that – to put it bluntly – the supposed infrastructural turn does not provide avenues of thinking about social life that have not already been addressed in earlier critical debates about “structures” in social analysis. To say that infrastructures should be investigated under the angles of relationality, temporality, imagination, prefiguration, to mention just some of the suggestions made in preceding contributions, is certainly useful. But such approach tends to widen the meaning of the term “infrastructure” so much that it loses specificity (for a related critique, see Hesmondhalgh 2022). Depending on context, many social/material phenomena can be considered as infrastructural. One can well say, for example, that human beings are the infrastructure that permitted the coronavirus to temporarily conquer the globe. But of what interest would such a statement be? In some contrast, to me it seems more fruitful to see the infrastructural turn as employing for the analysis of infrastructures angles that had already been developed for a broad and diverse range of other phenomena. But if this approach is taken, one needs some prior sense of which phenomena one wants to refer to as infrastructures.

---

### 3. Infrastructure: Concept and Context

---

Thus, let us revert to a more traditional definition of infrastructure; this one is from the *Britannica Dictionary*: “the basic equipment and structures (such as roads and bridges) that are needed for a country, region, or organization to function properly.”<sup>2</sup> Three initial insights can be gained from this

---

<sup>2</sup> <https://www.britannica.com/dictionary/infrastructure> (Accessed 4 November 2022).

definition: First, the term refers to something that has a function for something else. In this sense, infrastructure is indeed always a relational concept, but its relationality is not free-floating, it is determined by that towards which an infrastructure has a function. Second, this function is determined in this definition by needs of collectivities. And third, infrastructures tend to be material, “such as roads and bridges,” even though not necessarily exclusively material because they will have been built, and are used, in what always is a social process.

Going beyond a dictionary definition with its air of timelessness, as the next step, it is of interest to see in which context a term emerged that focuses on the material requirements for a collectivity to function. The first documented use is found in French in the year 1875, and the term there refers indeed to the material foundation of railway tracks. In the following decades, the use spread slowly, mostly in engineering contexts and with only a slight broadening of the meaning now including other types of foundations, such as for roads and buildings. (It may just be added that the French socialist Jean Jaurès employed the term early in the 20th century as a translation of Marx’s “Basis.”) Its breakthrough to wider usage – and in other languages such as English and German – occurs only after the Second World War, first in a military context for a NATO meeting in the early 1950s, at which the neologism was frowned upon. From the 1960s onwards, the usage multiplies and the meaning widens considerably, relating predominantly to large-scale public investments until more recently reaching as far as information infrastructures (see, e.g., van Laak 2018; Gutheil-Knopp-Kirchwald 2012).

Despite an apparent vagueness, the use of the term infrastructure, thus, has an identifiable context and a clear historical trajectory. While Mitchell (2014) rightly warns of painting too neat a picture of successively dominant infrastructures, such warning should not lead towards abandoning the search for a historical dynamic of socio-ecological transformations. In what follows I will try to make a connection between these sketchy elements of a conceptual history and a historical sociology of “modern” societies across these one-and-a-half centuries, which after all are the period of increasing unsustainability.

---

## 4. Infrastructures of Modernity

---

Leaving the town of Khorogh, capital of the Autonomous Region of Gorno Badakhshan in Tajikistan, in eastern direction, one encounters an unusual monument at the roadside, namely a black historic car, dating from the 1930s, placed on a concrete pedestal. The monument recalls and celebrates the completion of the Pamir Highway, the second-highest road on the globe, leading first east- and then northwards to Osh, Kyrgyzstan, along the frontiers of the Union of Soviet Socialist Republics, of which Tajikistan was a member, with

Afghanistan and with China, then not yet a People's Republic. The car is supposedly the first car that travelled the newly constructed road.

The completion of the road through high mountains was a major accomplishment, possibly serving more military than economic purposes, and an object of pride for the Soviet Union, a sign of its modernity. The core meaning of infrastructure is easily applicable to the endeavour: A firm foundation is built that – literally – underlies all future traffic and makes it possible at higher speed and with greater reliability. (It is worth pointing out that the road was not entirely new as it leads along the historic silk roads, which though were largely unsuitable for cars and hardly usable throughout long periods of the year.) The building of the Pamir Highway was a large-scale public investment in a collective good. Given both the time and the place of its construction, it stands at a transition between railroad building, as a collective means of transport, and motorway building with its penchant for individual use, bearing in mind that there was hardly any private car use in the region at the time. After the end of the Soviet Union, the road started decaying due to lack of public investment in independent but rather poor Tajikistan, while in parallel it regained importance due to increasing long-distance trade from China.

Considering the Soviet Union as a specific interpretation of modernity, this example speaks to the history of modern infrastructures. The closing decades of the 19th century, when the term infrastructure was coined, were the high moment of expansion of the railway network in European societies as well as of the building of the transcontinental railway lines across North America. In 1893, Frederick Jackson Turner published his treatise on the “frontier,” which connected spatial expansion in North America with a transformation of society and personalities (Turner 1893). The frontier thesis was highly contested in scholarly terms but became part of the societal self-understanding of the US. As Émile Durkheim, always suspect of separating the social from the material, noted at about the same time, “[T]he social fact sometimes materialises itself to the degree that it becomes an element of the exterior world. [...] The tracks of communication that have been built before us give a determined direction to the course of our dealings” (Durkheim 2007 [1897], 354, quoted after Charbonnier 2020, 186, my translation). The material infrastructural developments in the late 19th century created new foundations for social life. They marked the societal transformation towards “organized modernity,” as I had proposed to call the emerging social configuration (Wagner 1994), one in which full coverage of space went along with a higher degree of collectivization, both aiming at greater control and stabilization of society. Significantly, these developments go along with, and are increasingly supported by, the exploration of the “second vertical frontier” of crude oil and gas extraction (Barbier 2011).

In this light, the building of the Pamir Highway expands the infrastructural project of organized modernity by bringing it to the “roof of the world.” The early post-Second World War decades, in turn, witnessed the intensification of this project, entailing both greater spatial density of infrastructure and accelerated use of biophysical resources in the construction and utilization of these infrastructures. What became known as “the age of the great programmes” (Wittrock and Lindström 1984) has recently been rebaptized “the Great Acceleration” in resource use and environmental degradation. One may or may not want to date the beginning of the Anthropocene in the middle of the 20th century, but the early post-war decades were certainly the time during which carbon dioxide emissions as well as carbon dioxide concentration in the atmosphere increased so quickly that our current climate emergency has its origins in this period – in other words, in the intensified deployment of the material infrastructure of transportation and industrial production in Western societies.

Since then, there has been a certain shift of discourse about infrastructure. With the relocation of “heavy” industry, both labour- and resource-intensive, from the West to other world-regions, in particular to Asia, and the parallel diffusion of new information and communication technologies, now often referred to as digitalization, infrastructures are more often seen as serving “immaterial work” (Antonio Negri), thus appear at least as much social as material. Several contributions to this issue reflect the shift and consider it as (part of) the infrastructural turn. To some extent, this supposed shift is seen as inviting a less determinist reflection about the relation between infrastructures and the Anthropocene. Rather than claiming that extensions of infrastructure are a major contributor to humankind approaching planetary boundaries, there seems to be the possibility of decoupling infrastructure from resource use, namely precisely in as far as infrastructures are at least potentially more social than material. However, my recommendation is to be more cautious.

In the remainder of this essay, I want to discuss two infrastructures that also figure prominently in preceding contributions, namely money and energy, with a view to further exploring the historicity of infrastructures. Subsequently, I return to the question of the place of infrastructures in major socio-ecological transformations, now in terms of the expressed need for a revolution in infrastructures that overcomes capitalism, as also discussed in some preceding contributions.

---

## 5. Money: Breaking and Reweaving Solidarity

---

The examples of money and energy as infrastructures, which feature in contributions to this issue, are useful for the further exploration because one, money, is more social and the other, energy, more material. I have used this



way of speaking before, but I admit it is a slightly awkward since, as contributors here rightly argue, infrastructures are always both material and social, and it may be problematic to assume that the relative share could be quantified, as the expressions “more” and “less” suggest. Awkward or not, some such qualification is necessary if the task is to consider the significance of infrastructures in the Anthropocene, given that the core of the latter notion is the material impact of human actions on the planet. In this sense, to speak about an infrastructure as more material is meant to underline the high use of biophysical resources required for its functioning. In turn, a more social infrastructure functions without strong recourse to biophysical resources. Money and energy are highly distinct in this sense – in a way in which digital infrastructure is not, to mention a third example, as the latter’s high energy need is currently an important topic of sustainability debates.

Ever since the notion that the value of a coin equals the value of the precious metal of which it is made was abandoned, money has become steadily less material, at least at first sight. Thus, it is appropriate to consider money as a (predominantly) social infrastructure. As such, though, it is never socially indifferent or neutral, and at a closer look it will be difficult to find economic sociologists or even economists who have maintained this. The exchange of a valueless piece of metal, paper, or digital signal for a commodity presupposes a relation of trust, namely trust that the valueless item received can in future be exchanged for another commodity. If we look further at the diffusion of certain forms of money, we can also recognize that such trust generates a form of solidarity, namely among the holders of the same kind of money. Historically, such social ties were mostly hierarchical, as non-democratic states or private enterprises issued money and guaranteed the value of it. However, national currencies flourished in Europe broadly in parallel to processes of democratization; and the nation-state became the focus of an emerging concept of collective responsibility and solidarity.

If this is so, why can the creation of currencies of proximity today be understood as generating or sustaining ties of solidarity that protect from the impact of state-certified money? To answer that question, we need a historical perspective. Very broadly, monetarization, understood as the increasing use of money for the exchange of goods, broke or weakened existing ties of solidarity, since it permitted the exiting from habitual social relations of exchange. One should not underestimate the liberating and enabling effect that this process had. Within the same process, nevertheless, attempts were made to reweave social relations of trust and mutual responsibility with wider extensions and using the tool of money. Many local banks, concentrating on agriculture or on urban commerce, had historically such an objective, often with an explicit social component (such as the *Cassa di Risparmio di Firenze* – Savings Bank of Florence). A national currency dispatched through a network of larger and smaller banks can well be seen as a viable compromise between

enabling commerce and providing solidarity in European states, except that such systems repeatedly collapsed due to inflation and recession and only somewhat consolidated after the Second World War in very special global circumstances. Recent global financialization undermined this system, and the creation of the Euro is ambivalently both part of this supranational financialization and a reaction to it. Current creation of local monies, in turn, are strengthening social ties of proximity, but they should not necessarily be seen as opposed to the existing widely extended currency, but rather as operating within a larger context with a special objective compensating for the latter's deficiencies (Degens 2018).

---

## 6. Energy: Crisis Postponed

---

In turn, energy is an example of a predominantly “material” infrastructure of modernity, meaning that its “matter” strongly conditions its enabling and constraining features, in terms of extraction, transportation, and use, as has been demonstrated in detailed investigations of the adoption of, first, coal (Malm 2016), and later, crude oil and gas (Mitchell 2011). At the same time, this materiality does not fully determine the energetic trajectory of modernity, as the analysis of energy transitions and the disputes around them shows. The respective contributions to this issue focus, in my reading, on two key aspects: first, the way in which precisely the material rigidity of energy infrastructures generates crises, which in turn provoke re-interpretations of the socio-ecological constellation; and second, the way in which global power asymmetries provide significantly more interpretative and agential space for some actors than for others when dealing with crises. The early 1970s with the almost simultaneous publication of the Club of Rome report *Limits to Growth* and the so-called oil crisis were a crucial moment in both respects.

In the current debate about the Anthropocene and climate change, there is a tendency to see the early 1970s as a turning-point towards greater sustainability, environmental protection, and use of renewable energies. There is no doubt that this was a moment of rethinking, and with a bit of detective work one can find the seeds of a major re-interpretation, the fruit of which may still be ripening today (that is, unless they are again rotting). In due brevity, though, I want to claim here that the global trajectory towards increased fossil-fuel intensity remained unaltered and that all that happened was a world-regional shift.

*Limits to Growth* found great attention and wide reception, including among decision-makers at high level. However, the main conclusion was to take action with a view to turning it into a self-defeating prophecy. Facing a potential shortage of main resources, in particular oil, the exploration of new extraction sites as well as methods, e.g., fracking, was intensified so that the report's

conclusions could be refuted. A particular place in the attempted re-interpretation had been assigned to nuclear power, supposed to be cheap, relatively easily available, and not contributing to air pollution or the warming of the atmosphere. It is interesting to note that the West German head of government, Helmut Schmidt, mentioned global warming as an argument in favour of nuclear power, as it shows awareness of the latter issue among leading politicians even at that time. However, we can assume that for Schmidt this was an instrumental argument to accelerate the technology-driven “modernization of the national economy” (Hauff and Scharpf 1975), not driven by ecological concerns. In other words, the Western elites tried everything to avoid limiting the energy supplies to their societies, having come to assume that material well-being had become a crucial “social requisite of democracy” (Lipset 1959).

In parallel, though, environmental degradation came to be recognized as a topic of concern for increasing parts of the electorate in the North. But the main step to address it was to relocate highly polluting industries to other world-regions, with the welcome side-effect of limiting the bargaining power of the working-class. While this move appeared to attenuate two problems for Western elites with one stroke, the ecological and the social question, it remained unrecognized that the Western Great Acceleration was only slowed down by creating the Asian Great Acceleration, clearly visible in the growth in carbon dioxide emissions in China, for instance. Since the exploration of the “second vertical frontier” of crude oil and gas at the end of the 19th century, an energy divide between world-regions had been created that ever more also became a social divide between the First and the Third Worlds or, as one now says, between the Global North and the Global South. From the late 20th century onwards, the trajectory of the supposedly advanced societies had reached social and ecological boundaries. The strategy to overcome those boundaries made use of the global power asymmetry between formally equal states. It entailed creating economic opportunities for some societies of the Global South, but at the expense of subjecting others to the “double exposure” (Leichenko and O’Brien 2008) of environmental degradation and social inequality as well as pushing towards global boundaries such as accelerating climate change (for more detail on the above, see Wagner 2022).

---

## 7. Capitalism and Revolution: Battles at the Front of the Possible

---

Reviewing the analyses of money and energy in preceding contributions, two general insights emerge. First, there is a considerable social ambivalence in the infrastructures of modernity. Extending the human reach of action over

larger spaces and in shorter time, as David Harvey had put it, they are enabling and are often quickly experienced as such. In parallel, they often tend to decrease the density of social relations, a process that may also be experienced as liberating, but which entails losses that are less immediately perceived and arise clearly only in moments of crisis when remedial action is difficult. Furthermore, and in the centre of concern here, they have tended to use an unprecedented amount of biophysical resources, whether necessarily so or not. While the crises that ensued stimulate re-interpretations and may lead to changed socio-ecological trajectories, second, such interpretative work always takes place under the prevailing asymmetries of power. Thus, there is no a priori reason to assume that a change of course will lead into the right direction, that is for current purposes, enhance sustainability.

To delineate the course, some of the contributions use the concepts of capitalism and revolution. Updated for the current condition, they do so in the time-honoured sense of the need for overcoming capitalism through a revolutionary transformation as a precondition for reaching sustainability. Quite frankly, it seems to me that this way of speaking has worn out and is exhausted. And this adverse reaction of mine has nothing to do with a disagreement in substance: reaching a sustainable way of living is of utmost urgency given the planetary condition, in particular with regard to the climate emergency, and a radical social transformation is required towards this end. Thus, I shall try to explain my adversity in conceptual terms.

In my youth, I spent some time with trying to overcome the opposition of reform and revolution that haunted German socialists since the end of the 19th century. The solution that was then created consisted in an expression with an entirely new adjective, namely “system-transcending reforms.” We did not recognize that the problem was less with reform or revolution than with the understanding of the system, of capitalism. The concept of capitalism lacks a clear definition, but it has a conceptual history that can be delineated. Then, a tension becomes visible between an, indeed, systemic understanding that assumes a basic logic, and more precisely a dynamic of expansion, on the one hand, and on the other, a set of phenomena that are researchable and can be made more or less central for the definition of capitalism, such as individual property rights, market coordination, and capital itself as a mechanism of reinvesting profits in view of further benefits (see recently Kocka 2013). The connection between the observable phenomena and the logic of expansion is often unclear or, when it is made explicit, not fully compelling. Whether the existence of markets leads to ever further commodification, or the existence of capital to accumulation for accumulation’s sake is less self-evident than some critical theorists of capitalism assume. Once such claims are made, in turn, it becomes difficult to envisage overcoming capitalism in other ways than through a total revolution the details of which are difficult to specify.

The reasoning is made more complicated by the fact that capitalism itself has often been credited as not simply expansionist but as revolutionary, from Marx onwards. Its supposed capacity for “creative destruction” (Joseph Schumpeter) repeatedly leaves ruins of infrastructure behind: abandoned and overgrown regional railway tracks in my youth; the buildings of closed industrial factories rededicated as cultural centres; nuclear power stations that exploded like Chernobyl or were never fully switched on like the fast breeder reactors in Kalkar or Malville (on ruins of the Anthropocene, see Clot Garrell 2023). For current purposes, the material impact of such destructiveness is important. Significantly, the vagueness of the concept of capitalism permits the simultaneous propagation of opposite views: that capitalism’s creativity is the effective means to combat climate change, as Aghion, Antonin, and Bunel (2021) maintain, or that the need for sustainability will lead to the overcoming of destructive capitalism, a view advanced by Klaus Dörre (2021). In both of these views, a highway to the future is imagined of which we may have doubts whether it can indeed be constructed.

There may or may not be a logic of capital. This is a question that cannot be adequately discussed at this place. However, any nuanced reconstruction of the unsustainable historical trajectory of our societies shows that no such logic alone determined this path. There were arguments for markets that were not built on an extractive concept of autonomy (Charbonnier 2020); “political power” was significantly at work in building the petroleum infrastructures of the 20th century beyond a logic of capital (Mitchell 2011); and we may even detect some “logic of democratic politics” as a moving force of the Great Acceleration (Wagner 2022). Rather than imagining driverless cars on straight roads towards sustainability, it is more advisable to see the future as created in persistent battles at the front of the possible (Guéguen and Jeanpierre 2022).

---

## References

---

- Aghion, Philippe, Céline Antonin, and Simon Bunel. 2021. *The Power of Creative Destruction. Economic Upheaval and the Wealth of Nations*. Cambridge, Mass.: Harvard University Press.
- Barbier, Edward B. 2011. *Scarcity and Frontiers. How economies have developed through natural resource exploitation*. Cambridge: Cambridge University Press.
- Bazzani, Giacomo. 2022. Money Infrastructure for Solidarity and Sustainability. *Historical Social Research* 47 (4): 114-138. doi: [10.12759/hsr.47.2022.41](https://doi.org/10.12759/hsr.47.2022.41).
- Charbonnier, Pierre. 2020. *Abondance et liberté. Une histoire environnementale des idées politiques*. Paris: La Découverte.
- Clot Garrell, Anna, ed. 2023. Thinking through ruination: theoretical and empirical approaches to the ruins of the Anthropocene. *Digithum. A relational perspective on culture and society*, special issue, in preparation.

- Degens, Philipp. 2018. Geld als Gabe. Zur sozialen Bedeutung lokaler Geldformen. Bielefeld. Transcript.
- Degens, Philipp, Iris Hilbrich, and Sarah Lenz. 2022. Analyzing Infrastructures in the Anthropocene. *Historical Social Research* 47 (4): 7-28. doi: [10.12759/hsr.47.2022.36](https://doi.org/10.12759/hsr.47.2022.36)
- Dörre, Klaus. 2021. *Die Utopie des Sozialismus. Kompass für eine Nachhaltigkeitsrevolution*. Berlin: Matthes & Seitz.
- Durkheim, Émile. 2007 (1897). *Le Suicide*. Paris: PUF.
- Guéguen, Haud, and Laurent Jeanpierre. 2022. *La perspective du possible. Comment penser ce qui peut nous arriver, et ce que nous pouvons faire*. Paris: La Découverte.
- Gutheil-Knopp-Kirchwald, Gerlinde. 2012. Eisenbahn, NATO, Jazz und mehr. Der Begriff „Infrastruktur“ im Wandel der Zeiten. *Der öffentliche Sektor - The Public Sector* 38 (2-3): 67-78.
- Hauß, Volker, and Fritz W. Scharpf. 1975. *Modernisierung der Volkswirtschaft*. Frankfurt/M: EVA.
- Hesmondhalgh, David. 2022. The infrastructural turn in media and internet research. In *The Routledge Companion to Media Industries*, ed. Paul McDonald, 132-142. London: Routledge.
- Kocka, Jürgen. 2013. *Geschichte des Kapitalismus*. Munich: Beck.
- Laak, Dirk van. 2018. Infrastruktur. In *Handbuch Staat*, 1019-1027. Wiesbaden: Springer. doi: [10.1007/978-3-658-20744-1\\_91](https://doi.org/10.1007/978-3-658-20744-1_91).
- Leichenko, Robin M., and Karen L. O'Brien. 2008. *Environmental Change and Globalization. Double Exposures*. Oxford: Oxford University Press.
- Lipset, Seymour Martin. 1959. Some social requisites of democracy: economic development and political legitimacy. *American Political Science Review* 53 (1): 69-105.
- Malm, Andreas. 2016. *Fossil Capital. The Rise of Steam Power and the Roots of Global Warming*. London: Verso.
- Merton, Robert K. 1968 (1949). *Social Theory and Social Structure*. New York: Free Press.
- Mitchell, Timothy. 2011. *Carbon Democracy. Political Power in the Age of Oil*. London: Verso.
- Mitchell, Timothy. 2014. Introduction: life of infrastructure. *Comparative Studies of South Asia, Africa and the Middle East* 34 (3): 437-439. doi: [10.1215/1089201x-2826013](https://doi.org/10.1215/1089201x-2826013).
- Suckert, Lisa, and Timur Ergen. 2022. Contested Futures: Reimagining Infrastructures in the First Oil Crisis. *Historical Social Research* 47 (4): 242-266. doi: [10.12759/hsr.47.2022.46](https://doi.org/10.12759/hsr.47.2022.46).
- Symons, Jonathan, and Simon Friederich. 2022. Tensions Within Energy Justice: When Global Energy Governance Amplifies Inequality. *Historical Social Research* 47 (4): 303-326. doi: [10.12759/hsr.47.2022.48](https://doi.org/10.12759/hsr.47.2022.48).
- Szerszynski, Bronislaw. 2022. Infrastructuring as a Planetary Phenomenon: Timescale Separation and Causal Closure in More-Than-Human Systems. *Historical Social Research* 47 (4): 193-214. doi: [10.12759/hsr.47.2022.44](https://doi.org/10.12759/hsr.47.2022.44).
- Turner, Frederick Jackson. 1893. "The Significance of the Frontier in American History", *Annual Report of the American Historical Association*.
- Wagner, Peter. 1994. *A Sociology of Modernity. Liberty and Discipline*. London: Routledge.

- Wagner, Peter. 2022. The triple problem displacement: Climate change and the politics of the Great Acceleration. *European Journal of Social Theory*. doi: [10.1177/13684310221136083](https://doi.org/10.1177/13684310221136083).
- Wittrock, Björn, and Stefan Lindström. 1984. *De stora programmens tid: forskning och energi i svensk politik*. Stockholm: Akademi.

## All articles published in HSR Special Issue 47 (2022) 4: Infrastructures & Ecology

### Introduction

Philipp Degens, Iris Hilbrich & Sarah Lenz

Analyzing Infrastructures in the Anthropocene.

doi: [10.12759/hsr.47.2022.36](https://doi.org/10.12759/hsr.47.2022.36)

### Contributions

Sheila Jasanoff

Spaceship or Stewardship: Imaginaries of Sustainability in the Information Age.

doi: [10.12759/hsr.47.2022.37](https://doi.org/10.12759/hsr.47.2022.37)

Dominic Boyer

Infrastructural Futures in the Ecological Emergency: Gray, Green, and Revolutionary.

doi: [10.12759/hsr.47.2022.38](https://doi.org/10.12759/hsr.47.2022.38)

Simone Schiller-Merkens

Social Transformation through Prefiguration? A Multi-Political Approach of Prefiguring Alternative Infrastructures.

doi: [10.12759/hsr.47.2022.39](https://doi.org/10.12759/hsr.47.2022.39)

Cristina Besio, Nadine Arnold & Dzifa Ametowobla

Participatory Organizations as Infrastructures of Sustainability? The Case of Energy Cooperatives and Their Ways for Increasing Influence.

doi: [10.12759/hsr.47.2022.40](https://doi.org/10.12759/hsr.47.2022.40)

Giacomo Bazzani

Money Infrastructure for Solidarity and Sustainability.

doi: [10.12759/hsr.47.2022.41](https://doi.org/10.12759/hsr.47.2022.41)

Jonas van der Straeten

Sustainability's "Other": Coming to Terms with the Electric Rickshaw in Bangladesh.

doi: [10.12759/hsr.47.2022.42](https://doi.org/10.12759/hsr.47.2022.42)

Mathilda Rosengren

When Infrastructures and Ecological Actors Meet: Resituating "Green" Infrastructures through the History of the Willow Tree.

doi: [10.12759/hsr.47.2022.43](https://doi.org/10.12759/hsr.47.2022.43)

Bronislaw Szerszynski

Infrastructuring as a Planetary Phenomenon: Timescale Separation and Causal Closure in More-Than-Human Systems.

doi: [10.12759/hsr.47.2022.44](https://doi.org/10.12759/hsr.47.2022.44)

Stephen C. Slota & Elliott Hauser

Inverting Ecological Infrastructures: How Temporality Structures the Work of Sustainability.

doi: [10.12759/hsr.47.2022.45](https://doi.org/10.12759/hsr.47.2022.45)



All articles published in HSR Special Issue 47 (2022) 4:  
Infrastructures & Ecology

Lisa Suckert & Timur Ergen

Contested Futures: Reimagining Energy Infrastructures in the First Oil Crisis.

doi: [10.12759/hsr.47.2022.46](https://doi.org/10.12759/hsr.47.2022.46)

Vincent Gengnagel & Katharina Zimmermann

The European Green Deal as a Moonshot – Caring for a Climate-Neutral Yet Prospering Continent?

doi: [10.12759/hsr.47.2022.47](https://doi.org/10.12759/hsr.47.2022.47)

Jonathan Symons & Simon Friederich

Tensions Within Energy Justice: When Global Energy Governance Amplifies Inequality.

doi: [10.12759/hsr.47.2022.48](https://doi.org/10.12759/hsr.47.2022.48)

Epilogue

Peter Wagner

Frontiers of Modernity: Infrastructures and Socio-Ecological Transformations.

doi: [10.12759/hsr.47.2022.49](https://doi.org/10.12759/hsr.47.2022.49)