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Original article

Contesting fossil extractivism: Practices of deactivation in Milan and Civitavecchia, Italy

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ABSTRACT

This article explores the dynamics of climate obstruction and counter-obstruction through a comparative analysis of two Italian case studies: Milan and Civitavecchia. Based on a relational approach, it examines how fossil fuel infrastructures are sustained or deactivate through relational, strategic, and temporal processes. In Milan, climate activism focuses on symbolic and discursive delegitimisation of fossil companies such as ENI and ENEL. Despite persistent efforts, infrastructural continuity remains intact due to the entrenched alliances of fossil agents with financial, academic and cultural institutions. In contrast, the case of Civitavecchia demonstrates a rare instance of effective counter-obstruction. A multi-scalar coalition of environmentalists, trade unions, local institutions and civic groups succeeded in halting the conversion of a coal plant to gas, leading to its deactivation. The study highlights three critical conditions for successful counter-obstruction: internal realignment of obstructive networks, multi-level strategic practices (discursive, procedural, infrastructural), and temporal alignment with key decision-making moments. The comparison reveals that climate contestation is about but of strategic relational positioning within evolving infrastructural and institutional contexts. Ultimately, it argues that the deactivation of fossil infrastructure depends not only on public pressure, but on the capacity to fracture, reconfigure, and strategically disable the networks that sustain them.

1. Introduction

The decarbonisation of fossil fuel-based economies has become a definitive challenge of the 21st century, but despite growing scientific evidence and increasing climate impacts, many infrastructures and institutions remain structurally tied to dependence on fossil fuels (IPCC, 2023; UNEP, 2024). Instead of a reduction, we are witnessing a continuous increase (Hausfather and Friedlingstein, 2024).

In this context, the obstruction of climate action is not just the result of ideological denial or political inertia, but is sustained by deeply entrenched networks of agents, resources, institutions and discourses that operate to maintain the continuity of fossil fuels (Grasso, 2022; Sovacool et al., 2022). These fossil networks - which some have called fossil fuel blocs, fossil regimes and fossil machines - exert overt and covert forms of resistance to systemic change, often adapting in response to societal pressure, public scrutiny or threats to the fossil infrastructures necessary for their continuity (Geels, 2014; Turnheim and Geels, 2012).

But these networks do not exist without conflictual interaction with what we call counter-obstruction networks, the set of agents that seek to interfere with this continuity. Counter-obstruction practices range from grassroots mobilisations to institutional interventions that seek to disrupt the strategic coherence and legitimacy of fossil networks (Grasso and Delatin Rodrigues, 2024; Hess 2023), the aim of which is to create the conditions - through political, economic and cultural changes – for the effective decarbonisation of energy systems. Here, it will be considered as changing the social environment in which the fossil extractive regime is sustained; in other words, making this continuity unfeasible. However, the effectiveness of these practices varies substantially between contexts, raising crucial questions: What explains the differing capacity of climate agents to interrupt or deactivate fossil infrastructures? How do the network dynamics of obstruction and counter-obstruction shape the trajectories of contested energy infrastructures?

We will address these issues through a comparative analysis of two cases of fossil conflicts in Italy: Milan, where climate activists carried out sustained actions against the big fossil players ENI (*Ente Nazionale Idrocarburi*) and ENEL (*Ente Nazionale per l'Energia Elettrica*); and Civitavecchia, where a multi-agent mobilisation succeeded in stopping the

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conversion of a coal-to-gas plant (owned by ENEL), leading to the effective deactivation of the infrastructure (Grasso, Delatin Rodrigues 2024).

Although both cities have been sites of energy contestation, they differ greatly in the types of campaign conducted and the targets: continuous and diffuse resistance in Milan versus infrastructure shutdown in Civitavecchia. The point that will be explored is that of the relationship between territorial counter-obstruction practices. On the one hand, the existence of a relevant fossil energy production infrastructure in the Italian energy system stands out visibly; on the other, its presence remains in the background, characterised by high fossil consumption, but also by concentrating the most important political, administrative and financial operators in the sector. The fight for decarbonisation in Milan is not against a pipe or chimney, but against a network of institutional and symbolic legitimacy that sustains the reproduction of fossils on a national scale.

On the other hand, the deactivation of Civitavecchia does not mean a shift in Italy's energy policy towards decarbonisation, but rather the abandonment of one point in the network in favour of others and expansion into territories abroad - decisions, in turn, made at strategic points in this network such as Milan, which can be considered a hub for command, coordination and legitimisation.

To analyse these cases, we used aspects of the Dual Network Approach (DNA), an analytical framework developed previously (Grasso, Delatin Rodrigues 2025) to understand the interaction between climate obstruction and counter-obstruction as relational, processual and conflictual phenomena (Grasso and Delatin Rodrigues, 2024). DNA posits that obstruction is not merely a structural or ideological force but is carried out through dynamic and heterogeneous networks of agents and institutions (Cilliers 2001; Jasny, Fisher 2023) that work to delay or make decarbonisation impossible. Similarly, counter-obstruction is conceptualised not only as resistance or opposition, but as a field of networked practices that aims to destabilise, slow down or disable fossil infrastructures by neutralising the capacity of these fossil-supporting networks to act (Hess 2023).

The comparative project of this study focuses on two main elements: (1) practices of destabilisation and disruption employed by agents contesting the continuity of fossil fuel-based models of social reproduction and (2) the network configurations - both supportive and oppositional - that shape the trajectory of these practices. In Milan, climate justice groups have increasingly targeted the reputation and political legitimacy of ENI and ENEL, employing discursive and disruptive tactics in public, institutional and symbolic arenas (Delatin Rodrigues 2024; 2025). However, despite ongoing efforts, fossil infrastructures remain intact, and fossil capital continues to exert significant influence through financial, political and cultural channels present in the city.

In contrast, the case of Civitavecchia illustrates an effective counter-obstruction process: a coalition of local and extra-local agents, trade unions, political parties and environmental groups successfully blocked the Torre Valdaliga Nord coal plant's conversion project to gas, leading to its deactivation in 2022 (Grasso and Delatin Rodrigues, 2024).

The article seeks to explore these dynamics by considering the practices, the objectives of climate action and the effects achieved; it proceeds as follows. Section 2 presents the Dual Network Approach and situates it in relation to existing approaches to fossil resistance and transition politics. Section 3 describes the methodology and comparative design. Sections 4 and 5 present the cases of Milan and Civitavecchia, respectively. Section 6 offers a comparative analysis of the main dimensions. Section 7 concludes with reflections on the implications for climate action, the extractive transition and the study of deactivation practices.

2. Analytical framework

Over the last two decades, academic interest in the decarbonisation of energy systems has grown substantially (Köhler et al., 2019). However, much of this work remains focussed on the expansion of renewable energies, innovation systems and market mechanisms (Jacobsson and Bergek, 2011; Geels and Schot, 2007). Although valuable, this literature often ignores the critical challenge of dismantling fossil fuel infrastructures (Grasso and Delatin Rodrigues, 2024; Sovacool et al., 2022). This gap stems from both conceptual limitations and an analytical reluctance to tackle the politics of deactivation (Ford and Newell, 2021; Turnheim and Geels, 2012). Unlike replacement, which emphasises innovation and green technology, deactivation highlights the active dismantling of entrenched fossil fuel systems – systems that are materially embedded, ideologically defended and institutionally stabilised (Geels, 2014; Grasso, 2022; Mitchell, 2011).

Some frameworks (such as the Multi-Level Perspective and Technology Innovation Systems), prioritise niche innovations and their scaling up to replace existing regimes (Geels and Schot, 2007; Jacobsson and Bergek, 2011). These approaches generally treat the decline of fossil fuels as a by-product of the success of renewable energies, underestimating the resilience of fossil regimes, which are sustained by ideological legitimisation, financial reinforcement, institutional support (Ford and Newell, 2021; Grasso, 2022; Mitchell, 2011), but also by social and subjective attachment to it (Daggett 2018).

To address this, scholars such as Turnheim and Geels (2012, 2013) explore regime destabilisation, emphasising that decline involves distinct dynamics such as the erosion of legitimacy and political-economic withdrawal. The notion of exnovation (Davidson 2019; Seto et al. 2016) – the deliberate removal of unsustainable systems – try to highlight the limits of transition policies that overemphasise innovation, ignoring the need to dismantle carbon-intensive infrastructure.

A growing body of work has begun to conceptualise fossil persistence not merely because of technological lock-in or market inertia but as a politically defended system embedded in ideology, institutions, and spatial governance (Rinscheid et al., 2021). One such approach frames the dominance of fossil fuels as upheld by a “fossil bloc” — an alliance of agents and institutions whose power rests on deep ideological and institutional foundations that must be strategically dismantled (Grasso and Delatin Rodrigues, 2022). This builds on neoGramscian interpretations of regime stability, which view transitions not as purely technical shifts but as contested political projects shaped by hegemonic reproduction (Levy and Newell, 2002); this reproduction is sustained by labour regimes, governance arrangements, social meanings (Harris, McCarthy, 2023; Appel et al., 2015) and subjectivity engagement (Appel et al., 2015; Daggett, 2018; Wilson, Szeman, 2017). Scholars have further highlighted how fossil persistence is rooted in broader political-economic dynamics: Malm’s concept of **fossil capital** links energy to capitalist accumulation (Malm, 2016), while Hanieh and Eckhouse emphasise global extractivism and infrastructural labour politics (Eckhouse, 2025; Hanieh, 2021).

While mainstream transition policies often prioritise innovation, critics have pointed out their failure to include mechanisms of disruption. Some scholars advocate for governance frameworks that directly target fossil systems — through subsidy withdrawals, regulatory mandates, and forced closures — rather than waiting for renewable alternatives to outcompete them (Johnstone and Kivimaa, 2018; Kivimaa et al., 2021). Empirical studies from countries like Germany, the UK, and Spain suggest that coal phase-outs are rarely smooth economic transitions; instead, they involve high-stakes political negotiations and institutional resistance (Turnheim et al., 2015; Trencher et al., 2022).

This political complexity arises in part from the nature of fossil infrastructures themselves, which are deeply entangled in socio-cultural systems and territorial governance arrangements. Far from being neutral technologies, these infrastructures are maintained by regulatory frameworks, cultural narratives, and forms of territorial power (Chagnon et al., 2022; Gobby et al. 2022; Knuth et al., 2022). The concept of “infrastructural ecologies” reflects this idea, pointing to how

infrastructures act as value-generating hubs with political and symbolic meaning (Banoub and Martin, 2020).

Such arrangements align with broader regimes of "global extractivism," where fossil infrastructures serve both economic and geopolitical purposes, often in post-colonial contexts characterised by weak governance and elite alliances (Chagnon et al., 2022). In this view, infrastructure persistence cannot be reduced to sunk costs but reflects strategic investments in institutional entrenchment and political returns (Newell and Paterson, 1998).

Some accounts frame this persistence metaphorically as a "fossil machine" — a web of industrial, financial, and ideological forces that reproduce fossil dominance through both economic leverage and discursive adaptation (Grasso and Delatin Rodrigues, 2022). Power within this system manifests in multiple forms — instrumental, material, discursive, and institutional — and constantly evolves in response to external pressures (Geels, 2014). This dynamic has allowed fossil agents to absorb critique, recast their narratives, and continue operations under the banner of climate action (Corry, Reiner 2021; Kusnetz, 2023).

These patterns suggest that fossil infrastructures are not decaying relics but evolving systems that draw strength from their ties to state institutions, financial networks, and social life (Hanieh, 2021). As such, they cannot be dismantled through substitution alone (Mitchell, 2011; Grasso, 2019). A truly strategic approach to deactivation requires a multi-scalar vision that confronts the resilience of these systems on cultural, institutional, and spatial fronts. This includes recognising that "end of fossil fuel" narratives can sometimes obscure the very mechanisms of persistence (Paterson, 2021), and that renewables, if embedded in existing paradigms, may reproduce structural injustices (Knuth, 2018; Delatin Rodrigues, Grasso 2025).

Narratives that delay action — often framed in terms of justice, feasibility, or optimistic futurism — are a critical part of fossil endurance, as shown in studies of climate delay discourse (Lamb et al., 2020). Confronting these narratives is vital for enabling meaningful deactivation.

Ultimately, deactivation must be understood not as a technocratic phase-out, but as a struggle involving the dismantling of infrastructures, institutions, and ideologies. It demands moving beyond the innovation paradigm to embrace a view of transition as contested and political. By drawing from political ecology, political economy, and socio-technical systems analysis, scholars are increasingly uncovering where the real leverage points lie for breaking fossil continuity and enabling more just post-fossil futures (Chagnon et al., 2022; Ford and Newell, 2021; Geels, 2014; Levy and Newell, 2002).

2.1. *The fossil network*

Building on parts of the Dual Network Approach (Grasso, Delatin Rodrigues 2025) we understand fossil continuity as sustained by a reticular set of agents, technologies and institutions (Law 1992). This network is not merely economic or technical – it includes symbolic, political and cultural components that help maintain the legitimacy and inertia of fossil fuels (Barry, 2006; Mitchell, 2011). As mentioned above, this action creates a social environment where the continued operation of these infrastructures becomes possible, linking the future of these territories – and their socio-cultural and political reproduction – to the continuity of fossil fuels (Macdonald, 2017; Chagnon et al., 2022). In practical terms, the composition of the fossil network can be found (partially as illustration) in Table 1.

The perspective used here (based on part of DNA) differs from regime theory or socio-technical transitions models by emphasising the relational fragility and contested maintenance of fossil systems in a conflictual (McAdam 2021) rather than evolutionary key. Instead of assuming stability until a critical change, we emphasize that obstruction is always an ongoing work: these fossil networks need to constantly defend their position through lobbying, narrative production, institutional alignment and infrastructure reproduction (Brulle et al. 2024)

Table 1
Example of components of the fossil network.

Category	Description	Examples (Italy)
Main players	Core agents that operate and profit from fossil infrastructures.	ENI; ENEL; infrastructure operators in electricity & gas sectors.
Support structures	Institutions and actors that provide regulatory, financial, and organisational backing.	Ministries; regional energy authorities; major banks; trade associations; technical agencies.
Cultural carriers	Discourses, imaginaries, expertise, identities and narratives that legitimise fossil continuity.	Universities (Politecnico, Bicocca, Statale); professional networks; media outlets; cultural institutions (Triennale, Salone).

Illustrative categorisation of the main components of the fossil network, organised by functional role. Compiled by the authors on the basis of documentary analysis and fieldwork conducted in Italy (2018–2025).

Table 2
Categories of counter-obstruction practices.

Type	Sub-type	Description	Empirical Examples
Destabilisation	Symbolic delegitimisation	Challenges fossil legitimacy through narratives, norms, and public discourse.	XR protest at MICO; campaigns against ENI and ENEL sponsorships.
	Normative reframing	Repositions fossil energy as unjust, obsolete, or incompatible with transition.	Student "Fuori le Fossili" campaigns; critical reports.
Disruption	Institutional disruption	Intervening in licensing, planning, hearings, regulatory pathways.	Legal challenges to TVN gas conversion; municipal objections.
	Material disruption	Actions that directly intervene in or block infrastructural operations.	Plant strikes; blockades by workers and activists in Civitavecchia.

Typology of counter-obstruction practices organised by type and sub-type, with descriptions and empirical examples drawn from the Milan and Civitavecchia case studies. Compiled by the authors on the basis of fieldwork and interview data (2018–2025).

(Table 2).

These practices can be adopted by different agents - grassroots groups, municipal governments, professional associations and even defecting insiders - and can operate on different scales and timescales. What matters, in analytical terms, is how they interact with the obstruction network, exploit its weak points and sometimes reconfigure its very components (Ford and Newell, 2021; Knuth, 2018). In this sense, counter-obstruction is not just resistance, but an active form of deactivation politics, which intervenes in the connective tissue of the fossil network to try to dismantle its coherence and continuity (Grasso, 2022; Mitchell, 2011; Sovacool et al. 2022).

3. Methods and comparative design

This article adopts a comparative and empirically grounded approach to explore how different configurations of obstruction and counter-obstruction interact. The analysis focuses on two cases with divergent trajectories: the resilience of the fossil domain in Milan and the successful deactivation of a power plant in Civitavecchia.

The collection of empirical data was carried out at different times and for different lengths of time: in Milan the research was carried out from 2018 to 2022 through fieldwork, participating in meetings,

demonstrations, interviews (15) and document analysis (details can be found in Delatin Rodrigues 2025); and in Civitavecchia from 2022 to 2025 the data was collected by interviews (11) with activists, authorities and trade unions, analysis of documents, reports and archival research. The cases are treated as different forms of territorialisation of the energy system and struggles, which implies different strategic opportunities and limitations. Through initial data collection, the authors identified the agents involved and categorised them according to their actions and practices. The identification is not intended to be exhaustive; however, as can be seen in appendices 1 and 2, the data collected provides a picture of the characteristics of the conflicts over decarbonisation and offers some clues for understanding their different outcomes.

The aim is not to judge "success", but to understand why similar practices produce different effects - and how territoriality and relationality condition the effectiveness of counter-obstruction.

Milan has long served as Italy's financial and corporate centre, hosting major energy firms, banks and universities that influence national debates on climate and transition. Since the post-war period, the city has cultivated an image of modernity tied to technological innovation, design culture and growth, enabling fossil companies to maintain legitimacy through sponsorships, partnerships and institutional alliances. Fossil influence in Milan is thus reproduced less through local energy production and more through symbolic, financial and governance circuits.

By contrast, Civitavecchia's political economy has been shaped for decades by the presence of large fossil infrastructures, especially ENEL's power plants. The city's identity, labour market and territorial development have been intertwined with successive oil, coal and gas projects, creating a material dependency that historically constrained political alternatives. It is worth noting that >80 % of the city was destroyed during the Second World War; the first power station was built as part of the socio-economic reconstruction plans (Marshall Plan) after the conflict. Unlike Milan's diffuse fossil metabolism, Civitavecchia's conflict centres on a single, highly visible infrastructure whose health, employment and environmental impacts structure local contestation.

4. Milan's urban climate field: practices of obstruction and counter-obstruction in the fossil metropolis

If in Civitavecchia the materiality of the fossil infrastructure creates a physical and institutional clarity of the field of conflict, in Milan obstruction and counter-obstruction are organised around a radically different logic: relational, symbolic and institutional. What is in dispute is not (just) the permanence of a plant or terminal, but the reproduction of the authority, legitimacy and centrality of the fossil machine in the urban imaginary and metabolism (Daggett 2018 etc.). In this sense, the Milanese components of the fossil network operate as its "symbolic and financial head" - a centre of calculation, projection and governance of the transition under corporate control. In this context, obstructive and counter-obstructive practices do not translate into direct confrontations with installations, but into conflicts over spaces of discourse, representation, imagination and urban management. This is important for two reasons: to assess the type of counter-obstruction practice appropriate to a given component of the fossil network; and the possibilities of combining counter-obstruction practices that are relevant to the specific social environments and its scale – rather than relying on just one form, such as street demonstrations.

Obstruction in Milan manifests itself in the form of a diffuse blockade, operated by a network of agents who, while presenting themselves as protagonists of the transition, reproduce fossilised power on multiple scales. ENI, ENEL, academic institutions such as the Politecnico di Milano, University of Milano-Bicocca and the Università Statale, the city council, political parties and cultural entities act as operators in a field of "managed" transition, where the content of decarbonisation is depoliticised, technicised and progressively absorbed by corporate grammars (Table 3).

Table 3
Obstruction and counter-obstruction practices in Milan.

Domain	Obstruction Mechanism	Counter-Obstruction Response
Cultural	ENI sponsorships of Triennale, Salone; green aestheticisation.	Performative disruptions; campaigns exposing greenwashing.
Academic	ENI–Politecnico partnerships (CCUS; Joule).	Divestment campaigns; transparency demands; university occupations.
Institutional	Milan's "managed transition" narrative aligning with corporate interests.	Intersectional networks linking climate, housing, gender, and mobility struggles.
Territorial	Diffuse fossil urban metabolism (transport, finance, culture).	Autonomous spaces experimenting with post-fossil practices.

Overview of obstruction mechanisms and corresponding counter-obstruction responses across four domains in Milan. Compiled by the authors on the basis of fieldwork, interviews and document analysis (Milan, 2018–2022).

The main obstruction mechanisms identified include:

Obstruction, therefore, does not block the movement of transition, but guides, controls and depoliticises it by shifting the axis of transformation towards technical, corporate and consensual circuits. It is in this saturated field that counter-obstruction practices emerge. In Milan, they are not so much aimed at the physical deactivation of infrastructure, but at symbolic delegitimization, institutional tension and the production of alternative ecologies of urban life and care. These are practices that operate through infiltration, exposure, critical performativity and the creation of dissident ways of life. In Milan, autonomous urban spaces function as small-scale laboratories for alternative, low-carbon urban ecologies. Occupied social centres, community gardens and repurposed industrial buildings host experiments in agroecology, energy self-production, cooperative economies and mutual aid (Delatin Rodrigues 2025). Although diverse in scale, these spaces form part of broader networks linking climate activism with housing, transfeminist and migrant struggles. By cultivating practices that challenge fossil-dependent urban life and commercial logics, they embody prefigurative forms of counter-obstruction, offering concrete alternatives to the corporate "managed transition" promoted in the city (Delatin Rodrigues, 2024).

These practices, although fragmented and often invisible, operate as counter-obstruction circuits that cross, destabilise and redesign the city's obstructive institutional fabric. They don't set out to directly replace the fossil regime, but to weaken it at its symbolic, material, moral and relational margins - a fundamental condition for its long-term institutional erosion.

The analysis of obstruction and counter-obstruction practices in Milan reveals a field where climate conflict is not organised around a technical object, but around multiple layers of meaning, legitimacy and urban authority. In this sense, the dual dynamic network (DNA) approach makes it possible to visualise not only the stabilising links of obstruction (partnerships, sponsorship, consensus), but also the points of escape and fracture where counter-obstruction gains density.

Counter-obstruction here takes place less by rupture and more by infiltration – by creating cracks in the symbolic façade of the fossil machine and opening up spaces for an institutional transition from the inside out. Concretely, this occurs through trying to link climate struggles to other urban struggles (housing, mobility); untying ENI and ENEL sponsorships of cultural events that are contested by important foundations, local experiments in low-carbon neighbourhoods or fossil-free zones (such as installing solar panels on people's homes, creating agroforestry experiments, encouraging boycotts of big companies like Amazon, or feeding through local production networks) (more details can be found in Delatin Rodrigues, 2025).

5. Civitavecchia: deactivation through networked counter-obstruction

While Milan represents a diffuse and symbolically mediated terrain of climate contestation—centred on cultural legitimacy, institutional alliances and discursive politics—Civitavecchia constitutes a territorially concentrated conflict around a single major infrastructure. In Milan, counter-obstruction targets dispersed circuits of fossil influence across universities, cultural institutions and urban governance. In Civitavecchia, by contrast, mobilisation focuses on the material presence of the Torrevaldaliga Nord plant and the specific licensing procedures governing its future. This difference shapes the strategies available to local actors and explains why counter-obstruction in Civitavecchia could directly influence infrastructural outcomes (Grasso and Delatin Rodrigues, 2024). The climate conflict in Civitavecchia allows us to observe with rare clarity the concrete dynamics of obstruction and counter-obstruction around a localised fossil infrastructure: the Torrevaldaliga Nord (TVN) thermal power plant, operated by Enel. The port city, located around 70 km from Rome, has historically been dependent on the energy sector, having hosted multiple generations of power plants - oil, coal and, later, proposed transitions to gas. Since the mid-20th century, energy infrastructure has been a constitutive part of the urban fabric and the local narrative of progress. However, the attempt to convert the plant from coal to gas, announced in 2019 by ENEL, sparked a highly articulated process of multi-scalar opposition, culminating in the official rejection of the project in 2022. This cycle of struggles provides a rare example of successful counter-obstruction and allows us to observe precisely how the networks that sustain the fossil machine are built, expanded and undone in concrete contexts.

ENEL presented the plan to convert the plant as part of its energy transition strategy, within the framework of the PNIEC (National Integrated Energy and Climate Plan). The proposal called for the progressive closure of coal burning by 2025 and the replacement with a combined fossil gas cycle, with the promise of lower emissions. However, the project maintained the same pattern of energy centralisation, extensive use of fossil fuels and dependence on local port infrastructure.

Obstruction operated here as an adaptive reconfiguration of fossil continuity. Instead of defending the permanence of coal, Enel articulated a discourse of "responsible modernisation", associating gas with a "necessary", "inevitable" and "gradual" transition. The fossil network operates in a permanently unstable equilibrium: during its life cycle, its components can move from one functional group to another; new components can enter a fossil network, while existing components can withdraw and even become counter-obstruction agents, trying to deactivate it. This is what happened in Civitavecchia with the trade unions and the trade association CNA (*Confederazione Nazionale dell'Artigianato*), trapped in the health/employment dilemma associated with fossil energy, as described in the case study discussed below.

The project was framed by ENEL as "the only realistic way" to avoid the complete shutdown of the plant and the collapse of employment. This local institutional consensus acted as an obstructive vector, obstruction alternatives and compressing the political horizon of the transition. Enel positioned itself not just as the plant's operator, but as the curator of the city's future. In this sense, the obstruction didn't just happen via technical or political lobbying, but through a relational authority regime, which included local media, technical expertise, workers' memory and historical ties of loyalty.

The turning point began at the end of 2019, when a heterogeneous set of agents began a process of reconnecting past mobilisations with the new terms of the transition. Groups like Città Futura, Forum Ambientalista, Sole, and the No al Fossil Committee, articulated with national climate movements like Fridays for Future and Extinction Rebellion, began to dispute the dominant framing of Enel's proposal. The starting point was not just a technical rejection of gas, but a critique of the moral and historical conditions of the project: it was seen as a continuation of a logic of energy colonisation, concealed by a discourse of neutrality.

These groups revived the history of illnesses and environmental impacts, reactivating memories of the struggles against coal in 2003–2006. This process of "critical re-enactment" together with the effective development of an alternative project (renewable energy) was key to destabilising the project's normativity. Various public events were organised, including popular assemblies, documentary screenings, debates with experts and public acts.

The discursive action was articulated with the production of technical and scientific counter-information. Alternative reports were drawn up by local engineers, independent researchers and environmental NGOs, dismantling Enel's technical arguments about the supposed "neutrality" of the gas. The criticism was not only environmental, but also economic: studies showed that distributed renewable energy projects, such as the offshore wind farm proposed by local committees, could generate more jobs and less impact - converting to gas would in turn reduce the labour directly or indirectly needed to operate the power station by >90 % (Grasso, Delatin Rodrigues 2024).

One of the most significant transformations in the cycle of struggles was the change in position of the labour unions at the plant and in the production chain. Initially hesitant, the unions began to support the environmental movements in 2020, after intense internal discussions and pressure from the younger worker base. This alignment was decisive: it broke the pro-Enel union consensus, gave legitimacy to the criticism from the point of view of labour, and made strike actions, stoppages and blockades possible within the industrial complex. The dichotomy of 'environment or labour' had been broken down. This type of labour-based realignment was largely absent in Milan, where counter-obstruction remained disconnected from industrial labour politics.

At the same time, networks of technicians, planners and urbanists committed to an alternative energy transition emerged alongside the activists and numerous citizens' committees that were formed. The proposal to install offshore wind turbines - organised by a mixed consortium of local companies and universities - gained prominence as a concrete alternative. This proposal, supported by committees such as Comitato Sole (Solar committee, a broad scientific, political and cultural coalition), not only questioned the technical feasibility of gas, but offered a plausible public image of a post-fossil city.

In March 2021, the Lazio Region created the Department for the Ecological and Digital Transition (Assessorato alla Transizione Ecologica e alla Trasformazione Digitale, ATETD), which, according to all the transition agents interviewed, played a key role in deactivation the Civitavecchia power station, especially the head of the organisation, Five Star Movement politician Roberta Lombardi. According to a CNA transition agent: "If it hadn't been for the political impetus given by ATETD and two regional councillors, our success would have been very unlikely."At this point, the counter-obstruction network was already promoting multiple kinds of intervention: direct and symbolic action, technical engineering, institutional pressure, judicial mobilisation (complaints to the Ministry of the Environment), and articulation with national campaigns such as "Fuori dal Fossile" (Out of Fossil) (Table 4).

In mid-2022, after delays, media pressure, technical questions and growing political wear and tear, Enel officially withdrew its proposal to build the gas-fired power station in Civitavecchia. The decision was received by the movements as a victory, albeit a partial one: the coal plant would remain active until the new regional electricity matrix was defined, and the future of the wind farm still depended on bureaucratic procedures.

Even so, the case represented a decisive break: a fossil fuel infrastructure was decommissioned without being replaced by another fossil fuel, and this happened through territorially rooted, socially plural and institutionally tense counter-obstruction practices. The victory was not the result of a single act, but of an ecology of coordinated practices that transformed the local common sense about energy, health, justice and belonging.

Table 4
Key mechanisms in the civitavecchia counter-obstruction cycle.

Dimension	Mechanism	Description / Example
Discursive	Reframing gas as a continuation of fossil dependence, not a transition.	Public assemblies; expert counter-reports.
Institutional	Municipal and regional opposition to gas licensing.	ATETD intervention; delays in approval processes.
Labour	Union realignment from pro-ENEL to anti-gas position.	CGIL and USB convergence; internal debates.
Technical	Alternative project development.	Offshore wind proposal by regional coalition.
Operational	Material and procedural disruption.	Strikes, plant-level blockades, formal complaints.

Summary of the five key mechanisms through which counter-obstruction operated in Civitavecchia, with illustrative examples. Compiled by the authors on the basis of interviews and documentary analysis (Civitavecchia, 2022–2025).

6. Comparative analysis: divergent results, networked struggles

The case of Civitavecchia confirms the central hypothesis of the dual dynamic network approach: the fields of obstruction and counter-obstruction are not given, but relational processes in dispute, constantly reconfigured by situated practices. Obstruction was not dismantled head-on, but eroded at its moral, technical and affective margins. Counter-obstruction was not just resistance, but the active production of alternatives and imaginaries. The relationship between delegitimisation, technical viability and social coordination was central to making the deactivation concretely thinkable and politically viable.

The cases of Milan and Civitavecchia offer two contrasting trajectories in the field of climate counter-obstruction: one marked by persistent but limited disruption (Milan), the other by the successful deactivation of fossil infrastructure (Civitavecchia). Both took place in the same national context, involved protests against Italy's dominant energy companies and arose from wider climate mobilisations. However, the results were very different.

To explain this divergence, we applied the dual dynamic network (DNA) approach, which emphasises the dynamic interaction between obstruction and counter-obstruction networks. Through this lens, what distinguishes the two cases is not just the strength or scale of climate activism, but the relational architecture of the networks involved, the strategic use of temporality and the alignment of agents in the institutional and infrastructure domains.

In Milan, counter-obstruction practices were largely carried out through urban, discursive and symbolic interventions composed mainly of non-governmental organisations, student collectives, activist groups and environmental associations. Although sustained and imaginative, these practices have remained unrelated, with limited penetration into institutional domains or the levers of infrastructural change. The main fossil agents (ENI and ENEL) maintained strong connections with the city's financial, academic and cultural circuits. The activist networks, despite being vocal, had difficulties building alliances with workers, city authorities or formal political agents. This resulted in a field of counter-obstruction that was dense in terms of performativity, but limited in terms of the repertoire of practices available.

In contrast, Civitavecchia saw the emergence of a denser counter-obstruction network, made up of environmentalists, municipal agents, trade unions and segments of the public administration. This network was not only broader in terms of the inclusion of agents, but also more articulate, linking local grievances to national debates and institutional processes. The main nodes of the obstruction network - mainly the unions - were partially absorbed or neutralised through direct involvement and political repositioning. This interference between networks helped to erode the coherence of the fossil machine from within.

One of the most decisive contrasts lies in the alignment and flexibility of the agents in each field. In Milan, the central institutions remained practically unchanged. Universities, town halls and business chambers maintained their partnerships with ENI and ENEL, even when they held climate-themed events. The fossil network maintained its coherence, partly by appropriating the language of transition, thus blurring the lines between adaptation and obstruction.

Civitavecchia, however, saw a rare realignment of roles. The local CGIL branch, historically aligned with ENEL, broke ranks and joined the opposition, just as the USB, initially refractory, became a key player in labour unrest inside the plant. The municipal authorities refused to approve the gas conversion. Even within the agencies linked to the state, there were frictions and delays. These changes created a fluid field of obstruction, in which elements of the established network were removed or neutralised, opening up space for counter-obstruction to gain material influence. DNA helps to capture this dynamic not as a binary conflict, but as a strategic reconfiguration of network relations.

The temporal rhythms of each case were also different. In Milan, the counter-obstruction unfolded as a continuous and open process, shaped more by a long-term narrative rupture than by immediate institutional interests. Without a defined project timeline or a regulatory moment, activist interventions lacked a temporal anchor. Their power was accumulative, not catalysing.

Civitavecchia, on the other hand, was specific in time. The gasification plan introduced a narrow but decisive window of intervention - a phase in which legal, political and discursive pressure could directly alter the results of the infrastructure. The counter-obstruction network capitalised on this moment, coordinating actions to synchronise institutional, public and media pressure. The timing here was not accidental, but central to the success of the strategy.

6.1. Comparative summary

To summarise these relational differences, the following table juxtaposes the main dimensions of the two cases:

These differences point to a broader conclusion: counter-obstruction is successful not only through scale or intensity, but through strategic relational positioning - the ability to incorporate disruption into institutional, infrastructural and temporal interfaces. The experience of Milan reveals the limits of symbolic pressure when it fails to penetrate the material circuit of fossil power: the situation of the Milanese counter-obstruction network is similar to the Civitavecchia counter-obstruction network in the first period of protest, concentrated mainly through activists, associations and a few solar energy companies. At the same time, it shows that in metropolitan contexts, shutdown strategies have to take on a long form and timeframe, with fragmented actions that have little material effect. Civitavecchia shows what becomes possible when counter-obstruction acts as a relational force, capable of interfering and dismantling fossil networks from the inside out (Table 5).

Table 5
Contrasts between Milan and Civitavecchia.

Dimension	Milan	Civitavecchia
Network structure	Fragmented, centred on activists	Dense, with several agents, at various scales
Dominant practices	Delegitimisation, symbolic rupture	Disruption of procedures, alliance building
Focus on infrastructure	Absent/dispersed	Concrete, time-bound (TVN factory)
Alignment of agents	Fossil network intact, little realignment	Main players (unions, municipalities) change
Time strategy	Continuous, non-specific	Scheduled for permission/ policy windows
Outcome	No change in infrastructure	Deactivation of fossil infrastructure

Comparative summary of six analytical dimensions contrasting the counter-obstruction dynamics and outcomes in Milan and Civitavecchia. Compiled by the authors on the basis of fieldwork, interviews and document analysis (Milan, 2018–2022; Civitavecchia, 2022–2025).

7. Conclusion: rethinking the fight against fossil fuels through relational obstruction

The comparative analysis of Milan and Civitavecchia offers two distinct paths along which climate contestation unfolds in relation to entrenched fossil infrastructures. Although both cities have been sites of sustained counter-obstruction, their outcomes differ markedly: in Milan, despite symbolic disruption and public visibility, fossil agents remain institutionally intact and infrastructure untouched; in Civitavecchia, coordinated, multi-scale counter-obstruction has resulted in the deactivation of a major fossil facility.

What explains this divergence is not the simple presence or absence of activism, nor the strength of the incumbents on their own. Instead, as the Dual Dynamic Network Approach (DNA) emphasises, the outcome of fossil contestation depends on the relational dynamics between obstruction and counter-obstruction networks, the strategic practices that agents use and the moment in which these practices are incorporated into institutional and infrastructural processes.

Three important conclusions emerge from the analysis:

- Firstly, effective counter-obstruction depends not only on mobilising dissent, but also on gaining relational traction within the obstruction network itself. In Civitavecchia, this meant converting parts of the obstruction apparatus - trade unions, municipalities and even segments of regulatory bodies - into partial allies or internal critics. The network was not only pressured from the outside, but also destabilised from within, through a convergence of agents whose interests aligned around a shared opposition programme. Milan, on the other hand, illustrates the limitations of counter-obstruction, which remains externally positioned and symbolically powerful, but institutionally peripheral.
- Secondly, the practices that constitute counter-obstruction must operate on several levels - discursive, procedural and infrastructural. Symbolic delegitimisation, while important for public visibility, often doesn't produce material change unless it is associated with procedural intervention (e.g. challenging permits, changing legal conditions) or infrastructure disruption (e.g. obstruction construction, stopping operations). Civitavecchia's success was due to the strategic layering of its practices: disruption of licensing processes, destabilisation of the narrative and coalition building across traditional boundaries.
- Thirdly, the timing is important. Counter-obstruction gains power when it aligns with critical moments of political or infrastructural fluidity. In Milan, the lack of a concrete project in deliberation limited the opportunities for disruption to turn into transformation. Of course, considering the differences between the two cities, the deactivation process in Milan should take on a different dimension. It would involve a profound transformation of urban planning and production models and would serve as a low-carbon territory from which ENI and ENEL could be pressurised to reduce gas and oil exploration in their business plans. In Civitavecchia, on the other hand, the gas conversion proposal created a time-sensitive containment field - a window in which interventions could have (and have had) decisive effects. This emphasises the need to treat obstruction and counter-obstruction as temporally embedded processes, rather than static positions.

Together, these insights promote a more nuanced understanding of the fossil struggle. Rather than treating incumbents as unified blocs or resistors as inherently oppositional, DNA reveals a field of shifting alignments, contested practices and unstable coherences. The fossil network power is reticular and adaptable, but not invulnerable. It can be disrupted – not just through protests, but through strategically organised relational pressure.

This article also contributes to a growing body of scholarship that seeks to go beyond the simplistic binaries of "transition versus resistance". It shows that the deactivation of fossils is not a linear political achievement, but a conflictual, situated and networked process - one in which the practices of obstruction and counter-obstruction interact, adjust and continually reshape each other. The case of Civitavecchia does not reveal a model to be replicated on a large scale, but a set of conditions – alignment of agents, temporal convergence, institutional leverage - that can inform similar struggles elsewhere.

In conclusion, the cases of Milan and Civitavecchia show us that the fossil machine, although deeply embedded, is neither continuous nor permanent. Its continuity depends on active maintenance. Its interruption, in turn, requires not just opposition, but a networked, strategic counter-obstruction that is programmed for fracture.

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Supplementary materials

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References

Appel, H., Mason, A., Watts, M., Huber, M.T., 2015. Subterranean Estates: Life Worlds of Oil and Gas. Cornell University Press, Ithaca, NY, USA.
Banoub, D., Martin, S.J., 2020. Storing value: the infrastructural ecologies of commodity storage. Env. Plan. D Soc. Space 38, 1101–1119. https://doi.org/10.1177/0263775820911.
Barry, A., 2006. Technological zones. Eur. J. Soc. Theory 9, 239–253. https://doi.org/10.1177/1368431006063343.
Brulle, R., Roberts, J.T., Spencer, M. (Eds.), 2024. Climate Obstruction in Europe. Oxford University Press, Oxford.
Chagnon, C.W., Durante, F., Gills, B.K., Hagolani-Albov, S.E., Hokkanen, S., Kangasluoma, S.M.J., Konttinen, H., Kröger, M., LaFleur, W., Ollinaho, O., Vuola, M. P.S., 2022. From extractivism to global extractivism: the evolution of an organizing concept. J. Peasant Stud 49 (4), 760–792. https://doi.org/10.1080/03066150.2022.2069015.
Cilliers, P., 2001. Boundaries, hierarchies and networks in complex systems. Int. J. Innov. Manag 5 (2), 135–147. https://doi.org/10.1142/S1363919601000312.
Corry, O., Reiner, D., 2021. Protests and policies: how radical social movement activists engage with climate policy dilemmas. Sociology 55 (1), 197–217. https://doi.org/10.1177/0038038520943107.
Daggett, C., 2018. Petro-masculinity: fossil fuels and authoritarian desire. Millenn.: J. Int. Stud. 47 (1), 25–44. https://doi.org/10.1177/0305829818775817.
Davidson, D.J., 2019. Exnovating for a renewable energy transition. Nat. Energy 4, 254–256. https://doi.org/10.1038/s41560-019-0369-3.
Delatin Rodrigues, D., Grasso, M., 2025. The resistance to solar energy expansion in Italy: a systemic perspective. Sustain. Sci. https://doi.org/10.1007/s11625-025-01678-8.
Delatin Rodrigues, D., 2024. Climate activism and the destabilization of business-as-usual in Milan, Italy. J. Contemp. Ethnogr 53 (3), 301–326. https://doi.org/10.1177/08912416241233698.
Delatin Rodrigues, D., 2025. Climate Change and Political Action in Italy. Palgrave, London.
Eckhouse, G., Gibbs, E., 2025. Two late-imperial oil booms: the constrained national energy imaginaries of the UK's North Sea and US hydraulic fracturing. Geoforum 165, 104389. https://doi.org/10.1016/j.geoforum.2021.04.002.

Ford, A., Newell, P., 2021. Regime resistance and accommodation: toward a neo-Gramscian perspective on energy transitions. Energy Res. Soc. Sci 79, 102163. https://doi.org/10.1016/j.erss.2021.102163.
Geels, F.W., Schot, J., 2007. Typology of sociotechnical transition pathways. Res. Policy 36 (3), 399–417.
Geels, F.W., 2014. Regime resistance against low-carbon transitions: introducing politics and power into the multi-level perspective. Theory Cult. Soc 31 (5), 21–40. https://doi.org/10.1177/026327641453162.
Gobby, J., Temper, L., Burke, M., von Ellenrieder, N., 2022. Resistance as governance: transformative strategies forged on the frontlines of extractivism in Canada. Extr. Ind. Soc 9, 100919. https://doi.org/10.1016/j.exis.2021.100919.
Grasso, M., Delatin Rodrigues, D., 2022. Disrupting to decarbonise socio-energy systems: the 'carbon transformation axes' framework. Energy Res. Soc. Sci 90, 102672. https://doi.org/10.1016/j.erss.2022.102657.
Grasso, M., Delatin Rodrigues, D., 2024. Rage against the fossil machine: the deactivation of fossil energy production in Italy. Energy Res. Soc. Sci 115, 103655. https://doi.org/10.1016/j.erss.2024.103655.
Grasso, M., Delatin Rodrigues, D., 2025. Sustainability transitions through fossil infrastructure deactivation. Sustainability 17 (14), 6465. https://doi.org/10.3390/su17146465.
Grasso, M., 2019. Oily politics: a critical assessment of the oil and gas industry's contribution to climate change. Energy Res. Soc. Sci. 50, 106–116.
Grasso, M., 2022. From Big Oil to Big Green: Holding the Oil Industry to Account for the Climate Crisis. MIT Press, Cambridge, MA.
Hanieh, A., (2021). Petrochemical empire. New Left Review, 130, pp. 25–54. Available at: https://newleftreview.org/issues/ii130/articles/petrochemical-empire.
Harris, D.M., McCarthy, J., 2023. A just transition to what, for whom, and by what means? Transition technology, carbon markets, and an Appalachian coal mine. Energy Res. Soc. Sci. 106, 103307. https://doi.org/10.1016/j.erss.2023.103307.
Hausfather, Z., Friedlingstein, P., 2024. Analysis: global CO_2 emissions will reach new high in 2024 despite slower growth. Global Carbon Project. https://www.carbonbrief.org/analysis-global-co2-emissions-will-reach-new-high-in-2024-despite-slower-growth/.
Hess, D.J., 2023. Pipeline conflicts, coalitions, and strategic action: a review of the literature. Extr. Ind. Soc 16, 101339.
IPCC – Intergovernmental Panel on Climate Change, 2023. Summary for policymakers. Climate Change 2023: Synthesis Report. IPCC, Geneva, pp. 1–34. https://doi.org/10.59327/IPCC/AR6-9789291691647.00.
Jacobsson, S., Bergek, A., 2011. Innovation system analyses and sustainability transitions: contributions and suggestions for research. Environ. Innov. Soc. Transit. 1, 41–57.
Jasny, L., Fisher, D.R., 2023. How networks of social movement issues motivate climate resistance. Soc. Netw 75, 159–169. https://doi.org/10.1016/j.socnet.2022.02.002.
Johnstone, P., Kivimaa, P., 2018. Multiple dimensions of disruption, energy transitions and industrial policy. Energy Res. Soc. Sci 37, 260–265. https://doi.org/10.1016/j.erss.2017.10.027.
Kivimaa, P., Laakso, S., Lonkila, A., Kaljonen, M., 2021. Moving beyond disruptive innovation: a review of disruption in sustainability transitions. Env. Innov. Soc. Transit 38, 110–126. https://doi.org/10.1016/j.eist.2020.12.001.
Knuth, S., Behrsin, I., Levenda, A., McCarthy, J., 2022. New political ecologies of renewable energy. Environ. Plan. E Nat. Space 5 (3), 731–743. https://doi.org/10.1177/25148486221108164.
Knuth, S., 2018. Breakthroughs" for a green economy? financialization and clean energy transition. Energy Res. Soc. Sci. 41, 220–229. https://doi.org/10.1016/j.erss.2018.04.024.
Kusnetz, N., (2023). Fossil fuel executives see a 'golden age' for gas, if they can brand it as 'clean'. Inside Climate News, 19 March. Available at: https://insideclimatenews.org/news/19032023/fossil-fuel-natural-gas-branding/.
Köhler, J., et al., 2019. An agenda for sustainability transitions research: state of the art and future directions. Env. Innov. Soc. Transit 31, 1–32. https://doi.org/10.1016/j.eist.2019.01.004.
Lamb, W.F., Mattioli, G., Levi, S., Roberts, J.T., Capstick, S., Creutzig, F., Steinberger, J. K., 2020. Discourses of climate delay. Glob. Sustain 3, e17. https://doi.org/10.1017/sus.2020.13.
Law, J., 1992. Notes on the theory of the actor-network: ordering, strategy, and heterogeneity. Syst. Pr. 5, 379–393. https://doi.org/10.1007/BF01059830.
Levy, D.L., Newell, P.J., 2002. Business strategy and international environmental governance: toward a neo-Gramscian synthesis. Glob. Env. Polit 2 (4), 84–101. https://doi.org/10.1162/152638002320980632.
Macdonald, G., 2017. Containing oil: the pipeline in petroculture. In: Wilson, S., Carlson, A., Szeman, I. (Eds.), Petrocultures: Oil, Politics, Culture. McGill-Queen's University Press, Montreal, QC, Canada; London, ON, Canada, pp. 36–77.
Malm, A., 2016. Fossil capital: the rise of steam power and the roots of global warming. Verso, London.
McAdam, D., 2021. Social movement theory and the prospects for climate change activism in the United States. Annu. Rev. Polit. Sci 24, 189–208. https://doi.org/10.1146/annurev-polisci-052918-020154.
Mitchell, T., 2011. Carbon Democracy: Political Power in the Age of Oil. Verso, London.
Newell, P., Paterson, M., 1998. A climate for business: global warming, the state and capital. Rev. Int. Polit. Econ 5, 679–703.
Paterson, M., 2021. The end of the fossil fuel age'? discourse politics and climate change political economy. New Politic. Econ. 26 (6), 923–936. https://doi.org/10.1080/13563467.2020.1810218.
Rinscheid, A., Rosenbloom, D., Markard, J., Turnheim, B., 2021. From terminating to transforming: the role of phase-out in sustainability transitions. Env. Innov. Soc. Transit 41, 27–31. https://doi.org/10.1016/j.eist.2021.10.019.
Seto, K.C., Davis, S.J., Mitchell, R.B., Stokes, E.C., Unruh, G., Ürge-Vorsatz, D., 2016. Carbon lock-in: types, causes, and policy implications. Annu. Rev. Env. Resour 41, 425–452. https://doi.org/10.1146/annurev-environ-110615-085934.
Sovacool, B.K., Hess, D.J., Cantoni, R., Lee, D., Brisbois, M.C., Walnum, H.J., Dale, R.F., Rygg, B.J., Korsnes, M., Goswami, A., Kedia, S., Goel, S., 2022. Conflicted transitions: exploring the agents, tactics, and outcomes of social opposition against energy infrastructure. Glob. Env. Change 73, 102473. https://doi.org/10.1016/j.gloenvcha.2022.102473.
Trencher, G., Rinscheid, A., Rosenbloom, D., Truong, B., 2022. The rise of phase-out as a critical decarbonisation approach: a systematic review. Environ. Res. Lett. 17, 123002. https://doi.org/10.1088/1748-9326/ac9fe3.
Turnheim, B., Geels, F.W., 2012. Regime destabilization as the flipside of energy transitions: lessons from the history of the British coal industry (1913–1997). Energy Policy 50, 35–49. https://doi.org/10.1016/j.enpol.2012.04.060.
Turnheim, B., Geels, F.W., 2013. The destabilization of existing regimes: confronting a multi-dimensional framework with a case study of the British coal industry (1913–1967). Res. Policy 42, 1749–1767. https://doi.org/10.1016/j.respol.2013.04.009.
Turnheim, B., Berkhout, F., Geels, F., Hof, A., McMeekin, A., Nykvist, B., van Vuuren, D., 2015. Evaluating sustainability transitions pathways: bridging analytical approaches to address governance challenges. Glob. Environ. Change 35, 239–253. https://doi.org/10.1016/j.gloenvcha.2015.08.010.
UNEP – United Nations Environment Programme, 2024. *Emissions Gap Report 2024: No more hot air … please!* Nairobi. https://doi.org/10.59117/20.500.11822/46404.
Wilson, S., Szeman, I., Carlson, A., 2017. On petrocultures: or, why we need to understand oil to understand everything else. In: Wilson, S., Carlson, A., Szeman, I. (Eds.), Petrocultures: Oil, Politics, Culture. McGill-Queen's University Press, Montreal and London, pp. 3–19.