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Original research article

## Discursive destabilisation of socio-technical regimes: Negative storylines and the discursive vulnerability of historical American railroads

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## ABSTRACT

Incumbent socio-technical regimes based on fossil fuels probably cannot be destabilised to the extent necessary to achieve major reductions in carbon emissions without significant policy action. Policy actors, however, remain loyal to fossil fuels. Effective transitions to sustainability will therefore require the identification of political vulnerabilities in fossil fuel regimes. This article identifies one such vulnerability in the form of negative storylines. It describes the development of these storylines using the multi-level perspective on socio-technical transitions, as well as four dimensions of frame resonance developed in social movement theory. It then illustrates this phenomenon using an historical case study describing the development of negative storylines portraying the American railways as abusive monopolists during the late nineteenth and early twentieth century. These storylines played an important role in destabilising the railways, particularly when they also faced pressures from road transport, as policymakers were unwilling to relax regulations on a regime whose key actors they believed could not be trusted. This article argues that this pattern is unlikely to be unique to this case, but is rather a common development in incumbent socio-technical regimes. This article concludes by considering some implications of these findings for the destabilisation of existing fossil fuel regimes.

## 1. Introduction

An adequate response to the challenge of climate change in the energy sector requires not only a rapid expansion of renewable energy resources, but also a major *reduction* in the amount of electricity generated by fossil fuels [1]. This will require significant policy action. Despite offering some support for renewables in the form of feed-in tariffs or research funding [2], however, policymakers are often reluctant to support either of these goals: Renewable energy projects often face political opposition, which often emerges in the form of negative discourses challenging new energy infrastructures. Fossil fuel energy, meanwhile, retains enough political and discursive clout to attract significant government subsidies [3]. Thus, the political situation of both renewable energy and fossil fuels will have to change dramatically for a transition to low-carbon energy to get the necessary political support.

One important finding of research about discursive conflict in energy systems is that local, “mundane” concerns, such as the noise and visual obstruction caused by wind turbines, or health concerns related to the development of unconventional gas resources, are more important barriers to the development of renewable energy than big environmental controversies [4–9]. One side of this that is under-explored, however, is the effect that similar concerns might have on the

dominance of the fossil fuel industry. Fossil fuels, as Grubert and Hewitt’s research (this issue) shows, are subject to their own set of complex, deeply-rooted narratives [10]. Appalachian coal mining, for example, is often seen in melancholic terms focused on its history and ties to local communities, while oil drilling is seen as exciting and novel but also capricious. These narratives, crucially, cannot be reduced to mere factual claims: they are deeply emotional, symbolic, and rooted in people’s experiences. This poses a problem for efforts to understand, and possibly shape, public perceptions of energy issues to support the development of renewable energy. It is not enough merely to popularise facts about technological and environmental issues; the evolution of big public narratives must also be taken into account. This has implications both for the narratives that emerge around renewable energies, and the narratives that might help to destabilise energy systems based on fossil fuels.

It is relatively easy to document the influence of negative public perceptions on renewable energy projects, as these occur in the present day and can be observed directly. It is more difficult, however, to document the effect that negative perceptions might have on the stability of incumbent fossil fuel systems, as there are few opportunities for direct real-time observation of the destabilisation of a technological system. While we can easily observe the impact of public discourse on the stability of fossil fuel energy systems, it is harder to imagine its

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potential impact on their future destabilisation. This, however, is an important piece of the puzzle for discussions about energy politics. Theoretical studies of big technological transitions typically identify the *destabilisation* of incumbent systems to be at least as important as the development of new systems to replace them [11–13]. This is also important in empirical analyses of incumbent energy systems, which show that their supporters have been able to use discursive and political power to disrupt renewable energy [14,15].

Given this background, then, an interesting question is whether the kinds of mundane public objections that block the development of new energy resources might, when acting on a longer time-scale, also disrupt incumbent energy systems. This question is the focus of this article, which investigates the sources of sustained negative storylines about an incumbent socio-technical regime, and the effects that these can have on the regime's stability. It uses an historical example of the collapse of the American railway regime to argue that incumbent energy systems might be vulnerable to the effects of destabilising storylines, not just in spite of their power and stability, but *because* of it.

## 2. Literature review

### 2.1. Discourse and policy in socio-technical regimes

To understand the discursive forces that might destabilise incumbent energy systems, it is important first to understand how these systems are stabilised in the first place. This is well accounted for by the multi-level perspective, which accounts for socio-technical transitions by reference to three conceptual levels [11,16]:

**The socio-technical regime** is comprised of stable, mutually-supporting linkages between technologies, policies, user practices, scientific knowledge, cultural categories, and financial arrangements.

**Socio-technical niches** are sheltered spaces, such as experiments or niche markets, which give new technologies an opportunity to develop without having to compete directly with the regime.

**The socio-technical landscape** includes exogenous developments, such as major economic or political shifts, wars, or cultural movements, which can sometimes destabilise the dominant regime.

Socio-technical regimes are likely to be stabilised by stable discourses, which turn new and unfamiliar things into “concrete and ‘objective’ common-sense realities” [17]. Stable narratives can provide meaning, and thus legitimation, to stable entities in the world, including socio-technical regimes [18]. Scholars have described discursive structures that contribute to the defence of a dominant socio-technical regime, through “symbolic lock-out” of competing technologies, through political strategies that “parry” the framings of niche advocates, or through widely-shared, stable representations depicting the socio-technical regime's dominance as a simple matter of common sense [15,18,22,23]. This is echoed by some more general perspectives on discourse in transitions, including Sheller's [24] cultural multi-level perspective, and Pesch's [25] account of transitions, both of which describe stable discourses supporting the incumbent regime. As Jensen [26] points out, however, regimes can be represented in multiple different ways, some of which might be negative. There has also been considerable research on how discursive change influences socio-technical transitions. Niches, for example, have been identified as being sustained by discursive efforts, including promissory visions and expectations of the future, and discourses legitimizing new technologies [19–21]. The landscape level is considered by Hermwille [18], who demonstrates that landscape events have to be interpreted discursively before they become meaningful.

Some other perspectives on discourse in transitions emphasize its role in processes of change. Kern's [27] institutional analysis indicates that radical change occurs when new discourses challenge and transform existing institutions. Elzen and Geels' [28] account of normatively-driven transitions argues that they are more likely when discursive pressures line up with other pressures on the incumbent regime.

Lawrence and Phillips' [29] account of whale watching shows how discourse develops to support emerging technologies and industries.

A common theme here is a focus on how *new* discourses support *new* technologies and systems. This is an important phenomenon, but it is not the whole story. Historical studies reveal that changing discourses attached to *old* technologies, such as the New York Streetcar system or the British coal regime, can play an important role in undermining them [30,31]. In both of these cases, these discourses had a clear policy effect, acting as a negative policy feedback [32,33] by which policies that were initially supportive of the regime contributed political developments that ultimately undermined it. On a more theoretical level, Bigelow et al.'s [34] concept of a *dormant issue* suggests that it might be possible for big problems that are not solved satisfactorily to create simmering resentments that might become important at a later date. There is, however, little in the way of a detailed theoretical model describing how these resentments might emerge in connection with incumbent regimes, and the effect this might have on a socio-technical regime's ultimate stability.

### 2.2. Conceptual framework

Hajer's [35] account of discursive storylines offers a useful unit of analysis for the study of regime-level discourses. Hajer defines storylines as “narratives on social reality through which elements from many different domains are combined and that provide actors with a set of symbolic references that suggest a common understanding” [35]. This account emphasizes storylines' importance in allowing actors to make sense of complex environmental problems such as acid rain, but the concept is also useful for understanding how actors make sense of complex socio-technical systems. All actions influencing a socio-technical niche or regime, as discussed above, are influenced by actors' *understandings* of that regime, which will of necessity be incomplete, inexact, and subjective. Storylines are therefore a crucial variable in understanding the choices made by actors in relation to the incumbent regime. A storyline, in the context of a socio-technical transition, can be defined as a single explanatory scheme integrating different observations, facts, experiences, and understandings of a socio-technical regime or a niche-innovation into a single narrative that is comprehensible to a wide audience. Storylines play a key role in the formation of discourse coalitions, or political coalitions of actors holding to similar discourses. These coalitions can in turn influence a regime's development. While storylines are not actively managed on a macro-scale, they evolve through the deliberate strategic efforts of actors opposing or supporting niche or regime technologies. The result is a set of competing storylines which, while not actively designed, nevertheless are the product of strategic competition.

The outcome of this competition is determined by which storyline scores the highest in a list of four elements of frame resonance, based on Verhees' [36] account of cultural legitimacy, and on Snow and Benford's [37] account of social movement framing efforts<sup>1</sup>:

**Empirical fit:** This refers to the fit between the storyline and widely acknowledged empirical facts about the world. A storyline portraying wind turbines as unreliable, for example, will have greater empirical fit if there are widespread reports of brownouts in energy systems that use wind turbines.

**Experiential commensurability:** This refers to the extent to which a storyline is consistent with the lived experiences of its intended audience. A storyline portraying an energy system to be too expensive, for example, will have greater experiential commensurability if this expense is reflected in consumers' bills.

<sup>1</sup> The category of centrality, which is used by Verhees as well as Snow and Benford, and which refers to the perceived importance of the topic to its audience, has been left out because this analysis does not consider the competition for attention between debates about the regime, and other public debates.

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