

# Chapter 12

## The Regulator, the Regulatee, and the End of the World as We Knew It



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**Abstract** The rapid breakdown of the climate has radical implications for hazardous industries and for the regulator–regulatee relationship. It will lead to an exponential increase in NaTech events, and as such will transform the scale and level of complexity of contingency planning. As most fossil-fuelled hazardous industries play an oversized role in overshooting planetary boundaries, these industries will need to transform radically or shut down. To tackle such challenges, the regulator–regulatee relationship needs to transform itself so as to still be relevant and impactful in a troubled future.

**Keywords** Climate change · NaTech events · Regulation · Existential risk

### 12.1 Introduction

Year-on-year temperatures recorded across the globe show a continuous, rapid warming path. Extreme weather events are multiplying at a pace and with an intensity that exceeds what scientific models had anticipated.<sup>1</sup> There is a marked acceleration in the signs of climate breakdown visible the world over.<sup>2</sup>

There is no logical reason whatsoever to assume that things will get better any time soon. Societies have been on the same path of exponential growth since the Great Acceleration (Steffen et al. 2015a) started in the 1950s, with ever more intense impacts on the Earth system. CO<sub>2</sub>, of which we are emitting more and more, stays in the atmosphere for centuries. Emissions of methane, which is a far more potent greenhouse gas than CO<sub>2</sub>, are increasing at a rapid rate that scientists are only starting to understand.<sup>3</sup> Several critical parts of the Earth system have or are about to pass the point of no return, including the West Antarctic and Greenland ice sheets, warm-water coral reefs, the Northern permafrost, and the Amazon rainforest (Ripple et al. 2021; Armstrong McKay et al. 2022), which will create even more disruption. And

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there is no tested technological fix that can be deployed at scale in time to revert it all. Instead, the climate is evolving so quickly, scientists tell us that we cannot hope to adapt to it rapidly enough.<sup>4</sup>

It is the end of the world as we knew it, and therefore, it is also the end of ‘business as usual’.

In this chapter, I explore what it means for hazardous industries and the regulator–regulatee relationship (hereafter RRR) to enter ‘business as unusual’. The question I seek to answer is not: “should the RRR change?” In a radically transformed and transforming world, it would be preposterous to claim that anything can continue as it is. Instead, the question I seek to answer is: “how should the RRR transform itself to be relevant and impactful in future?”

## 12.2 Three Perspectives on the Regulation of Hazardous Industries

Let me begin by outlining three different rationales for regulating hazardous industries and thus three different roles for the RRR.

The first one is rooted in economism, the dominant ideology since the third quarter of the twentieth century. It argues that regulation is there to address market failure. The market generates hazards, but it is not good at managing them. These “externalities” have ranged from chronic pollution to occupational diseases and accidents, and the occasional major disaster. In that perspective, the RRR exists to ensure those externalities are addressed over time, repeatedly bringing the attention of the regulatee back to those dimensions its economic rationality supposedly leads it to ignore. Because these externalities are technical in nature (not only in terms of what causes them but also of what impacts they have on the world), the RRR is also technical in nature. It is worth noting that the RRR has usually ignored the systemic externalities of hazardous industries, such as climate change or cascading biodiversity loss.

The second perspective is rooted in history. The regulation of hazardous industries grew in response to social tensions, in the context of industrial development within and in the vicinity of cities. Regulation aimed to manage those tensions while enabling the growth of industry (Fressoz 2012). A shorthand for the role of regulation was therefore to make hazardous industries “acceptable” to society. There have been strong economic interests at play, then and now, that the regulation of industrial risks has spearheaded while taming criticism and protest. In that perspective, the RRR is there both to address society’s angst and to protect industry from it. The widespread acceptance of fossil-fuelled refining, chemicals, agriculture, plastics, and tourism may be seen as a testament to the successful taming of societal concerns.<sup>5</sup>

The third perspective is rooted in time. Regulation is there to preserve equilibrium over time, as implied in such expressions as “body temperature regulation”, for example. Applied to societies, equilibrium is the preservation of societal functions such as sustenance, order, consensus, or communication (noting that various societies

have different ways of fulfilling these functions). It is about endurance and maintenance (Caye 2020). Nowadays, hazardous industries contribute to an oversized share of crucial functions: the supply of energy, food, health, transportation, and communication. A core role of regulation has been to ensure that such functions could be delivered through the *continuous safe operation* of hazardous industries (refining, air and rail transport, nuclear fission, etc.) The regulator's continuous surveillance and steering of such crucial functions has been channelled through the RRR.

### 12.3 The Future of Hazardous Industries and Risk Regulation Regimes

Hazardous industries and the outer world are in a so-called double materiality relationship: there is what the world does to the industry, and there is what the industry does to the world.

The impact of a rapidly warming world on hazardous industries is multifarious (Garcia et al. 2021). Droughts pose significant challenges for industrial processes that need cooling. They reduce water supply in case of fire. Heatwaves raise cooling needs that may go beyond design expectations. They affect workers' capacity to carry out their tasks, to respond to unexpected events, and they make human error more likely. Heatwaves may make stored substances that react exothermically more dangerous. Buckling rails and roads, melting tar may interrupt supply of raw materials but also make it more difficult or impossible for emergency services to reach a site in case of an accident. It could affect the structural integrity of site platforms, e.g., at chemical plants. Droughts and heatwaves create conditions for wildfires that may reach industrial sites. Excessive air temperature makes it difficult and, beyond a certain point, impossible for planes or helicopters to take off and fly at low altitude, also undermining emergency response capacity. Flooding and submersion may close off emergency routes, precipitate uncontrolled shutdown of hazardous processes, threaten the continuous cooling of certain stored materials (peroxides) by shutting down generators, and lead to contamination of the wider environment if containment of hazardous substances is breached. High winds and storms can shut down power lines and affect buildings.

In sum, extreme weather will lead to an exponential growth in 'NaTech' events (see e.g., Mesa-Gómez et al. 2020). While not directly triggered by industry, these events will therefore lead to an exponential growth in industry's "externalities", taking the meaning of "market failure" to a whole new level. NaTech events will add to the growing anxiety about climate change and rejection of fossil fuels, making it ever more difficult to make hazardous industries "acceptable" to society. The multiplication of NaTech events will also break any pretence that it is possible to continuously operate hazardous industries safely. Indeed, it would be reckless to keep all or even most hazardous industries *on* when circumstances (e.g., a sustained + 50 °C heatwave) make emergency response extremely difficult, if not impossible.

Another laundry list of challenges emerges when one considers the impacts of industry on the world (Sterner et al. 2019). Fossil fuel extraction and processing play an outsized role in driving climate change, ocean acidification, and aerosols pollution. Fossil fuels and chemical processing drive the dramatic overshooting of the recently measured planetary boundary for novel entities (Persson et al. 2022). The chemical industry together with mining plays a major role in the breakdown of biogeochemical flows (principally phosphorus and nitrogen). Transportation contributes greatly to aerosols pollution and, for air travel in particular, climate change.<sup>6</sup>

(Most) hazardous industries are, therefore, the problem. From a regulatory perspective, the understanding that the “externalities” of hazardous industries extend to undermining humanity’s future on Earth is, alas, a novelty. The social unrest that scientists expect will materialise as a result of water and food scarcity, compounded by mass climate migrations, dwarfs the regulator’s concern with making hazardous industries acceptable to society. Above all, reaching an equilibrium and safeguarding societal functions can only mean pushing industries not only to operate within the boundaries of safe operation (Rasmussen 1997) but also within planetary boundaries (Steffen et al. 2015b). Indeed, scientists, the UN, and various social movements openly call for the immediate “phasing out of fossil fuels”, which implies the radical transformation or shutdown of most hazardous industries. Whether these industries’ role in taking us all outside the “safe operating space” of planetary boundaries can be reversed is a critical question, one that mingles engineering—is it possible to re-engineer these industries very rapidly?<sup>7</sup>—economics—should the industry be greened or should it be downsized?—and sociology—can societies withstand withdrawal from the services and products delivered by hazardous industries?

## 12.4 The Future of the Regulator–Regulatee Relationship

These challenges justify an urgent transformation of the relationship between regulator and regulatee. As a first attempt at rebuilding the RRR, I consider below what needs to change (or not) in order to make it relevant and impactful.

1. **The RRR needs to work swiftly.** In its current form, RRR is rhythmized by complex studies and counterstudies, which take time. Timescales for the more costly changes are negotiated. Not only is this far too slow compared to the urgency of a rapidly unravelling Earth system. It is also a notoriously flawed exercise that tends to favour business interests and undermines all others. Instead, both contingency planning for NaTech events and profound technological changes (including the termination of operations that are neither critical nor rapidly adjustable) need to proceed swiftly.
2. **The goals of the RRR should be aligned with planetary boundaries.** At present, regulators may not act decisively on lapses unless they cannot be hidden from third parties (Etienne 2015). They negotiate the scale of improvements in face-to-face discussions, effectively putting the relationship above and against

other interests (Etienne 2013). The boundaries for safe operation they consider are those of the organisation they regulate, but they ignore the far-ranging impacts of those organisations on the Earth system. When industrial activities cannot be redirected rapidly to operate within planetary boundaries, then they should not be authorised, unless a very robust case about their critical importance can be made.

3. **The RRR needs an effective toolkit.** The regulator's toolkit and the written and unwritten rules that govern it are a historical construct, embedded in legal traditions and legal systems, which regulators navigate according to their perceptions of what deserves escalation, what they expect the legal system will accept as worthy of its limited resources, and of their own style of regulating (see e.g., Hutter 1997). The tools at hand also lack the flexibility that would enable parties to the relationship to adapt to the challenges, which would require not only the ability to try things but also to terminate them (Romano and Levin 2021). Instead, a far more impactful set of instruments and a much greater readiness to use them is required to drive rapid and effective change.
4. **The RRR should be about technologies.** To accompany businesses towards exploring and implementing technological solutions that cut their impacts on the Earth system drastically, regulators need to rapidly consider the value (and the risks) of alternatives. The RRR in the regulation of industrial hazards is already focused on technologies. In fact, few regulators have as much visibility of and leverage over the technological choices of businesses as those overseeing hazardous industries. The state agents regulating those industries have themselves a good degree of technological literacy, which is a necessary condition for a meaningful dialogue to take place. It is a fertile ground for a rapid upskilling of both regulator and regulatee, to bring back the industry within planetary boundaries.
5. **The RRR should be about organisations.** Tackling industrial practices also means tackling organisations. The organisational side of risk has been considerably studied and it has become, slowly, a dimension of risk regulation that regulators are aware of. Strategies have been devised for regulators to use on organisations (Hopkins 2007), which can help drive home the message that decisive action is needed fast.
6. **The RRR should invest in building shared understanding.** A shared understanding (and trust) can build over time through repeated interactions. This can be a hindrance to change: shared views and a shared past are both easier to go back to and difficult to shed. Nevertheless, understanding of the scale of the Earth system crisis is sinking in, particularly among young engineers, at different speeds and through different ways, both within public administration and across different sectors. This process can be facilitated and quickened in the regulator–regulatee relationship, to achieve the common understanding necessary for decisive action to then be discussed. It is all the more so since conversations between regulator and regulatee on industrial hazards and risk commonly trade in the concepts and tools that are the bread and butter of the scientific and policy discussions on climate change: models, scenarios, probabilities, and impacts. This is fertile

ground to incorporate concepts of planetary boundaries into the risk governance of high-hazard industries (Cosens et al. 2014).

7. **The RRR should be about grounding planetary issues at the local level.** Its reach all the way down to the local level makes the RRR a valuable forum. As several commentators have noted, climate mitigation and adaptation need not only to be thought about and acted on at the global level. It is also crucial to translate them and to explore in depth their implications at the local level (Bonnet et al. 2021). Transforming industries affects not only sites but also the wider ecosystem of social and economic relationships that are tightly linked to those sites. In this regard, the RRR is often already set at the right level. Where members of the local community have been involved in the conversation about regulating industrial hazards—which has been increasingly the case in the past two decades—a framework already exists to build a shared understanding of what needs to be done, why, and how it may be done.

## 12.5 Conclusion

I have argued that the existential risk of the Earth system breakdown (including climate change and biodiversity loss) poses a critical challenge to the RRR. It cannot be maintained as it is. Business as usual is a self-defeating strategy, whether one thinks of regulation as a solution to market failure, a way of making hazardous industries acceptable, or a way of ensuring the safe operation of industries that deliver core services and products to society. The RRR will need to substantially change, in particular to make the boundaries of safe operation for individual sites work within the planetary boundaries. This can only be a collaborative effort or else it will fail. Indeed, decarbonising high-hazard industries or decommissioning them affects many more actors than workers and neighbours. Hazardous industries hold central functions in the current economy, with countless other sectors depending on them. It will not be possible to make significant progress unless those other sectors, those who regulate them, and the broader supply chains (which may well extend beyond the jurisdiction of the state) also transform themselves within the same timelines. The RRR needs to be a crucial node in that collective endeavour.

## Notes

1. <https://www.nationalgeographic.com/environment/article/climate-change-already-worse-than-expected-un-report>.
2. <https://www.visionofhumanity.org/global-number-of-natural-disasters-increases-ten-times/>.
3. <https://www.theguardian.com/environment/2022/jul/05/global-heating-causes-methane-growth-four-times-faster-than-thought-study>.
4. <https://www.theguardian.com/environment/2022/jun/01/we-cannot-adapt-our-way-out-of-climate-crisis-warns-leading-scientist>.

5. This is not the handiwork of regulators alone. The explosion of advertising has done much to normalise fossil fuelled consumerism.
6. Some hazardous industries, like nuclear energy and rail are seen as potential solutions under the assumption that they would be developed as *replacement* for fossil fuelled energy or transportation, a hypothesis that has no bearing in past or recent history; see Fressoz, J. B. (2020) *Le mythe de la transition énergétique*, in Laurent Testot (ed.) *Collapsus*, Albin Michel.
7. Energy expert Vaclav Smil, echoing the view of many others, argues that it is not possible: <https://www.latimes.com/business/story/2022-09-05/the-energy-historian-who-says-rapid-decarbonization-is-a-fantasy>.

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