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Web:	http://valuationstudies.liu.se
E-mail, editors:	editors.valuationstudies@gmail.com
Twitter:	@Val_Studies

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Theme issue editorial

Revisiting Critique: Introduction to Valuation and Critique in the Good Economy

Kristin Asdal and Liliana Doganova

As we were writing this editorial, we learned with immense sadness of the passing of Michel Callon on 28 July 2025. His thinking has shaped the ways we study markets, valuation and the economy. It has spurred and enabled much of the analyses presented in the pages of this journal. His view of markets, inspired by the social studies of science and technology, is a powerful springboard to tackle many of the issues raised by processes of valuation in the economy and beyond. The topic addressed in this theme issue – valuation and critique in the good economy – is no exception. The introduction to the second part of the theme issue explores this topic with Michel Callon as a companion, putting emphasis on how his work sheds light on our inquiry. We would like to dedicate this editorial to Michel Callon as a humble contribution to the acknowledgement of the legacy of his writings for all scholars interested in the economy.

Kristin Asdal is Professor and Centre Director at TIK Centre for Technology, Innovation and Culture at the University of Oslo.

Liliana Doganova is Associate Professor at Centre de Sociologie de l'Innovation, Mines Paris, PSL University.

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The concept of "the Good Economy" (Asdal et al. 2023) was proposed to denominate economies and situations where practices and instruments are set out to work towards combining what is often understood as "economic" purposes (profit, growth, return on investment) *and* other forms of "goods". [1] The intention with this concept was to call for attention to these kinds of practices and situations, which we think are in fact becoming increasingly prevalent, *and* to propose a distinctive analytical approach to investigating them. This editorial introduces the second part of the theme issue on valuation and critique in the good economy. While the introduction to the first part of the theme issue (Asdal and Doganova 2025) focused on the problem of valuation in the good economy, we engage here more directly with the problem of critique. We explore how critique intertwines with valuation, what role it plays in the good economy and how in turn the good economy shapes the form and purpose of critique. How should one critique an economy which purports to be good? What are and could be the relations more generally between the good economy and critique? What forms of critique are triggered by good economies and what can we perhaps learn about critique through the lens of the good economy?

The twin element of "the good economy" in the sense of being both a thing in the world and an analytical approach has in fact its parallel in two forms of critique: we are interested, on the one hand, in how the actors that are part of this thing we denote the good economy perform forms of critique, and, on the other hand, in how the good economy triggers reactions from us as scholars who study it, which we then work towards articulating, substantiating and developing.

The issue of critique is not new to valuation studies (Doganova et al. 2014) and to the pragmatic sociology traditions from which this field has drawn inspiration. In this editorial, we revisit important but lesser-known contributions on this issue of critique conducted from a pragmatic sociology stance which are linked to two traditions, one that stems from the work of Michel Callon and one from the work of Luc Boltanski. We put these traditions to work to reflect on how critique and the study of the good economy can be conducted together. We use contributions to the two theme issues to look for openings as well as limits to how critique is, and could be, dealt with within these traditions.

We start by showing that the problem of critique is central in both lines of research but takes different forms: the study of controversies in one, and the study of justification in the other. We then follow how this

[1] We would like to thank the STS group at the TIK Centre for Technology, Innovation and Culture at the University of Oslo for its generous reading and helpful comments for clarification on the occasion of presenting a draft version of this introduction. We also want to express our gratitude to José Ossandón and Trine Pallesen for their careful reading and commenting on the manuscript.

problem has been addressed more specifically in their work relating to markets and capitalism, paving the way for a discussion on critique in the good economy. One criticism that the pragmatic approaches proposed by Callon and Boltanski faced, and that we also encountered while working on the analyses of the good economy presented in this theme issue, was that of their own critical capacity. In what follows, we revisit responses that Callon and Boltanski gave to such criticism in two articles written in French: an article titled "*Ni Intellectuel Engagé, Ni Intellectuel Dégagé: La Double Stratégie de l'attachement et Du Détachement*" (Neither Engaged nor Dis-engaged: The Double Strategy of Attachment and Detachment), which Callon published in the journal *Sociologie du Travail* in 1999, and an article titled "*Sociologie Critique et Sociologie de La Critique*" (Critical Sociology and the Sociology of Critique), which Boltanski published in the journal *Politix* in 1990. We reflect on how their ideas on the critique and intervention afforded by pragmatic sociology can be taken up and problematized in the study of the good economy today.

Controversies, justifications and matters of concern

As an earlier editorial of *Valuation Studies* put it, "critique and valuation are two angles for considering the same thing" (Doganova et al. 2014, p. 88). Indeed, the editorial suggested, valuation as a social practice can be studied as a kind of critical examination of value, and, conversely, critique itself can be studied as a kind of valuation practice. It is not in fact surprising to find critique at the core of valuation studies. Interest in critique is common to the two pragmatic sociology traditions from which, as we have shown elsewhere (Asdal et al. 2024), scholars in valuation studies generally draw: analyses of markets and the economy inspired by Science and Technology Studies, and Actor-Network Theory in particular, namely works by Michel Callon and Fabian Muniesa (Callon 1998; Callon et al. 2007; Muniesa 2011; Geiger et al. 2024), and the sociology of critical capacities, namely works by Luc Boltanski, Ève Chiapello and Laurent Thévenot (Boltanski and Thévenot 2006; Boltanski and Chiapello 2005). This interest in critique is not surprising either, as these two traditions emerged in response to critical sociology and Pierre Bourdieu's theory of fields which viewed actors as driven by forces whose effects the sociologist, observing from a distance, can reveal (Guggenheim and Potthast 2012). The response from pragmatic sociology coincided with a broader turn, including in STS, away from what often went under the name of critical theory which shared the same features with regard to the role and capacities of the analyst. With the pragmatic turn, critique ceases to be the prerogative of the sociologist but becomes instead an activity performed by the actors that the sociologist studies.

In STS, and in ANT in particular, moments of critique have often taken the form of controversies. Controversies are the empirical site

where the analyst can observe "science in action" (Latour 1988). In other words, in controversies, a lot of what is often black boxed is opened and, in Latour's expression, matters of fact become matters of concern. In this way, controversies augment the analyst's capacity because she can build on the actors' critique when engaging in the "description" of technologies (Akrich 1992). But controversies are not only helpful for the analyst. One of Callon's strong arguments is that controversies are not a pathological state, soon to be corrected by the forces of equilibrium or by the power of the strongest, but a general rule and a productive force. In his early formulation of the sociology of translation (Callon 1984), controversies were depicted as putting as much uncertainty on the social as on the scientific or the technical.

This view of controversies as productive remained stable as Callon's analysis expanded from the study of science and technology to that of democracy and economy. In his work on technical democracy, controversies are described as a mode of exploration of possible states of the world (Callon et al. 2001). In his work on markets, the controversy dynamic can be found in the dual concept of framing and overflowing (Callon 1998), and in the role given to "matters of concern" in the evolution of markets (Callon 2021). It is because they relentlessly produce matters of concern that markets contribute to what Callon called (borrowing an expression coined by Marilyn Strathern (Strathern 1999)) the "proliferation of the social".

In the other pragmatic sociology tradition that has nourished valuation studies, critique has taken the form of practices of justification that appeal to manifold, and sometimes conflicting, "orders of worth" (Boltanski and Thévenot 2006). The move away from Bourdieu's "critical sociology" to a "sociology of critique" was foundational for the sociology of critical capacities (Boltanski 1990). Critique was no longer an activity reserved for the sociologist studying actors from the outside and observing that which they could not see, revealing to them the forces of the fields that drove their action. Critique was what actors themselves did, and the role of the sociologist was to account for their "critical capacities".

The resonance with the sociology of critical capacities appears clearly in Callon's work on markets. His approach departed from two types of critique that the social sciences had commonly put forward with regard to markets. The first approach was the critique by economic sociology, which targeted the capacity of economics to account for the functioning of markets: markets in general (sociologists argued), or at least some markets, cannot be explained with the tools economics has developed to study markets but with the tools that sociology has developed to study societies (tools such as the concepts of trust, networks, reputation or judgement). The second one was the critique put forward by political economy, which targeted the effects that markets generate and the expansion of markets into other,

non-economic, spheres of society and nature. Callon's proposition was to look for critique in markets themselves. Like social actors in moments of controversy and justification, markets produce critique which takes the form of "matters of concern" (Callon 2007).

The ways in which markets address and produce matters of concern have been examined in the market studies literature, for example in the edited volume on "concerned markets" (Geiger et al. 2014) focusing especially on how markets are designed for multiple values and how markets for particular goods may become encapsulated in controversy, turn into hot issues and so spur matters of concern. In the introduction to a special issue on "markets for collective concerns and their failures", the editors (Frankel et al. 2019) also engage with Callon's approach but rather question the optimistic idea implied by the notion of civilizing markets. The failure of markets, or of market-based policy instruments implemented as a response to collective concerns, does not necessarily trigger democratic forums, it rather facilitates the consolidation of technical expertise such as expertise in market design.

An optimistic view of markets goes hand in hand with an emphasis on the productiveness of controversies and moments of critique. As we noted above, in Callon's analysis controversies remake society in rather unpredictable ways, producing new issues and entities. By contrast, Boltanski and Thévenot's (2006) model of the orders of worth appears more directed towards how society remains stable across moments of justification. Stability here comes from the consistency of a set of orders of worth to which actors appeal and which can be observed across the variety of justifications. In Boltanski and Chiapello's (2005) historical analysis of how capitalism has been reshaped in response to various forms of critique, one can find critique as a productive force, partly echoing Callon's view. One of the key theses here is precisely that the critique of capitalism fuels, redirects and in part helps capitalism to develop and renew itself. Hence, controversies and critique are indeed productive, but in this framework are observed as not only moments of improvement but also moments that are quite problematic. The critique helps capitalism to remain stable as a system by integrating the critique which enables it to renew itself. So, how to critique an economy which thrives, so to speak, on critique?

The concerned sociologist, or *where* is scholarly critique?

The pragmatic sociology approach has faced the accusation that, by approaching critique as the very manifestation of society that the sociologist should study, rather than the contribution that the sociologist could bring to society, it risks losing its own capacity to be critical. If Bourdieu's critical sociology held the promise to help social actors emancipate themselves by revealing to them the field forces that

moved them, how could pragmatic sociology help social actors? Is it enough to describe the dynamics of controversies and the principles that underlie justifications? Does this mean that the sociologist needs to forsake the ambition to intervene by, say, altering the trajectories of controversies or adding to actors' orders of worth? Does abolishing the distance between the actors and the analyst entail the end of sociological critique? While some might find these questions enough to abandon Callon and Boltanski altogether, we propose to pay attention to their response. Indeed, such questions have also led Callon and Boltanski to clarify their positions and the capacities of their frameworks to engage with actors and intervene in debates. We present the responses they proposed in two articles published in the 1990s in French (that, to our knowledge, have not been translated into English).

Callon's response was to treat sociology as STS had treated the natural sciences (Callon 1999). Similar to how ANT scholars see the scientists they study not as revealing the functioning of nature that exists out there but as speaking for the entities that are performed through their experimental apparatus, one could see the sociologist as a "spokesperson" for the entities – such as social movements or social categories – that she performs. This process of "performation" operates through tools rather than concepts: Callon cites tools like surveys, questionnaires, factor analysis – and we could add, referring to his own work, controversy analysis and hybrid forums. Such "performative" sociology, as Callon calls it, makes a "transfer of competency": "what used to characterize the sociologist's know-how now serves to define the actors who equip themselves with the tools that allow her to reconstitute these invisible threads and to act on (and with) them" (Callon 1999: 71, our translation).

If the relationship between the actors and the sociologist is one of cooperation, the choice of actors with whom the sociologist associates becomes crucial. To ensure the quality of the knowledge that she produces, the sociologist, according to Callon, needs to "ally with actors considered as competent (in the sociological sense), facing problems that suppose a good dose of reflexivity" (Callon 1999: 73, our translation). But then, one could ask, what does the sociologist give to the actors – those with whom she allies and those with whom she does not ally? Callon's answer here is once again driven by his theory of science: if the production of scientific knowledge relies on the extension of networks through which locally produced knowledge is transported, embodied in people and devices, thereby gaining more and more generality, the role of the sociologist could well reside in her capacity to transport the knowledge that she produces with the actors with whom she allies to other sites and other actors. It is these "transport operations" that distinguish the sociologist from the actors. We quote Callon at length:

> What the actors, who are engaged in the experimentation of new forms of action, identity and organisation, weave, the sociologist, thanks to her own competences, makes appear, expresses, makes explicit, makes manipulable and assessable. It is precisely in this work of explicitation that the possibility of generalisation can be found. The only contribution of the social sciences, and it is an immense one, is to participate with the actors themselves in forming the lessons that can be drawn from an ongoing collective experience, always singular, in order to express its possible generality and transport it elsewhere, hoping that other actors will be convinced by the equivalence and will seize it. (Callon 1999: p. 74, our translation).

Callon's analysis suppresses the distance between the actors and the sociologist as a necessary condition for producing both science and critique. For him, science does not emerge from "taking distance" but from "the double movement of cooperation and transport, of attachment and detachment" (Callon 1999: p. 75, our translation). This movement creates asymmetries. By providing the actors (to whom she attaches) with tools that help them to learn from their experimentations and endow the local knowledge that they generate with greater generality, the sociologist increases their power. Callon assumed this responsibility when referring to the work on and with patient organizations that he was conducting with Vololona Rabeharisoa at the time (Rabeharisoa and Callon 1999): increasing the power of the rare diseases patient organization that they studied could counterbalance the power of other actors such as companies and public research organizations. Thus, Callon reconfigures the landscape composed by the actors and the analyst and invites us to rethink the problem of the distance between them. If the analyst is able to play a scientific and a political role, it is because she can move between different actors and transport what emerges locally to other sites.

The problem of distance is crucial too for distinguishing Boltanski's sociology of critique from Bourdieu's critical sociology (Boltanski 1990). In the latter, the capacity of the sociologist to observe that which the actors cannot observe rests upon the possession of a specific know-how (the scientific method) and an exterior position (the scientific laboratory). However, Boltanski argues that this distance collapses as soon as one considers the fact that actors use the knowledge produced by the sociologist in their own critique. From this perspective, it is the "reports" produced by the sociologist that move and supply actors with additional resources.

This does not mean that the sociology of critique forsakes a position of exteriority. As Boltanski writes, "After all, exteriority is what defines critique. To perform critique means to disengage from action in order to access an external place from where action can be considered from a different point of view" (Boltanski 1999: 131, our

translation). The orders of worth in Boltanski and Thévenot's model provide precisely the possibility of reaching such an exterior position: exteriority is produced when a new order of worth, which was not convoked in the situation under consideration, is introduced to it and brought to bear on it. In Boltanski's terms, the sociology of critique needs "an exteriority of a higher rank than the one critical sociology settles for" (Boltanski 1990: 131, our translation); its objective is to reconstruct the "critical space" in which a conflict unfolds. The asymmetry between the sociologist's and the actors' positions remains: the sociologist has the resources (among which are time and a laboratory) that enable her to confront actors' statements in the same space and to submit them to her analysis with the aim being "to make explicit and to clarify" (Boltanski 1990: 132, our translation).

Callon's and Boltanski's reflections shed light on *where* scholarly critique might reside in a pragmatic sociology approach, and how issues of distance and exteriority might be rethought. They also raise several difficult questions. In the double movement of attachment and detachment, should the sociologist, aware of the asymmetries that she creates, seek to ally with the less powerful? Who are the less powerful anyway? And should she espouse the role of taking her actors further to other sites so that they can grow in significance? Or, seen from a different angle, aren't the less powerful those whom the sociologist will be less likely to engage with, because they do not have the resources to conduct the experiments that the sociologist would tend to study?

One striking feature in both frameworks is the focus on the sociologist as an individual, either circulating between sites or collecting reports in her laboratory, which makes invisible academic institutions, scholarly traditions, other disciplines and the scientist's own ethos and grounding. While transferring competencies to the actors, what happens with the competencies of the sociologist? How do we account for her own knowledge and theories? Because critique is also about helping to develop the analyst *and* the scholarly field to which she belongs in joint efforts to develop critical capacities.[2]

With these caveats in mind, how can Callon's and Boltanski's reflections guide us in our exploration of the "good economy"? Can the role of the analyst still be described as collecting and making explicit, transporting and confronting, to her own models or other empirical sites, what actors do and say? Can the analyst, so to speak, "travel freely" in the good economy, attaching and detaching herself from the actors on and with whom she works? Can she still consider herself to be in a position of exteriority? These are the questions to which we now turn.

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[2] We want to thank Maka Suarez who drew our attention to this latter point.

The Good Economy as a critical problem

How to critique an economy which positions itself already as a normative project geared to speak towards the good? In this theme issue we observe and take an interest in the normative positioning of actors in the "good economy" and how the normative is, in many and indeed different ways, integral to these economies. And we also observe how promises of doing good are explicitly made and sometimes also used strategically by relevant practitioners. Hence, the "good economy" is just as much a problem to be investigated, as a diagnosis. With Boltanski and Thévenot, we could perhaps then proceed to ask: What are the critical capacities of the actors in the good economy? And what are the sources of justification from which their critical capacities are being nourished and cultivated?

In our initial analyses of the good economy (Asdal et al. 2023) we observed how "the good" was not simply about producing good outcomes, but also about "the stuff" from which economies are manufactured. In EU programmes developed to support the bioeconomy, for instance, we observed how "the good" was imagined as lying with the biological (the bio) from which the economy was attached and made. It was as if "the bio" of the bioeconomy, was a form of guarantee of the economy's goodness and thus also served as a form of justification for this economy. An important form of critique, then, can be to investigate the economy more closely not only as a concerned economy or as a concerned market, but also in its concrete and heterogeneous material and living forms, in other words the "stuff" from which it is composed. The economy, which is now often termed an "economy in transition" from the bad fossil economy to a new supposedly good economy based upon renewables, produces its own "bads" which ask for scrutiny. But again, how to critique an economy which defines itself already as a good economy? Does this perhaps also urge a more explicit normative positioning of the analyst or is it just as much about doing critique somewhat differently?

One of the difficulties that the pragmatic sociologist is likely to face when studying the good economy stems from an observation that we made earlier in this article: in the good economy, actors sometimes explicitly and strategically use critique to value or devalue. For example, a good economy's effort to create "green growth" implies the existence of a bad economy, whose valuations are depicted as problematic, possibly insufficient, or even perhaps wrong or misleading. Good economy actors, for example the impact investors described by Kaja Lilleng in her article in this issue (Lilleng this issue) or the carbon market tool providers described by Kamilla Karhunmaa in her article in the first part of this theme issue (Karhunmaa 2025), base their business on the critique of a bad economy. Conversely, actors operating in industries that come to be part of a bad economy, such as the road companies described by Roman Solé-Pomies in his

contribution to this issue (Solé-Pomies this issue) or the mining companies described by Tobias Olofsson in his article in the first part of the theme issue (Olofsson 2025), integrate critique and must learn how to respond to it. Critique also shifts the lines demarcating good from bad economies, as Marie Widengard shows through her analysis of the reclassification of a material called PFAD (palm fatty acid distillate) from residue to co-product, and hence from being part of the good sustainable biofuel economy to being part of the "bad" palm oil industry (Widengard this issue).

A vivid illustration of the strategic use of critique is provided by Tobias Olofsson's description of how mining companies reply to contestations from local communities, stakeholders and NGOs (Olofsson 2025). Olofsson examines how mining industry actors justify the "goodness" of their industry and "unpacks" the structure of their justificatory claims, outlining several semiotic strategies: balancing costs and benefits, resorting to greenness as a signifier of goodness as well as to strategies for comparing. What is the critical potential of "unpacking" justifications? We suggest that by making explicit the structure of justifications, such analysis can enhance the critical capacities of actors – not only the mining companies examined here but also the local communities, stakeholders and NGOs to whose critique they respond – and scholars – from valuation studies but also other disciplines concerned with mining as an empirical reality. Once unpacked, justifications can be taken on and diverted to other aims.

Stine Engen's contribution opens a complementary path for the pragmatic sociologist examining the "reports" that actors produce to formulate and respond to critique (Engen 2025). Building on Tellmann (Tellmann 2016), Engen urges us to examine the "tools of critique" that central banks mobilize when dealing with the problem of climate change. The concept of "uncertainty", which has the interesting characteristic of being shared by sociologists and actors, is one such tool. Engen shows how central banks have used uncertainty to "twist" critique from a critique of their expertise (to which they would be likely to be subjected) to a critique of the models that they may use (which, they argue, could be reformed).

Engen's analysis illustrates that we can move from the structure of justifications to the tools that actors use. This unpacking requires analytical tools, one of which is the notion of "de-scription" proposed by Madeleine Akrich (Akrich 1992). The description of valuation devices can play a twofold role: to help concerned groups to engage with expertise (pertaining to technology, economics or public policy), and render visible and debatable the assumptions embedded in different valuation devices, the effects that they induce and their modes of economization (Doganova 2019).

As José Ossandón and co-authors show in their article in the first part of this theme issue, the analysis that ANT scholars made of

technical objects and that valuation scholars made of market devices can be pursued for other tools, like policy instruments (Ossandón et al. 2025). Building on ANT and semiotic analysis (Greimas in particular), they identify the actants inscribed in policy instruments that were introduced to foster the development of wind power in Denmark, and hence the good economies that they sketch. By conducting a historical comparison of three different policy instruments, they also show how the current good economies of wind power are also a critique of previous forms of conceiving good and bad instruments.

In her article in the second part of the theme issue, Marie Widengard sheds light on another kind of valuation tool: classification systems in regulatory procedures which distinguish between substances defined as "residues" or "co-products" and thereby alter their valuations (Widengard this issue). She shows how controversies led to the "de-scription" of PFAD as residue and its "re-scription" as co-product, which was made possible through an amendment of the regulation on sustainability criteria for biofuels. In this case, the revaluation of a substance, and hence the redefinition of the "good economy" of which this substance could be part, entailed reforming the tools of valuation. In his article in this second part of the theme issue, Roman Solé-Pomies examines another valuation tool: software developed by the French business association of roadworks companies so that local governments issuing public orders can compare the environmental impacts of different technical solutions that are proposed to them (Solé-Pomies this issue). He shows that this tool contributes to a good economy of infrastructure by enacting a particular version of the environment (the "additive environment") which redistributes the state's and the industry's ability to address ecological concerns.

Tools of valuation and the broader valuation arrangements of which they are often part may make up distinct versions of economization understood as patterned or semi-stabilized economic forms and ways of doing economy (Asdal and Huse 2023). Observing and identifying such "versions of economization" can itself be a form of critique. Here then, critique is about forms of unpacking, "re-scripting" and reformulating the entity and phenomenon at stake.

The Good Economy as critique by other means

Another difficulty that the pragmatic sociologist is likely to face when studying the good economy is that, because it is saturated with normativity, the good economy urges the analyst to position herself. The temptation to argue with actors claiming to do "good" can be strong: shouldn't we object to the claims to goodness made by mining companies (Olofsson 2025), innovators in the pharmaceutical industry (Brueckner Johansen et al. 2025), road companies (Solé-Pomies, this

issue), impact investors (Lilleng this issue), carbon markets professionals (Karhunmaa 2025), bioeconomy promoters (Krüger and Paulsson 2025), regulators in the biofuels industry (Widengard this issue), urban planners (Nordstrand Frantzen 2025), central banks (Engen 2025; Violle this issue), etc? Do we want to enhance their critical capacities and to transport the knowledge they produce? Do we want to ally with actors who have gained power by skilfully combining orders of worth and offering their help in addressing matters of concern?

It is noteworthy that the great majority of articles in this theme issue deal with "strong" actors: big pharma, mining companies, central bankers, economists, etc. One exception is the article by Marie Stilling in this second part of the theme issue (Stilling this issue) that focuses on a start-up attempting to propose new ways of valuing seaweed, in opposition to the logics of the broader bioeconomy of which it is a part. The start-up, the reader learns at the end of her article, went bankrupt and no longer exists. What we can take from it, the author suggests, is salvaging the "details", extricating them from the start-up and moving them into a broader conversation about the good of the blue bioeconomy.

Stilling's contribution could be placed close to Callon's proposition of attachment, detachment and transport. However, it introduces an interesting modification: a shift from actors to issues. Building on Latour, Stilling argues for the need for "critical proximity" – the attachment to actors, we could say in Callon's terms – as a research strategy to make sure that issues "reach criticity", that is, that they become hot enough to engage public discussion (Latour 2005). The critique that the researcher can perform then is to "lend criticity to questions about who and what is and should be made valuable in good economies" (Stilling this issue).

Hence, one of the interesting effects if moving in this direction is that the whole (and problematic) question of allying (or not) is de-centred for the benefit of issues. What good economy investigations may also teach us is how the actors (with whom we were supposed to ally (or not)) are also de-centred for the benefit of the objects, the nature objects for example, from which good economies are made (Asdal and Huse 2023). That the good economy triggers such re-directions may be related to how it is often occupied with sustainability, land, the climate, green impact, transitions and so on. Hence, the very material issue interferes with its problematizations and triggers "re-scription" and reformulation.

A general insight focus that we can take from the articles in this theme issue is the need to stay close to practices to account for the hesitations they entail and the tensions they produce, even when "strong" actors are the ones under scrutiny. It is in these hesitations and tensions that the "strength" of actors is tested. What if the

possibility of critique does not hinge on exteriority and transfer, but on what Latour calls a "critical proximity" characterized by an attention to details that can keep situations "hot", moving, uncertain? Critical, Latour notes, is not only a characteristic of actors or analysts, but the name of a state: what matters, then, is not that the analyst becomes more or less critical, but that she helps issues reach "criticity".

This leads us to think of critique not as a position, as a general capacity of actors or sociologists, but as a moment, a situation or event. Very much in line with Callon's view of the dynamics of markets, good economies are constantly evolving. While markers of the good economy such as "bio", "eco" or "impact" seem to be viewed as inherently good, their implementation triggers controversies and transformations. Kamila Karhunmaa's analysis of voluntary carbon markets in the first part of this theme issue (Karhunmaa 2025) provides a vivid illustration of this dynamic. We should not forget, nevertheless, that the dynamic can move in unexpected directions. The bifurcations we have witnessed lately are a striking example. The "good" can change (as a recent article in *The Guardian* put it, "of course Mark Zuckerberg is still doing good works – he's just switched up the definition of 'good'" (Brockes 2025)) or be blatantly thrown out of the framing (as when companies readily shut down their diversity and inclusion programmes).

When debating or pursuing critique we should not forget that the practice or phenomenon subjected to critique does not straightforwardly and neatly already exist as an easily describable thing. Integral to critique is formulating anew – re-formulating or re-scripting, as we already noted, what the thing or the issue is about. The analyst's role is often that of restating the problem in other terms (as practiced in Landecker (2016)). The issue is not so much either that of proximity or distance, but how the analyst from *inside* the problem may experience and learn how the empirical case in question challenges, extends and stretches earlier or other preliminary perspectives.

The very notion of the good economy is already a critique in this way; a way of restating and reformulating what the economy is and of what it is composed. The economy is not "pure" or "clean", never simply and straightforwardly an economy, but also about different versions of the good. This thing we name the good economy, then, next invites critical scrutiny – not so much to deconstruct it or draw it apart as to seriously consider it. Along with Latour's reflections on critique (Latour 2004), the good economy can also be seen as a thing – understood in the Old Norse as a gathering – and as such also a matter of collective concern. It is not a natural entity but carefully constructed in travels back and forth between the insides and outsides of the economy as a problem. And as Latour reminds us, "if something is

constructed, then it means it is fragile and thus in great need of care and caution" (Latour 2024: 246).

A theme issue like this is also a form of gathering; it is precisely about bringing together different empirical cases that can and will stretch and reformulate the thing in question. The threads by which we have pursued the knitting together of this thing –which we now know is also a matter of concern – have been inspired by two theoretical traditions in French pragmatic sociology that have nourished valuation studies; a knitting together which has also been about drawing some of its prominent proponents together: a generation that has made its mark on how critique can be re-invented and made anew.

We have taken the good economy as a moment to re-think the issue of critique, prompted as we could say by this very thing in the world and which simultaneously can be examined critically through our lenses and the lenses of the actors that tend to move and work with it. We have taken this moment to also appreciate how there are resources at hand that help and also provoke us to engage with this issue of critique in ways that, when they were first proposed in the 1990s, were unexpected, challenging and provoking. They still are, we reason, and precisely therefore still productive and helpful. We have proposed, however, that the "the good economy" triggers more engagement with issues than with actors, and so urges us as scholars to engage with economy as a critical valuation problem.

Presentation of the individual papers in this theme issue

In her article, Marie Stilling tackles head-on the issue of critique in the good economy by asking: How should we perform a scholarly critique of the blue bioeconomy? Through the case of the Norwegian seaweed cultivation industry, she outlines two forms of economy and two forms of critique that this triggers. While the dominant model in the industry pursues growth and automation, the article focuses on a start-up that emphasizes manual processing and artisanal quality. The dominant blue bioeconomy has been approached with "critical distance" in the social sciences; conversely, Stilling proposes to build "critical proximity" with the actors that she studies. Building on ethnography and interviews with people involved in the start-up, she describes how their valuation practices are intertwined with the processing of seaweed and implicate multiple registers of valuing. The article argues that attending to such "details" can open a critical dialogue on good economies.

Marie Widengard's article examines processes of "subtraction" in the good economy through the case of the reclassification of a substance called PFAD (palm fatty acid distillate) from "residue" to "co-product". Building on the analysis of a wide range of documents

produced by different actors that took part in the controversy over the classification of PFAD as a residue in Sweden, she shows that reclassification was part of the revaluation of this substance and its shift from the "good" sustainable bioeconomy to the "bad" palm oil industry. Her analysis highlights how classification systems act as valuation tools. She argues that studying the valuation and governance of residues offers a lens for critically examining the "good economy". The process through which problematic substances are removed for the public good, which she calls "good riddance", illustrates that selective classification and reclassification can align with broader economic and environmental narratives.

Alexandre Violle's article examines how central banks attempt to help the transition towards a "good global economy", where "good" refers to "low carbon." His analysis focuses on central banks' valuation practices and more precisely the climate scenarios built by economists from the Network for Greening the Financial System (NGFS). Building on interviews with economists and a review of academic literature, press articles and central bank reports, the article explores the effects of valuation practices on the banks' financial and economic knowledge. Violle traces the transformation of the climate issue to what he calls a "climate for investors" and identifies three boundary work operations that intervene in this process to enact a "good global economy": redefining the climate issue as a source of risk for investors, instilling politics in NGFS climate scenarios by encouraging banks and insurance companies to finance low-carbon assets, and giving national central banks the flexibility to redefine the use of these scenarios according to their understanding of national economies in transition.

Kaja Lilleng's article takes us to a different field of finance: early-stage impact investing in the Nordic region. In contrast with the literature that has examined the financialization of valuation, Lilleng examines impact investors' qualitative and moral judgements beyond financial frames. Building on interviews with the founders or managing partners of impact investment firms, as well as field observations and archival data, the article identifies three themes that are central to how investors value impact: scale (where financial and environmental value are coupled in the quest for scalability), scope (which frames environmental focus and draws moral boundaries) and intent (as investors assess entrepreneurs' values and ambition). Lilleng argues that in impact investing, making things valuable is entwined with making things "good"; shedding light on this process is all the more important as investors' valuations are performative and have a bearing on what kind of activities and what kinds of "good" get funded and are put into the world.

Roman Solé-Pomies's article explores how the French roadworks industry addresses environmental concerns. Can roads (and

infrastructures more generally) be "good" for the environment? Building on interviews and document analysis conducted as part of a broader research project in collaboration with the French business association of roadworks companies, the article focuses on a tool called the "eco-comparator": software designed to compare the environmental impacts of different solutions that are proposed to local governments by roadworks companies in response to tenders. Solé-Pomies analyses the eco-comparator as a tool of valuation that aims to reconcile the economic value of infrastructure and the moral value of the environment, thus contributing to a particular notion of the "good economy." He shows that the tool enacts a specific version of the environment that he describes as "additive": a reservoir of greenhouse gases, energy and materials that is external to the economy of infrastructures and to which impacts can be added, compared and mitigated without being subjected to constraining thresholds.

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Kristin Asdal is Professor and Centre Director at TIK Centre for Technology, Innovation and Culture at the University of Oslo. Kristin is an economic historian and professor of STS. She has published widely on sustainability issues, focusing on the tools of politics, the role of economics and often in its encounters with the life sciences and the natural sciences more broadly. Her recent publications include *Nature-Made Economy: Cod, Capital and the Great Economization of the Ocean* (2024) (with Tone Huse) and *Doing Document Analysis: A practice-oriented Method* (2021) (with Hilde Reinertsen).

Liliana Doganova is Associate Professor at Centre de Sociologie de l'Innovation, Mines Paris, PSL University. At the crossroads of economic sociology and STS, her research explores valuation practices in the economy. She is the author of *Discounting the Future: The Ascendancy of a Political Technology* (2024), and co-author of *Capitalization: A Cultural Guide* (2017). Her current research projects focus on forestry and drug pricing.

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Theme issue contribution

A Wealth of Worths: Critical Details in the Cultivation of Norwegian Seaweed

Marie Stilling

Abstract
In recent years, the blue bioeconomy has been promoted as an economy that can deliver economic growth while being sustainable. Yet, it has also been subjected to critique. This article engages with the question of how to perform a scholarly critique of the blue bioeconomy by studying the Norwegian seaweed cultivation industry. Seaweed cultivation has been attributed with the potential to be environmentally beneficial and to generate enormous economic growth. Inspired by the "good economy", the article problematises the good of Norwegian seaweed cultivation by investigating alternative ways of relating normative and economic value than the one currently dominating the industry. Through ethnographic studies of the manual processing procedures on a small seaweed farm, the article shows how these processing procedures enact the good of cultivated seaweed as residing in its processing rather than in the biological substance. The article also shows how this manual processing generates a wealth of registers of valuing, which value both seaweed and the beings in its environment for more than their commercial potential. Finally, the article argues for attending to details and uses them to commence a critical dialogue about what is and ought to be good of good economies.

Keywords: blue bioeconomy; seaweed cultivation; good economy; critical proximity; details

Marie Stilling, PhD Fellow, TIK–Centre for Technology, Innovation and Culture, University of Oslo

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Introduction

What makes a blue bioeconomy good? And how to critically examine economies that purport to be good? As policy efforts turn to making the ocean economy environmentally sustainable, these questions have become pressing.

For over half a century, efforts of growing the Norwegian ocean economy through attempts at domesticating salmon, trout, and cod, and cultivating new markets, have brought about a "great economization of the ocean" – an intensified exploitation of the ocean and its beings (Asdal and Huse 2023). Recently, the EU launched a strategy for a "blue bioeconomy", indicating a strategic shift away from the mere pursuit of "blue growth" and towards a more sustainable bioeconomy at sea (European Commission 2021). This sustainability is envisaged to be achieved by cultivating hitherto uncultivated marine organisms such as microbes and algae, and through the "valorisation of co-products" from traditional marine industries, such as fish discards (European Commission 2020). In Norway, a similar vision of a sustainable blue bioeconomy has been launched in policy and research reports. Here, seaweed cultivation has been envisaged as the basis for a whole "new Norwegian bioeconomy" (SINTEF 2014), and attributed with an enormous potential for economic growth as well as for enriching the ocean environment by sustaining marine biodiversity, mitigating ocean acidification, and up-taking carbon (DKNVS and NTVA 2012; SINTEF 2014). This year is the tenth anniversary for the legalisation of commercial seaweed cultivation in Norway, and now the development of the industry has also been subjected to critique, especially with regard to its strong focus on large-scale growth (Albrecht 2023).

The industry's focus on growth can be traced back to a report published by the Norwegian Society of Sciences and Letters (DKNVS) and the Norwegian Academy of Technological Sciences (NTVA) (DKNVS and NTVA 2012). This report estimated a production potential of as much as 4 million tonnes in 2030 and 20 million tonnes in 2050 and delineated industrialisation, mechanical automation, and large-scale production as the path to profitability (DKNVS and NTVA 2012). Access to very large areas was also required, and subsequent reports argued for making space for seaweed cultivation by cultivating in offshore locations (Broch et al. 2019; Norderhaug et al. 2020. See also Stilling and Asdal, forthcoming). Albrecht (2023) has demonstrated that although entrepreneurs in the industry generally consider the growth potentials estimated by the report as being too optimistic, the orientation towards large-scale and industrialised growth is shared by policymakers, researchers, and most entrepreneurs, and that alternative trajectories – such as those advocating for a more diversified industry, with locally rooted, small-scale farms – are marginalised (ibid.: 9). Observing that most

Norwegian seaweed entrepreneurs consider upscaling to depend on investment-intensive automation, technological innovation, and integration into existing food and feed processing systems, Albrecht warns that large-scale growth, while beneficial to company shareholders and investors, may reduce the "coherent distribution of the potential social benefits" that scholars vested in socially just blue resource management call for (ibid.: 8).

This critique is found across marine science and technology studies (STS) and adjacent fields, where policy visions of and economic ventures into the blue bioeconomy have been met with scepticism, particularly regarding the effects of reconciling capitalist pursuits of economic growth with environmental concerns. Helmreich (2007) has characterised biotechnological attempts at harnessing marine biodiversity for commercial purposes as a "blue-green capitalism", "where blue stands for (a particularly American vision of) the freedom of the open ocean and speculative sky-high promise, and green for belief in ecological sustainability as well as biological fecundity" (Helmreich 2007: 289, original emphasis). Arbo et al. (2018) have argued that blue growth strategies risk furthering the industrialisation and financialisation of ocean space and resources and warned that concepts such as "ecosystems services" enable the expansion of "unsustainable capitalistic practices" to new domains. Similarly, Johnson and Braverman (2020) have linked the rise of the blue economy with the techno-optimistic notion of the "good Anthropocene", and criticised blue economy advocates' portrayal of the "oceans as utopian spaces of limitless, yet sustainable, development" (Johnson and Braverman 2020: 9). Thus, this literature outlines several overlaps between the blue bioeconomy and its land-based, green counterpart, including the high hopes surrounding it (Martin 2015), and its investment in biotechnology as a means of surpassing ecological limits to growth (Cooper 2008).

Recently, Asdal and Huse (2023) have suggested a different approach to ocean economy studies and the critique of it. Bringing valuation studies and social studies of markets together in a study of the life and economisation of the cod fish, they seek to bring nature back into these fields of studies. By attending to "(…) the rich nature-worlds that markets and commodities are made from, we can learn about preferences, but even more about dependencies, precarities, and the vulnerabilities of nature as well as economy. We can begin to ask, is this a good economy?" (Asdal and Huse 2023: 26). This question references the notion of "the good economy", which Asdal et al. (2023) have suggested as an analytical tool for critically investigating the bioeconomy without presuming it to be "simply another turn in a capitalist logic" – at least from the outset (Asdal et al. 2023: 2). They argue for an analytical approach that examines the entwinement of normativity and economic values in the bioeconomy, as well as in other economies in the recent past, to "demonstra[te] how the

economy can be otherwise and in fact relatively recently was otherwise" (Asdal et al. 2023: 2, original emphasis). Compared to the marine STS studies referred to above, "the good economy" provides a more pragmatic entrance to critique, in which the question of whether the economy is good is approached by investigating how different economic configurations were constructed as good in the first place (ibid.).

What, then, is a good seaweed? This article examines how economy, biology, and normativity are related, albeit not in the Norwegian seaweed industry as such, but in one small farm, here called Goodweeds.[1] Whereas most entrepreneurs in the Norwegian seaweed industry pursue profit by scaling up production volumes and automatising production processes (Albrecht 2023), Goodweeds produces seaweed of an artisanal quality and aims to "make money by being green". To study how Goodweeds produces good seaweed, I take inspiration from Heuts and Mol's study of "good tomatoes" (2013). Unlike Asdal et al. (2023), Heuts and Mol do not consider the economy as a whole, but they provide a compelling analysis of the various "registers of valuing" at play in the production of valuable goods. I apply this to show that Goodweeds' manual processing values seaweed along registers which extend beyond commercial and even environmental potentials.

This article is also concerned with developing a critique of the good economy. Here, I draw on Latour's distinction between two strategies of critique in science studies, "critical distance" and "critical proximity" (Latour 2005a). The former performs critique by developing grand narratives and from a strong, normative stance, whereas the latter renders objects critical by closely examining details. These two strategies and the tension between them are also present in valuation studies. Here, an editorial has debated whether blatant critiques of valuation practices make valuation discussable or merely reproduce existing oppositions – and vice versa, whether impartiality and symmetry allow for a deeper understanding of the issues at hand, or rather inhibit interventions (Doganova et al. 2014). This article relates to both positions. I suggest that valuation studies can develop critique through critical proximity to valuing activities and by attending to what I call "critical details": small things of value that can be mobilised to problematise the good of economy.

The analysis is based on ethnography conducted between spring 2022 and spring 2023. I visited Goodweeds three times, for five weeks in total. During those stays, I worked as an unpaid intern, partaking in daily life on the farm on roughly the same terms as other interns – most of them university students – working there. In addition to participating, observing, taking notes, and photographing, I have conducted interviews with the management, seasonal workers, interns,

[1] All names of companies, people, and places are pseudonymised.

and with one freelancer – eight interviews in total. I also participated in an online seminar for Goodweeds' shareholders in the summer of 2022. The analysis emphasises "thick description" (Geertz 1973) of valuing activities and the "details" that these activities foreground. This means that the analysis is based on ethnographic data – notes and quotes which were jotted down while situations unfolded, and which were elaborated afterwards. It also means that the analysis provides a synchronic description of Goodweeds, which gives prominence to the here and now of said situations rather than to the changes that Goodweeds underwent during the year I followed the company.

The article proceeds as follows. The first section discusses the Norwegian seaweed industry in relation to the strategies of critical distance and critical proximity. The empirical sections first place Goodweeds' strategy of "making money by being green" in relation to the dominant way of relating sustainability to economy in the Norwegian seaweed cultivation industry. Studying the processing procedures at Goodweeds, I show that the "good" of Goodweeds' seaweed consists in being processed well, that is, by skilled hands, thus becoming an artisanal product rather than a green biomass. This manual processing generates a wealth of registers of valuing, which value both the cultivated seaweed and the beings in its environment for more than their commercial potential. I argue that these registers of valuing foreground certain details, small, but significant things that apprise us of the relations between the cultivated seaweed, the farm, and their environment, and which hold a potential for challenging and redefining the good of Norwegian seaweed cultivation. However, they do not lend themselves easily to the valuation tools usually deployed to account for environmental impact, and this challenges Goodweeds' goal of "making money by being green". In conclusion, I propose that even though Goodweeds filed for bankruptcy while this article was written, there lies a critical potential in salvaging the details from the bankruptcy estate, by which I mean extricating them from Goodweeds, and using them to problematise the good of the Norwegian seaweed cultivation industry and to engage in critical dialogue about the good of good economies.

Norwegian Seaweed Cultivation and critique

What makes the Norwegian seaweed industry an interesting case of a "good economy" is its promise to deliver both an enormous economic growth and to benefit the marine environment. In 2012, an influential research report stipulated that in 2050, Norway's seaweed cultivation industry could produce as much as 20 million tonnes of seaweed biomass per year – a potential which has since become a target for governmental policy (DKNVS and NTVA 2012; see also Stilling and Asdal, forthcoming). This large-scale seaweed cultivation

industry is envisioned as the basis of "a new Norwegian bioeconomy" that will bolster the Norwegian economy when oil extraction ceases, while simultaneously enriching the ocean environment by sustaining marine biodiversity, mitigating ocean acidification and up-taking carbon (DKNVS and NTVA 2012; SINTEF 2014).

In environmental humanities, the term "good Anthropocene" has been applied to criticise such projects of solving the current ecological and climate crises by the use of well-known means (Hamilton 2015; Haraway et al. 2015; Tsing 2017). When it was first introduced by the environmental scientist Erle Ellis, the term "good Anthropocene" was used to argue that if humans use "our unprecedented and growing powers (…) to create a planet that is better for both its human and nonhuman inhabitants", the Anthropocene should be perceived "not (…) as a crisis, but as the beginning of a new geological epoch ripe with human-directed opportunity" (Ellis 2012: n.p.). Since then, scholars such as Tsing and Haraway have given the term a different value by using it to warn against "the fix-it people", those who "believe in a 'techno-fix'" and consider the Anthropocene, the current epoch where humanity and its industry have become a destructive force of nature, as a situation that "(…) can be controlled and exploited by familiar civilizational tools (…)[such as] capitalism, elite technology, and canonical philosophy" (Haraway et al. 2015: 546; Tsing 2017: 16).

With its grandiosity, its aim of creating market dominance, its envisioning of upscaling, expansion and intensification as the means of creating an economically viable growth, and its technological solutions to "problems" such as ocean acidification, biodiversity loss, and climate change, the vision of a new, Norwegian industry based on industrial-scale seaweed cultivation lends itself easily to this kind of distanced critique. Research and innovation strategies present Norwegian seaweed cultivation as an environmentally friendly alternative to the resource extracting and pollutive carbon-based ocean economy it is imagined to replace, but they also promote a fast-paced development of large-scale production, which is to be realised through industrialisation, automation, biological refinement, and by extending cultivation activities to offshore regions (DKNVS and NTVA 2012; SINTEF 2014; Broch et al. 2019). As Albrecht (2023) has illustrated, this has several problematic consequences. The need for a sizable production area has led to visions of establishing industrial production in offshore areas, and the comprehensive investments required to realise such a production are likely to result in the concentration of business ownership. Thus, Albrecht concludes that "to prosper [in the Norwegian seaweed cultivation industry] without a strong growth focus seems more utopic (…) than the envisioned conquering of offshore spaces" (Albrecht 2023: 10). In that light, the new, Norwegian seaweed cultivation industry seems more like a continuation of long-

running attempts at intensifying and expanding the ocean economy than a break with them.

On the other hand, describing – or passing judgement of – this new industry with concepts such as "good Anthropocene" runs the risk of failing to notice that which does not fit into these logics or to overhear those voices that point in a different direction. As Albrecht (2023) brings attention to, there are more versions of the Norwegian seaweed cultivation industry at play than that presented by the above-mentioned reports. Besides, as other studies of emerging aquacultures have illustrated, intensive innovation efforts cannot ensure that the visions of innovation reports are ever realised (Asdal 2015; Asdal and Huse 2023).

The "good economy" offers a different critique of the bioeconomy, which is based on an interrogation of how the normative and the economic are related within it or what "the good" of this version of economy purports to consist of (Asdal et al. 2023: 2). Thus, Asdal et al. (2023) describe how, in the emerging bioeconomy, "the 'bio' is made to stand out as the essentially good". Put bluntly, the bioeconomy is presented as good simply because it is based on biology and, therefore, making this economy good becomes less of question about how to relate it to society, and more of an expert challenge. This also applies to how research and policy papers present the Norwegian seaweed cultivation industry. Here, the "good" of seaweed cultivation seems to consist in the seaweed's properties – its nutrient and carbon absorption, for instance. As mentioned in the introduction, this article engages with the "good economy" (Asdal et al. 2023) as an analytical move that can interrogate alternative ways of relating the normative and economy. This form of critique can be read as an intervention into the tension between the kind of distanced critiques presented above and the pragmatic approach of valuation studies, where value is studied as an outcome of valuation practices (Helgesson and Muniesa 2013; Muniesa 2011). This pragmatic approach has entailed an interest in multiplicity, regarding registers of value, valuation practices, metrics, and processes as well as the multiplicity of values (Helgesson and Kjellberg 2013). Thus, in valuation studies, attempts at reconciling economy and other concerns are often approached as an inquiry into how economic and non-economic values are made and made to co-exist, for instance in markets for impact investment (Barman 2015), or clean technologies (Doganova and Karnøe 2015). This does not mean that valuation studies cannot perform critique, but rather that critique is performed by showing tensions between different valuations, for instance by showing that environmental actions are subordinated to market principles in circular economy start-ups (Ariztia and Araneda 2022) or by showing that markets for environmental impacts contain a tension between commodification, which entails detaching environmental impacts from their physical environment, and actual environmental improvements, which hinge on the opposite (Chiapello

and Engels 2021). While sharing the attention to tools and practices of valuation, the "good economy" extends valuation studies to analyse economies "at large" as well as their historically different ways of relating the economy and the good (Asdal et al. 2023: 8). As such, and by emphasising that the "good" of an economy is also about its relations to politics, society, and the resources it exploits (ibid.: 2), the "good economy" intervenes in this pragmatist vein in valuation studies, prompting the field to expand its means of performing critique of the economy.

Latour has engaged with the tension between distanced and pragmatic critiques in a text titled "Critical Distance or Critical Proximity" (Latour 2005a).[2] A fictional dialogue written in honour of Donna Haraway, the text stages a heated argument between two friends and allies, referred to as SHE and HE. They discuss how science studies should perform critique and be politically relevant in a time when neo-conservatives use terms developed by science studies to deny the existence of global warming, and where tech and agro conglomerates seem to become ever more dominant. The unnamed friends share a concern about these matters, and both agree that the political front lines have moved since the 1980s and that "science studies is in the middle of a difficult search for political relevance" (Latour 2005a: 5). Yet, they part on the question of what good critique performed by science studies should entail. More specifically, they disagree on "details" and the role they should play in science studies critiques. SHE argues for a critical distance that does not get so lost in details and a pragmatism that cannot address politics, but that can defend facts, take massive asymmetries into account, and call out "patterns of irreversibility" (ibid.: 5). HE warns against "replacing politics with moralizing" (ibid.: 4). Instead, HE promotes an approach of "critical proximity", which studies those details that can make sure that issues "reach criticity": that they become hot enough to engage public discussion (ibid.: 8). Since then, Birkbak et al. (2015) have developed a methodology under the name of "critical proximity", in dialogue with Latour's works on critique (2005a, 2005b) as well as with Haraway's "situated knowledge" (Haraway 1988). Not unlike Asdal et al. (2023) and Asdal and Huse (2023), the methodology of critical proximity encourages avoidance of "grand scale ideas" such as capitalism and democratisation in favour of critiques which pay notice to, latch onto, and further develop the critiques that are "always already present in the empirical cases we study" (Birkbak et al. 2015: 268). This, they argue, allows the researcher to explore how actors become connected to or disconnected from issues and to consider

[2] The dialogue is published on Latour's website. In Latour's own words, it was "[w]ritten for a book in homage of Donna Haraway but then rejected by the editor". Available at www.bruno-latour.fr/node/248

actors in the field as allies, whose problematisations challenge existing frameworks for critique (ibid.: 285).

Although I draw on this approach, I do not read the dialogue as a denunciation of critical distance. The statement that the two positions are separated by "details" is ambiguous – it can either mean that they differ on the importance of details or that they are not that far from one another after all. Therefore, I read the dialogue as an appraisal of a tension within science studies regarding what good scholarly critique is and ought to be – a tension which is also appreciated in valuation studies (Doganova et al. 2014) – and as a staging of critique worth listening to as one performed by allies with shared concerns.

A critical voice in the development of a Norwegian seaweed cultivation industry

My guide to the details of Norwegian seaweed farming is Bitten, a marine biologist who is the co-founder and managing director of the seaweed farm Goodweeds. Before that, she was an academic, studying the environment of the seaweed she now cultivates. Goodweeds also stands out among the Norwegian seaweed farms as a small farm with ambitions of increasing the quality rather than the quantity of the production and with an emphasis on the perks of manual labour and slow growth. In Bitten's own words, the company and its team have a reputation in the sector for "doing things differently", and for sometimes playing the role of the devil's advocate in the community of seaweed cultivators.

It was while she was playing this role that I first encountered Bitten. She was a presenter at an online conference, jointly organised by several Norwegian research institutes, municipal authorities, and trading organisations, aimed at discussing means and methods of "commercialising" seaweeds. Over two days, the conference participants – a diverse group of seaweed farmers from Norway, Iceland, the Faroe Islands and Portugal, researchers in marine biology and aquaculture, economists, private investors, municipal officials, and a finance adviser from the national Norwegian innovation fund, Innovation Norway – presented their businesses or research projects. Not unlike the entrepreneurs in the Cleantech Funders Forum described by Goldstein (2018), most presenters commented on the sustainability of their products, for instance how seaweed added to cattle feed might reduce methane emissions, or, when used as a non-synthetic fertilizer, aid decreasing agricultural land use, or which initiatives were taken to lower the carbon footprint of their production. At the centre of discussions, however, was how to make both cultivated and wild-harvested seaweeds the basis of profitable business. Despite their diverse professional backgrounds, most presenters seemed to agree on the preconditions for achieving

profitability. Firstly, the small companies that today make up the Nordic seaweed cultivation industry must be made profitable – something they, according to an economist presenting at the conference, were not at the time. Secondly, the seaweed cultivation must be "industrialised", which here seemed to mean mechanising production processes in order to increase the companies' production volumes without increasing the production costs, thereby lowering the price of the product.

In this setting, Bitten's presentation stood out as a moment of critique. Rather than praising and making plans for how to realise the enormous growth potentials accredited to the Norwegian industry, Bitten criticised the big expectations surrounding the growth and profitability of the seaweed cultivation industry in Norway. The critique followed a recent reorientation of her business, Goodweeds, and a reformulation of the goals in the business plan. When she and her business partner founded Goodweeds a few years prior to the conference, they had started out with a business plan aiming at increasing yields and reducing the production costs, since they were expecting a fall in market prices. However, the business plan did not correspond well with the challenges Bitten and her partner met when they began cultivating. These challenges were biological (getting the seaweed to grow), regulatory (getting a cultivation licence), and finally market-related, with customers asking questions such as "what are seaweeds?", "are they edible?", "what do they taste like?", "what are the differences between the species?", "why are they [cultivated seaweeds] so expensive compared to wild-harvested seaweeds?", and "can you deliver 500 kg yesterday?". Thus, their immediate challenge was not to bring down the production costs to meet a decreasing market price, because there was no "ready-made market", as Bitten put it. Rather, they had to "build a market" by educating people about seaweed. And thus, they changed the goals of their business plan. Instead of pursuing growth on a large scale, they set a goal of "mak[ing] money by being green (…) [N]ot just by acting sustainably, but by being environmentally beneficial" – that is, rather than being sustainable by reducing the negative impacts of the pursuit of profit, Bitten and her company wanted to generate more values than profit alone. They wanted to make a positive impact on the environment and society – the former by translating principles of regenerative agriculture[3] to seaweed farming, the latter by aforementioned educational activities, by engaging in collaborations, and by giving the diverse team working on the farm a sense of "immaterial ownership" by drawing on their different perspectives. To sum up, Bitten presented a business plan that no longer envisioned reaching goals of large-scale

[3] Introduced by the Rodale Institute in the 1980s, regenerative agriculture refers to farming aimed at restoring rather than depleting ecosystems and natural resources (Kallio and LaFleur 2023). See also Rodale Institute (2020), and Ahl (2023).

production and competitiveness in a low-price market, but a slow growth sustained by the production of a high-value product and a pursuit of generating and sharing multiple values: economic, ecological, and social.

Interestingly, this critique seemed to be both normative and quite pragmatic. Normative, because the presentation of a business that pursues other values than profit alone and the rejection of sustainability in favour of a goal of being environmentally beneficial introduced new ideals for seaweed cultivating businesses. Pragmatic, because rather than engaging in ideological arguments against strategies of large-scale growth, Bitten seemed to argue for the possibility of an alternative simply by practicing it. I was interested in how this alternative way of developing a seaweed farm was practiced: how is a high-value seaweed product produced, in which way does such production generate multiple values, and how would Goodweeds translate these values into profit? And what might that tell us about alternative ways of relating normative and economic value in the Norwegian seaweed industry?

Crafting product quality

If the Norwegian seaweed cultivation industry at large attempts to achieve profitability by industrialising production processes and thereby seeking a lower price, Goodweeds pursues a strategy of increasing the price of their product by processing well, thereby "valuing" their product as a craft product. I use the term "valuing" here to indicate that this processing is an activity that entails both "evaluation" and "valorising" (Heuts and Mol 2013: 129). This distinction builds on Vatin (2013), who argues that valuation studies should not only study evaluation, the "static judgement attributing a value" to something, but also "valorization", the dynamic increasement of value, which Vatin locates in the sphere of production. Work and production, Vatin argues, do not merely produce goods to be valued and priced on and by the market. It creates value along several "registers of valuation", economic as well as non-economic in kind (see also Asdal and Cointe 2023). Heuts and Mol (2013) develop this argument further by showing that the activity of valuing is carried out by vendors and consumers as well as producers. Moreover, they foreground "registers of valuing" and the clashes and compromises between them, showing the complex work that goes into making tomatoes good.

Goodweeds is, as mentioned, managed by Bitten, an academic who has previously lived on several continents. Her right-hand man is Alfred, the head of production, a former fisherman, who is so locally rooted that his family shares its name with the village where Goodweeds' has its headquarters. Goodweeds is a cooperative, and

both Bitten and Alfred are shareholders. It is a small company. During the time I studied Goodweeds, the permanent staff consisted of three people: Bitten, Alfred, and a sales manager, a position occupied by several people. In addition to the permanent staff, academic interns from various universities in Europe and the US conduct the company's basic tasks and develop projects. In the high seasons, when the seaweed is "seeded" and when it is harvested, the staff expands to include seasonal workers who are paid by the hour. These might be locals with multiple sources of income, adolescents working part-time after school, shareholders, or Bitten's friends, who come from various places in Europe to spend their holiday at the farm while earning a little extra income. At Goodweeds, the growing season begins in November, when ropes infused with germinated seaweed spores are deployed in a marine field – Goodweeds is located in a fjord close to the coast. The harvest season begins in April and continues for about a month and a half, until the end of May.

Goodweeds' seaweed product is only sold for human consumption. It consists of a finely ground, dried seaweed from the two species known as sugar kelp (Lat.: *Saccharina latissima*, Nor.: *sukkertare*) and winged kelp (Lat.: *Alaria esculenta,* Nor: *butare*). Their target customers are businesses in the food industry, in particular food producers with an organic or environmental profile, such as businesses producing vegan replacements for meat, fish, or dairy. Thus, Goodweeds pursues a niche market with high demands for quality, or, to paraphrase Heuts and Mol (2013), a market where consumers value naturalness and sensual qualities above the seaweed's price. In a sense, they produce a seaweed equivalent to the "Tasty Tom" tomatoes described by Heuts and Mol (2013: 132), which should enable them to receive a higher price than if the seaweed had been sold as a supplement to feed for household animals or as growth enhancer for agriculture.

To ensure this high product quality, Goodweeds processes the seaweed manually. Among the larger farms, the seaweed is often processed by cutting the seaweed blades[4] off the ropes, sometimes while still on the boat, and fermenting them in tanks. They argue that this method is the most efficient, allows for more mechanisation of the processes, and that it is the easiest method to scale up. In Goodweeds' case, the seaweed is preserved by drying, exactly because drying allows for manual work. They harvest the seaweed without detaching it from the rope it grows on and transport it to Goodweeds' headquarters, where the ropes are fastened to clips in the ceiling. The seaweed is still

[4] Since seaweeds are not plants, but algae, their parts are described by another vocabulary than that used for plants. "Blade" refers to the flat part, which resembles a leaf; "holdfast" refers to the part anchoring the seaweed to rocks (or here, a rope), which resembles a root; and "stipe" is the stem-like structure in-between the holdfast and the blade.

alive at this point, since the blades have not been severed from the holdfasts attached to the rope. This postpones the decay of the seaweed and allows time to clean it while it is still wet. In a dried condition, the seaweed is crisp, crumbly, and easily broken, and the crops and fouling will stiffen together and become inseparable. Therefore, the crew "cleans" the seaweed manually immediately after the ropes have been fastened to the ceiling. Dressed in rain gear, hairnets, and sometimes rubber gloves, they unfold those blades that have coiled up around the ropes, disentangle knots, and run their hands through the blades – carefully, so as to not break them – to sever the crops from the greasy threads of filamentous brown algae that have attached themselves to the ropes during the growth season.

This sorting is a "valuing" activity (Heuts and Mol 2013), in which seaweed is both evaluated and valorised along many of the same registers as mentioned by Heuts and Mol, such as sensuality and handling. While Goodweeds' staff distinguish between valuable and worthless seaweed, they improve the taste of the end product, which becomes purer, and prepare it to be dried and thereby become practically imperishable and very easy to handle. Yet, what is perhaps more important than the product's sensual qualities is the manual processing procedures by which these qualities are produced. Because it is processed by the skilled hands of Goodweeds' staff, Goodweeds' seaweed becomes an artisanal product.

This much became clear to me one day, when, during the cutting down of the now dry seaweed, Bitten called me over to show me a vividly green spot on one of the seaweed blades. This is a sign of contamination with sulphuric acid, which the crop gets while being a neighbour to the seaweed species known in Norwegian as "*myk kjerringhår*" or "ladies' hair" in English (Lat. *Desmarestia viridis*), a seaweed containing high concentration of said acid. Bitten's point in calling me over was not so much the spot – which, she said, was not a problem and could just be cut off – but to direct my attention to the value of a processing procedure that allows for noticing these interspecies relationships and their effects. It was the youth worker who "picked it up", she told me, adding that he also worked here during last year's harvest. If the seaweed were processed already on the boat, this would not have been noticed, she said, implicitly referring to the few large and well-known Norwegian seaweed cultivators who cut the seaweed off the ropes on the boat – often using machinery – and preserve it in bulk, for instance by fermentation. Bitten thus implied that Goodweeds' skilled workers produced a product of a quality that cannot be created through mechanical processing, and she characterised Goodweeds' manual procedures as a "craft", a skill acquired through hours and hours of touching and closely examining the growths on the ropes. In producing a craft product, Bitten said that Goodweeds' "goal is not to make a standardised product", but one where local specificity could be emphasised as a kind of seaweed

"terroir" and seasonal variations as "vintage, like in fine wine", so that natural variations could add to rather than subtract from the value of the product.

This suggests a different approach to the development of a profitable seaweed cultivation business than the one dominant among Norwegian cultivators, who pursue profit by scaling up production and automating processing, creating what one of them during a conversation called "economies of scale". As Albrecht (2023) has noted, several Norwegian seaweed cultivators indicate an annual production of 200–300 tonnes as the point when they "break even", while aiming for even higher production volumes. Goodweeds' emphasis on crafting high product quality indicates a different path to profitability.

More importantly, it suggests an alternative relation between the normative, the economic, and the biological – a different version of the "good economy" (Asdal et al. 2023). As Paxson (2010) has illustrated, the notion of terroir has been evoked by US artisanal cheesemakers

> for conveying the value of their craft practice and products [that] … may enhance a cheese's cultural capital and price per pound [and] suggest that the gustatory values that make artisan cheeses taste good to consumers are rooted in moral values that make the cheeses ethically good for producers to make (Paxson 2010: 445).

What I want to suggest here is that, unlike the version of the Norwegian bioeconomy described by Asdal et al. (2023), "the good" of Goodweeds' seaweed does not so much consist in the seaweed's biology, but in the artisanal – and thereby good – processing of this biology.

A wealth of worths

Yet, in Goodweeds' operations, the normative and the economic seemed to be related in more ways than by its good processing methods. Looking closer at Goodweeds' staff while they cleaned the wet seaweed, it became clear that the manual processing procedures allowed for valuations of the seaweed in ways that went beyond valuing the product. In fact, I will argue, the manual cleaning of seaweed fostered a wealth of "registers of valuing" (Heuts and Mol 2013), among them aesthetics, emotional appeal, and interspecies effects, which included the crop's marine environment and its fellow beings on the growing ropes in the array of things to be valued, and, notably, valued them for more than their commercial potentials.

When the staff at Goodweeds cleaned the newly harvested seaweed, Bitten instructed them in a fashion that cultivated the kind of attention and skilled touch that enabled the youth worker to notice the

contaminated spot on a crop, as described above. As she moved through the rows of wet seaweed, I heard her point out other seaweed species, describe the characteristics that identify them and add information such as "this grows in shallow waters, on sand", or – referring to a specimen of another species – that it "has a long stipe, grows on mussels". While this kind of attention was put to work to produce the artisanal quality of Goodweeds' product, it appeared that it also fostered other registers of valuing.

One of these registers of valuing was aesthetics, as when Laura, an intern, showed me a specimen of winged kelp which she described as "actually quite pretty" with its long, broad blade and its symmetrical midrib. Another was the emotional appeal exuded by other species than the crop, for instance the lumpsucker, a fish that spawned and reared on the farm site, and which was sometimes pulled up from the water when its rearing ground was harvested. With gentle hands, Laura picked the juvenile fish from the seaweed blades or from the floor and carried it to a bucket of seawater, which she and her colleagues emptied into the sea at regular intervals. In her own words, Laura had become "such a lumpsucker nerd" during her internship. One particular day, she showed me a silvery blue specimen, no longer than a centimetre, that she had found in the folds of the alaria. To her expressed relief, this one wriggled its tail as she slipped it into the bucket of seawater, but most of the lumpsuckers died if they were unlucky enough to be pulled up during harvest. Still, Bitten was adamant that all were carried to the bucket and released in the sea. It was a matter of ethics, Bitten told me on a different occasion: "It's just not good that they die on the floor in there."

More registers of valuing came to the fore in the experiments Bitten conducted to interrogate the relations between the farmed kelps and their environment. For instance, she once showed me an experiment carried out by tying short pieces of seeded rope onto a growing rope and untying one every two weeks to study it under a microscope. Here, she could follow the growth of the seaweed, see when unicellular algae, called diatoms, fastened to the tips of her crops, and get a closer look at the many skeleton shrimps inhabiting the farm site. Like the cleaning procedures, these experiments had a commercial purpose. Knowing how and when the crops and fouling grow might inform Bitten in her attempts to optimise the farming. Yet, when Bitten told me about the fouling, I heard the same fascination that characterised Laura's relation to the juvenile lumpsuckers. So, while Bitten informed me that the diatoms create a rough and slimy surface on the crops that other fouling algae can thrive in, she also told me that they look "beautiful" under the microscope, with their clear colours and star-like structures. Similarly, Bitten told me that she had observed that the skeleton shrimps inhabiting the farm had spikes along their spine, indicating that they were not of the native, Norwegian species, but of the invasive, Japanese one. The latter is better at colonising new

substrates than the native species, and the presence of seaweed farms may therefore fuel its proliferation (Hancke et al. 2021: 24). Even as she told me this, Bitten still valued its emotional appeal, as she smiled while pointing out the resemblance between a brooding skeleton shrimp and a pregnant woman.

The point is that while the purpose of Goodweeds' manual processing procedures and Bitten's close attention to the beings on the rope was to make a high-quality product in the short term, and to improve the cultivation procedures in the longer term, it also generated registers of valuing which did not just value the seaweed as a crop, but the interspecies relations between the crop and the other beings in its marine environment. This valuing activity brought certain details to the fore – small things, such as diatoms, skeleton shrimp spikes, and tail-wriggling lumpsuckers. Albeit small, these details have normative significance. Firstly, because the staff at Goodweeds, by appreciating their beauty, sharing their fascination with each other, and caring for them, also gives worth to the non-crop life forms on the farm. Secondly, because recognising what farming inflicts on these life forms – whether by giving them a rearing ground during the growth season or by effectively putting an end to them during harvest – gives the farm a moral responsibility for these beings. And thirdly, because it complicates the virtues that have been attributed to Norwegian seaweed farming by policy papers and research reports, for instance that of providing rearing and spawning grounds and thereby contributing to marine biodiversity (SINTEF 2014). When the seaweed is harvested and cleaned at Goodweeds, this biodiversity becomes "palpable" (Haraway 2008: 6), and therefore appears as something else or more than biodiversity. One does not relate to a lumpsucker squirming in one's palm as "biodiversity", but as a being, a being made vulnerable by seaweed cultivation. This other notion of life inflicted by farming raises questions about what responsibility seaweed cultivators have for lumpsuckers' and other marine species' lives and deaths once their rearing ground has been pulled up from the water, and whether they are all equally good to rear.

By prompting these questions, Goodweeds' close attention to the growths on the rope itself comprises a critique of the grand-scale visions of the Norwegian seaweed economy. This is not an accusatory or judgemental critique, but a critique "by other means" (Latour 1988), more specifically by granting critical importance to the relations between the crops and the farm on the one hand, and the aquatic environment on the other, and by lending "criticity" to questions regarding seaweed cultivators' responsibility for the intricate and never innocent effects of introducing new species to the economy, even with the best of intentions.

Making seaweed goods

Thus far, I have shown how Goodweeds' manual processing enacts the good of seaweed as consisting of being processed well. I have also shown that this processing generates multiple registers of valuing which value the seaweed and its companion species (Haraway 2008) for more than their commercial potential, and which, by appreciating that seaweed cultivation affects these beings, holds potential for critique. The remaining question is how to integrate these values into the price of Goodweeds' product and enable them to "make money by being environmentally beneficial", as Bitten put it at the conference. At a shareholder meeting in the summer of 2022, it appeared that making these values commensurable was perhaps too large an undertaking for Goodweeds.

The conversation in the meeting evolved around how Goodweeds should document what they called the "non-economic positive impacts" of their production and enable customers to assess them. A shareholder working with the marketing of Goodweeds emphasised the importance of finding a means to distinguish their product from that of others, because "the customers we want to work with ask for indicators that we are beyond sustainability. We need to be able to assure them that they do the right thing with us." Certification was needed, this shareholder argued. Yet, certifications are costly to obtain, as another shareholder argued, and among the ones discussed by the shareholders, none seemed able to define and measure the qualities most valued by Goodweeds. Was it worth the time and effort, then, one shareholder asked, or should they rather focus on building a strong and trustworthy brand? Or was the most important thing, as yet another shareholder proposed, to formulate a single statement encapsulating "our higher purpose, our mission, our aim, or whatever you want to call it, and we always try to strive for achieving that"?

Following Callon et al.'s (2002) distinction between a product and a good, one might argue that what Goodweeds' shareholders struggled with in this meeting was the task of turning their product into a good – or, more specifically, to turn their good production into qualities attributed to their good. Callon et al. propose to understand a product as a process, a series of actions and operations in which the object's characteristics change, whereas a good is a moment in that process – a stabilised product which can be characterised by a set of properties which both establish its singularity and position it in relation to other similar goods.

The discussion at the shareholder meeting demonstrated that how the good of Goodweeds' processing should or could be qualified, verified, and translated into properties of their good was still an open question. Whereas the suggested mission statement enacts the good as a moral orientation – as being good – the certifications enact the good as doing good. The latter relates to the goal of being "environmentally

beneficial" and making "positive impacts" expressed by Bitten at the conference mentioned initially. At the shareholder meeting, it became apparent what a massive undertaking this would be. As works from valuation studies have illustrated, making such impacts a property of a good or a good in themselves requires making them calculable and thus comparable by devising calculative tools (Barman 2015), a costly process involving the conducting of scientific experiments and measurements (Doganova and Karnøe 2015). The value of an attentive youth worker or of a staff member appreciating the intricate relations between cultivated seaweed and the beings in its environment, however, does not lend itself easily to such metrics for environmental and social value. It seemed, in other words, that Goodweeds had developed registers of value which were too attached to the circumstances of their production to be translated to "impact" – and therefore to become economically valuable properties of the good.

Conclusion: Salvaging details for critical dialogue

As mentioned in the introduction, Goodweeds did not succeed in developing an economically viable alternative to the scale-pursuing businesses in the Norwegian seaweed industry. The company filed for bankruptcy while this article was underway. Yet, the case of Goodweeds illustrates that there might be an alternative way of developing the Norwegian seaweed cultivation industry rather than through large-scale growth and automated production, and that the good of seaweed cultivation might be enacted differently. At Goodweeds, I have argued, the good of the cultivated seaweed did not consist in its undemanding metabolism, which requires neither fresh water nor fertilisers to grow. Rather, it became good by being processed well: manually and in a manner which required resources such as the time, skill, and attentiveness of an engaged staff. Moreover, I have shown how these processing procedures generated other normative values, including the notion that seaweed and the beings in its marine environment hold a value aside from their commercial potential, and that cultivation could include responsibility for how farming activities affect these beings.

In conclusion, I would like to return to the Latourian dialogue with which this article began and its claim that "details" separate critical distance from critical proximity. In this article, I have stayed close to the processing procedures at Goodweeds in order to convey the small but significant details that appeared in these procedures: the acid-green spot on a kelp blade, the nerdy staff, the tail-wriggling lumpsucker, and the spikes along the spine of the skeleton shrimp. I suggest that studies invested in the good economy might find critical potential in salvaging these details from Goodweeds' estate, by which I mean extricating these details from Goodweeds and moving them into a broader

conversation about the good of the blue bioeconomy. Not because they add up to a coherent critique of the Norwegian seaweed cultivation industry, but because they can be mobilised to problematise the virtues that underpin it.

In the specific case of Goodweeds and Norway's blue bioeconomy, mobilising these details can lend criticity to such questions as whether upscaling and automatising are the best paths to breaking even, whether all the species thriving and proliferating on the seaweed farms are equally good, and which responsibility seaweed cultivators might assume for their lives and, in some cases, deaths. Those questions do not add up to a big-picture critique, but they might be a starting point for dialogue between the actors developing Norway's blue bioeconomy and its critics.

On a more general note, proximity may also offer a contribution to the ongoing discussions about valuation and critique. Critical proximity is influenced by the same pragmatism that characterises valuation studies (Birkbak et al. 2015; Muniesa 2011), but its emphasis on critical details allows for developing critiques that lend criticity to questions about who and what is and should be made valuable in good economies – critical, but open-ended questions that may allow alternative problematisations of economy to enter scholarly conversations, and perhaps also for rethinking how good economies can and should be developed.

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Marie Stilling is a PhD Fellow at TIK–Centre for Technology, Innovation and Culture at the University of Oslo. As part of the research project Value Treads. Tracing the Economy as Technology and Culture in an Emerging 'Value Economy', she studies the cultivation of Norwegian seaweed and the values and valuation practices that emerge with this new industry. She holds a BA and an MA in European Ethnology from the University of Copenhagen, Denmark.

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Theme issue contribution

'Good Riddance': Sorting out 'Bad' Residues from the Swedish Biofuel Economy

Marie Widengård

Abstract
This article examines the reclassification of palm fatty acid distillate (PFAD) in Sweden's biofuel sector and its broader implications for the 'good economy'. Initially classified as a residue, PFAD was subject to minimal sustainability oversight, in line with the practice of transforming waste into valuable, sustainable products. However, due to its association with the controversial palm oil industry, PFAD was reclassified as a co-product, subjecting it to stricter scrutiny. Using the concept of 'de-scription', this study explores how this reclassification alters PFAD's sustainability profile, highlighting how classification systems act as valuation tools. It also shows how a subtractive logic (ridding) can help maintain a favourable economic image. The research challenges the assumption that biofuel residues are inherently sustainable and critiques the minimalist regulatory approach of residual governance, which allows materials classified as residues to escape rigorous oversight.

Keywords: carbon offsetting; voluntary carbon markets; valuation; economization; tools of valuation

Marie Widengård, School of Global Studies, University of Gothenburg

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Introduction

Recent shifts towards sustainable energy solutions have placed biofuels, particularly those derived from residues and wastes, at the forefront of policy and industrial agendas. These biofuels are promoted as 'good' alternatives to fossil fuels, addressing the issues of land and food competition while also reducing waste (Humalisto 2014; IEA 2022; IRENA 2016). This approach lauds the transformation of leftovers into profitable products, epitomising 'doing good while doing well financially'. However, rather than viewing the good economy as a straightforward concept with purely positive social and environmental outcomes, a more critical perspective examines how economies and versions of 'the good' are intertwined. It asks what it takes to perform the good and how materials are expected to embody and deliver this good (Asdal et al. 2023).

This article critically examines how 'good' residues are valued within the biofuel economy, focusing on the Swedish case of palm fatty acid distillate (PFAD), a by-product of palm oil refining. While 'by-product' is often used generically, the technical classification of a material – whether as a residue, waste, co-product, or product – plays a crucial role in determining its value within the biofuel sector. In Sweden, PFAD was initially classified as a residue, exempting it from strict sustainability scrutiny and making it attractive to biofuel producers. However, due to its connection to the environmentally and socially damaging palm oil industry, critics began to question this favourable classification. They called for its reclassification as a co-product, a move that would subject PFAD to stricter scrutiny and potentially remove it from the biofuel mix.

The central issue of this case study is how the classification of PFAD as either a 'residue' or a 'co-product' influences its valuation, which oscillates between being seen as part of a 'good' sustainable biofuel economy and the 'bad' palm oil industry. By analysing the two-year process that led to PFAD's reclassification in 2019, this study highlights the pivotal role of classification systems as tools of valuation. The analysis demonstrates how PFAD's value shifts dramatically based on its classification, directly affecting its sustainability credentials and marketability as a biofuel component. This illustrates that classifications are not merely administrative acts but are central to the valuation processes that define materials and influence how economies are perceived. Madeleine Akrich's (1992) concept of 'de-scription' provides a powerful lens for analysing how materials like PFAD are contested and redefined. Focusing on the 'script' of a material – its expected uses, sustainability profile, and economic role – allows us to observe how it is reshaped through debates, regulations, and practical applications. This redefinition process reveals the interactions between different values, evaluators, and valuation tools.

The exploration of PFAD's reclassification not only sheds light on the practices of classification systems but also enriches the field of valuation studies by examining how the 'good economy' is constructed and maintained. By demonstrating how classification systems serve as tools of valuation, the research challenges the oversimplified categorisation of biofuel residues as inherently 'sustainable' and calls for a deeper examination of the factors that shape these labels. The subsequent narrative details how Sweden strategically excluded 'bad' palm residues while selectively retaining 'good' domestic residues within its biofuel industry. I describe this process as 'good riddance' – the intentional removal of problematic substances for the public good. This aligns with Emma Greeson's concept of the 'subtractive logic of ridding' (2020), which involves sorting and discarding materials deemed undesirable and retaining those that contribute positively to environmental or economic goals. This strategy not only removes items but systematically reduces the presence of problematic materials, thereby improving the environment or context in which it occurs. In this article, I highlight that the subtractive logic raises critical questions about the fate of the sorted residues – the leftovers. Such issues directly tie into residual governance, as defined by Gabrielle Hecht (2023), which is a type of governance that deliberately keeps regulation minimal, allowing residues to sidestep stringent checks. This form of governance is evident in European and Swedish biofuel regulations, where materials classified as residues avoid rigorous scrutiny. Viewed as subtractive, this simplification strategy strips away the complexities and potentially negative aspects of these residues from regulatory oversight. I argue that examining residues, subtraction and classification offers a lens for critically examining the 'good economy', revealing the complex and often contradictory mechanisms that sustain it.

In the next section, I develop this critical perspective on the 'good economy', connecting concepts such as subtractive value production, residual governance, and classification systems under the overarching theme of 'good riddance'. This theoretical framework lays the groundwork for the case study methodology, which details the specific materials and data sources that inform this research, including an in-depth analysis of the Swedish biofuel context and the regulatory dynamics that shape the classification and valuation of residues. The following sections explore the PFAD controversy, tracing the pivotal two-year reclassification process and unpacking the strategic motives of key stakeholders as well as the design of classification systems. The analysis concludes with a discussion of the findings, framing them as a form of 'good riddance', and offers reflections on how the concepts of residues and classification deepen our understanding of the 'good

economy', while proposing pathways for future research and policy development.

'Good riddance': critical perspectives on the good economy, subtractive value production and residual governance

Subtractive value production shifts the focus from value addition to managing and repurposing materials cast aside, involving processes where value is generated by discarding or transforming residues, waste, or secondary materials (Greeson 2020). In the context of the good economy (Asdal et al. 2023), this approach emphasises sustainability and efficiency by transforming waste into useful products or by-products. Examples include second-hand outlets, recycling, upcycling, and managing industrial residues to create new products. Subtractive logic involves creating value not by adding but by reducing and sorting. Greeson (2020) explored this concept in the second-hand market, highlighting how books undergo various rounds of sorting, categorising, and arranging to create value. The subtractive logic can also be found in various sectors, such as the scrap economy, which thrives on breaking down materials (Gregson et al. 2010; Laser 2020), and the construction sector, which creates value by demolishing structures, sometimes removing 'bad' residents in the process (Easterling 2003; Halauniova 2022). While industries claim to have 'designed out waste', this process often introduces new, unknown, and inherently problematic repercussions (Zavos and Pyyhtinen 2024: 4).

Despite their tangible presence, residues are often overlooked and neglected due to their perceived insignificance. Residue refers to the remainder, such as the waste left after recycling, traces of chemicals left after cleaning, or by-products left after processing the main product. It is 'the matter left behind by the main event' (Hecht 2023: 28) or 'matter that is not supposed to matter' (Boudia et al. 2018: 170). The growing importance of understanding residues has led to emerging literature exploring their properties, governance, and implications. This literature often focuses on detrimental residues like toxic substances and greenhouse gases, examining their impact on health, environment, and policy frameworks (Boudia et al. 2022; Hecht 2023). Hecht's (2023) study on mine residues shows that managing discarded materials involves simplification and exclusion of environmental costs, sidelining pollution-related facts and treating residues as insignificant by-products requiring minimal attention. This creates a scenario where residues persist and potentially cause harm without being adequately monitored or addressed. Laws and regulations may permit residues to remain under the radar by focusing on threshold values that fail to capture the full extent of their presence and impact. The accumulation of fossil fuel residues confronts societies with long-lasting ecological

and existential damage (Folkers 2021). Subtractive value production is reflected in the way carbon dioxide is increasingly conceptualised as waste. Processes such as carbon capture, utilisation, and storage transform this waste into profitable ventures by integrating carbon management into economic cycles (Buck 2020). This approach emphasises sustainability by repurposing carbon emissions, thus aligning with broader environmental goals while creating economic value.

Discarded items often carry both environmental 'bad' and economic 'good' values, having 'a double—plus and minus—value charge' (Doganova and Karnøe 2015: 231). Items that people discard but are then revalued and given new life are often seen positively (Gregson and Crang 2015). However, a comprehensive valuation perspective acknowledges that 'good' can be constructed in many ways, recognising diverse modes and registers of valuing goodness (Heuts and Mol 2013). For instance, a 'good mother' may hold on to children's clothes and toys or get rid of them in caring ways (Gregson 2007). While being 'a good sorter' has become a central virtue, it also entangles ethics and the economy in new ways (Hawkins 2001). 'Riddance' can perpetuate consumerism by making room for new items, encouraging continuous cycles of consumption and disposal. What is 'good riddance' or not varies depending on perspectives, often leading to conflicting perceptions. Dumpster divers, for example, see value in rescuing discarded matter, claiming to reduce waste and challenge wasteful consumerism (Lehtonen and Pyyhtinen, 2020). However, their actions can also lead to legal disputes when waste is viewed as a resource by proponents of a circular economy, illustrating the clash between different valuation systems (Barnard 2011; Gregson and Crang 2015).

Valuation processes are crucial for understanding how stakeholders assign significance and worth to various materials within an economic system. These materials acquire value through complex processes, involving multiple values, schemes, and evaluators (Foster 1997; Bigger and Robertson 2017; Bracking et al. 2019). Different stakeholders may use various valuation tools to advocate for or against certain governance approaches, influencing how materials are classified and managed. Asdal et al. (2023) highlight that tools of valuation are essential for understanding how economies and notions of good are interlinked, especially in contexts like the bioeconomy where traditional economic assessments intersect with ethical and sustainable concerns. These tools range from economic models integrating environmental impacts to narrative strategies shaping public and policy discourse.

Classification systems are also important valuation tools. Bowker and Star (1999) argue that these systems do not merely organise reality but are outcomes of norms and moral principles, highlighting that

classification is about deciding what counts and what doesn't. For example, states can adjust classification systems to boost industry opportunities and reclassify waste into renewable resources to make waste problems disappear (Behrsin 2019; Behrsin, Knuth, and Levenda 2022). Similarly, mining heaps have been reclassified from 'worthless residues' to 'valuable secondary resources' (Bleicher, David, and Rutjes 2019), and profit can be derived from waste transformation, redefining discarded items beyond mere disposal (O'Brien 2012). These classifications carry significant implications for how materials are assessed, reflecting both technical definitions and strategic interests of stakeholders.

The classification debate surrounding PFAD critically distinguishes between categories such as waste, residue, co-product, and product. The term 'by-product' is often used generically for substances that are not the main output, yet the specific technical categories and their sub-categories are essential in the biofuel economy. These classifications are pivotal because they not only influence the semantic understanding of materials but also determine how these materials are valued in sustainability terms. For instance, products and co-products must adhere to comprehensive sustainability standards, and allocation rules play a crucial role in deciding how carbon footprints are apportioned between these categories. The specific rules governing carbon accounting and sustainability criteria for the category 'processing residues' will be detailed in the upcoming sections of this paper. Within the European Union, the responsibility to classify substances like PFAD rests with individual member states. The following empirical study from Sweden offers an in-depth examination of these classification dynamics, uncovering the tensions and strategic decisions that impact the sorting and valuation of PFAD within the biofuel sector.

Examining residue valuation: methods and materials

This study focuses on a time in Sweden when the definition of residues was being updated to match new EU regulations due by September 2017. The debate over PFAD and its classification stirred up this process. This provided a rich context to explore how residues are valued. Given the specificity of PFAD, an online search was feasible. The regulatory process and parliamentary debates around PFAD were publicly available through the Swedish government, allowing access to diverse stakeholder opinions. For analysis, I selected 22 texts from 2016 to July 2019, when the reclassification of PFAD went into force. These texts included online publications by environmental organisations, politicians, and fuel companies, as well as remittances, parliamentary debates, regulatory drafts, and final legislation (e.g., GoS 2017; Riksdagen 2017; The Environment and Agricultural

Committee 2017). Environmental organisations and the Green Motorists used online media to express their views, and eight texts were selected for their focus on residue classification (Sveriges Natur 2016a, 2016b, 2017; Greenpeace 2017; Gröna Bilister 2017, 2018, 2020; WWF-Sweden 2020). Industry perspectives were captured through trade magazine articles and texts from the 'Fossil-free Sweden' platform and representatives from the biofuel and forestry industries (Bioenergitidningen 2016, 2018; Neste 2020; Riksdagen 2017; Skogsindustrierna 2018). Political perspectives were gathered from blog posts (Nordin 2017; Tovatt 2017) and media coverage, including an article from a prominent Swedish newspaper (Dagens Nyheter, October 31, 2020). Excerpts were coded and translated from Swedish, with attention to how PFAD and residues were perceived, defined, and revalued by various actors.

Akrich's (1992) concept of 'de-scription' is useful for analysing how controversies and social contexts redefine a material's place in the economy. If a script prescribes what a category should contain, then de-scription involves the process by which these classifications and materials are stripped of their initial roles and redefined through social, economic, and political contexts. This re-scription often emerges from controversies, challenging initial intentions and revealing the dynamic nature of material and category construction over time.

Sorting out PFAD and the value of residue in Sweden

The PFAD controversy emerged in 2016 when environmentalists discovered significant amounts of PFAD in Swedish biofuels. Until then, the specifics of waste content and origin were not required in fuel producers' reports, allowing PFAD to go unnoticed. Public opinion in Sweden was divided: some defended PFAD as a benign residue, while others pushed for its reclassification as a co-product, which would impose stricter regulations and potentially exclude it from the biofuel mix. By narrating the two-year-long reclassification process, this section demonstrates how PFAD and the concept of residue were simultaneously de-scribed (Akrich 1992). To understand this, it is essential to first explore how processing residues were valorised, that is, how their values were enhanced under Swedish and European biofuel regulations.

Valorising residues through biofuel regulation

Valorising residues in this context means assigning value to residues by integrating them into the biofuel economic system as valuable resources. This process begins with defining what constitutes a residue.

Following changes in the EU's Renewable Energy Directive (REDII 2018/2001/EU 2(43)), Sweden had to adopt a definition stating that a residue is 'a substance that is not the end product(s) that a production process directly seeks to produce; it is not a primary aim of the production process, and the process has not been deliberately modified to produce it'. The inclusion of the phrase regarding deliberate modification was intended to prevent fraud, highlighting the high value placed on residues within the biofuel economy. In Sweden, this addition was accepted without much controversy. However, the revision coincided with a broader debate on what constitutes a 'proper' residue, particularly in light of the PFAD issue. A new provision was introduced, allowing the government or an appointed authority to issue further regulations defining what qualifies as a residue.

This regulatory negotiation was influenced by the significant advantages that residues received under biofuel legislation, such as exemptions from full-chain sustainability criteria and carbon accounting, which positioned residues favourably in sustainability rankings compared to crop-based biofuels. The EU REDII, which Swedish law must adhere to, is particularly lenient on processing residues. While crop-based biofuels must account for greenhouse gas (GHG) emissions throughout the entire production chain, processing residues only need to account for emissions from the point of their collection at processing plants. They are exempt from land use criteria and the EU's Indirect Land Use Change (ILUC) factors. Although palm oil is identified as high risk and slated for phase-out by 2030 in the EU biofuel market, materials classified as processing residues from palm oil production escape these ILUC factors.

These simplified measures and differential treatments position residues higher in sustainability rankings compared to crop-based biofuels. Regulatory advantages have created a lucrative market for residues, including those eligible for the 'double market', where certain residues and wastes listed in EU REDII's Annex IX list A can count twice towards renewable energy targets due to their substantial carbon reduction potential. This multiplier mechanism makes these materials highly desirable, as their energy content contributes doubly to renewable energy goals. Additionally, there is a specific minimum target for advanced biofuels, including those derived from waste and residues.

By applying the perspective of residual governance (Hecht 2023), we can understand this approach as a minimalistic and simplifying governance style. It showcases how the biofuel regulation externalises residual impacts to minimise administrative and economic burdens. With residues in the biofuel economy, the appearance of a sustainable economy can be maintained. For instance, as a residue, PFAD can reduce greenhouse gas emissions by 90% compared to conventional

fossil fuel-based diesel. In contrast, when defined as a co-product, the emission savings are much lower: life-cycle assessments range from 11.44 gCO2eq/MJ to 79.8 gCO2eq/MJ, the latter being well above the EU requirement for carbon emission savings to qualify as sustainable biofuels (Cho et al. 2013; Johnson 2017; Xu, Lee, and Wang 2020). This variability underscores the importance of classification in carbon accounting.

Given this preferential treatment for residues, one might expect clear definitions of what constitutes a residue, but this is far from the case. What is defined as a residue at the EU level may differ in member states and other countries, leading to varying and sometimes contradictory classification systems. Practitioners, including regulators, industry stakeholders, and certification bodies, frequently grapple with the distinctions between residues, waste, co-products, and main products. This ambiguous situation provides one of the few opportunities for EU member states to shape biofuel regulations. Sweden leveraged this flexibility to define what constitutes a residue within their national context, but it was preceded by long debates.

De-scribing PFAD: residue or co-product

The issue of PFAD divided public opinion in Sweden. Proponents argued that PFAD, as a residue, did not drive palm oil production, affect demand, or cause deforestation. Opponents contended that PFAD and palm oil were produced together and had similar drivers and negative impacts. Environmental organisations, including Greenpeace and WWF, campaigned against PFAD, citing its negative climate effects and difficulties in tracing its origins (Greenpeace 2017; WWF-Sweden 2020). Campaigns against PFAD included stickers at petrol stations, online communication, and investigative articles. Questions of what a residue should be or not moved from the technical, expert sphere to the fuel consumer. Issues such as deforestation, habitat loss, fires, greenhouse gas emissions, and human rights abuses were highlighted. The Swedish Society for Nature Conservation (SSNC) actively campaigned against palm oil and its by-products in fuels, hoping to 'sanitise' the industry (Sveriges Natur 2016b). SSNC and the Green Motorists used 'naming and shaming' tactics to pressure companies to avoid PFAD-based biofuels.

The Green Motorists' campaign 'Fossil freedom at any cost?' criticised the easy availability of palm oil and its by-products and the resultant environmental damage. They argued that fuel companies could buy PFAD without worrying about its origin from uncertified or illegal palm plantations (Gröna Bilister 2017). They estimated that 15–20% of all PFAD produced globally was used in Sweden, claiming that the Swedish biofuel transition was 'doped with PFAD' (Gröna Bilister 2018). The cheap availability of PFAD, coupled with the growing

demand for biofuels, created what the Green Motorists described as a 'dangerous mix'. As PFAD, classified as a residue, was automatically assigned a low climate impact, it was 'by far the easiest and cheapest way for companies to fulfil the obligation' to reduce carbon emissions, referring to a regulation which was to be introduced on 1 July 2018. Before this obligation took effect, it was crucial to 'disconnect the fossil-free transition from one of the most valuable natural areas on Earth' (Gröna Bilister 2017). This situation illustrates the concern that a supposedly good economy could turn into a bad one, if not governed in proper ways (Asdal et al. 2023).

For the Green Motorists, a concrete step in that direction was to reclassify PFAD so it no longer counted as a residue and did not travel the 'priority lane' from Southeast Asia into Swedish diesel cars. They argued that Sweden would otherwise be 'complicit in destroying the reputation of biofuels for good, and the market will die – if it turns out in a few decades that our demand for biodiesel was behind the devastation of the last rainforests in Southeast Asia'. Pretending that palm biofuels could be used while protecting rainforests through regulation and certification was, according to them, like steering a horse carriage while 'trying to avoid trampling delicate flowers in its path'. Instead, Sweden would do biofuels 'a favour' by limiting the inflow of palm oil and PFAD until the industry was 'rehabilitated' (Gröna Bilister 2017).

To underscore how 'bad' PFAD was, it was compared against what Swedish actors defined as 'good' residues, particularly those from the domestic paper and pulp industry, such as 'tall oil' (pine oil). According to the Green Motorists, the influx of cheap PFAD undermined investments in 'slightly more expensive but more sustainable raw materials for renewable diesel, such as residual products from the Swedish forestry and pulp industry'. They hoped that residues from this industry would be able to compete if PFAD was reclassified. The Green Motorists argued that Sweden's innovative industry was promising, but it needed 'rules of the game that make it competitive' (Gröna Bilister 2017). They expected that a reclassification would make PFAD 'financially impossible in the market' (Gröna Bilister 2018). An anticipated consequence was that the carbon reductions would drop from 90% to 65% when emissions from the entire chain were considered (Bioenergitidningen 2018).

Sweden's biggest fuel company also argued against PFAD, stressing the need to avoid replacing one environmental problem with another. The industrial platform 'Fossil-free Sweden' generally supported reclassification, considering PFAD a cheap and unsustainable competitor. Companies without stakes in domestic production were more hesitant, arguing that stopping PFAD would increase palm oil demand (Riksdagen 2019). International players also intervened. For example, Finland, representing a major PFAD producer, lodged

complaints with the European Commission, causing delays in the reclassification process (Sveriges Natur 2018).

Public debates on PFAD's value intersected with party-political disputes. The ruling Social Democrats and the Green Party, supported by the Left Party and environmental organisations, opposed labelling PFAD as a highly sustainable residue. They argued that reclassifying PFAD would prevent market confusion and improve transparency by tracing PFAD back to its palm oil origins. The Green Party emphasised the economic benefits for Swedish industries, predicting multi-billion investments (Tovatt 2017). Conversely, opposition parties worried about the economic fallout of losing a major biofuel component and potential increases in palm oil-based HVO (Hydrotreated Vegetable Oil) and fossil fuels (Nordin 2017). The Minister of the Environment acknowledged that losing PFAD could lead to higher palm oil use, which was undesirable. Nevertheless, the government believed that removing PFAD was necessary before introducing a new regulation aimed at increasing biofuel usage. This decision was grounded in the expectation that PFAD would be replaced by biofuels from domestic production which had a better climate performance (Sveriges Natur 2016a).

Most actors eventually agreed that PFAD should be sorted out from the residual category. The challenge was how to achieve this within the classification system without significantly disturbing the biofuel economy. The reclassification was slowed under the pretext that Swedish residues risked being thrown out in the same process if the regulatory change was rushed (Nordin 2017). It was deemed important to avoid the unintended consequence of excluding Swedish residues along with PFAD. Opposition parties delayed the reclassification for a year, arguing that rushing the change would negatively impact the biofuel sector. Despite these delays, the reclassification process to exclude PFAD from the biofuel mix was ultimately initiated.

Re-scription: reclassifying PFAD by redefining residue

When the Swedish Parliament decided to exclude PFAD from the residual category, a significant issue remained: establishing clear principles for its reclassification. Any attempt to change how PFAD was classified (from a residue to a co-product, for instance) had to follow the rules and not be seen as reversed cherry picking. As I mentioned, a new provision had been introduced, allowing the government or an appointed authority to issue further regulations on what constituted a residue. Initially, the government proposed that a substance should be considered a residue if the production process was optimised for other substances and its economic value was low compared to the main product. However, 'low' was considered too

vague, prompting calls for greater clarity (JP 2017). The Energy Agency proposed a more precise economic criterion: a residue cannot have a market value higher than 40% of its main product. Although many actors deemed this criterion arbitrary, it was accepted because it disqualified PFAD, which sometimes reaches 90–95% of the market value of palm oil.

Consequently, the Swedish Parliament (2011: 1088) amended the regulation on sustainability criteria for biofuels, stipulating that a substance is not a residue if 'during the last two years or the shorter period it has been on the market, its average selling price per kilogram exceeds 40% of the average selling price per kilogram of the substance the process is normally optimised for'. Figure 1 illustrates the valuation tool in the form of a decision-tree, initially introduced by the Energy Agency to guide biofuel producers.

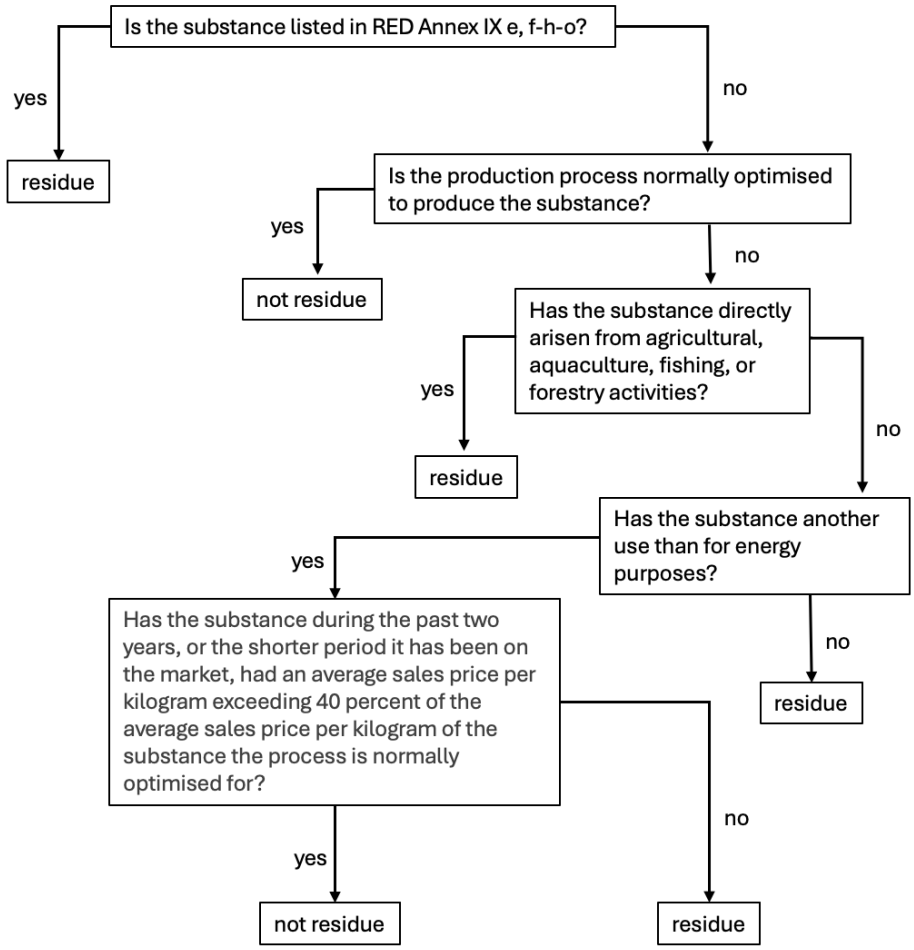

Figure 1: What counts as residue according to the Swedish regulation (Swedish Parliament 2011:1088, 3a) on sustainability criteria for biofuels.
Source: The decision-tree was developed by the Energy Agency (translation by author).

The new definition meant that, as of 1 July 2019, PFAD was no longer classified as a residue, losing its high climate benefit attributed to the category. Instead, it had to meet the same certification and traceability requirements as palm oil. As a co-product, Sweden anticipated that PFAD would become less attractive to fuel operators due to stricter carbon accounting and ILUC factors. After all, the reclassification aimed to make PFAD financially unviable and remove it from the Swedish market. By changing the classification, Swedish actors wanted to influence the market in favour of more locally produced and environmentally friendly biofuels. It is noteworthy that Sweden decided that its own tall oil should always be seen as a residue (Energimyndigheten 2019: 47), even if the forest industry declared that it, too, might generate a high price (Skogsindustrierna 2018). The Swedish rationale was that it is listed as a residue in the EU directive; however, so were palm oil mill effluent and empty palm fruit bunches, which the Energy Agency removed from the residual category together with PFAD (Energimyndigheten 2019: 47). Although PFAD suppliers subsequently tried to comply with the full sustainability criteria, Sweden declared palm oil and PFAD to be a high ILUC risk, effectively banning its use unless proven otherwise by complicated means (Energimyndigheten 2022).

These interactions highlight the role of critique and controversies in shaping what is considered 'good'. By analysing the perspectives and actions of various stakeholders – environmentalists, industry actors, and policymakers – the case reveals the conflicting interests and values at play. Despite their differing motives, these groups collectively pushed for classifications that best aligned with their own economic, environmental, or political goals. This convergence of efforts demonstrates how diverse agendas can come together to drive regulatory changes. As Stark (2009) and Doganova and Karnøe (2015) suggest, environmental and economic values are often juxtaposed, maintaining a state of dissonance where both are actively considered and remain in tension.

Understanding 'good riddance' in the context of PFAD

The reclassification of PFAD from a residue to a co-product exemplifies the process of 'good riddance', a strategy aimed at maintaining Sweden's biofuel economy as a leader in both environmental sustainability and ethical business practices. By selectively removing or redefining elements considered problematic, such as PFAD, Sweden sought to uphold its image of producing biofuels that meet stringent sustainability standards while also adhering to broader ethical concerns, such as minimising harm to the environment and avoiding associations with industries that have

negative social or ecological impacts. This process illustrates how perceptions of sustainability and ethics are not fixed but are actively shaped through strategic management of classifications and public discourse.

Sweden's decision to exclude PFAD from its biofuel mix underscores the dual nature of 'good riddance'. On the one hand, it represents an effort to enhance sustainability and uphold ethical standards by eliminating PFAD due to its environmental concerns. On the other hand, this exclusion serves economic interests by supporting domestic industries and prioritising local residues over imported alternatives. This approach reflects Sweden's goal of improving environmental standards ('doing good') while simultaneously leveraging these actions to block competition and promote domestic economic interests ('doing well financially'). This demonstrates the flexibility and subjectivity within classification systems, and the significant economic, environmental, and political implications they entail.

The removal of PFAD emphasises that residues are not inherently 'good'; their value is contingent on regulatory definitions and market dynamics. This becomes evident when comparing Sweden's approach to that of other countries. For instance, the UK sets an economic threshold for classifying substances as residues at 15%, categorising both PFAD and tall oil as 'products', meaning they follow the same rules as co-products (UK Government 2018). This comparison highlights the variability and subjectivity of classification systems, showing how Sweden's reclassification aligns with its vision of a sustainable biofuel economy by excluding contentious residues like PFAD while favouring domestic ones such as tall oil. These actions demonstrate how classification systems can be manipulated to influence perceptions of value and legitimacy within the biofuel market, further emphasising their arbitrary nature.

To reclassify PFAD, its initial designation as a residue had to be 'de-inscribed', reshaping its identity and prompting a re-evaluation of the broader category of residues. This shift from residue to co-product was followed by 're-scription', significantly diminishing PFAD's role within the biofuel economy. Despite this scrutiny, the process ultimately 're-inscribed' the management of residues within the biofuel sector, effectively obscuring governance mechanisms once again. The residual category is treated as 'unproblematic in itself', akin to how the 'bio' in biofuels was once uncritically accepted as inherently beneficial within the discourse of the good economy (Asdal et al. 2023: 18). This re-inscription exposes the risks of residual governance, where potential problems are concealed through regulatory loopholes. For example, the categorisation of tall oil as a residue remains unchallenged despite its potential environmental impact. This case exemplifies how residual governance, when critically examined, avoids addressing the complexities and contradictions of the biofuel sector.

In essence, the case of good riddance in PFAD's reclassification shows how selective classification and reclassification can align with broader economic and environmental narratives. By reclassifying PFAD, Sweden met its sustainability goals while strategically favouring local industries and residues. This case also illustrates how residues like tall oil can bypass stricter regulations and maintain their 'good' status through strategic regulatory manoeuvring. The balance between exclusion and retention underscores how national interests shape the 'good economy', with classification systems playing a key role in the sorting and valuation of materials.

Conclusion

What does the reclassification of substances like PFAD reveal about the good economy and valuation processes? This analysis demonstrates how classification systems, as tools of valuation, profoundly influence perceptions within the biofuel industry. Residues like PFAD are praised for their potential to mitigate environmental issues such as waste and carbon emissions. Yet, their favourable valuation often arises from strategic classifications and minimalist governance, potentially masking significant impacts. The decision to label a substance as a residue or a co-product impacts its regulatory oversight, market value, and public perception significantly. These outcomes hinge on the strategic interests of those in power, emphasising that valuation is contingent and shaped by a mix of economic, environmental, social, and political factors. This dynamic reveals the complex interplay between material properties and their broader socioeconomic contexts, underscoring that such decisions are deeply entangled with regulatory and economic agendas.

The subtractive logic demonstrated here suggests that value is not only generated through inclusion but also through exclusion. The removal of PFAD from the residue category highlights this point; however, the story of PFAD itself underscores the complexity of value production. PFAD is a versatile commodity used in biofuels, oleochemicals, and animal feed. Unlike traditional linear value chains, where products follow a straightforward path from raw material to finished product, PFAD exemplifies a 'flex commodity' that moves through intricate value webs (Bastos Lima 2018). This aligns with the concept of 'ecologies of valuation' (Greeson 2020), in which the worth and utility of materials are continuously re-evaluated and transformed. These industrial value webs, particularly within the green and circular bioeconomy, reveal the interconnectedness of different sectors, where subtractive production ensures that residues and by-products are not wasted but reintegrated into the economic cycle. However, tracing these value webs is a complex task, making it difficult to identify where valuation processes begin and end, and who is using which tools

of valuation. This study has only mapped a portion of this intricate narrative.

As materials enter the biofuel economy, the processes of naming, sorting, and classifying them become increasingly important. Materials labelled as residues are often prioritised over food oils and grains. By examining how residues are repurposed and integrated into value webs, we can gain a deeper understanding of the complexities involved in their valuation. While these residues differ from toxic ones that persist in the environment, the similarity lies in the way that labelling something as a residue can allow it to bypass rigorous regulatory scrutiny.

Ultimately, the case of PFAD serves as a reminder to critically evaluate claims of sustainability and goodness. The use of residues may align with the discourse of the good economy, but closer scrutiny often reveals hidden contradictions. Biofuel policies may assert that the sustainability of residual materials has been 'assessed', when in fact, it is often assumed rather than proven. This underscores how residual governance shapes what is considered beneficial or harmful, allowing damaging practices to persist if their impacts are obscured or relocated. Threshold limit values, such as Sweden's 40% rule, imply that substances below a certain level of concern may be disregarded, leaving them in an ambiguous 'in-between' state where they exist in the environment but remain unrecognised or unregulated (Alexander and Sanchez 2019; Boudia et al. 2022: 120). These materials oscillate between acknowledgment and neglect, revealing gaps in regulatory frameworks. Biofuel residues may go unnoticed, only to have their long-term environmental impacts recognised later. For instance, the emissions from burning residual biofuels, including carbon dioxide, leave lasting environmental consequences.

To build a trustworthy economy, greater transparency is needed in how residues are managed. Accountability for the residual impacts of materials is essential. The PFAD case emphasises that developing a genuinely sustainable biofuel economy requires ongoing scrutiny and a commitment to addressing the complex challenges of residue management. The growing controversy around Sweden's tall oil residue presents a relevant next step for further investigation.

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Marie Widengård holds a PhD in Environmental Social Science and is currently a researcher at the School of Global Studies at the University of Gothenburg. Her work examines the politics of nature and resource governance, with research spanning the Swedish fuel transition, rights of nature, and the entanglements of extraction, conservation, and Indigenous rights in Jamaica. She is also co-curator of Sweden's Transformed World Exhibition 2045, a digital public exhibition hosted at fossilfreenation.se.

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Theme issue contribution

A Climate for Investors. Climate Scenarios in the Network for Greening the Financial System

Alexandre Violle

Abstract
A growing body of scholarly contributions has shown how environmental issues are being "financialised", as financial actors problematise the environment and the climate as a question of financial valuation. But what effects are their valuation processes having on financial and economic knowledge? By considering the case of the Network for Greening the Financial System (NGFS), I show how central bank economists are trying to create a "climate for investors" out of climate change, defining climate scenarios that give banks incentives to finance low-carbon activities and thus encourage the transition to a "good global economy". I argue that NGFS economists are doing boundary work that treads a path, carefully highlighting certain threats of climate change for an audience of investors, without losing their legitimacy or running the risk of appearing to be political actors. In doing so, these central bank economists are also transforming their understanding of what makes up national economies.

Keywords: financialisaton; good economy; climate scenarios; risks; boundary work; central banks

Alexandre Violle is a postdoctoral researcher at the Centre for the Sociology of Innovation at Mines Paris.

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Introduction

Valuation studies have conceptualised financialisation as a configuration in which actors use instruments or knowledge from the world of finance to attribute value to goods (Chiapello 2015; Leyshon and Thrift 2007; Muniesa et al. 2017). Recently, a number of studies inspired by this understanding of financialisation have demonstrated how using financially-based valuation techniques to address environmental problems is becoming more widespread (Aguiton 2018; Bracking 2019; Sullivan 2013). In the case of environmental damage, public and private authorities are increasingly adopting an investor-style reasoning in terms of "risks", "costs" and "returns on investment", along with the related measurement techniques, in order to put a financial value on "nature". This has made investors the political subjects in whose names the legitimacy of action to address environmental problems is assessed (Ortiz 2013). Finance is analysed by some authors as a body of knowledge, actors and practices, extending its field of action to an ever-increasing quantity of environmental goods that are turned into profitable assets on behalf of investors (Birch and Muniesa 2020). This literature has provided very important analyses of the political consequences induced by assigning a financial value to the environment or the climate. Yet its analytical approach tends to focus on how economic concepts and instruments affect the transformation – the economisation – of entities. Valuation studies rarely consider that economic and financial knowledge derived from theory is being transformed in valuation processes.

In showing how the central bank economists belonging to the Network of Central Banks and Supervisors for Greening the Financial System (NGFS) seek to integrate the issue of climate change into their banks' supervision practices, I will demonstrate how these actors must transform both the climate as an object of scientific knowledge, and some of their conceptions of finance, to achieve their aim. Studying the co-production (Jasanoff 2004; Laurent 2017) of a climate for investors, and the global economy that central bank economists want to enact, enriches analysis of both the political consequences of valuation operations and the contemporary changes in central banks' economic interventionism.

Central bankers are increasingly acknowledging the challenges posed by the climate issue (Langley and Morris 2020). This is the outcome of a long process of framing climate change as a public matter of concern for the financial community. In 2015, the "Breaking the tragedy of the horizon" speech given by Mark Carney, then Governor of the Bank of England, was widely reported as the first public stand by a senior official on the relationship between central bank action and climate change. It was indeed the first time that a person of such standing argued in favour of central bank action in response to climate change, to preserve financial stability. But that

speech was not the only event that turned climate change into a concern for central banks. Coalitions of various actors had been campaigning since the financial crisis of 2007–2008 to politicise central banks' policies (McPhilemy and Moschellla 2019). For instance, NGOs (non-governmental organisations) and parliamentarians played an important role in linking financial and climate risks (Massoc 2022; Quorning 2023). In prominent central banks such as the European Central Bank, internal conflicts and the replacement of certain senior officials contributed to stabilise a concern to combat climate change (Deyris 2022).

Analyses of the action taken by central banks to address climate change have given rise to debate in the literature. Christophers (2017), for example, analysing the proposals of the "Task Force on Climate-Related Financial Disclosures", one of the most visible initiatives of the central banks which began in 2015, showed that these banks' main concern was to produce financial information about climate change so that the financial markets, assumed to be efficient, would take it into consideration when pricing assets and thus redirect capital flows towards "greener" activities. Christophers uses the term "neoliberal governance" to emphasise that the public authorities do not envisage any new regulations for banks. With the benefit of a longer time horizon, other authors (Thiemann et al. 2023) have recently argued that central bank actions are founded on different problematisations of their economic intervention. Central bankers seem to be gradually abandoning the idea of regulating and supervising the economy apolitically in the name of a market neutrality paradigm.[1] Central banks are moving towards a more proactive role, shaping market forces rather than just acknowledging them, and this paradigm shift has ushered in new monetary policy strategies. Some of these banks, such as the Bank of England and the European Central Bank, are gradually developing measures to "green"[2] their monetary policy, introducing green asset purchase programmes to encourage investors to favour green assets over carbon assets in their asset management strategy. At the moment, these initiatives are not coordinated and are far from being stabilised with dedicated instruments (Monnet and Van't Klooster 2023). This is partly because central bankers do not totally agree on the appropriateness of such policies, and partly because they lack the legitimacy to take public responsibility for climate change without prior democratic deliberation on their missions (Van't Klooster 2022).

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[1] This paradigm, regularly used by central banks to justify their independence from governments (Van't Klooster and Fontan 2023), posits that monetary policies should not favour any economic player, so as not to impede the "laws of the free market".

[2] The question of what constitutes "green" and "non-green" economic activities is the subject of much debate and many power struggles.

What the contributors to this debate have in common is that they seek to show how central banks' economic interventionism has evolved. In many studies examining changes in central banks' capacity to address climate issues, the concept of the climate itself is taken for granted. It is the starting point for analyses of how central banks change or do not change the way they govern the financial sectors they help to supervise or regulate. In this article, I aim to contribute to the debate on central bank action by asking the following question: what conception of climate and finance are central bankers acting on, and to what effect? To answer this question, we must seriously consider the version of the global economy that central banks seek to enact in the name of new moral and political concerns (dubbed 'a good economy' by Kristin Asdal and her colleagues (Asdal et al. 2023)), and a specific conception of climate change that is gradually becoming institutionalised as the banks develop expertise on climate issues.

Adopting this perspective, I look at the most important collective step taken by central banks, namely the creation of the Network of Central Banks and Supervisors for Greening the Financial System (NGFS) in 2017. The NGFS brings central bankers together to develop climate-related financial expertise by building climate scenarios intended to simulate the effects of climate change on banks' and insurance companies' balance sheets, in order to make financial actors "sensitive to climate change", in the words of one of the chief economists at the Banque de France (Clerc 2020). We are thus witnessing a new age of "scientisation" (Mudge and Vauchez 2016) at the central banks, which are bringing in new economists to respond to the problem of climate change with science (in this case, financial economics). Climate scenarios are valuation tools that enable central bankers to take new moral and political concerns into consideration, in order to contribute to a reorganisation of the banking sectors they help to supervise and regulate (Coombs and Thiemann 2022), in response to the risks that climate change represents for financial actors.

To build climate scenarios, the central banks need new expertise in climate finance, and a new institutional setting to debate and elaborate the scenarios. We have here a particularly interesting case of co-production of a scientific and political order (Jasanoff 2004; Laurent 2017), with central bankers explicitly seeking to stabilise a new form of expertise and economic intervention. I argue that the development of this new expertise is based on a process of boundary work (Gieryn 1983; Jasanoff 1987; Latour 1993), during which the NGFS economists transform climate change into an object of intervention that falls within their scope of expertise, while excluding climate issues they consider too "political".

The rest of this article begins with a presentation of the methodological approach I have adopted to study the development of

climate scenarios. I then discuss three boundary work operations that turn climate change into "a climate for investors" with the aim of enacting a "good global economy". I conclude by discussing the implications of my case study for valuation studies and the literature on central banks.

Boundary work at the NGFS: materials and methods

Taking the NGFS actors' aims seriously means analysing how their conceptions of both the economy and the climate are transformed by their attempt to enact a new conception of the economy. This is exactly what Kristin Asdal and her colleagues did when they studied the bioeconomy (Asdal et al. 2023). They showed that the originality of the bioeconomy does not lie in the idea of grounding the economy in the "biological" but rather in seeking to bring about a "new version of the economy" in which markets and "biological resources" are co-transformed in the name of moral imperatives. This is what they call a "good economy".

I propose to analyse the work of the NGFS economists in a similar way, characterising what I call the "good global economy" they want to enact by building climate scenarios for bankers and investors. It is important to clarify an empirical point here. As the NGFS membership includes over 70 central banks worldwide, it is impossible to document the work of all the economists from all those banks. However, the NGFS structures its activities into workstreams. At the time of its creation in 2017, it had three workstreams. One focused on climate change-related financial stability issues, the second on macroeconomic modelling issues, and the third on scaling up green finance and developing ideas for appropriate financial instruments to finance the transition. By reconstructing the debates in workstreams 1 and 2 through interviews with participants in those debates, I have been able to identify the type of "good global economy" these actors seek to enact. In the rest of this article, when I refer to the "NGFS economists" or "NGFS actors" I am talking about the economists participating in NGFS workstreams 1 and 2, who are a small subset of all the central bank economists involved in the debate on the relationship between finance and the climate.

As previously mentioned, the NGFS economists' work involves boundary work operations. Looking at the NGFS' activities in terms of boundary work enables me to analyse the way the actors link ontological questions such as "what does climate change mean for economic actors such as investors?" and "what is a good global economy in transition?" to institutional and political questions such as "how can central bankers intervene to influence economic actors, and with what legitimacy?". I do this by examining how they construct the

boundaries between the scientific expertise they develop, the politics they want to promote and political matters they consider beyond their remit. In practice, this boundary work explains how central bank economists turn "the climate", defined as an object of climate science, into an eligible object of central bank intervention, in other words how they create a "climate for investors".

The NGFS economists' boundary work consists of three main operations that make up the three sections of this article. First, they draw a line between what is problematic and what is unproblematic for them and their audience. At this stage, the climate is problematised as a source of risk for investors, who could lose money due to global warming. Second, they seek to enact a "good global economy" by promoting a certain type of politics with the aim of encouraging banks and insurance companies[3] to make calculations that will favour the transition to a low-carbon global economy rather than maintaining the status quo and continuing to finance fossil fuel industries. Finally, they leave it up to the national central banks to define their "transition". I suggest that "climate diplomacy" emerges from the NGFS economists' actions, as they produce climate scenarios and then allow the national central banks to translate those scenarios according to their own idea of what a national economy in transition should look like. This last boundary work operation leads national central banks to ask themselves new valuation questions about what "national economies" are and how they should be represented.

My research takes the form of a qualitative inquiry involving interviews with eleven European central bankers (mainly French and British), and a review of press articles and the econometric literature on climate scenarios and models. I also studied the public reports on climate finance produced by the Banque de France, the Deutsche Bundesbank, the Bank of England, the European Central Bank and the NGFS from 2017 to 2023. I chose to focus on European central banks because they are among the most active central banks in the NGFS' workstreams. Some of them have even carried out what they call "climate stress tests" or "scenario analysis exercises" at national level based on the climate scenarios developed at the NGFS. I analysed these documents using an inductive method (Glaser and Strauss 2017) aiming to identify the actors' problematisation of climate change and finance, and then explored these issues further through the interviews. I also conducted an ethnographic study of four workshops for central bank economists, to observe how they debated the topic of climate finance.[4]

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[3] Central banks supervise financial institutions, which may be either banks or insurance companies. Consequently, central banks may decide to carry out climate stress tests or scenario analyses that relate to either banks or insurance companies.

[4] See Appendix 1 and 2 for more information.

Defining what is and what is not problematic

The first task of central bankers is to define what is and what is not problematic in the relationship between finance and climate (first boundary work operation). As mentioned previously, the process of establishing the climate issue as a concern for the finance world lasted several years and involved a wide variety of players (both finance and non-finance professionals). I focus here on the first emblematic public stance taken by a central banker, in the famous 2015 speech given by Mark Carney, then Governor of the Bank of England and Chairman of the Financial Stability Board.[5] This speech has the advantage of clearly setting out the problem, concepts and solutions that central bankers considered after 2017 in the NGFS (Engen 2025). I analyse it from a "good economy" perspective, to characterise both the problem Carney wants to address and the "good global economy" he wants to help emerge.

The reasoning in this speech is entirely based on an investor's point of view. Carney presents climate change no longer just as a source of physical risk, in the sense of the threat of environmental disasters, but as a financial risk, potentially endangering the profitability of assets held by investors – and thus global financial stability. He defines the good economy as a low-carbon global economy in which climate change will not bankrupt investors. In other words, Carney is expressing the relationship between climate change and finance by presenting the climate as a source of moral and financial concern for central banks because of the threat it poses to financial stability. He also promotes the use of a dedicated instrument to identify this good economy: climate stress tests.

The title of this important speech was "Breaking the Tragedy of the Horizon – Climate Change and Financial Stability". It was given on 29 September 2015 at Lloyds Bank in London to an audience of bankers and insurers from the City. Mark Carney started with a diagnosis that he called the "tragedy of the horizon", observing that the temporality of climate change is different from the temporality of financiers (who think in terms of a maximum ten-year time horizon). If financial actors wait until the effects of climate change materialise to ponder their role in financing fossil fuels, even though those effects are already quite visible and will become more patent in the coming decades, it will be too late to manage climate change risks.

> We don't need an army of actuaries to tell us that the catastrophic impacts of climate change will be felt beyond the traditional horizons of most actors

[5] An international organisation of central bankers and finance ministers of the G20 countries, formed to set the international agenda for financial regulation.

> – imposing a cost on future generations that the current generation has no direct incentive to fix. (…)
>
> The horizon for monetary policy extends out to 2–3 years. For financial stability it is a bit longer, but typically only to the outer boundaries of the credit cycle – about a decade.
>
> In other words, once climate change becomes a defining issue for financial stability, it may already be too late. (Carney 2015: 4)

Carney then went on to explain why climate change should be a serious concern for financiers: it could disrupt or prevent business activity, and jeopardise the stability of the global financial system. Although the financial world was aware of climate change (insurers have been worried about the increasing frequency of natural catastrophes for decades (Gray 2021)), Carney's conceptual innovation was to propose a typology of climate change-related risks, for consideration in order to preserve financial stability. He identified three categories of climate change risks that can impact the international financial system: (1) physical risks (characterised by the growing number of natural disasters such as hurricanes, floods and droughts), (2) liability risks (which correspond to the increase in demands for economic compensation from polluters) and (3) transition risks (the costs associated with the move to a lower-carbon economy). These are the most important risks driving central bank action today.

After identifying these risks, Carney set out how central bankers should act to break the tragedy of the horizon. He suggested a classic line of reasoning for a financial actor: climate change must be approached as a problem of the financial information that is reflected in asset prices. Adopting an investor's reasoning, he problematised climate issues as solvable through asset revaluation. He argued that in order to transition to less carbon-intensive activities, the climate change factor should be included in financial risk calculations, so that financiers and investors will ultimately withdraw from fossil fuels due to their low profitability.

> More properly our role can be in developing the frameworks that help the market itself to adjust efficiently.
>
> Any efficient market reaction to climate change risks as well as the technologies and policies to address them must be founded on transparency of information.
>
> A "market" in the transition to a 2 degree world can be built. It has the potential to pull forward adjustment – but only if information is available and crucially if the policy responses of governments and the technological breakthroughs of the private sector are credible.

Mark Carney's solution consisted of translating climate change into a problem of financial market efficiency: climate-related financial

information must be produced so that it can be incorporated into prices, and the markets will do the rest through the interplay of supply and demand. This expression of the climate change issue belongs to financial imagery that has already been studied in the literature (Ortiz 2014, 2021). It rules out other forms of public action, such as using the law to ban financing of certain infrastructures. It sees climate change as a problem only insofar as it affects investors' assets and financial stability: central bankers' job is to maintain economic stability, so devastated landscapes, displaced populations and colossal floods are only considered when financial stability is threatened. In the investor-centred view of the climate issue, many of the impacts of climate change are ignored because they have no financial value (Christophers 2017).

Carney argued that the appropriate instrument to transform the climate into financial information would be climate stress testing using specific climate models and scenario analysis.

> (…) [S]tress testing could be used to profile the size of the skews from climate change to the returns of various businesses. (…)
>
> Stress testing, built off better disclosure and a price corridor, could act as a time machine, shining a light not just on today's risks, but on those that may otherwise lurk in the darkness for years to come.

Stress tests use hypothetical crisis scenarios (such as a sharp fall in property prices, or a sudden drop in growth) to model the future value of portfolios, in order to control banks' capital adequacy and prevent them from insolvency even in the event of a crisis. During the 2007–2008 financial crisis, after the collapse of Lehman Brothers the Fed (the United States' central bank) made the first use of stress tests to publicly demonstrate the solvency of American banks and stabilise stock market fluctuations (Langley 2013). It carried out a full-scale stress test simulation exercise and published the results of its scenarios bank by bank (instantiated by stock prices), to reassure investors that they could still trust American banks because they were sufficiently capitalised, and in the process possibly forcing undercapitalised banks to increase their capital.[6] The advantage of stress testing over other supervisory instruments is that instead of referring to the average outcomes of past events to anticipate future losses, it works on a forward-looking, scenario-based approach that is more appropriate for

[6] Central bankers don't perform their demonstration in front of a real public of investors. This public is mostly supposed to express itself via the variation of stock prices (a high variation observed after the public disclosure of stress tests results is supposed to be "a panic", a price decrease is a sign of "relief") (Preda 2005; Montagne and Ortiz 2013).

events whose frequencies of occurrence do not follow probabilistic rules[7] (Collier 2008).

The way Mark Carney framed the issue of climate change and its solutions has become the main concern and raison d'être of the NGFS. Since the NGFS was formed in 2017 following the Paris Agreement, most of the institution's publications have focused on climate risks and the development of scenarios as advocated by Mark Carney. The NGFS members I interviewed frequently referred to this speech as their source of inspiration for theorising transition risk.

Enacting a good economy: the politics channelled through climate scenarios

I am interested here in the practical ways NGFS economists translate the climate issue into financial scenarios. To do so, they have to identify and compartmentalise the type of politics they want to promote through their scenarios (the second boundary work operation).

To build their climate scenarios, the NGFS economists use the "physical risks" and "transition risks" categories described by Mark Carney. In other words, they consider that climate change could have two main effects. First, the increase in extreme weather events (such as droughts, hurricanes and rising sea levels) could affect banks' balance sheets by destroying assets that are likely to generate value in the future: these are the "physical risks". Second, climate change could engender costs that are likely to cause assets to lose value and thus affect the balance sheets of financial firms: these are the "transition risks". These costs may result from a transition that is "too slow" or "too fast" for the targets set by the Paris Agreement for 2050, as one NGFS economist explained to me:

> For us, the "transition" means compliance with the Paris agreements. And there's an infinite number of ways to achieve it. So, we distinguish between smooth and not so smooth transitions, based on their degree of success with regard to the Paris agreements. We call the ones with more negative impacts "disorderly".[8]

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[7] As climate change will generate unpredictable catastrophes, central bankers cannot rely on their traditional models, which simulate financial losses based on past statistical series. The aim is not to anticipate a simple fluctuation, for example in property market asset prices (they have probabilistic models based on long historical statistical series to do that), but rather to anticipate an abnormal, unusual loss in such markets, for example by simulating a sudden fall in value equivalent to the financial crisis of 2007–2008.

[8] Interview with an economist at the Banque de France on 25 February 2022.

In the economist's reasoning, if the climate transition is too slow to meet the terms of the Paris Agreement, it will be costly in the sense that economic activities will have to be halted abruptly because a rising number of environmental disasters will destroy entire economic sectors (and emergency government decisions will be made to reorganise these economic activities, with no advance planning). Similarly, if the transition is too fast, it will generate a certain number of costs, due to early discontinuation of economic activities that are still generating cash flows. Using this analysis based on the speed of the climate transition, the NGFS economists have developed several scenarios corresponding to different transition trajectories, which they group into "orderly", "disorderly", and "hot house world" scenarios and compare to a "business as usual scenario". NGFS builds scenarios concerning the evolution of the global economy. In an "orderly" scenario, the global economy is gradually restructured through proactive government action, ultimately reaching net zero by 2050. In a "disorderly" scenario, governments are assumed to adopt a wait-and-see approach until 2030, before implementing binding public policies to urgently reduce CO2 emissions. In this configuration, the transition is economically costly due to the faster winding down of certain activities.

For these scenarios to be translated into measures of impact on the global economy, the NGFS economists work to incorporate them into macroeconomic models so that national central banks can use them. Measurement of the scenarios' effects is made possible by combining several models, derived from the Intergovernmental Panel on Climate Change (IPCC) teams working on Integrated Assessment Models (IAMs), and the central bankers' communities (Allen et al. 2020).

The challenge of using this complex set of models is how to translate global trends into impacts on specific economic sectors. To achieve this, the NGFS builds legitimacy and scientific authority by its association with the IPCC, and more specifically the laboratories which have been developing IAMs, such as the Postdam Institute for Climate (PIK) or the Pacific Northwest National Laboratory (PNNL). The IPCC has been documenting climate change for decades and was the instigator of the first models for measuring the economic effects of climate change on economic sectors (Cointe et al. 2019). However, IAMs aggregate national economies into less than a dozen economic sectors (such as agriculture, energy and services) and are not sufficiently precise for the NGFS members' aims. Finance is not represented as a sector in its own right in the IAMs. For greater granularity in their modelling, NGFS economists therefore disaggregate the results of the IAMs to match their preferred macroeconomic classification, the European Union's "NACE" system (the Statistical Classification of Economic Activities in the European

Community), which breaks down national economies into almost 400 economic sectors

Once the sectors have been disaggregated, the NGFS economists translate climate change into the question of a carbon tax to influence the price of carbon, to be implemented sooner or later, progressively or otherwise (as a proxy for the climate transition in their scenarios). This operation ultimately enables NGFS members to give national central banks a way to measure the impact of their scenarios on the macroeconomic equilibrium of national economies (which they model using the "NiGEM", the model most widely used by central banks).[9]

This brings us to what the NGFS economists are trying to demonstrate through their scenarios and the politics they want to promote. They want to contribute to the emergence of a good global economy in transition, and that means they have to produce a very specific public demonstration that will encourage banks and insurance companies to finance low-carbon assets rather than carbon assets. This means they have to make the scenarios of a delayed, disorderly or non-existent transition for the global economy less desirable than the scenario of a gradual transformation of production systems, as one member of the NGFS explained to me:

> Imagine an article that says: "The Banque de France has estimated that the transition to a low-carbon economy would result in a GDP loss of 3%". People would say that it's better not to make the transition. Or worse: "The Banque de France, or the Bank of England, estimates that a transition to a low-carbon economy would put such a systemic bank in great difficulty" (…). We were scared our results might be used like that. The NGFS, and the Banque de France in particular, are trying not to take a position on the merits of the transition. They take them for granted. But it can be done in various ways, it could be disorderly. That's the transition that we think involves the greatest financial risks.[10]

This dilemma relates directly to the user who is imagined (Akrich 1992) when the NGFS economists elaborate a scenario: an investor or a banker who would like to read the climate stress test results in order to decide where to invest. In a financialised world, showing risks, whether they are high or low, enables the owners of capital to choose where to invest, and possibly decide not to finance low-carbon projects if they do not fit their business strategies. The economists at the NGFS

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[9] National Institute Global Econometric Model. National central banks need data on the portfolios of the banks or insurance companies they wish to assess in order to measure the scenarios' effects on specific institutions. There are many different ways to take this final step in the use of the scenarios, which is beyond the scope of this article.

[10] Interview with an economist at the Banque de France on 15 March 2022.

are fully aware that financial actors may not be willing to make the cost–benefit calculations they believe are necessary to bring about a low-carbon world, and their scenario-building anticipates that:

> The question for investors is whether it's better to face the cost of transition risks now, or to face the materialisation of physical risks, which will increase in number later. As we want to show that it's preferable to start a transition now, we're always trying to increase the detail in the modelling of physical risks. Initially, we kept things very simple, mainly considering cyclones and floods. We also used mostly historical data. We're gradually bringing in models of lots of other events, such as heat waves and droughts, and gradually increasing granularity by country. We're also using more complex meteorological models that can model an increase in the frequency and intensity of events. The more physical risks we add, the better it is for investors to prioritise the cost of achieving a transition over multiple extreme weather events.[11]

In other words, the NGFS economists calibrate their scenarios so as to generate calculations that favour financing a climate transition, in the hope of encouraging banks and insurance companies to invest in low-carbon activities. In building their climate scenarios, NGFS actors are also problematising what they see as a good global economy and how to achieve it. They want to show by their scenarios that it is morally and economically better for investors to contribute to a transition by financing low-carbon activities, because a carbon-intensive world is not politically desirable and will not be profitable (the physical risks being considered outweigh the transition risks in their scenarios). Their boundary work is thus political: they are deliberately producing incentives with the aim of promoting certain financing and investment decisions rather than others.[12] The aim is to make climate change matter financially by guiding banks and insurance companies towards calculations that are likely to lead to a less carbon-intensive global economy. This is the politics that the NGFS economists promote through their scenarios.

However, this calculated orientation by NGFS members conflicts with other aims they are pursuing, such as refraining from being the public arbiter of what a climate transition should look like and thus exposing themselves to criticism. We will now see how the NGFS leaves a number of sensitive issues it considers "too political" to the national central banks.

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[11] Interview with two economists at the Banque de France on 11 September 2023.

[12] However, this is a bit of a gamble by the NGFS actors. The attempt to show that a world without transition is financially riskier still leaves investors with the choice of continuing to finance carbon projects, partly because higher risks may also mean higher returns (De Goede 2004; Morris and Collins 2023).

Politics beyond the NGFS' remit: climate diplomacy with national central banks

When building their scenarios, NGFS members are faced with a number of dilemmas that they do not wish to resolve on their own (the third boundary work operation). The future of the energy mix is one example, because each country has a different energy mix and NGFS actors do not want to judge which country has the "best" mix (is nuclear power acceptable? What kind of renewable energies should be included?).

> The real problem arises when we move to country disaggregation. National policy choices may not be fully reflected, and the differences in positioning may be more obvious. Particularly on variables such as the energy mix, for example. (…)
> Again, we try to be receptive to what the transition experts say, we aren't transition experts. Some of them say there's a place for nuclear power, for gas, in the transition. But the general public can see things very differently.[13]

NGFS actors fear they will be criticised for going beyond their official mandate and taking a normative approach to what a good climate transition should be. They want to encourage the redirection of international financial flows, without pointing the finger at certain financial or state actors. They fear losing their legitimacy in a field of public action where they are starting to take the lead. To understand these fears for their reputation, it is important to remember that the central banks became independent of their national governments due to a technocratic aim to separate monetary policy issues from the vagaries of the democratic game (Braun 2016). Central banks are frequently criticised for exceeding their mandate without legitimacy, mostly by academic or financial actors who hold an ordo- or neo-liberal conception of central banks and are prepared to take them to court (as has already happened at the German Court of Justice) for acting "too politically" – for instance, if they fund programmes that are considered to violate market neutrality (Fontan and Howarth 2021).

In order to deal with any disagreements that might arise over their climate scenarios, the NGFS members leave the national central banks plenty of room for manoeuvre as to how to use them, as one of the institution's economists pointed out:

> On the question of energy mixes, we don't make the decisions ourselves. We draw on the three major existing IAMs, and each models the future energy

[13] Interview with an economist at the Banque de France on 18 March 2023.

> mix very differently. Our scenarios work with all three of those models, then we leave it up to the national central banks to choose the trajectory that suits them best. Similarly, if the central banks want to use some other macroeconomic model rather than the NiGEM, they can.

Consequently, when national central banks want to organise climate stress tests or scenario analysis exercises, they choose NGFS scenarios compatible with their own modelling practices and their own conception of what a good energy mix is and how it will evolve in each scenario. The NGFS can thus be said to be engaged in climate diplomacy, in the sense that it aims to provide national central banks with scenarios that encourage banks and insurance companies to conduct risk calculations that favour the transition, while allowing national central banks the flexibility to redefine the use of these scenarios according to their own understanding of what the transition entails. As in other diplomatic arenas such as the IPCC (Miller 2001), national sovereignty prevails. This fact is manifest in this case study, as the choice of scenarios and their implementation through models are left up to the national central banks, to avoid international political disputes.

But that does not mean there are any debates on critical issues between NGFS members and other actors (public or private). NGFS actors frequently meet, read NGO reports, and exchange views with research centres and other public modelling bodies to debate the scenarios. In the end, however, the national central banks decide on the details of their stress test models, as one NGFS economist confirmed:

> There's a line the NGFS mustn't cross in terms of the information it can give out. A balance has to be found between the mandate of the NGFS to facilitate its members' work by giving them as much information as possible, and at some point the NGFS should, not judge, but better understand the specificities of certain political decisions to make choices in modelling exercises, otherwise those exercises would be out of step with certain jurisdictions' political or strategic positions. So, there's a balance to be struck between giving enough information to make things feasible for its members, and not descending to a granular level of modelling that makes the exercise impossible for an institution with an international mandate.[14]

For fear of criticism, NGFS members do not allow non-members behind the scenes of their scenario-building and uses. This is typical of many areas of public action where expertise is likely to be contested (Hilgartner 2000). The NGFS consults financial and other actors, but does not provide public access to its internal debates and decides for

[14] Interview with an economist at the Banque de France on 25 February 2022.

itself whether or not to leave certain options for adaptation open in its scenarios.

When national central banks use the NGFS climate scenarios, the public demonstration they perform is entirely different from conventional stress tests. Contrary to classic stress testing-based demonstrations (Langley 2013; Violle 2017; Coombs 2022), central bankers do not publish their results bank by bank, to avoid blaming any particular establishment or economic sector. As a result they also avoid publicly attributing responsibilities in the transition to a low-carbon economy. They fear criticism for exceeding their official mandate and having a normative take on what a good transition should be. Unlike with traditional stress tests, at the moment, the central banks are not responding with regulatory measures such as obliging banks to recapitalise in the event of poor results:

> Everyone realises that we'll get to the point of higher capital adequacy requirements. For the moment, our tool isn't mature enough for that. Imagine if a central bank required additional capital based on the NGFS climate scenarios, there'd be attacks from all sides, on the models, the methodology and the assumptions. For the moment, we don't have a sufficiently legitimate instrument, but we will get there.[15]

Stabilising expertise at the intersection of climate and financial issues is a risky business for the NGFS. Numerous objections are already emerging. Academics, NGOs and financial actors have criticised the use of IAMs, considering them too optimistic about climate change. Some denounce what they call the "neoclassical reasoning" used by central banks to model the economy (Finance Watch 2023); others say that publishing the results of scenario analyses or climate stress tests is often an exercise in self-congratulation by the central banks for the stability of financial systems (Baudoin 2023), or lament the lack of pluralistic debate about the scenario-building process itself (Grandjean and Lefournier 2021).

This climate diplomacy, which leaves national central banks with freedom to choose how to apply the scenarios, nonetheless has significant political and ontological implications regarding the way national economies in transition are conceptualised. In practice, the "good global economy" as described in the NGFS scenarios is never fully implemented in the national central banks' models. When national central banks redefine the use of these scenarios, they are also redefining what constitutes a "good economy" at national level. The use of climate scenarios by national central banks even requires central bank economists to change their valuation practices and economic knowledge, by altering their conception of a national economy.

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[15] Interview with two economists at the Banque de France on 11 September 2023.

As Peter Miller and Andrea Mennicken have shown, any valuation operation that involves accounting processes has territorialising effects, in the sense that it defines a space of calculation and the relationships between entities within that space (Mennicken and Miller 2012). To date, macroeconomics as an economic discipline has considered modelling of the national economy its implicit purpose, seeking to measure movements of monetary aggregates on national territories (Mitchell 1998). Now, the national central banks are having to ask themselves new questions about the boundaries of national economies and the geographical location of the economic activities they model (which I call the territorialisation of national economies). The territory described by central bankers no longer matches the territory of national accounting (which measures the economic output of a national territory whose boundaries correspond to the geographical borders of nation states). Instead, it now encompasses the financial and material economic interdependence of companies and public institutions. For instance, when the European Central Bank (ECB) wants to integrate physical risks into its climate scenarios, its modellers need to know the geographical location of the production chain financed by banks, since physical risks are not evenly distributed across the globe, but they do not have the relevant data in their computer system. By default, the ECB's 2022 climate stress tests used head office location as a proxy for the geographical location of a company's production (Baudoin 2023). The territorialisation of economic activities is also at work when insurers start using climate scenarios to anticipate the economic viability of customers and their supply chains:

> We're in the process of a major project with our customers to map out their economic activities. We're asking them to tell us the location of their supply chains, which means a lot of work for them because they themselves don't always know the geographical origin of the goods and services they order, but it's necessary for these forward analysis exercises.[16]

In other words, there are two sides to the climate diplomacy between central bankers that I am describing. One side involves selection by national central banks of the scenarios that suit them best for modelling the future of the national economies they help to regulate. The other side has a more ontological dimension, relating to how the good global economy can be enacted. National central banks enact "good national economies" by making visible the economic and territorial relationships between economic activities, and thus generate properties of national economies that did not exist before (Muniesa

[16] Interview with the economist in charge of Impact & Regenerative Financing at an insurance company on 29 September 2023.

and Linhardt 2011). The NGFS aims to produce a good global economy in transition by contributing to the national central banks' multiple descriptions of good national economies. Through those descriptions, central banks can help to bring important political questions into the public debate: where are the assets of banks and insurance companies located? How are they geographically linked to each other? How can economic activities be reorganised territorially? These questions cannot currently be debated publicly, since the results of scenario analyses are kept private by central banks for fear of public criticism.

Moreover, boundary work is always connected with the construction of institutional legitimacy and the making of an object of knowledge (in this case climate change) by selective consideration of certain epistemic and political issues rather than others (Laurent 2016). In the case studied here, delegating the task of implementing good national economies to national central banks, in order to respect national sovereignty, ignores the question of whether the transition-related choices made by the central banks will have significant effects on the achievement of a coherent global low-carbon transition.

Conclusion

I have examined how NGFS economists transform the climate from an object of knowledge, derived from climate sciences, into a "climate for investors" through the production of climate scenarios that aim to enact a "good global economy". I have shown that creating a climate for investors involves three boundary work operations.

Mark Carney contributed to the first of these operations by clearly positioning climate change in the public debate as a problem for the central banks, because it was likely to be a source of financial risk. This is a boundary work operation that consists of defining what matters for central banks. It has had important effects, since Carney's speech is one of the key conceptual sources used by central bankers to legitimise the existence of the NGFS and its agenda.

The second boundary work operation analysed concerns the way the NGFS economists promote a certain type of politics in building their climate scenarios. They aim to guide the banks' and insurance companies' future risk calculations, and design their scenarios to encourage them to finance low-carbon projects and stop financing carbon-intensive projects now, rather than continuing the business-as-usual status quo.

The third boundary work operation analysed concerns the politics the NGFS economists do not want to endorse: namely making national central banks use a standard conception of the transition and standard scenarios. Climate diplomacy is thus emerging, since the national

central banks can ultimately decide which scenarios and models they want to use to assess their assets. This climate diplomacy is political not only in the sense that central banks are free to choose the climate scenario parameters for their own territory, but also in the sense that the NGFS scenarios help to make visible where banks' assets are located, how companies and their activities are linked to other companies and other activities, and how they could be reorganised in the future. In other words, the NGFS climate scenarios territorialise national economic activities and allow central banks to describe a variety of potential "good national economies". The question of the concrete effects of the scenarios and the similarity of the "good national economies" implemented in each national exercise, however, is not debated and falls outside the scope of the NGFS' remit.

This article makes a number of contributions to valuation studies, and to the literature interested in characterising the transformation of central banks' economic interventionism. It shows how, in practice, the economic operations used to value the environment or the climate can result in transformation of the financial or economic knowledge likely to be applied to the object to be valued (here, the climate). Although the NGFS economists do mobilise concepts derived from mainstream financial theory, such as risk and cost (which financialise the understanding of climate change), the study of their scenario-building process also shows how economists come to ask new questions about what makes a national economy, how it should be represented, and the role of the financial sector in structuring it. This is in line with the conclusions of an emerging body of literature that shows how the climate issue is transforming the valuation practices of financial actors, and driving hybridisation of the actors' economic and financial knowledge with climate science (Folkers 2024).

This article also makes a contribution to the study of central bank action. At a time when central banks' monetary policies seem to be moving towards more ambitious economic interventionism (Thiemann et al. 2023), the central banks' supervisory policy promoted by the NGFS is encouraged through incentives rather than required by legal constraints on banks and insurance companies. Also, showing how the climate is conceptualised and then valued in practice by economists at the NGFS or individual central banks opens up interesting avenues of research. Comparative studies of different national initiatives could be carried out to understand how certain central banks seek to promote more and less ambitious conceptions of the transition to low-carbon economies. Finally, studies could be conducted inside banks and insurance companies to see how climate scenarios are used and whether or not they influence changes in the banks' asset portfolio management. The NGFS scenarios are based on an incentive logic, but scenarios can be built and used to support different conceptions of climate change and its effects on national economies, and research

analysing this is needed to study the contemporary transformation of central banks' economic interventionism.

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Appendix 1: Interviews

Interview number	Date	Interviewee
1	08/02/2022	Economist 1 at the French National Environment and Energy Agency (ADEME)
2	08/02/2022	Economist 2 at the French National Environment and Energy Agency (ADEME))
3	25/03/2022	Economist 1 at the Banque de France
4	11/03/2022	Economist 1 at the Bank of England
5	15/03/2022	Economist 2 at the Banque de France
6	30/08/2022	Economist at the University of Montpellier
7	20/10/2022	Economist at 2 the Bank of England
8	18/01/2023	Economist at the French International Research Centre for Environment and Development
9	17/04/2023	Economist in charge of stress tests at a French bank
10	11/09/2023	Economists 3 and 4 at the Banque de France

11	29/09/2023	Economist in charge of Impact & Regenerative Financing at an insurance company

Appendix 2: events attended

Event number	Date	Event
1	28/03/2022	Banque de France seminar on climate finance
2	19/12/2022	French seminar organised by the Association Europe- Finances-Regulations (AEFR): "Green finance. Climate, the financial sector and the net zero transition"
3	27/06/2023	FFJ-Banque de France workshop "Climate change, natural disasters, and financial risk: how could central banks integrate environmental issues into their policies?"
4	27/03/2023	Lecture by John Hassler: "Climate and Climate Policy - what we know, don't know and should do", Banque de France - Paris School of Economics, March 27, 2023

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Alexandre Violle is a postdoctoral researcher at the Centre for the Sociology of Innovation at Mines Paris. He is interested in the ways in which expertise based on economic knowledge or theories of innovation contributes to shaping the way in which public action is conceived and carried out, whether in France or Europe, in various sectors (banking, energy, metal, and mineral supply).

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Theme issue contribution

Making a 'Good Investment': Value under Construction in Early-Stage Impact Investing

Kaja Lilleng

Abstract
This article is an inquiry into value under construction. By unfolding the context of early-stage impact investing I examine how investors qualify and give value to environmental aspirations. I trace the role of the investor in shaping what a 'good investment' is and highlight the close connection between judging value and constructing value. Earlier studies have emphasised how investors spur financialised forms of valuation and impose financial frames onto the companies they engage with. However, more than financial logic is in play when things are made valuable in finance. The findings of this article illustrate how making something valuable is entwined with making something 'good'. I show how the qualitative and moral judgements of investors shape what is valued of environmental aims in significant ways. The qualifications constrict what is considered environmental solutions and draw boundaries between 'right' and 'wrong' aspirations. The approach contributes a holistic lens onto how things are made valuable in the economy.

Keywords: valuation; value under construction; qualification; financialisation; moral economy; early-stage impact investing

Kaja Kirstine H. Lilleng is a doctoral researcher at the Department of Management, Aalto University.

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Introduction

> This might be good climate-wise, you can see that if we actually want to consume chocolate in this volume, this is probably the best solution […] But the thing is that we don't want to do it, because even if it's the best solution, we don't want to be part of a world where we colonize the global south again in the name of climate. (Climate VC investor)

What makes a good investment? The investor in the quote above illustrates how qualifications of what a 'good' investment is involve a variety of considerations. This is especially true when aims of financial return meet aspirations to foster social and environmental good, like they do in impact investing. In this article I explore how environmental aspirations are made valuable in early-stage impact investing. The findings show how financial and moral judgements are entangled as investors establish their impact investment focus and make investment decisions. I uncover a context where outsized growth aspirations, moral intent, and judgements of 'good' and 'bad' approaches to environmental issues entwine as investors qualify and construct what a 'good investment' is.

In this inquiry into how things are made valuable, my interest is not only to understand what qualifies as 'good' in early-stage impact investing, but also to trace the 'making' of this 'good'. Drawing on valuation studies, I approach valuation not as passive appraisal but as a process through which value is actively made (Muniesa 2011; Kornberger et al. 2015). I elaborate on the connection between making things valuable and making things (Doganova and Muniesa 2015), and how evaluators shape what they observe and assess. The impact investors' judgements are performative in how they shape what a worthwhile investment into environmental impact is, and what it is not. It matters how the environment is assessed in finance, because the judgements have a bearing on what is invested in, promoted, built, and ultimately valued.

A growing number of sites across the world are being valued from an economic point of view and assessed through financial frames. Nature, ocean, and 'invaluable' goods alike are being brought into economy and given economic and monetary value (Fourcade 2011; Asdal and Huse 2023). Studies on economisation and financialisation highlight the limits of economic forms of valuation and what is lost of complexity and diversity when social and environmental qualities are folded into financial frames (Arjaliès and Bansal 2018). Financialised assessments tend to reduce the importance of other forms of valuation (Chiapello 2015). Studies have shown the role financial actors have in driving financialised forms of valuation through imparting their financial logic onto investee companies and turning things into financial assets (Golka 2023; Cooiman 2024). To glean alternatives to financialised forms of valuation it is important to understand how

things are made valuable. Beyond the financialised imprints investors leave (Cooiman 2024), we know little about how impact investors shape what is valued in impact. Studies of economisation risk observing only that which is economic. It is important to foster a broader view on valuation to understand how non-financial value is engaged with in the economy.

I highlight the role of qualitative and moral judgements in valuation. This answers calls for approaches to valuation in economy which leave room for the possibility of the extra-economical. Asdal et al. (2023) introduce the 'good economy' as a concept to analyse how the 'good' is entangled with the economy: there have always been good–economy relations although with different and changing entanglements. I take inspiration from their approach in my analysis of what makes a 'good investment'. I also expand on the role of morality in valuation and introduce studies of moral economies (Fourcade and Healy 2007) to emphasise how such entanglements require a lot of work. My analysis contributes to studies of valuation by illustrating how making things valuable is entwined with making things 'good'.

To explore how approaches to environmental impact are qualified and made valuable in finance I examine early-stage impact investing in the Nordic region. Early-stage impact investing is a less studied phenomenon in the valuation literature. Early-stage investments take place upstream of institutional finance and public markets. They are investments into companies who do not yet have significant profits nor social or environmental outcomes to measure and quantify. This is a site where valuation has less to do with enabling convergence on price, and more to do with judging whether an investment is 'good' or 'bad' based on investors' qualitative and moral valuations of environmental impact. In contrast to financial sites where actors insist on 'objectivity' and division between 'facts' and 'values'(Asdal 2022), this is a financial context where money and morals entwine seemingly openly. The findings foreground these qualitative and moral assessments and contribute insights on how approaches to environmental issues are made valuable, and made 'good', in the economy.

In the following, I introduce relevant literature on valuation, financialisation, and moral economy. The research context of early-stage impact investing and methods are described next. The empirical findings are organised around three qualitative assessment frames of scale, scope, and intent, and I unpack financial and moral judgements in each. This is followed by a discussion on the performativity of valuations in early-stage impact investing and concluding remarks on the findings and their implications.

Studying value under construction in moral economies

Making things valuable and the performativity of valuation

A growing body of literature engages with valuation, understood as how things are made valuable (see for example, Kornberger et al. 2015; Antal et al. 2015; Plante et al. 2021). As Kornberger et al. ask in *Making Things Valuable* (2015: 9) 'through which practices, technologies, and devices are objects evaluated? How are things commensurated, compared, categorized, and classified?' Studies of valuation shed light on the range of activities that go into making matters valuable (Helgesson and Muniesa 2013). Value is thus not seen as something an object intrinsically 'has', nor as something objectively given (Beckert and Aspers 2011). Valuations are not appraisals done by a passive evaluator but happen through interactions between actors, objects, and judgements, where value is actively produced (Muniesa 2011; Kornberger et al. 2015). In line with this literature, this article is an inquiry into value under construction.

Making things valuable is also about making things (Doganova and Muniesa 2015). Central contributions to the valuation literature have highlighted how valuation devices and frames perform the economy (Callon 1998; Muniesa 2014). These works highlight how economic ideas, models, and practices change and make the economy. The idea of performativity also emphasises the involvement of the evaluator in shaping and generating the thing they describe (for example, Esposito 2013). In analysing how making things valuable is entwined with making things in early-stage impact investing, I draw on a broad notion of performativity.

The role of financial actors in 'making things' has been studied in previous research. Doganova and Muniesa (2015) point to how investors shape which businesses grow, and what they grow into, through the process of investing in a company and influencing its business model.[1] Cooiman (2024) shows the power venture capital investors have in 'imprinting' their financial logic onto the businesses they invest in through investment structures. Golka (2023) highlights the power of financial actors to expand financial markets in his study of social impact investing in Britain, whereby social welfare funding was shifted from a structure of non-repayable grants to one of for-profit investments. Hellmann (2020), adding to the few studies on

[1] More specifically, Doganova and Muniesa (2015) show how the business model functions as a capitalisation device, a type of valuation device geared towards transforming things into future flows of revenue. Related processes by which things are turned into assets through valuation devices are explored in the growing literature on assetisation (see for example, Birch 2017; Birch and Muniesa 2020; Golka 2021).

early-stage impact investors, points to the role of impact investors in imposing financial disciplines onto their investees. These studies all emphasise the role played by financial actors in transforming objects into assets and imparting financial logic onto the businesses they engage with. They also underline how financial actors contribute to the broader developments of economisation and financialised valuation.

Making things economic and the financialisation of valuation

The notion of economisation emphasises a view on economy as something that is constantly in the making (Çalışkan and Callon 2009). Moreover, it shows how economic ways of valuing are persistently extending into new areas of society and nature, into sites and situations which were not approached as economic in the past. These developments can be seen in conjunction with broader societal shifts in how value is increasingly conveyed by way of quantification (Mennicken and Espeland 2019) and commensuration (Espeland and Stevens 1998), and through monetisation and the pricing of the priceless (Fourcade 2011), where monetary price becomes the primary signifier of value. Within the proliferation of economic assessments, financial forms appear to be particularly prevalent. Chiapello (2015) shows how the financialisation of valuation is changing valuation practices in a variety of social settings and imposing financialised metrics and reasoning onto previously non-financial activities.

Economic and financialised assessments tend to reduce the importance of prior forms of valuation (Chiapello 2015). Arjaliès and Bansal (2018) study a socially responsible investment firm attempting to integrate environmental, social, and governance (ESG) criteria in investment evaluations, and show the challenges that arise when the fund tries to fold environmental and social evaluations into existing financial valuation practices. The authors emphasise the limits of financialisation and how activities which are hard to value are frequently discarded, and non-financial values embedded in environmental and social issues are ignored. One of the risks of financialisation is how it 'decontextualizes the societal and natural environment, so that the criteria no longer reflect the phenomena they were intended to represent' (Arjaliès and Bansal 2018: 695).

What these studies on how things are made economic also show, whether implicitly or explicitly, is the relevance of understanding how things are made valuable if we are to explore alternative conceptions of economy and finance. Lamont (2012: 202) emphasises that it is more urgent than ever to understand 'the dynamics that work in favor of, and against, the existence of multiple hierarchies of worth or systems of evaluation', arguing how a plurality of coexisting ways of valuing is critical for social resilience. Arjaliès and Bansal (2018) also warn against presuming that financial actors require financial

valuation methods and calculability simply because this is the way they have always been portrayed. Studies on economisation, despite their usefulness in observing economy in the making, may risk giving too much weight to what is seen and conceptualised as economic (Asdal et al. 2023: 5).

To allow space for the possibility of the extra-economical in analyses of the economy, Asdal et al. (2023) put forth the concept of 'the good economy' as an empirical tool to investigate how economy and different versions of good may be entangled. I draw inspiration from the notion of 'good' in my study of making a 'good investment', where I analyse not only how impact investors make things economic, but also how they make things 'good' as they judge and qualify environmental aims in their investment decisions. To illustrate the relevance of moral and qualitative judgements in valuation, I introduce studies on the role of morality in the economy.

Making things 'good' and the role of morality in valuation

The notion of a 'moral economy' was introduced by E. P. Thompson (1971), as he described the tensions that arose between the morals of the English working class and the emerging capitalist economy. However, Thompson's view of moral economy placed morality as something on the outside of, or in opposition to, the market economy (Asdal et al. 2023). The perspective in this article is rather on how morality is entwined with the economy. Economies are morally embedded and should be analysed as such (Fourcade 2017). Studies on the role of morality in valuation have shown how matters perceived to be 'priceless' or 'invaluable' have, nevertheless, been given a price tag and brought into the economy. But even 'if the outcome of monetary commensuration looks flat … the process is obviously not' (Fourcade 2011: 1725). Fourcade illustrates this in her study of economic valuations of nature after oil spill disasters and how the value of nature is judged and subsequently priced differently across two countries. Zelizer (1978) traces the development of life insurance, and shows a process by which economic engagement with 'sacrilegious' human life was shifted from being perceived as immoral to being perceived as a morally responsible form of investment. Literature on morality in the economy, and related studies of moralised markets, highlight how economies and market exchanges are filled with moral meaning (see also Fourcade and Healy 2007).

Essentially, studies on the role of moral qualification in valuation highlight the tremendous effort that goes into making things valuable and how this is inherently entwined with making things moral or shifting the justifications of why it is 'right' or 'good' to value something on a certain basis. It is this process of making something

'good', and how this good entwines with financial value frames to make up a 'good investment', that I explore in this article.

Not all roads need lead to economisation. In foregrounding qualitative and moral judgements in an economised context, I leave room for the possibility and exploration of value plurality. The coexistence of various valuations could be said to be present in any situation (Helgesson and Muniesa 2013). They are especially apparent in contexts where aspirations are both financial and non-financial, like in clean tech innovations (Doganova and Karnøe 2015), socially responsible investments (Arjaliès and Bansal 2018; Arjaliès and Durand 2019) or, indeed, impact investing (Chiapello and Godefroy 2017; Barman 2020). Empirical studies have given us insight into how some investment funds fruitfully use visuals instead of numbers to convey ESG criteria (Arjaliès and Bansal 2018), and how, during the development of the first impact investing measurements, the meanings and measurement of environmental and social value remained multiple rather than resulting in economisation (Barman 2015). Even in long-standing economised sites there can be value plurality or qualitative judgements that make value into something else or more than just a financial number. Reinecke (2015) demonstrates this in her study of 'conflict-free' gold and the role of qualification in troubling the uniformity of value. Gold, long perceived as the ultimate measure of value, was challenged by social qualifications and assessed through ethical and cultural values. Reinecke's study emphasises how processes of qualification are just as important to understand as processes of quantification. Barman (2015; 2016) also explores alternative outcomes to economisation in impact investing, and highlights cases of environmental and social aspirations being brought in as distinct regimes of value alongside finance. This makes impact investing a compelling context for studying how financial frames and environmental aspirations entangle, and how they do so in different ways.

I investigate how the investors frame what a good environmental focus is and draw moral boundaries between 'right' and 'wrong'. The explorations contribute insights into how financial and moral considerations entwine, underpin or overrule one another to make up a 'good investment'.

Methodology of the study

The study centres on impact investors in early-stage private equity in the Nordic region. This encompasses venture capital (VC) funds, family offices, and business angels who invest in for-profit companies whose business prerogative is to solve social and environmental

problems. I first outline the impact investing field and then describe the empirical data, and its collection and analysis process.

Impact investing

Since the late 2000s, impact investing has grown alongside other tangential concepts such as micro finance, venture philanthropy, and socially responsible investments (Barman 2016; Hehenberger et al. 2019; Agrawal and Hockerts 2021). Generally defined, impact investing aspires to foster positive, measurable impact alongside a financial return (GIIN 2020). Compared to other sustainable investment strategies such as socially responsible investments or ESG measures, impact investing has an intentional focus on outcomes. Instead of minimising negatives or risk, the emphasis is on spurring positive outcomes and societal impact. Despite the ambiguously understood term of impact investing there is general agreement around some core tenets, such as that in order for an activity to count as impact investing, the creation of social or environmental impact needs to be intentional; and aims to create both social/environmental impact and financial returns must be present (Hockerts et al. 2022). Measurability is another much discussed component of impact investing. The development of impact measurement standards has been seen as central to growing the impact investing market (Barman 2015). However, there is no one agreed-upon impact measure or indicator for social performance across various impact investing practitioners today.

Early-stage impact investing

Early-stage private equity can be distinguished from public equity which includes all publicly traded goods, stocks, and market exchanges. Early-stage private equity can also be contrasted to late-stage private equity which concerns investments into larger, more established companies. In private equity investments a company receives a certain amount of capital in exchange for shares in the company. Early-stage private equity investments, such as VC investments, are typically thought of as high-risk investments. They are seen as early 'bets' on companies which at the time of investment have low or no revenue, a small team, and multiple technical and financial risks to be resolved. On a global average less than 1% of start-ups get venture funding, and a typical industry expectation is for only one in every ten of these investees to become a highly profitable investment (CFI 2017).

Investors within early-stage private equity include VCs, family offices, and business angels. VC fund managers invest others' capital – that of the fund's investors – while angels and family office owners invest their own capital. The divide between fund managers and

private investors is less pronounced in this context than it may be in others, and they are therefore most fruitfully studied as one group of early-stage private equity investors. All the investors in this study invest directly into early-stage companies and several have invested into some of the same companies.

There has only been a handful of studies on valuation in early-stage impact investing. Bourgeron (2020) unpacks a French impact fund's passage towards more quantified, economised assessments of impact, while Hellmann (2020) captures the role of affective judgements among impact investors in San Diego and underlines alternative paths to financialisation. I give insights into a different region and find other value dynamics at play.

The geographical focus of this study is on the Nordic region: Denmark, Finland, Iceland, Norway, and Sweden. The Nordic countries have strong ties and share comparable welfare systems, with low inequality and high trust in government institutions. The region has a growing early-stage investment scene and an active impact investing ecosystem that seeks to profile the Nordics as leading the global impact investing trend. Compared to the studied impact investing practices in other regions such as France (Chiapello and Godefroy 2017) or the UK (Golka 2019; Casasnovas and Ferraro 2022; Casasnovas 2022), the Nordic region is seeing its own context-dependent practices develop. Among early-stage impact investors in the Nordics the common investment focus is on environmental impact. This differs from other geographies which took up the impact investing mantle earlier, such as funds in the UK, which have had a predominant focus on social impact. In the Nordics, impact investing practices began to gain traction around the mid-2010s. The impact funds in this study were mostly established between 2015 and 2021, while several angels and family office investors had been engaged in the impact investing field since its inception.

Data and method

The main sources of empirical data are interviews and field observations as well as archival data. I conducted 25 interviews which lasted between 45 and 75 minutes each, following a semi-structured interview guide. The field observations include in-person participation in eight industry gatherings hosted by central impact investing organisations across the region – ranging from half-day events to multi-day conferences – and participation in six online industry events. Field notes include about 180 pages of in-situ observations. Supplementary archival data include ten industry reports on Nordic impact investing developments. My data collection and access to interviewees and events was also helped by my own background in

impact investing, having worked in the field and with impact funds over the last decade.

The interviewees of this study are all founders and/or managing partners of their respective impact investment firms. This means that they have autonomy over the investment thesis, decision-making, and assessment frames used. This autonomy allows for insightful analysis of their investment decisions and choice of impact focus. It enables a study of the values and justifications the investors invoke when reflecting on how they came to choose their particular approach to 'impact'. The investors were also selected based on their affiliation with and active engagement in impact-driven investing and aims of deploying finance for positive social and environmental outcomes. Active engagement was further indicated through their impact investment records.

In the interviews the investors elaborated on their perception of impact and their evaluation of impact-companies. The questions asked about their path and approach to impact investing, assessment practices, investment decisions processes, and components making up their investment strategy. This included a focus on how the investors decided their focus within environmental challenges, what they perceived as essential and as investable impact and why, and asking the investors to walk me through one of their last investment decision processes.

Analysis

I followed an empirically driven and iterative approach in my analysis, inducing theory from emerging patterns within the data (Charmaz 2006). Several rounds of coding and revisiting the data helped me gain a comprehensive understanding of the various facets and themes within, as I moved from open coding towards outlines of larger themes. The analytical themes that arose from the analysis also informed the structure of the empirical sections, where I foreground themes central to the investors' judgement of impact. These analytical themes also substantiate earlier empirical observations of valuations in impact investing: Barman (2016) shows how social value holds a variety of meanings but still has a bounded quality that orients judgements and actions. A cross-cutting theme also arose from the analysis on how a 'good' impact investment is something 'in the making'. The quotes in the findings exemplify the themes that emerged throughout the analysis.

Making a good investment in early-stage impact investing

The findings are segmented into four themes. In the first three sections on scale, scope, and intent, I explore how the investors qualify what a 'good' impact investment is. These empirically grounded themes group qualifications that are central to the investors' judgement of impact. In the fourth section, I highlight the relation between perceiving something as valuable and making that something valuable.

Scale

Environmental value is typically not translated into financial numbers in early-stage impact investing, but it is coupled with financial value. They become entwined parts of one business case. In early-stage investments the coupling of financial and environmental value is most apparent in the assessments of the potential for outsized growth – scalability.

> I'm happy to take a lot of risk if the impact is significant. I like the idea of doing moon-shot investments, if the reward, not necessarily the financial reward, but the planetary reward or the reward to humankind can be seen as potentially massive. … That said, this is not just altruistic, idealistic tree-hugging, because I believe that if you can create massive impact, you can make tons of money as well. (Private impact investor No. 19)

In this context, financial growth expectations meet aspirations for positive change to society and the environment. As the investor quote above illustrates, boundaries between 'financial rewards' and 'planetary rewards' become blurred as judgements of what a good investment is entangle with judgements of what a good environmental impact is. The impact aspirations are often deeply personal, and the financial growth expectations are often – especially in venture capital – extreme. For an early-stage venture to qualify as VC-investable it needs to be seen as scalable. This expectation towards outsized profit-potential is a classic feature of conventional VC investments. It boils the question of 'valuation'[2] down to a question such as: *Can this $10 million company sell for $3 billion?*

Several impact VCs are bringing the qualification of rapid scalability along with them into their impact investment theses. For instance, climate tech is one area that has seen significant traction in early-stage investing with a growing number of VC funds being established, many

[2] 'Valuation' here specifically refers to the industry-understood term of financial valuation. In this article, unless explicitly noted, the term valuation refers to the sociological study of how value is assessed and made, as detailed in the theoretical sections above.

of which appear to be adhering close to the conventional VC ethos. As one climate VC who identifies as operating at the 'centre of the VC lane' explains it:

> This is venture capital, if a company doesn't grow really, really big, have a path to do that. … And if we don't believe companies can do that, then the impact they could do by becoming big is just not there. … And that means that it's a bunch of cool stuff we don't do. And, I mean, stuff that would be great, but it's just not going to happen. Or we don't think it's going to happen. (VC impact investor No. 24)

To some investors, like the one above, it is paramount that the potential for outsized growth is present. Or rather, it is essential the investors *believe* it to be present. There is always an element of conviction in early-stage investment decisions. Given how companies who receive venture funding are far more likely to succeed, this points to the potentially self-fulfilling nature of valuation. What investors judge as valuable is more likely to be what is created. As a result, financially scalable business solutions to environmental problems are poised to become a qualifier for what counts as good impact on nature.

The expectations towards scalability vary in intensity across the investors. They are most prevalent in climate VCs, which is further justified and sustained by fund managers' fiduciary duty to drive profitable returns to their fund investors. They are more individually varied across private investors. Some private investors emphasise scalability as always coming secondary to the evaluation of the impact-case and whether the environmental solution is the one the world needs. In addition to this, there are new impact VCs being established that challenge conventional VC structures more fundamentally, such as changing funds time-horizons and ownership structures.[3] In this sense, scalability as qualifier, while present across all investors, can be seen as a range. It is a measure that brings environmental aspirations into financial practice. Profit and impact entwine, as exemplified by the following quote, each contingent on the other for success.

> The space that we're investing in and the theory of change that [our Company] has, it's very much: profit as a result of impact. And that's the mantra we're looking at, these are big scalable, tractable problems, backing amazing teams, using innovative technologies, a profit will fall out of that. So that is sort of why there are no lower return expectations … the impact is

[3] For now, these alternatively structured VC funds are in the minority. Nevertheless, they point to interesting developments in restructuring financial practices in the name of fostering social and environmental good.

> so integral into why that company's gonna be a success. (Fund impact investor No. 12)

The perception of scalability as a signifier of value works as a filter for what is considered as investable. The need for scalability screens out a significant amount of environmental solutions from consideration.[4] Any impact investment comes with profit expectations; the high growth expectations in early-stage impact investing tend to narrow the scope further. Moreover, scalability qualifies 'good impact' based on its level of alignment with business operations. The best companies are said to be those who have impact at the core of their business model. The more evident the profit–impact integration, the better. A good impact and a good business merge through their perceived mutual reinforcement and their shared potential to create scalable positive change. In this sense, good scale acts as the glue binding environmental solutions to financial outcomes. What originally qualified what a good financial outcome was, now equally qualifies what a good environmental outcome is. Huge problems become great business opportunities. 'With the best companies, there is no question of the connection', says one private investor (No. 17), a sentiment echoed across impact investors.

> Most of them, when you have impact weaved into your product or service, the more you grow your impact, you will grow your financial return or your financial growth. So, in a company where this is integrated, financial growth is really key to growing the impact. (Fund impact investor No. 10)

The conviction that financial gain and greater impact go hand in hand is grounded in both market predictions and moral reasoning among the investors. One VC investor (No. 9) foresees: 'We think that in the next 10 years, another 10 Tesla's or Tesla-sized companies will be built in climate.' It is a common VC approach to bolster convictions of investment strategies by market predictions, but the investors are also rooting the need for scalability in moral arguments. As the following investor sentiment so vividly illustrates, financial scalability is *made good* by being embedded in the moral imperative to help as many people as possible.

> What I find is the dilemma of the social entrepreneur that often is not taking out dividends or profits to investors, but then they're not attracting growth capital and they're not scaling. So, I think if you really have a good innovation for health care, public ownership or foundation ownership or

[4] In practice, impact investors often perceive it the other way around in the sense that start-ups are the starting pool of investment consideration and social and environmental criteria screen out many from consideration.

> non-profit status, it keeps you from the opportunity to scale and help more people. (Fund impact investor No. 10)

The assessments of scalability show one aspect of what goes into early-stage impact investing valuations. Environmental aspirations are also assessed on their own. I explore this in the next section by shifting the focus from qualifications of scale to qualifications of scope.

Scope

Investors have a variety of 'boundaries' of operation: geographical area, size of investment, company stage, legal restrictions, and more – all these define their investment scope. I explore the boundaries forming around environmental value. While the investors hold a variety of views on what environmental impact means, there are still some reoccurring qualifications that orient their impact investment scope. These qualitative assessments become apparent when observing how the investors shape the focus of their fund and judge environmental aspirations.

Framing environmental focus

Environmental impact is the principal investment focus among early-stage impact investors in the Nordics. While conventional funds focus their investments on a certain 'vertical' or set of industries, these impact funds are industry agnostic and aimed at investing for a certain type of 'change'. This includes different, yet related aims of enabling systems change, facilitating industry transitions, or promoting regenerative innovations. Many impact funds also target a broader area in need of sustainable solutions such as 'the ocean', 'energy systems', or 'agriculture'.

To decide their impact investment scope, the investors draw on both personal experience and impact-related frameworks. What qualifies as investable impact is not defined by impact investing ranking tools or reporting standards, nor do the investors consult such rankings when forming the fund's impact mission. Several of the investors draw upon what could be loosely classified as scientifically based frameworks.[5] The investors use these to communicate and guide their impact assessment, and particularly to set a scope to invest inside of. To evaluate a company's impact, one private investor (No. 20) always starts with the same question: 'Is this something that creates value while staying within our planetary boundaries? … What's actually the numbers when you look at it from an absolute perspective? And then

[5] Reoccurring frameworks include the Planetary Boundaries and the categories of Project Drawdown.

go from there.' Another investor reflects on how they chose their fund's impact focus:

> And then we're like, okay, what's the frame going to be around it? Are we going to look to CO_2 in and out, or like, greenhouse gas CO_2 equivalent. … And that felt too constraining. And it felt, I think that we wanted to step one step further back and say, no, this is really about having a liveable planet. And then it's, you know, would be tempting to take the next step and say, well, what about the people and health and wealth and education, democracy? And we decided to stop short of that. So it's really just planetary… (VC investor No. 9)

An investment scope excludes as much as it qualifies. As the investor above describes how they deliberated around the focus of their impact fund, emphasis is also placed on opting out of issues. Drawing on the planetary boundaries the investor (No. 9) explains how it gives them 'a circle that we invest inside of. So we're not going to do stuff that is outside of that circle'. Frames around environmental aims can be used to draw a boundary at investing in social issues that are deemed 'complicated'. Some investors draw their operating domain around 'climate', or as above, around 'planet'. Social issues in these cases are described as morally ambiguous or simply as areas that are seen as immoral to profit from. As one VC investor (No. 4) argues: 'I don't think you should make a business idea out of that. I don't think that you should figure out a way to profit from people who will lose their jobs because of, you know, displacement.' There are also those who emphasise social issues as less pressing issues in light of the looming climate crisis. One private investor explains the reason for her investment focus being purely on climate simply because it is the most important problem to solve:

> I think that different impact investors value different kinds of impact. So that some people I know really care about women's rights and they won't invest in anything that doesn't have a woman co-founder. … And although I don't have anything against women, that's not bad, but I think that if we don't fix the climate, then there will be billions of people on the march and starving families will sell their daughters at the age of nine, right? This is not good for women's rights. So, I figure I'm trying to fix the main problem and that other people care more about other stuff. And that's fine too. We're all pretty much on the same side. But I don't want my measurement mixed up with women's rights measurement. As far as I'm concerned, sure, do what you can, go ahead and I'll try to fix, do my best to fix the main problem. The main threat to women's rights. (Private investor No. 7)

The investors display a variety of opinions on why climate is the right investment focus. The focus is on explaining why something is 'wrong' to profit from, or why it is the 'most important' problem to be solved in the world. It also shows how choosing a 'good' investment focus is almost inevitably about choosing what is not. By extension, the choice and its justifications construct a divide between different issues, such as between solving planetary problems or human rights issues. In categorising one investment focus as 'less important' or as 'ethically questionable', and another as 'good', orders and hierarchies of social and environmental problems start to take shape.

Previous studies have emphasised how impact investors express 'no moral discomfort with the simultaneous pursuit of economic value alongside social and environmental value' (Barman 2015: 36). The relevant question when it comes to impact investors, I argue, is not *if* they see the coupling of profit and impact as morally good. Rather, the more interesting exploration is *what* impact, what type of environmental and social change, they perceive as good. What is judged more important or less important and why? What is deemed right and wrong? Explorations like these can unearth insights into what kinds of entanglements between finance and environment are being made, and what kinds of judgements of 'good' are constructed and spurred into being. Any 'moral discomfort' arising from pursuing environmental value alongside economic value varies with the particular environmental issue in question and the investor judging it. I show two examples of this in the following section.

Drawing moral boundaries: 'Is this the best way to solve the problem?'

A climate VC investor (No. 2) describes two investments they decided *not* to make, and why: they met with the companies, liked the founders, thought the businesses were good, they were 'about to do it', but then chose not to invest due to how they judged the impact. In the end the solutions were deemed to be the wrong solutions for climate or right for climate but wrong for ethical reasons. These cases, as two of many, provide an example of moral judgements grounded in perceptions of what is 'best' for climate or 'fair' in society, rather than market sentiment.

'Don't eat fish': The first solution was lab-grown fish. The investor (No. 2) reflects on how he assessed the solution, why fish is a polluter, how it relates to what it is fed, how that relates to what is farmed, and unsustainable agriculture. He considered other solutions which might improve the situation and concluded that 'Lab-grown fish is not a climate solution. It is a health solution.' This is because lab-grown fish gets rid of toxins, which is good for health, but it is not the solution the *climate* needs.

> If you want to do the best climate solutions, you would do aqua farming on land fed by grains or something. That's the best solution. And the thing is, we don't want to do that because we don't like fish. But the thing is that if you want to solve the fish problem, the best thing according to us is, don't eat fish. But this company was good, but it's like, we don't think that solution is part of the future. (VC impact investor No. 2)

A longer process of reflection led the investment team to conclude that this company's solution was not within the scope of their climate fund. Here, conviction on what a 'right' solution is also played a central role in the investment decision. When assessing the potential for scalability, investors typically ground their convictions in matters such as market trends, technical and business model analyses, and founder expertise (and a good dose of 'gut feeling'). When assessing a company's potential for environmental impact, like in the example above, the question becomes whether the solution is the right one for the planet. Or, more specifically, whether the investors believe the solution to be the right one. In this case, the investors did not think eating fish was good for the climate, and thus their conviction against fish was also a conviction against whether this company's solution should exist in the future.

'That is colonization 3.0': The second solution was synthetic cocoa: 'really amazing, amazing cocoa. Amazing product, blah, blah, blah. Cocoa is number five in the world of pollution. Like coffee and cocoa are huge. And the problem … the reason cocoa is huge is because of deforestation. You cut down a lot of forest.' The investor (No. 2) considered alternative ways to grow cocoa, 'sustainable chocolate', and concluded that 'if we want to consume chocolate the way we do it, the volume and the price, well, this is the solution'.

> The headache for us is the fact that we, the global north colonized the global south, forced them to grow things like palm oil, cocoa, and chocolate, or other things, made hundreds of millions of people dependent on this jobwise. And now we're coming back 200 years later, calling them climate assholes, pulling out all of their jobs and making these jobs in like hundreds of maybe thousands of jobs in [Europe]. That is colonization 3.0. And we don't want to be part of that. So, this might be good climate-wise. You can see that if we actually want to consume chocolate in this volume, this is probably the best solution. So, it's better than the fish one, where this is not the best solution. But the thing is that we don't want to do it, because even if it's the best solution, we don't want to be part of a world where we colonize the global south again in the name of climate.

In this impact assessment process, the solution was indeed a good one for the climate, but the approach was deemed unethical and the

potential social impact negative, which is what swayed the investment decision against it. Here, the qualifications of what kinds of solutions should exist in the future were also a matter of the past. Geography and history became part of the factors considered as the investor reflected on whether this was an approach they wanted to see in the world.

These deliberations emphasise how moral qualifications are entwined with investment decisions. As part of their impact valuation and investment decisions process, the investors draw different boundaries that delineate what is an acceptable or an important environmental solution to invest in. For some, this means staying clear of many social innovations, for others it means striving to think systemically about how any one thing relates to the needs of the surrounding ecosystem. Moral boundaries also shape how a company's mission and a founder's intentions are considered, valuing certain qualities and questioning others, as explored next.

Intent

Early-stage founders are often portrayed as the present-day manifestation of what the future company can become. These aspiring company-builders bear the brunt of investor scrutiny. The usual focus of early-stage investors is on assessing the founders' achievements – their experience and expertise. But in this impact context, heavy judgement also rests on another founder attribute: intent. For a founder's intent to qualify as good, and their impact-focused company to qualify as a potential investment, it needs to resonate with the investor's perceptions of what a good ambition is. Two qualifications that return time and again when the investors describe what they are looking for in an impact-driven company are the ambition level and the values of the founders.

A founder's intentionality is evaluated on whether it is 'grand' enough and the ambition is to create positive impact on a level greater than oneself. The assessments reflect the value investors place on scalable solutions. Good ambitions are described as 'outsized' and 'outrageous', good founders as 'unique' and 'outstanding'. An angel investor (No. 19) explains 'when assessing these people, it's about the ambition level. … What does it tell about you as a person when you project yourself into the future?' The investor goes on to emphasise how some founders lack ambition and a greater purpose for building a company: the main motivation of two founders he met with was to afford a bigger house and a second car for themselves – these ambitions were not worth investing in. Similar tales of visions deemed unexceptional are shared by other investors.

> And our job is to figure out like, is this outrageous and crazy good or outrageous and crazy bad? And that's a very hard thing to figure out. … That's the one aspect about the founders. The second aspect, which is super, super important for us, which is not very important for most funds, is the fact that we want these people to be the leaders of tomorrow and navigate the very, very hard choices of walking the right path. (VC investor No. 4)

Founder ambitions need to be both grand and good. 'Good' is described as being values-based, having the values in the 'right place', having a moral compass, being 'true believers', walking the 'right path', or understanding what is 'fair' and 'right'. How to assess whether a founder is good is explained through various scenarios and hypotheticals. For example, how do founders treat their employees? 'There are multiple risks for us. One risk is that they are behaving badly towards employees, and we will not be proud of them. And that's super important for us' (VC investor No. 4). Will the founders do the 'right thing' in the future when faced with moral dilemmas?

> First of all, we check … the people's values. It's a cliché but it's just really easy. If the people running it have their values in the right place, they'll make those decisions. That is their decision compass, right. That's their algorithm for making decisions. So, if that component is there we know, when they're faced with decisions, they will always value, that will always be part of the consideration, and won't just choose, you know, the cop out or be willing to do dirty shit. So that's a big part of it. (Private impact investor No. 13)

Assessing whether the founders 'have their values in the right place' is seen as a way to assess where they will take the company going forward. Whereas a conventional assessment of founders and their experience is used to judge *whether* they are likely to succeed, here the assessment of founders and their intentions is also used to judge whether they are likely to take the business in the *right* direction. Values that are deemed good become a safeguard for future development. One investor gives a hypothetical scenario to exemplify the risk of investing in a founder that veers off the moral path:

> When they like two years down the road get this massive contract from the big oil company and that contract will give them a hundred times the amount of money that you're giving from current contracts. And they will just say, I mean, it's a hundred times the money and we'll take this money and we'll fund it into clients. Like, we're doing good shit. But we will be like, you're now working with Shell, and I know that Shell says they're turning around, but no, we don't think you should work with them. (VC investor No. 4)

There is good money and bad money, a right path and a wrong path, in these scenarios. The investors qualify intent as good based on both ambition level and values, and if it resonates with their own moral judgements. What these early-stage assessments highlight is not only what goes into qualifying an investment as 'good', but also how it is a question of whether the founders will be able to *make* the investment a good one.

Making an investment good

Valuing a start-up is as much about making a good investment as it is about *making* an investment good. Valuation is not just about assessing present qualities, but a matter of improvement, of considering the work to be done and ascertaining its achievability.

There is a double meaning to the *making* of a good investment in this article. For one, valuation involves shaping the thing being valued through activities and co-construction. Investors first and foremost evaluate an early-stage company by its potential. While they do evaluate existing qualities, the investors are primarily concerned with what the company could become, what is required for its potential to be fulfilled, and whether it is feasible. Second, the making of a good investment speaks to the performativity of valuation: what investors judge as valuable is more likely to be what is created. Their qualifications of impact can have a self-fulfilling tendency in how they influence which environmental solutions are seen as valuable, including what other actors come to value.

In their study of what makes a 'good tomato', Heuts and Mol (2013) show how valuation in practice is not only about valuing through different value registers but also something that happens through 'care', acts of 'caring' for and handling of the tomato. This is the process by which the tomato becomes good, is *made* good. There are similarities between the acts of making a tomato good and making an early-stage investment good. Both things, the growing fruit and the early-stage company, are in the process of being made. Neither becomes valuable or good on its own accord. Valuation happens through external evaluations and work by actors engaging with them. As the tomato passes through the supply chain, and the company passes through funding rounds, different evaluators and qualifications are part of constructing their value.

A decision to invest in a company is also an agreement to partner up with each other. An investment assessment is thus also an evaluation of the potential for fruitful collaboration. An early-stage investor goes into a company with the prospect of staying invested for at least 5 maybe 10 years, and it is not uncommon for the investor to take a board seat in the company. Investors are also mindful of what they bring to the table. The impact investors see their role in fostering

companies in distinct ways, be that as a provider of unique expertise, future fund-raising support, emotional support, as custodians of the impact-mission, or a mix of these and other qualities. One VC sees it as her fund's responsibility to be the advocate for design-thinking principles in impact solutions.

> We want to be the investor that focuses on any need around design. Design thinking support, specific challenges that we might be able to use tools on, and the experience and the knowledge and the network to support around specific identified challenges. And mission endorsement. I think this is also for them to be reminded that they are still focused, they still have impact embedded into the DNA of the company. To be a reminder for the founders that there's still an investor, that we represent that part of who they are and who they will become going forward. (VC Investor No. 11)

In the quote above, the investor's perceived role in making, and keeping, an investment good is apparent in how the investor identifies as a custodian of a company's impact mission. There is a recognition of responsibility and work to be done. Some impact investors are especially mindful of the role they play in shaping what is made. This perspective stands in contrast to conventional VC where investing is approached as high-risk, high-reward 'bets' on the future.

> [M]oney is power, so meaning, when you're investing in this company versus that one, you're actually giving way better chances to that company than the other to be successful. … So investing is not predicting the future as a lot of people think, it's crafting the future. So, there is a responsibility. There's a responsibility because it's acting, it's not just thinking and betting and numbers, it's really changing the life that, the society your children will be living in, you will be living in in the future. … Knowing that you're impacting the future, the question after is, what society do you want to live in? (VC Investor No. 25)

Conclusion

In this article I investigate value under construction by analysing how impact investors qualify and give value to environmental aspirations. I show how assessments of economic performance and moral qualities are entangled in judgements of what a 'good investment' is. Environmental aspirations are both coupled with financial value frames and judged on their own, which indicates there is more than financialised valuation taking place. From the three empirically grounded themes of scale, scope, and intent I sketch out the investors' way of qualifying 'good'. Scalability becomes a qualification both financial value and environmental impact must

meet, constricting the pool of what is considered investable. Scope sees investors creating frames around what a good impact focus is, and what it is not. Lines are drawn between what is right and wrong, more important and less important to invest in. Assessments of a founder's intent further emphasise the entanglement of financialised and moralised valuation: good ambitions are huge and selfless. How the investors qualify a 'good investment' shapes what kind of impact-driven businesses they are helping to create.

The contribution to the existing literature is threefold. First, the article presents a clearer understanding of impact-driven investors in early-stage private equity, a hitherto less studied segment of impact investing. Second, it contributes to the valuation literature by showing how making things valuable is entwined with making things 'good'. This emphasises the relevance of analytical approaches that give room to observe the qualitative and extra-economical even in financialised contexts. Finally, the article highlights the performativity of valuation in early-stage impact investing. Qualitative judgements play an important role in shaping what is made good, and by extension what is likely to be made.

With the various evolving investment practices deployed in the name of 'doing well by doing good' it is important to develop nuanced understandings of the role financial actors play in shaping what is valued. The analysis gives novel insight into how investors engage with environmental value before it flows through to public markets. The few existing studies on valuation in early-stage impact investing have emphasised the financialising effects investors have on the companies they engage with. But as this study shows, there is more to valuation in early-stage impact investing than a story of uniform financialisation. I show how qualitative and moral judgements of investors shape what is valued in important ways. Convictions of which environmental solutions should exist in the future and what acting for the good of the planet means influence where investments go. I further show that the relevant question is not *if* investors think it is moral to couple profit and impact aims, but rather *what* impact is seen as moral.

Valuation in early-stage impact investing is performative. Assessments of value in this context are primarily about judging future potential. The value to be made – financial or environmental – lies ahead of the present and will require a lot of work and capital to attain. Investors hold a central role in shaping what is created. It is important to understand the wider array of judgements and activities that go into making things valuable, because they have a bearing on what is put into the world, and ultimately what is valued of the environment in the economy.

Engagements with environmental issues in finance are likely to increase. If we dismiss the broader spectrum of qualifications that go into making things valuable, we may miss the very practices that can

shine a light on alternative paths of valuation in the economy. With this article I have aimed to dispel some of the misleading dichotomies between financial 'fact' and environmental 'values', or 'objective' market and 'subjective' factors. I hope it is one of many inquiries to come on the diversity of approaches to making things valuable.

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Kaja Lilleng is a Doctoral Researcher at the Department of Management Studies at Aalto University. Drawing on the sociology of finance and experience from early-stage impact investing, her research examines valuation and temporality in impact-driven investing. She studies how financial actors attribute value to social and environmental qualities and how valuation practices shape and reflect perceptions of the future.

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Theme issue contribution

The Additive Environment and the Good Economy of Infrastructures: Valuing Roadworks through Eco-Comparison

Roman Solé-Pomies

Abstract
Infrastructures have been increasingly challenged by ecological concerns. Yet they are supported by industries whose ability to seize upon such concerns should not be underestimated. This article focuses on a French business association of roadworks companies that has developed an eco-comparator. The software aims to valorize certain techniques for road construction and maintenance, by demonstrating that they amount to reduced "environmental impacts." A number of features of this valuation instrument are used by the industry as part of a broader repertoire of ecological justification. I analyze this argumentative endeavor as strengthening a form of "good economy" (Asdal et al. 2023), in the sense of a certain understanding of the good relationships between economy, society, the state, and the environment. The software enacts a version of the environment that I describe as "additive": a reservoir of greenhouse gases, energy, and materials that is external to infrastructures, and in which the consequences of economic activities are not to be subjected to constraining thresholds, but only compared and mitigated. As the French central administrations have reduced their involvement in road policies, this additive environment is used by the industry to claim its own ability to relevantly address ecological concerns, while questioning that of the state.

Keywords: good economy; environmental valuation; infrastructures; maintenance; public policy; roads

Roman Solé-Pomies, is a researcher in science and technology studies at Logiroad.

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Introduction

Can infrastructures be good? They obviously play an integral part in the economy, which has been demonstrated to go hand-in-hand with ambivalent, more or less capitalist political projects (Harvey 2002; Harvey and Knox 2015; Humphrey 2005; Mitchell 2020). Furthermore, in many Western countries, even technical networks that are usually considered essential have been increasingly challenged with respect to environmental issues. Roads offer a good illustration of this publicly addressed ambivalence, from numerous debates focusing on specific construction projects, to broader efforts such as those recently undertaken by the Welsh Government (2022) to review existing roads and suspend new projects until stricter environmental assessment is in place. All in all, pressing debates about the tensions between the ecological consequences of infrastructures and their vital role for society make it clearer than ever that their economic value—derived from the exchanges and accumulations of capital they enable—is but one in many ways of valuing them.

These debates are all the more vivid since they keep questioning the future of a whole domain of economic activity. While former theories about the development of infrastructures could suggest that, once networks reach a certain degree of maturity (as they have arguably done in most Western countries), they would stabilize and no longer require important investments (or public debate), the "age(s) of maintenance" (Denis and Florentin 2024) appear to be animated by ongoing collective efforts dedicated to make infrastructures last and evolve (see also Barry 2020). In what I call the economy of infrastructures—that is, the complex economic forms dedicated to building, maintaining, and transforming them—public institutions bear important responsibilities, while private organizations also occupy a crucial position (Guy et al. 2011; Mains 2012). As these actors are involved in markets expectedly dedicated to the provision of public services, they find themselves needing to justify the value they grant to various things—including infrastructures themselves, and what is conceived as the environment. In doing so, they enact "versions of the good" framing relations between the economy, society, and the state (Asdal et al. 2023).

The case of French public roads provides an illuminating example. For road construction and maintenance, managing authorities most often entrust private companies with the execution of roadworks, according to different modalities: either for a one-off worksite, or on a longer-term basis with different types of contracts. In efforts currently underway to reconcile road policies with ecological demands, the functioning of this market is reflexively criticized by its actors themselves. As the central state has reduced its technical support to local governments, the roadworks industry is looking for a specific role in these debates. Road construction companies have strived to respond

to environmental criticism by demonstrating their ability to develop more virtuous techniques. Their public reports promote, among other things, the recycling of surfacing materials, in response to a growing demand for a circular economy, and the lowering of the production temperatures for certain materials, supposed to reduce energy consumption and greenhouse gas (GHG) emissions: "Compared with hot-mix asphalt, energy savings are achieved both on the temperature of the aggregates and on the energy required to heat and evaporate the water" (Routes de France 2022a: 8).

In addition to these reports, the industry often strives to demonstrate its environmental concerns by showcasing the design of a specific valuation instrument developed by Routes de France (RdF), the national business association of roadworks companies. Since 2010, RdF has been offering an "eco-comparator" that can be used for various public orders, especially by local governments. This software is supposed to inform local governments' choices between the different offers made by companies in response to tenders, through the comparison of the "environmental impacts" of the proposed "solutions."

This article takes this instrument as an empirical entry point to analyze a particular version of infrastructures and their environment enacted by the eco-comparator, and illustrative of a certain conception of the good roadworks economy. I will not focus on how the software is actually used by companies to brand their products, or by public road managers to make decisions, but rather on how the technical and institutional aspects of its development are discussed by its advocates as part of a more general repertoire of justification. According to RdF, the eco-comparator is expected not only to mitigate the ecological consequences of roadworks, but to improve the economic efficiency of the market itself. In other words, this tool of valuation aims to reconcile the economic value of infrastructures and the moral value of the environment, thus contributing to a particular notion of the "good economy" (Asdal et al. 2023).

The following analysis intends to qualify this notion of the good economy by bringing forward two main implications of the mode of computation inscribed in the eco-comparator. First, the software compares the environmental value of different solutions by breaking them down into a series of operations, whose certain "impacts"—GHG emissions, energy consumption, etc.—are then added up. Relationships between infrastructures and their environment are thus reduced to exchanges of materials (GHG and raw materials) and energy that can easily be summed and compared. This enacts a version of the environment itself as a reservoir that is external to the economy of infrastructures; a receptacle from which actors draw resources while emitting GHG into it. Second, due to a lack of certified data, the software can only compare the relative withdrawals and emissions of

different solutions, and not assess them in absolute terms. The question of the limits of the reservoir—the risk of the environment becoming, for instance, drained of resources or saturated with GHG—is thus left unaddressed by the eco-comparator. I characterize this version of the environment as "additive": materials and energy are essentially added to it or subtracted from it, without it being likely to overflow or go empty. This locates environmental valuation in economic transactions, in which the role of local public authorities is reduced to comparing the total impacts of different market options offered to them. Some limits of this framing are made explicit by the roadworks industry, and, when asked about it, its representatives argue that the implementation of more constraining modes of assessment would be the responsibility of the state. Still, the additive environment conveniently allows them to perpetuate a certain notion of the good economy of infrastructures. It shapes environmental concerns in a way that implicitly makes it sufficient, for a given worksite, to choose the less harmful solution. By contrast with other forms of environmental assessment, the software could not be used, for instance, to renounce a project on the ground that its impacts are too high. Instead, it simply endows certain technical options with a supplementary, environmental value supposed to participate in a broader effort of optimization. Ultimately, this enables the roadworks industry to maintain its most classical commercial argument—namely, that well-maintained infrastructures are absolutely necessary to the good functioning of society—while contributing to additional corporate arguments designed to address environmental concerns—namely, arguing that the industry possesses the technical expertise needed for virtuous maintenance and management policies, and that the role of public actors essentially consists of inciting private companies to implement the best possible techniques.

The next section reviews a composite body of literature to specify the analytical questions posed by the tensions between economic and environmental valuations of infrastructures. I then expose the research design implemented to investigate how environmental concerns are addressed by the French roadworks industry. Thereafter follows two analytical sections. The first one outlines a brief history of the relationships between public governments, roadworks companies, and their business associations in France, with a special focus on responses to environmental concerns and the role of tools of valuation. The last section turns to the specific place of the eco-comparator in these decade-long debates on the environmental impacts of roadworks, and how its design contributes to constructing an additive environment, allowing it to address ecological concerns without destabilizing the market of roadworks.

Valuing infrastructures and their environment

The eco-comparator studied in this article addresses three objects of concern: the well-being of a market (in this case, the market of roadworks), the protection of the environment, and the maintenance of an infrastructure network. Various tensions may arise at this intersection. Here I propose to draw inspiration from the study of tools of valuation, that has proven especially useful to the analysis of the complex relationships between capitalism and environmental concerns, in order to examine how economic actors themselves strive to reconcile the durability of infrastructures and the environmental sustainability of the economy.

Capitalist economies rely on efforts to appropriate entities commonly considered as natural, turning them into resources destined to fuel forms of economic growth (see, e.g., Hultman et al. 2021; Nadaï and Cointe 2020; Smessaert, Missemer, and Levrel 2020). A long line of academic discussions has emphasized their ability to develop complex notions of the good, in response to all sorts of collective concerns beyond the sole aspiration to economic prosperity (Asdal et al. 2023; Boltanski and Chiapello 2011; Frankel, Ossandón, and Pallesen 2019). Environmental concerns are no exception. Scholars have investigated how market instruments are developed to address them without questioning capitalist principles, one of the most studied examples being that of carbon markets (e.g., Lohmann 2005).

Beyond general arguments that such instruments are problematic in principle (see Larrère and Larrère 2007, to relocate market approaches in a detailed discussion on the broader problem of anthropocentrism in environmental ethics) or ineffective in practice from an ecological point of view (Quirion 2020), these approaches aim to understand the kinds of justifications that they enable and their effects on collective organization. Tools of valuation, understood as "material-semiotic entities, technologies, or artifacts that in and of themselves are modest, small, and act locally, but that by being part of larger machineries and apparatuses, by their movement, and by their combination with other such tools perform valuations" (Asdal and Huse 2023: 40), provide a fruitful empirical lens in this respect. Certain public policies have favored the development of such tools to translate notions of the good into economically rational calculations, assuming that the economy will automatically be made more virtuous by the spreading of well-designed tools of valuation (Asdal et al. 2023). The eco-comparator discussed in this article is one of these tools and, as it operates in the economy of infrastructures in the making, it participates in a specific apparatus of justification.

Since seminal historiography on the invention of cost–benefit analysis by French civil engineers (e.g., Grall 2003), the use of tools of valuation in the specific field of infrastructure policies has been little

studied as such. Yet, an abundant literature has analyzed the manifold values attributed to infrastructures, be they directly derived from their concrete uses, or more symbolic (e.g., Anand 2017; Barry 2020; Humphrey 2005; Larkin 2013; Schwenkel 2018). The multiple normativities at play translate into complex forms of valuation developed by economic actors themselves to justify the relationships that infrastructures materialize between economy, society, and the state. First, unsurprisingly, construction and maintenance costs are still carefully examined by public powers in their efforts to prioritize their investments, especially as public expenses face increased restrictions (e.g., Rapoport et al. 2017; Welsh Government 2023: 7). At the same time, some contributions to public debates, including from scholars, reassert that infrastructures lay the basic foundations for the functioning of modern societies (Bentham et al. 2013). This relates to one of the most classical results of infrastructure studies, namely the tendency of infrastructures to be taken for granted by their users—which is, arguably, their very purpose. This issue of "taken-for-grantedness" (Star and Ruhleder 1996) translates into debates regarding the long-term valuation of maintenance policies that have often been neglected in Western countries (Denis and Florentin 2024; Henke and Sims 2020; see also Caye 2020 for a discussion on the notion of heritage and its consequences for the valuation of maintenance).

Furthermore, the rise of environmental concerns has significantly questioned the valuation of infrastructures. As an essential ingredient to capitalism (Harvey 2002), infrastructures are known to materialize an ecologically destructive modernity (Boyer 2018; Cronon 1991, 1995; see also Jensen and Morita 2017 for a more anthropological perspective). More specifically, works in Science and Technology Studies (STS) have seen in them a key to understanding the delineation of "nature" as a domain of the material world that is given for humanity to use as a resource (Edwards 2002). Contemporary debates and quantification efforts tend to emphasize, among other effects, the role played by infrastructure development and maintenance in GHG emissions (CGEDD 2024), soil artificialization (Béchet et al. 2017), or the appropriation of a disproportionate share of global material resources by Western countries (Magalhães et al. 2019). These concerns fuel disputes not only about whether to build new infrastructures, but also whether to maintain or dismantle existing ones (Anand et al. 2018; Lopez 2019). The durability of technical networks would then be at odds with the environmental sustainability of the economy.

While these debates might be broadly framed in terms of a compromise to be found between infrastructures' environmental impacts and their social, economic, and political advantages, they often come to question these very advantages—suggesting that even the

benefits of infrastructures to their human users are not straightforwardly assessed. As I will show below, the focus on a binary choice between infrastructures and the environment is also being challenged as the roadworks industry seizes upon ecological concerns to advocate for ambitious maintenance policies. Their endeavor relies on tools of valuation intended to reaffirm the value of long-existing roads while producing new quantifications of their environmental implications. The development of such tools is part of a broader transformation of the roles given to market mechanisms and the state's technical capacity in reconciling the provision of services considered essential to society and the control of their ecological consequences. The understanding of infrastructures themselves, as objects whose ability to last cannot be taken for granted, is thus renewed in relation with their environment, understood as a domain of the material world subject to "impacts" that should be mitigated.

In their efforts to justify certain orientations in infrastructure policies, market actors enact specific notions of the good relationships between the state, economy, society, and environment; that is, specific notions of "the good economy" (Asdal et al. 2023). Asdal et al.'s conceptualization of "versions of the good" builds on Mol's (1999, 2002) analyses of how different practices enact different "versions" of a given thing, these versions being sometimes able to coexist or conflict. Drawing on Denis and Pontille's (2015) reading of Mol's work in terms of maintenance and ontology, I have argued elsewhere (Solé-Pomies 2024) that debates on maintenance policies enact different versions of roads, accounting for more or less complex interdependencies within infrastructures' material environment. In this article, I focus more specifically on how a valuation tool aimed at informing road management policies (the eco-comparator) enacts a particular version of the environment. This version results both from concerns for road maintenance and from a specific understanding of the good market relationships in infrastructure management.

Materials and methods

My empirical research started with a thematic analysis of a series of documents produced by Routes de France (RdF), the national business association of roadworks companies—essentially its general annual reports, and the environmental reports released yearly since the early 2010s, in the wake of a "voluntary commitment pact" that will be further discussed below. RdF's publications recurrently highlight at least two complex aspects of the valuation of infrastructures. On the one hand, they emphasize the need for road maintenance and the alleged tendency of policy-makers to neglect it. On the other hand, they strive to respond to environmental criticism by demonstrating the

non-negotiable need of society for infrastructures, and the efforts made by the industry to make roadworks more sustainable: "Let's not make the mistakes of the past, and remember that roads are still the preferred means of transport for the French. We need to take this into account and give ourselves the means to maintain, modernize, and sustainably transform them" (Routes de France 2023: 3).

Their arguments were further investigated through a series of 21 meetings with RdF over four years, complemented by less formal encounters to discuss a PhD research concerned with the ways in which the patrimonial values of roads were taken into account in public policies.[1] It quickly appeared that RdF was working within a complex network composed not only of private companies, but also public administrations, associations of local elected representatives, local governments, higher education and research establishments, and more hybrid institutions further discussed below. I investigated this network by attending various meetings and conducting 19 semi-structured interviews focusing on how road policies dealt with maintenance issues and new challenges such as environmental debates.

This research revealed that the main efforts made by RdF as representatives of the roadworks industry in response to environmental concerns, beside their regular reporting on the implementation of more virtuous construction techniques, consisted of promoting their eco-comparator. I systematically identified situations in which this software was mentioned by stakeholders in relation to broader concerns, in order to understand its contribution to the industry's repertoire of environmental justification. This was complemented by a review of the documentation related to the software, among which an important source was the "voluntary commitment agreement" signed in 2009 by the national government, a federation of local authorities, and various corporate associations of companies involved in roadworks, including RdF: this was the first official document to mention the need for a shared eco-comparator developed by companies and approved by public powers (Ministère de l'Écologie et al. 2009). I also examined the user manual of the instrument (Cavagnol 2016), presentation brochures (e.g. SEVE 2018), and a technical assessment (IDRRIM 2013). In addition, I conducted three semi-structured interviews specifically focused on the eco-comparator, two with the engineer at RdF in charge of the software (who also gave me access to the online interface, allowing me to examine its design and the reports automatically generated by the eco-comparator), and one with two road managers (engineers employed by local governments or motorway concession operators to organize roadworks) who had long

[1] The research presented here was part of a PhD in partnership with RdF, the Center for the Sociology of Innovation, and the *Institut pour la recherche appliquée et l'expérimentation en génie civil* (IREX).

used the instrument to assess offers made by roadworks companies in response to their tenders.

In parallel, I investigated debates in a selection of local governments chosen for the diversity of their road policies, conducting 60 semi-structured interviews and 10 half-days of observation with elected representatives, technicians, workers, and different organisms involved in local road management. This research yielded insights into infrastructure policies that often differed from the image given by the argumentative efforts of the roadworks industry. Here I will only refer to this part of the investigation occasionally, in order to illustrate contrasting ways of addressing the valuation of roads in the face of maintenance issues and environmental concerns.

Environmental valuation and the management of French roads

Road policies in France have a long history of taking part in the structuring of both public institutions and private companies. Created in 1936, RdF was the first nation-scale business association representing road construction companies, notably in debates regarding public policies for both employment conditions and public infrastructure management (Barjot 2006). Since then, it has developed tools that justify entrusting private businesses with public works, often relying on quantification techniques—from its lobbying efforts in relationship with the national institute of statistics on indexes for pricing materials, to its participation in the *Association Qualité Pesage* (Quality and Weighing Association) aimed at ensuring that the execution of roadworks technically conforms to official specifications. At the turn of the twenty-first century, its agenda adapted to two major evolutions: the rise of environmental concerns and, more specific to the French context, the partial withdrawal of state engineering.

Until the late 2000s, engineering services placed under the direct jurisdiction of the central government were present all over the French territory, providing all public authorities, especially the smallest, with technical support for the management of their roads. Since the early 2010s, they have been withdrawn as part of a more general weakening of the historical power of engineers in certain public institutions, and of the late ramifications of decentralization policies. As a consequence, central administrations have noted the difficulty in restoring a centralized knowledge of even certain elementary geographical elements on road networks and, *a fortiori*, knowledge of the management practices at play in local governments (Rapoport et al. 2017). This weakening of state engineering has been an opportunity for business associations such as RdF to play an increased part in

centralized efforts dedicated to the supervision of road networks and the development of technical guidelines. This was exemplified by the creation of the Institute for Roads, Streets, and Mobility Infrastructures (*Institut des routes, des rues et des infrastructures pour la mobilité*—IDRRIM), a national institute partly in charge of these missions, jointly administrated by public powers and private corporations, and created in the wake of the 2009 "voluntary commitment agreement" (Ministère de l'Écologie et al. 2009; IDRRIM 2016; 2022).

Concerns with the ecological consequences of roadworks were one of the important justifications for founding IDRRIM. More generally, the environmental justifications showcased by the roadworks industry are complex, not only because road transportation is responsible for a large part of GHG emissions (27% of all French emissions in 2020 according to Citepa 2022), but also because infrastructures themselves are largely made of materials partly resulting from the extraction of hydrocarbons, and subject to health and environmental concerns. In addition to the long-standing problem of accidents on worksites, RdF has been involved in debates regarding asbestos and polycyclic aromatic hydrocarbons, and has been more recently concerned with national and European policies against land artificialization. Public acknowledgement of their technical expertise has been all the more important to roadworks companies, as indicated by the efforts made by RdF to promote this expertise in public reports.

Tools of valuation and the good economy of roadworks

As the 2009 "voluntary commitment pact" strived to demonstrate a shared dedication to making the roadworks economy evolve in response to environmental concerns, the main task RdF was entrusted with was the development of an eco-comparator that had to be certified by the public–private institute IDRRIM. This tool is supposed to enable local governments, when they intend to engage in road construction or maintenance work, to compare the "environmental impacts" (Cavagnol 2016) of different solutions offered by roadworks companies. Understanding this argumentative focus on the minimization of "impacts" requires a brief overview of how RdF envisions environmental criticism more generally.

Large road construction projects—such as new highways or road bypasses of major cities—have been criticized by ecologist associations for years, notably on the basis of their destructive consequences on biodiversity. In a number of informal conversations at RdF, such examples were cited to present ecologists as antagonists to the roadworks industry in general—antagonists who were reproached for overlooking the social necessity of roadworks. Corporate promotion of the French roadworks industry has relied on figures emphasizing the

essential role played by roads in society, notably their large part in the transportation of passengers (varying between 86% and 91% between 2016 and 2022) and goods (84–89%), enabling RdF to recurrently present roads and streets as "the first social network" (e.g., USIRF 2016). This general framework of justification hinges on a certain notion of the good economy, in which private, industrial corporations bring an essential contribution to society by providing basic infrastructures.

The industry emphasizes the importance of maintenance work, which is acknowledged to account for about 50% of the turnover of roadworks companies (Routes de France 2022b). For several years, building on the decline of state engineering, RdF has advocated for contracts that entrust companies with the whole supervision of maintenance over several years, rather than ad hoc contracts in the short term. The association not only argues that such contracts are a way for local authorities to benefit from the contractors' expertise in supervising roadworks, but also that they contribute to local economies by guaranteeing regular revenue for small and medium companies. They are also justified as securing constant budgets for preventive maintenance, which is discussed as critical to the long-term viability of public finances: RdF systematically disqualifies arguments in favor of the reduction of public work budgets as irresponsible, due to the increased refurbishment costs they would lead to in the long term (e.g., USIRF n.d.).

RdF's responses to environmental concerns align with this rhetoric of maintenance. The technical department of the business association often quotes studies demonstrating that GHG emissions due to transportation are reduced when roads are kept in a good state (e.g., AEC n.d.). RdF has also used its eco-comparator to prove that preventive policies, as they allow for less frequent major operations, limit the cumulative environmental impacts of roadworks in the long run. None of these justifications claims that the industry has overall positive environmental impacts: roadworks are more or less explicitly acknowledged to be inevitably harmful, but still necessary. In the seminal "voluntary commitment agreement," environmental concerns were addressed in terms of a compromise: "The expectations of our fellow citizens and territories to take better account of environmental challenges do not diminish their demands in terms of mobility and intermodality" (Ministère de l'Écologie et al. 2009, 2).

What these observations do not clarify, however, is how the environmental rhetoric of the roadworks industry gives credit to the possibility of minimizing impacts without renouncing roadworks. In what follows, I will highlight the crucial part played in this reconciliation by the eco-comparator as it enacts an additive version of the environment.

The additive environment of eco-comparison

RdF has long claimed a role in public road policies, as a business association that does not favor any particular company, with an expertise and neutrality that can constitute relevant support for local governments. In this context, environmental demands have been taken as an opportunity to improve the market of roadworks.

Coordinating environmental valuation to frame the market

This subsection is going to show that, as the roadworks industry tackles environmental concerns, the primary aim expressed is not always to make the economy greener, but to take advantage of environmental values to stimulate the market, justify the role of private companies, and enroll public authorities. The eco-comparator is, then, at the heart of an effort to organize a heterogenous set of actors around a general agenda, assumed to transcend public/private boundaries.

The promotion of the instrument is linked to a critical discourse on the proper functioning of the market. RdF has long advocated for the legal possibility of proposing alternative solutions in response to public tenders, and this notion is at the heart of their environmental justifications. One day, I was invited by the business association to attend a meeting with three mayors, who also held positions in their federations of municipalities. This event responded to the observation by RdF that small local governments are an important customer base whose needs are poorly understood. It was also clearly an opportunity to promote the actions of the industry, and make contact with local governments for more general purposes, the association being keen to maintain close connections with public administrations.

At an early point of the discussion, a debate started on the performances of worksites, and especially on the distribution of responsibilities in stimulating innovation. Environmental concerns then emerged in a general discussion on the quality of roads:

> [RdF representative:] Contracting authorities often favor the cheapest solutions at the expense of technical and environmental performance: we rarely get the occasion to implement the better techniques in which we have invested.
>
> [Mayor of a medium town:] Our problem, as a local government, is that we don't know that: to us, all companies are technically skilled, and the price is sometimes our only way to make a choice.
>
> [Another RdF representative:] We are in a vicious circle in this respect, because we understand that local governments are constrained, but because of that we do not offer alternative solutions, and our techniques stagnate. In other words, poor public expertise obstructs innovation capacity. The upturn will have to be environmental. (author's field notes)

In this excerpt, RdF refer to a common economic assumption that the improvement of supply has to be encouraged by demand. The object of negotiation is not expected to be solely the price, but rather a general valuation of technical solutions that takes into account their environmental consequences. Environmental concerns are introduced as a source of improvement for the general well-being of the economy, providing new criteria to stimulate competition. The response to these concerns is then primarily envisioned through the modes of valuation used by public infrastructure managers in the existing market.

To promote environmental valuation, RdF engages in an enrollment effort with at least three components. First, in debates on road policies in France, the market is not generally discussed as a separate and homogeneous domain, but rather as "public markets" in the plural—as many sites of the economic life that depend on local governments, and whose criteria to choose between different offers may vary largely. The general case for environmental valuation then justifies a coordinated action to frame these markets. Right after the discussion reproduced above, a mayor agreed to the importance of environmental criteria, and the facilitator of the meeting took the opportunity to draw attention to a commitment pact for environmental performance signed the day before by RdF and representatives of several levels of public administrations. This pact, among other objectives, set targets for the use of certain, more environmentally virtuous construction techniques (IDRRIM 2021). The facilitator of the meeting suggested that local authorities themselves, such as those currently represented by their mayors in the meeting, could sign local declinations of this pact. Such local agreements are regularly presented as prerequisites to the use of the eco-comparator in public markets. The instrument itself, as the result of the 2009 "voluntary commitment agreement," is thus part of a coordinated negotiation of the missions of the roadworks industry.

Second, to enroll public contractors, the promotion of the eco-comparator reaffirms that it is adapted to the allegedly pre-existing needs of its users: in promotional brochures, RdF reminds public road managers of their obligations to justify their actions, and asserts that the instrument can help them in this. Brochures explicitly mention the laws compelling local governments to draw up a yearly balance sheet of material supplies with the percentage of recycling, as well as waste orientation choices; these requirements were also mentioned during the meeting recounted above. The eco-comparator is supposed to help in this reporting effort. RdF thus interposes itself between two levels of government, namely national requirements and local public road managers directly active in public markets.

Third, other eco-comparators have been developed, for instance, by isolated roadworks companies; yet, they are sometimes suspected of favoring the techniques for which said companies are particularly well

equipped. To impose its own software, the main asset of RdF is then its federative position. As the manager in charge of the software explained in one of our interviews: "In the past, when you would collect models from different tools [assessment software], it was difficult to compare the results." This idea is reflected in promotional documents that describe the tool as accessible, certified by the IDRRIM, and shared by the entire public works profession.

This manifold justification leads to selecting consensual criteria for which data can be aggregated—namely indicators such as energy consumption and GHG emissions, in the reduction of which all market actors are said to have their share. This justifies the collection of data on the so-called "environmental impacts" of a wide range of construction and maintenance techniques. Their valuation is expected to have a direct effect on the economic conditions of the making of public infrastructures: the vocabulary of impacts enables the construction of an instrument supposed to effectively make existing markets more virtuous. This hinges on an enrollment effort that unifies the environment in the form of a few indicators, aligned with an ecological agenda supposed to transcend the boundaries of state policies and market dynamics.

"Environmental impacts" and the shaping of a simplified valuation process

The purpose of the eco-comparator is to make general criteria applicable to particular cases, in situations when a public road manager is to choose between different offers from private companies. What is assessed is not the ecological consequences of infrastructures themselves, but of worksites. This form of environmental valuation differs from those at play in impact assessments for large construction projects that investigate, for instance, the consequences of new infrastructures in terms of perturbations in the natural habitat of certain species or soil artificialization. The eco-comparator rather addresses the broader, ongoing work of transforming existing road networks. Its calculation techniques are thus involved in a general understanding of the role of public authorities regarding the conciliation of the benefits of infrastructures and environmental concerns.

Brochures first point out that, when answering a specific order, companies can improve their offers by adapting a number of parameters: transportation, implementation techniques, recycling, etc. The eco-comparator provides a framework for defining variants: companies offer a solution and can also propose alternative options. Public road managers generally give a score to the various offers they receive, with a certain percentage on price and another on technique. The aim of the eco-comparator is to redirect part of the assessment to

environmental concerns, giving managers the opportunity to attribute a percentage of the score to environmental impacts, next to price and technique. To this end, the software compares different solutions on the basis of seven quantitative indicators—energy consumption, GHG emissions, four indicators of raw materials consumption (for four different materials), and the quantity of materials multiplied by their distance of transportation—as well as two so-called "declarative indicators", namely "water management" and "awareness to biodiversity", that are not quantitative: they simply allow companies to declare whether they have a particular corporate policy in these matters.

According to the person in charge of the software at RdF, quantitative indicators are the ones that are most taken into account by users of the eco-comparator. The general principle relied on by the software to compute them is simple (see Figure 1). For a given roadworks project, the contracting authority issues a tender describing the characteristics of the project, in which they can also demand that companies respond via the software. Companies using the software then offer one or several *solutions*. Each solution consists of a list of *operations* that can correspond, for instance, to the different layers of the roads, the sidewalks and their borders, etc. For each operation, the quantities of materials used, their techniques of production and transportation, and their distance of transportation are specified (see "Interface for the company" in Figure 1). Referring to a database that gives the unit impacts of these techniques regarding each quantitative indicator (e.g., the amount of energy consumed when laying one ton of a given type of asphalt), the software then simply sums the impacts of all operations, thus computing the impact of the solution (see "Database" and "Computation"). The resulting figures allow it to produce comparisons of different solutions—either proposed by one or different companies—in the form of automatically generated histograms (see "Report for the contracting authority").

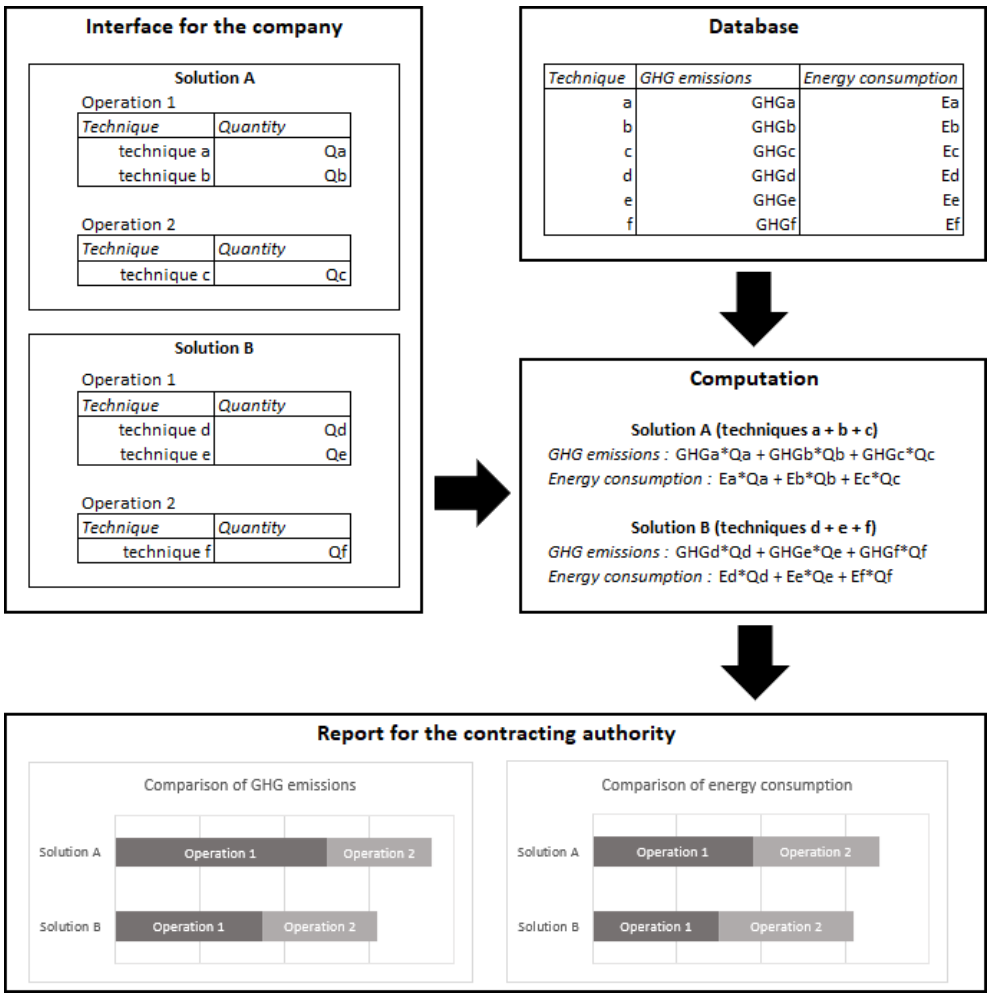

Figure 1: Illustration of the general principle of the eco-comparator. For clarity, only two indicators, GHG emissions and primary energy consumption, are considered here.

Source: Author's own elaboration

One of the crucial properties of quantitative indicators in this mode of assessment is that they are additive: assuming that two tons of carbon emitted or two joules consumed are systematically equivalent, the impacts of different operations can be summed to compute the total impact of a solution, and the sums thus obtained are simple to compare. This simplification shapes a valuation process that strongly differs from more complex forms of negotiation at play in local governments. In a small town I investigated, for instance, the transformation of the main road through the town center was subject to a debate illustrative of the ramified consequences of large infrastructure projects. The town used to be crossed by the main route to the neighboring country, but a recent diversion of the highway had considerably transformed the traffic through the town. The municipality intended to take advantage of the diversion of heavy

vehicles to make its inner public spaces more attractive to tourists. It had been working with consultants to redesign a large part of its roadways; this iterative design process involved a committee representing a variety of actors. Within the committee, technicians from a larger administration (corresponding to the territorial level of the "*département*" in the multi-layered organization of local policies in France) brought their expertise on the technical aspects of roadworks solutions, and different stakeholders contributed to a complex valuation of the road and its material environment: the tourist office discussed the consequences of parking lots for the local economy; representatives of the town's technical department advocated for revegetation choices favoring local species that were easier to maintain; the neighboring municipality was invited to debate the fate of a larger-scale project of a walking and cycling path, typical of how the ecological value of road infrastructures is often debated in contemporary French territorial policies, through the prism of their evolving uses. Such a process clearly complicates the delineation of a limited number of solutions, let alone their assessment in the form of a report that would reduce their environmental impacts to a few key figures. On the contrary, it requires public authorities to orchestrate public debates and bring expertise to the table, in order to make different forms of ecological (and other) values count in infrastructure policies.

By contrast, the eco-comparator offered by RdF organizes a valuation process with at least three distinctive characteristics. First, the range of actors involved is restricted to the contracting parties who take part in a market transaction. Second, thanks to the reports automatically generated by the software, the role of public authorities is simply to make a choice between alternative market solutions offered to them. Third, the eco-comparator enacts a specific, simplified version of the environment. Its most critical characteristic is to be *additive*: rather than being intertwined with infrastructures, this environment functions as a reservoir *containing* certain quantities, namely GHG, energy, and materials, that can be added or subtracted. The "impacts" of each operation simply consist of *emitting* certain amounts of these quantities into the environment (GHG), or *removing* them (energy, materials). This form of valuation translates environmental concerns into the expectation to reduce totalized impacts. Such approaches are known to be commonly favored when bringing environmental valuation to markets with numerous actors, but their ecological relevance has been strongly called into question (Quirion 2020). Here, this framework limits the role of public authorities to the environmental optimization of the services allegedly rendered to society by roadworks companies.

Maintaining the market, limiting environmental constraints

While the use of quantitative, additive indicators equips a mode of valuation that is well adapted to market transactions, it may still be constraining for the economy. Consider the French "National low-carbon strategy" (*Stratégie nationale bas carbone*, SNBC), a governmental policy recurrently cited in debates about the environmental impacts of economic activities. Referring primarily to the work of the International Panel on Climate Change, the SNBC sets thresholds for the total GHG emissions of the different sectors of the national economy, in the form of "carbon budgets" established for periods of three to four years (Ministère de la transition écologique et solidaire 2020). In this approach, computing totalized environmental "impacts" such as GHG emissions might subject them to constraining thresholds, as is the case in many environmental markets (Quirion 2020), or justify other public interventions that would amount to a reduction of activity in the economy of infrastructures—as exemplified by the decision made by the Welsh Government (2023) to suspend roadworks projects suspected to fail to contribute to environmental commitments. It may thus seem counter-intuitive that RdF discusses environmental concerns as an opportunity for the market, while advocating for such computation. Yet, further investigation reveals that the "additive environment" enacted by its eco-comparator happens to escape the risk of being subjected to constraining thresholds.

First of all, RdF stresses the importance of users (public authorities) sticking to a comparative approach. Promotional brochures state that the software enables the comparison of solutions that are "technically equivalent". The user manual specifies that different solutions can only be compared if they provide "the same service level for the same period of time." During an interview, the person in charge of the instrument elaborated on this by showing me an example of a simulation: he compared a first solution that would maintain a road in a good state for ten years, and another that would require refurbishment work after a few years. In such a case, the simulation has to be made over the whole (ten-year) life cycle for both solutions: for the second solution, one should add the environmental impact of the supplementary work needed after a few years. GHG emissions or energy consumptions at different points in time are supposed to add up, which must be taken into account to produce a comparison *all other things being equal*. In other words, the eco-comparator enacts a version of the environment as external to infrastructures by distinguishing, as two independent aspects in the making of roads, the technical requirements that express the infrastructural imperative that roads last, on the one hand, and the environmental impacts that intervene as additional variables informing decision-making, on the

other hand. The additive environment can be simply *added* to infrastructures without interfering with them.

More critically, the user manual insists that the instrument

> is an eco-comparator for comparing two or more solutions in response to tenders. It is by no means possible to use this tool to calculate the environmental impact of a worksite in absolute terms, and it is therefore unsuitable for carrying out a greenhouse gas emissions assessment (Bilan Carbone ®, OMEGA TP, ...). (Cavagnol 2016, 5)

According to the software manager, this is mainly due to the characteristics of the database that provides the unit impacts of different techniques. For a given technique, the database draws from the Environmental Product Declaration (EPD) established by the industry in compliance with national and international norms. However, for a number of techniques, such normalized documents do not exist, in which case any company can provide its own non-normalized data. Moreover, the unit impacts given by the database are generally mean values. All in all, these approximations and uncertainties are the reasons why the total impacts computed by the eco-comparator cannot be interpreted as the impact of any given worksite "in absolute terms".

This is why promoters of the software encourage public road managers to approach results with caution and control the data provided: the tool then seems to operate as an invitation to engage in a normative discussion on the market. The road manager whom I interviewed about his use of the software, stated that it helped him detect illegitimate claims to environmental virtue in the offers assessed. For instance, he noticed that companies often ticked the box stating that they would use a certain optimization technique for the transportation of materials, while he suspected they did not systematically have the capacity to implement this technique. He argued that the fact that they used the eco-comparator, and had to tick this box, gave him the occasion to control this particular point: it introduced a critical, tangible topic for caution, which was for him one of the main advantages of the instrument. But controlling requires a supplementary effort, which explains why the use of the instrument is not adapted to smaller public administrations without structured technical services or qualified staff. According to him, however, this was not a serious issue because ensuring that larger authorities, who are the most consequential clients, use the software to encourage most companies to make efforts is already a significant progress.

All these argumentative precautions specify the understanding of the good economy associated with the additive environment. It appears that the incapacity of the software to compute the impact of a given worksite "in absolute terms" does not undermine its environmental

justification, because the role of the eco-comparator is to systematically favor techniques that are known to be more environmentally virtuous *on average*. In other words, the point is not to ensure that any particular worksite does not cause too much damage to the environment, but that the market as a whole reduces its impacts. This makes sense precisely because indicators such as GHG emissions or energy consumptions are additive: not only can they be summed at the scale of the various operations constitutive of a worksite, but also at the scale of the market. The whole economy of roadworks shares a single additive environment, a common reservoir whose limits remain undefined.

This version critically differs from that enacted by the more constraining framework of carbon reports, which allows the setting of thresholds that the impact of a given activity should not exceed: in such an approach, roadworks would operate *within* a finite environment. By contrast, the additive environment operates as an external reservoir that offers the space for a supplementary form of valuation for market transactions. This particular form of environmental valuation, as it adjusts to pre-existing economic practices, thus reinforces both the structure of the market and the conception of infrastructures as delineated objects, clearly distinct from their natural environment. It does not fuel a systematic critique of the ecological consequences of infrastructural policies, but rather gives certain options a supplementary value compared to others, emphasizing only positively the efforts made by certain public and private actors to mitigate their "impacts".

Conclusion

As ecological concerns bring to light different options to refurbish or transform roads, actors involved in long-term debates on maintenance and repair policies develop new forms of valuation of the existing and future relations between infrastructures, public and private actors, and the environment. As they are associated with the production of documents such as public reports and agreements, these developments bring to light certain conceptions of the responsibility of different actors—understood as their ability to take action in response to certain concerns, and to demonstrate the relevance of their action. In contexts where public infrastructures are essentially managed by local governments who contract out a large part of the construction and maintenance work to private companies, tools of environmental valuation contribute to renewing conceptions of the good economy, while being themselves framed by existing distributions of responsibilities.

The shared eco-comparator developed by the French roadworks industry participates in a justification apparatus that relies on a

restrictive understanding of the ecological implications of infrastructures. As it is supposed to simply add a comparison of the environmental "impacts" of different "solutions," without questioning prior decisions to engage in roadworks, it enacts an additive version of the environment in which impacts are not computed in absolute terms, but inserted in a general optimization effort. In the version of the good economy of infrastructures thus constructed, infrastructures are a primary need of society that should not, in itself, be negotiated regarding environmental concerns. This form of valuation does not engage, for instance, with general debates regarding the mitigation of urban spread, or with local debates regarding the best solutions to fight soil impermeabilization or to favor local biodiversity—alternate framings in which environmental concerns can lead to certain pieces of infrastructure being renounced.

This version of the good economy of infrastructures cannot be dissociated from relationships between the state, technical expertise, and the market. It is embedded in an institutional framework in which the state has renounced both the expert ability to produce centralized assessments of infrastructures, and the ability to systematically bring technical expertise in local decision-making. Environmental concerns in the making of infrastructures have been largely delegated to the private sector, and to local governments with limited resources that do not allow them to develop their own technical capacities. The justification apparatus developed by the industry reasserts that private companies are endowed with the best technical expertise to provide the well-maintained infrastructures needed by society, and that public actors should simply encourage them through their valuation practices. However, some of its arguments regarding the software more or less explicitly acknowledge the inherent inability of capitalist companies to take responsibility for the ecological consequences of the infrastructures they build and maintain: in informal discussions, RdF representatives occasionally suggest that it should be the central state's responsibility to impose stricter environmental norms.

Coming from representatives of private companies themselves, who keep promoting corporate efforts to reduce environmental impacts, this point could be deemed hypocritical. However, it is not purely cynical, as it returns the responsibility to public institutions. This gesture is consistent with other arguments that come with the development of the software, namely the constant reminders that local governments are legally expected to produce environmental reports, or more general critiques of the weakening of centralized expertise. In any case, the justifications brought forward by the corporate roadworks industry itself urge us to question the capacity of state institutions to implement more constraining environmental criteria in the ongoing making of public infrastructures.

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Roman Solé-Pomies completed a PhD thesis in STS at the Center for the Sociology of Innovation (CSI, Mines Paris, PSL University), studying local road policies in France. Since then, their research mainly has drawn on STS work on infrastructure and maintenance, as well as feminist approaches and environmental ethics, to analyze how infrastructures materialize divisions of labour and relationships between societies and ecosystems. They are currently employed by the company Logiroad to investigate more specifically the consequences of new digital tools developed for road management.