

The Good Economy Working Paper Series

Working Paper no. 3/2019

The Good Economy

Re-casting the bioeconomy, its normativities
and its troubles

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This working paper series is part of a larger project, headed by Kristin Asdal: *Enacting the good economy: Biocapitalization and the little tools of valuation* ([Little Tools](#)). This project has received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (grant agreement no 637760).

Front page design: Tobias Kaasa Fossheim

We thank our research assistant Sofie Nebdal for preparing this manuscript for publication.

Introduction

It is now more than a hundred years ago that the German scholar Max Weber published the work that has come to stand as a landmark in the analysis of modern capitalism. A key tenet of the book and his argument was, as the title *The Protestant Ethic and the Spirit of Capitalism* already indicates, the intimate interlinkages between ethics and capitalism (Weber 2001 [1904]). Capitalism is not, according to this thesis, a non-moral enterprise but, to the contrary, constituted upon a particular version of ethics: A work-ethics inspired by protestantism and oriented towards meticulous, diligent work; a work-ethics not for the purpose of showing off what the work paid off in expensive lifestyles or conspicuous consumption, but for the purpose of profit, and the re-investments of that profit, as an end in itself. In this respect, the relation between the economy on the one hand and normativities and ethics on the other, is well and convincingly established. Interestingly, it is not the economy itself which is good, but the surplus value which is constantly produced – read as a sign of people pursuing profit as morally good subjects.

What would this, or these, relations, if any, be today? And to where would we eventually go to find, analyse and conceptualize them? The ambition of this paper is not to copy neither in scale nor depth nor conceptuality the vast work of Weber. However, inspired by his work we take an interest in exploring normativities-economy relations. The context of this interest, though, is more specific and limited: Not that of investigating the emergence of modern capitalism, but that of enabling analyses and conceptualizing of some significant features of our contemporary economy, mainly initiated, so far it seems, at the policy level. From there, we hope to be able to expand our scope and the sites that we and others study.

The place from where we start, or our working hypothesis, is that in contemporary society we are witnessing something new. Or put differently, that we are witnessing the emergence of a new version, or new versions, in the plural, of ethics-economy relations. Whereas Weber's thesis was that the ethics came from an outside force so to speak, namely religion, the new version or versions, are different. Here it is rather the economy itself that is good; hence the concept "the good economy" which this paper suggests as a way of conceptualizing it for the benefit of enabling further and closer analysis.

The 'good economy', we want to argue, is a *post*-economy, an economy that posits itself as coming after the current, now increasingly understood as an ethically "bankrupt" economy, namely the carbon economy. So where is this economy located? Let us start out with a series of questions that are now constantly being asked anew: What shall we live off in the future? What will provide jobs, food, create new markets and opportunities? What will come *after* the carbon economy? What will follow the fossil era? In the last ten to fifteen years, key institutions like OECD and the EU as well as individual nation-states have proposed and promoted answers to this question. They all point in a similar direction: After the fossil economy, comes, will come, must come, *another* economy – a *bioeconomy*. Even if the bioeconomy in these policy strategies is envisioned in somewhat different ways (and these differences is something we will return to in more detail in the following), they all seem to share a strong normative basis; a vision of a shift to a new economy that is innovative, sustainable, responsible and environmentally friendly – in short ethical and good.

So where does this ethics come from? What is its substantial basis? Contrary to the Weberian version of a capitalist spirit fuelled by the protestant ethos becoming integral to the capitalist endeavour, the normativities we are now observing seem different: Rather

than a particular work-ethics, that of pursuing diligent economic activity for the benefit of profit and the reinvestments of that profit, it is as if there is a particular version of the *economy itself* which is deemed good: It is the bioeconomy which stands out as “the good economy”.

So is it then “the bio” that is now fuelling the ethics of the economy? And eventually, in which ways? These questions come with immediate methodological consequences, or put in a more mundane way, they have consequences regarding how to pursue the analysis and which relations to look for and investigate. Whereas for Weber the key relation that stood out to be investigated was the religion-economy relation, for the bioeconomy it is clearly the bio-economy relation. What is then the relations between the bio and the economy? In which sense or in what ways is the good seen to be located in the bio – and which versions and parts of the bio? And how does, eventually, the economy come to be transformed, by which tools and practices, by way of “the bio”? In other words: How are the bio and the economy connected and linked up with one another? And how, more concretely, can we conceptually, analytically and empirically trace and work on these relations?

The ‘good economy’ as a conceptual tool

Besides working as a re-casting of the bioeconomy, the paper and the concept of the ‘good economy’ carry a double ambition: To be used as an analytical tool in order to break open the bioeconomy visions, strategies and promises, and, next, to find ways to do this in novel re-combinations with the field of valuation studies and the scholarly tradition that we can sort under the umbrella of critical bioeconomy studies. We start with the methodological move, introducing and working out the good economy as an exchange across valuation studies on the one hand and the bioeconomy literature on the other. We then move to tentatively suggest how the good economy concept can be put to empirical and analytical work by exploring a set of empirical examples of bioeconomy strategies from the EU, OECD and Norway, as a way of starting to tease out tensions between versions of the good and its trouble.

We do not walk alone I: From biocapital to bioeconomy

While the recent decade has seen a proliferation of policy strategies, programs and visions that seek to enable and push for a bioeconomy, the term “bioeconomy” has also thrived in parallel in another context: namely, as a scholarly construct in critical academic literature. Indeed, for a long time already the term has been put forward to make sense of the transformations spurred by the contemporary articulation of life sciences to capitalist economies (e.g. Yoxen 1981; Rose 2001; Cooper 2008; Asdal 2015). Hence, there is already a tradition for analysing the bio in its relations to capital and a capitalist economy. The literature that has developed around this term has analysed such transformations as they play out around various biological objects entangled in economic projects, such as biotechnologies, stem cells, human reproduction, bioenergy, bioprospecting, and so forth (cf. Helmreich 2008; Helmreich and Labruto 2018; Birch and Tyfield 2013; Birch 2017a).

One of the many analytical and empirical contributions of these works lies in the ways in which they conceptualize life as entangled in economic systems and, also, how nature is a driving force of capitalism. An early contribution was Yoxen (1981), drawing

on Foucault and proposing, in precisely this direction, to investigate how life was becoming a productive force in modern capitalism.

A form of re-combined Marx-Foucault inspiration is also very much the case in more recent studies, such as Melinda Cooper's comprehensive work. Her take is precisely that of linking life and the biological with new phases of capitalism, arguing that "as the realms of biological (re-)production and capital accumulation move closer together, it is becoming difficult to think about the life sciences without invoking the traditional concepts of political economy – production, value, growth, crisis and revolution" (Cooper 2008: 3). Already the title of her influential book *Life as surplus* (2008) is clearly indicative to the life-capitalism relation in Cooper's comprehensive inquiry into what is formulated as "biotechnology and capitalism in the neoliberal era" in the book's subtitle. This linking of biotechnology and the life sciences in its evolutions and co-productions with what is framed as neoliberalism is precisely her take on the specific US history since the late 1970s that she is investigating. Cooper starts from the premise that the emergence of biotechnologies raises challenging questions about the interrelationship between economic and biological growth, and goes on to sketching intersecting genealogies of the evolving conceptions of the two. She argues that neoliberalism "profoundly reconfigures the relationship between debt and life, as institutionalized in the mid-twentieth-century welfare state", and that it does so "in productive dialogue with the life sciences, where notions of biological generation are being similarly pushed to the limit" (Cooper 2008: 10). The notion of "surplus" and the idea of "regenerative potential" are the keystones of the book and they are put to work as conceptual tools to emphasize the parallels between changes in the economy and in the life sciences, the key idea being that the two combine efforts to push the limits to economic growth and to life (see also Cooper 2007).

Another key example is the contributions of Kaushik Sunder Rajan, who in related ways considers the bio in its relations to newer forms of capitalist development. In Rajan's own words, "the life sciences represent a new face, and a new phase, of capitalism and, consequently, that biotechnology is a form of enterprise inextricable from contemporary capitalism" (Rajan 2006: 3). In his book *Biocapital: The Constitution of Postgenomic Life* (2006), contrary to how Cooper takes her point of departure in neoliberalism and its role in shaping the biotechnology enterprise, Rajan takes neoliberalism rather as a lens from which to deal with long-standing concerns in the social sciences on how to understand capitalism as a theoretical and empirical construct. From his empirical study of the pharmaceutical industry, he argues that the life sciences are overdetermined by the "capitalist political economic structures within which they emerge" (Rajan 2006: 6). Rajan is careful to stress the space for contingency embedded in the notion of overdetermination, and challenges the conception of "capitalism as something unitary, eternal, and without history" (Rajan 2006: 7). On this basis, he proposes that "biocapital is one vantage point from which to view the complexities of capitalism, and like all situated perspectives, it contains within it both its specificities and its diagnoses of more general structural features of capitalism" (Rajan 2006: 7).

We do not walk alone II: Critiques of the bioeconomy as a neoliberal policy

The biocapital literature presented above has, however, not so much been tuned in towards analysing the bioeconomy as a policy object. The latter is exactly what a different strand of authors have recently been doing, by taking bioeconomy strategies and policies as their object of analysis to criticise the political-economic logics that is taken to

underpin the new economy-biology entanglements. In particular, the attention has been turned towards the bioeconomy strategies of the OECD and the EU. Goven and Pavone (2015) and Birch and Tyfield (2013), for instance, engage critically with the bioeconomy literature from a political-economy perspective. Analysing the OECD initiative *The Bioeconomy to 2030* (OECD 2009), Goven and Pavone approach the bioeconomy as a narrative and a political project and argue for it to be understood as “a response to some of the most acute challenges facing the current neoliberal-capitalist accumulation regime, which seeks to protect and extend that regime” (Goven and Pavone 2015: 302). As they add: “[J]ust as the market system required state action to eliminate alternative modes of meeting needs and organizing the economy, so the bioeconomy aims to embed biotechnology, and science in general, in a neoliberal logic that eliminates alternative scientific and political-economic pathways, including alternative ways of (defining and) meeting needs with the help of biosciences” (Goven and Pavone 2015: 313).

Their approach includes taking an issue with STS-takes on the bioeconomy for failing to adequately acknowledge power structures and (neoliberal) institutional and structural contexts. Rather, they argue, we need to situate ethnographic examinations of “horizontal micro-relations” within a macro-context that enables and constrains this micro (Goven and Pavone 2015: 324-325). Although they in later work discuss a number of tensions and conflicts within the bioeconomy (Pavone and Goven 2017), their 2015 analysis comes with a quite strict and predefined framework for how to understand the economy: It is already grasped as inherently neo-liberal and as part of a capitalist logic.

In related ways, Birch and Tyfield (2013) address the bioeconomy as mainly an issue of political economy. Again, criticism is directed towards STS scholars’ conceptualisations of the bioeconomy for failing to adequately incorporate recent political-economic analyses and for failing “to theorize asset-based economic processes and the realization of asset value through market exchange” (Birch and Tyfield 2013: 301, 313). In particular, they reject the notion that the source of value in the bioeconomy lies in the “bio” and take issue with conceptualisations of value “as a dual concept comprising (broadly speaking) ethical and economic value” (Birch and Tyfield 2013: 307). These notions, they argue, stem from a “misappropriation or selective adoption of terms from Marxism and critical political economy” such as capital, value, or surplus (Birch and Tyfield 2013: 312). Hence, again the analysis comes with quite strict instructions both on the correct vocabulary for studying the bioeconomy and on “what is important about the connection between the actually existing bioeconomy and financialization” (Birch and Tyfield (2013: 320). The bioeconomy issue is redefined as a matter of asset production and value realization through market exchange (Birch and Tyfield 2013: 318, 321).

Taken together, Birch and Tyfield’s and Goven and Pavone’s approaches leave us with a conception of the bioeconomy as a relatively unified project with its own logic. This prevents us from opening up the bioeconomy as an object and from studying how, in practice, bioeconomy projects are constructed and negotiated. Moreover, it closes down “the economy” as a study object for STS-scholars (and others) unless you adhere to a particular predefined marxist-inspired vocabulary and definitions of the object. Or as Birch puts it in another paper, the bioeconomy is, by definition “the articulation of capitalism and biotechnology” (Birch 2017b: 460).

We do not walk alone III: From the study of fact-making in science to the study of value-making in markets

The scholarly field of valuation studies has emerged from a different strand of STS, spawning from the actor-network theory tradition towards the study of markets (see Callon et al. 2007). Importantly, science studies in the actor-network theory tradition sought to get away from determinist approaches to their objects, and quite deliberately stayed away from the economy as both an object of study and an explanation of the object studied. Science was not to be described or explained by external logics or driving forces, and social explanations were not to be privileged at the expense of “nature”. To the contrary, the ambition was to have an eye for the co-productions of the natural and the social.

Hence, the actor-network theory approach can be read as a deliberate move *away* from the Marxist-oriented traditions, which had been oriented precisely towards describing and explaining by way of more determinist logics and driving forces, i.e. a capitalist logic as part of a capitalist system. In its recent turn to the study of markets, actor-network theory and valuation studies similarly avoid taking categories such as “the market”, “the economy” or “the economic” as their point of departure. Rather, in drawing from the pragmatist tradition of John Dewey (1939), the ambition has been to enquire empirically how things *become* markets, valued, or economic (see for instance Callon et al. 2007). If one considers that there is nothing which is economic *per se* and that everything may, in principle, *be made* economic according to the relations in which it becomes entangled, the focus shifts from “the economy” as a given entity or defined sphere, to economic practices and devices and to “markets in-the-making”.

With valuation studies, the economy ceases to be a privileged site for studying value. Rather, drawing on Dewey (1939), the object investigated is no longer “values” or “value” but valuation as practices, which can be investigated empirically and that potentially cuts across different forms of value-making. In theory then, the turn to valuations can be put to work across academic disciplines such as economics and sociology and, consequently across the study of economic value on the one hand and people’s values on the other (Muniesa 2012; Geiger et al. 2014). In other words, valuation practices cannot be reduced to economization, marketization or financialization. This perspective then enables us to analyse how different values are tentatively made integral to the economy and to economic analysis. This is what scholars affiliated with valuation studies have attempted to do in addressing “concerned markets”, that is, markets in which both economic and non-economic values are at stake (Geiger et al. 2014).

There are, however, a few key elements from actor-network theory that have not accompanied valuation studies in its turn to markets and values. In interesting and important ways, valuation studies have brought with it the actor-network theory sensibility to the significance of materialities in their turn to markets. This has led to a series of important studies on market-devices and their partaking in processes of economization; that is, the devices by which something becomes a market-thing or an economic entity (with Cochoy’s example of the shopping chart as a good illustration, cf. Cochoy 2008). However, this concern with materialities has focused largely on diverse forms of material-semiotic devices, i.e. devices that enable and equip markets. The broader commitment to materialities – in the form of a demand to bring also nature and the non-human into the analysis – is largely missing. The very entities that are made into commodities and traded are more often than not absent (Asdal 2015). Ironically, then,

“the bio” is precisely what valuation studies so far have not been particularly good at bringing into the equation, despite its actor-network theory inheritance. That this is so, is perhaps due to the fact that, empirically, valuation studies largely started with the study of financial markets, which deal in rather abstract commodities. To continue following this line of research means that one of the purportedly defining characteristics of bioeconomies, namely, the reliance on biological or biologically processed resources, are being downplayed and under-investigated.

Another missing element is perhaps more fundamental and, as a result, more challenging to address. Let us once more turn to actor-network theory: In its analysis of science, actor-network theory in its laboratory studies version (Latour and Woolgar 1986) turned to the nitty-gritty practices and devices of science in order to show how scientific facts were made. Importantly, however, what this move in fact also provided was a comprehensive account of science. This is, as of yet, somewhat lost in the turn to markets and valuation practices. Perhaps because of actor network theory’s ambition to move away from a Marxist-oriented critique, the finely described market/valuation practices and devices do not, as of now, add up to “capital”, “economy”, or any entities that may account for economy as composed of an ordering set of practices or the economy as an ordered entity.

The Good Economy: If valuation studies and bioeconomy studies meet

Regrettably, the two strands of literature discussed above – valuation studies and the bioeconomy literature – and their ways of working upon the economy and economic practices seldom “meet”. They seem to thrive in different and rather separated discourses. A sign of this is that the authors in the respective strands of research do not very often cite each other. So what if we brought some of the everyday, open-ended approach into the bioeconomy machineries (Asdal 2014)? And further, if we bring the concerns with “the bio” in the bioeconomy literature into conversation with the concern for valuations? It is in order to enable this that we suggest the notion of “the good economy”.

Can we, in drawing upon valuation studies and the bioeconomy literature in recombination discern a good economy – not as the end-point of our analysis, but as our point of departure for investigating how “the good” relates to “the bio”? How, more broadly, the quantitative and the qualitative are linked, and what the valuation practices are that make up the different versions of the policies and strategies that keep competing for becoming *the bioeconomy*? The objective is precisely to re-combine the two literatures for the benefit of improving our methods for studying bio-economy relations, broadly speaking. In re-combining the two, the ambition is to enable us to attend to agencies, valuation practices, and local enactments of the good economy but, and importantly, without losing sight of the economy as an ordered activity and object. Key to this must be to turn the bioeconomy *relations* into the empirical object of inquiry: i.e. its bio-economy relations, its policy-economy relations, as well as its life science-economy-policy relations. With the notion of the good economy, we also suggest that we start interrogating the relations between “the good” as a normative and ethical issue versus the good as more strictly related to value-creation, hence a narrower economic question. Hence, in contrast to Birch and Tyfield (2013) who ask us to leave the non-economic value-question to the side for the benefit of a Marxist version of value, we propose that these are relations that are begging curiosity and further investigation.

Charis Thompson's work on stem cell-research in her book *Good Science* (2013) actually opens up for such investigations: With a point of departure in science, her overriding argument is that stem cell research is a science, as she puts it, that has ethics, i.e. that is enmeshed in ethical controversy. Hence, following her argument, science must be approached, analysed and indeed governed as if always also having ethics. Similarly, the "good economy" concept suggests that we approach the economy as an economy that has ethics. Yet we would also like to move further and suggest that the economy is involved in valuation struggles and value-issues more broadly. This also includes and moves across the question of value in surplus-, market- and monetary terms. Hence, this is a Dewey-inspired approach that we elaborated on above.

Another approach by Thompson is also interesting as a bridge here. In her work on scientific and medical practices she has alerted us to these as particular *choreographies* (Thompson 2005, 2013), which we find to be a useful way of approaching the economy as an ordered activity (see also Law 1994). What we are after with the good economy concept is, however, not only a mapping of the valuation-practices involved, but to question the different versions of the good at play and at stake in the various bio-economy relations, policy-economy relations and life science-economy-policy relations.

Exploring tensions between versions of what constitutes the good

Hence, the good is not the end-point of the analysis, but where we need to start troubling. This includes investigating the different and potentially conflicting versions of "the good". It is towards this exercise that this second part of our contribution will now turn. In the following, we will point out three inherent tensions within and between bioeconomy policy documents from the EU, OECD, and Norway. These tensions concern different definitions of the bioeconomy; different modes of valuing nature and the economy; and different views on the role of science in the bioeconomy.

Tensions between versions of the good I: Biotech versus biomass as the good bioeconomy goods

We have so far argued that policy versions of the bioeconomy put forward a promise of an economy that, essentially, is and does good because economic activities are grounded in the biological. But what, exactly, is this biology and how is it expected to be and to do good? In this first section, we explore this question by looking into the tensions and sometimes competition between a "biotech" versus a "biomass" conception of the bio (for similar distinctions, cf. Bugge et al. 2016 and Pavone and Goven 2017).

The paradigmatic bioeconomy policy documents by the OECD and EU shows how such tensions can play out, following from diverging operationalizations of similar visions. OECD's report, entitled *The Bioeconomy to 2030: Designing a Policy Agenda* (OECD 2009), provides an influential argument for new biotechnology as an engine of economic growth. Its vision of the bioeconomy is one where "biotechnology contributes to a significant share of economic output" (OECD 2009: 22). Economic growth and innovation on the basis of biotechnology and the life sciences, in other words, is what drives the OECD version of the bioeconomy. The European Commission, on the other hand, provide a different formulation in the report *Innovating for sustainable growth. A Bioeconomy for Europe* (EU 2012a). Here biotechnology is also crucial, but the bioeconomy itself is delineated differently: "The bioeconomy encompasses the production of renewable biological resources and their conversion into food, feed, bio-based prod-

ucts and bioenergy.” (EU 2012a: 16) In other words, what distinguishes this economy as “bio” is not a common base of biological knowledge or technology, biotech or the life sciences, but rather a shared resource base from biological and non-fossil inputs.

Despite overlapping policy prescriptions, the two different formulations just outlined have very different practical implications in terms of inclusion and exclusion under the umbrella of the bioeconomy. This becomes clearly visible in the case of the Norwegian government’s bioeconomy strategy (NFD 2016), which by using the EU definition came to sideline already existing bioeconomy initiatives. A biotech-centric strategy initiated by universities, hospitals and biomedical companies (BioVerdi 2014) fit poorly with the government’s biomass version. Further analysis of the Norwegian government’s adoption of the EU’s biomass conception of the bioeconomy shows, however, that this does more than marginalise the biomedical sector. It also makes biomass a *pivotal* concept, and turns access to biomass into a prerequisite for the growth of the bioeconomy. Accordingly, increased outtake from forests, fisheries and other marine resources figure prominently among the specific targets of the strategy (NFD 2016: 53-54, 63), turning several long-standing tensions in Norwegian environmental policy on their head. What could have been problematized and discussed in terms of conservation or political differences is here framed as subordinated to the needs of a particular innovation regime (for a related argument in another context, see Pavone and Goven 2017).

Consequently, rather than being framed as questions of protection or biodiversity, natural resource exploitation comes to be regarded as a *substitution* solution for fossil inputs, and thus as part of the *good* bioeconomy. This version of the bioeconomy, in other words, contains a narrative of transition by substitution away from fossil inputs, where increased utilization of biomass in itself is desirable, because it represents a step in this direction. The biotechnology version, on the other hand, relies on a different logic: Biotechnology promises to be good because it decouples economic growth from constraining limits by harnessing the regenerative or reproductive capabilities of life itself.

The biomass and biotech versions of the bioeconomy value the bio that are to take part in the future bioeconomy very differently – and with potentially vast, contestable and highly specific consequences for nature-issues, the economy and policy. The bio-relation to the bioeconomy is, however, far from the only tension that we can discern. Also which version of economy and economics that are to underpin, enable and do good are at stake and in tension.

Tensions between versions of the good II: Different modes of valuing nature and the economy

Behind the broad-reaching umbrella term of “the bioeconomy”, we find not only co-existing definitions of the term, but also several conceptions of the good–economy relation that are related to how it promises to *reorganize* the economy from fossil-based to renewable and from linear to circular, and also to *recalculate* the value of nature and the economy. In the following, we will present these two conceptions and some of their inherent tensions.

Changing the endpoint: Enacting the good economy by moving towards a fossil-free future

Regardless of their diverging definitions of the bioeconomy concept, a key move in

many bioeconomy strategies is to facilitate a transition towards a low-emission economy. For instance, the EU states: “Greater use of renewable resources is no longer just an option, it is a necessity. We must drive the transition from a fossil-based to a bio-based society, with research and innovation as the motor” (EU 2013: 4). The bioeconomy strategy is in itself a response to this, as “[a] strategy is also needed to ensure that fossil fuels are replaced with sustainable, natural alternatives as part of the shift to a post-petroleum society” (EU 2013: 2). Pointing to the future problem of “finite natural resources”, the EU states that “[a] strong bioeconomy will help Europe to live within its limits”, will enable “production of more from less”, “reducing the heavy dependency on fossil fuels”, and “moving Europe towards a post-petroleum society” (EU 2012a:4).

Also national examples, such as the Norwegian bioeconomy strategy (NFD 2016), adopts a clear transition narrative, but without the same explicit emphasis on the need to *move away* from fossil fuels. What is emphasised is rather what the bioeconomy *moves towards*. The strategy opens with stating that realizing the bioeconomy is “central for the transition towards a low-emission economy” (NFD 2016: 5, our translation). This economy is further characterised as having a strong potential for value creation, more efficient use of renewable biological resources, new growth, a “green shift” within the economy, increased competitiveness for Norwegian industries and firms, cross-sectoral policy initiatives, and interdisciplinary research and innovation (NFD 2016: 5). Similarly, the OECD, in its attention to the potential of biotechnology, stresses the importance of incentives to “reward environmentally sustainable technologies” and the “use of renewable biomass” (OECD 2009: 6, 8), yet does not explicitly adopt a transition narrative. Rather, it indicates some potentially more controversial sides of realizing the bioeconomy: “disruptive and radical technologies ... may lead to the demise of firms and industrial structures, creating greater policy challenges, but they can also result in large improvements in productivity” (OECD 2009: 16).

Furthermore, in the bioeconomy documents there are different degrees of commitment to not only renewable, but also a circular economy. This is becoming increasingly more prominent: EU’s recent bioeconomy action plan opens with asserting that the bioeconomy is “sustainable and circular” (EU 2018a). The “circular economy” is currently an expanding concept in itself, as attested by the OECD’s ongoing RE-CIRCLE program (OECD 2018), EU’s action plan for the circular economy (EU 2015, 2019a); and the Norwegian white paper on the circular economy (KMD 2017). In answering the question “What is the circular economy about?”, the EU explains that “A circular economy aims to maintain the value of products, materials and resources for as long as possible by returning them into the product cycle at the end of their use, while minimising the generation of waste. The fewer products we discard, the less materials we extract, the better for our environment. This process starts at the very beginning of a product’s life cycle: smart product design and production processes can help save resources, avoid inefficient waste management and create new business opportunities” (EU 2019b).

The notion of a circular economy is historically distinct from the bioeconomy, with origins particularly in design approaches to eliminating industrial waste and from the academic fields of industrial ecology and ecological economics. The point of departure was to conceptualize and model an economy independent of continuous input of finite natural resources and output of waste, in opposition to mainstream economic growth models. In its current policy form, circular economy is more narrowly focused on recycling and waste elimination, and yet it contains its own tensions, much like the bioeconomy does. Gregson et al. (2015), for instance, has shown how the seemingly simple

formula of doing good by turning waste into resources involves challenges where different logics and moral economies clash: there are right and wrong ways of recycling, inside and outside of territorial boundaries.

In its current policy application, the circular economy and the bioeconomy often appear together, and without the initial concern for producing and consuming less. The Norwegian white paper explicitly makes the circular economy a key component of the bioeconomy: “Central to the bioeconomy is a more efficient exploitation of the renewable biological resources, through a transition to a more circular economy where waste is minimized and residues are optimally used. It is at the same time a wish for a profitable processing and development of products that may yield high returns” (KMD 2017: 26, our translation). The term thus involves a notable conceptual shift: “Circular economy involves an expanded view of what constitutes resources and how they may be exploited as efficiently as possible” (KMD 2017: 6, our translation). This entails moving from considering waste as a problem to a resource in itself, hence creating new value and growth from what was formerly waste and residues. In practice, then, the concepts of the bioeconomy and the circular economy are increasingly merging.

Regardless of their diverging emphases, these bioeconomy strategies thus envision “the good” as a move away from non-renewable, fossil-based and wasteful economies towards an economy that is characterized as increasingly bio-based, renewable, green, sustainable, low-emission, circular and resource efficient.

Changing the equation: Enacting the good economy by re-valuing nature

While we above highlighted the green dimensions of the bioeconomy, it is also increasingly blue. In the EU’s revised bioeconomy strategy, “unlocking the potentials of oceans and seas” has been included as one of three main dimensions of the bioeconomy (EU 2018a: 1). This involves links to a related, but until recently parallel strand of policy initiatives for realizing blue growth (EU 2012b), the blue economy (EU 2014), the ocean economy (OECD 2016, 2019), or simply the blue bioeconomy (EU 2018b). This blue bioeconomy points to a different conception of “the good” than in the versions we presented above. A key difference is the role of the fossil fuels and petroleum production, which we saw from the examples above that bioeconomy documents often seek to move away from (albeit sometimes only by implication). In contrast, in its blue version, as asserted in the Norwegian government’s ocean strategy, “[t]he ocean industries are part of the bioeconomy” (NFD and OED 2017: 73, our translation). This effectively includes petroleum, which is the largest Norwegian industry and the dominant one offshore (followed by shipping and aquaculture). Instead of defining the good economy as a move *away from* petroleum, the blue version of the good economy effectively embraces petroleum by assuring that it will continue to be a cornerstone of Norwegian industry in decades to come. Similarly, both the EU’s “Blue Bioeconomy” initiative (2018b) and OECD’s “Ocean Economy” project (2016, 2019) encompass all existing ocean-based industries. This clearly contributes to toning down the call for moving away from the fossil era, and in practice combining initially diverging goals.

A critical feature of the blue bioeconomy are the new methods proposed for calculating the good economy. Rather than being a different economy in and of itself, it is the tools by which the new economy will come into existence that are key and which stands out as the new. Hence, this interest is quite specific, namely to calculate the value of nature in another way than what has been the standard procedure. These calculative

tools are intimately linked up with the notion of 'ecosystem services' and this is what is put forward as the key to a transformed and more sustainable economy (OECD 2016; EU 2018b). By way of such new forms of calculation, the promise is the ability to take into account other forms of value; the value of nature, which is now external to and not taken into account by the economy (for related valuation practices in other contexts, see e.g. Asdal 2008; Fourcade 2011; Chiapello 2015).

The OECD's "Ocean Economy Project" is a leading example of this (OECD 2016, 2019). Here, economic capital and natural capital are sought made commensurable and integrated into the same economic model. By way of these tools for nature-calculation, the promise is the ability to demonstrate how environmental degradation of the ocean will negatively impact not only nature as such, but also the growth potential of the ocean economy – its very size. In other words, unsustainable growth will reduce not only natural values or "bio-values", but also financial values. In the ocean economy, "the good" resides in the promise of these new tools (which are still yet to be developed and implemented): when put to use, they will ensure that the oceans are not only exploited, but also protected. The two become one: Pursuing the human self-interest of growth entails not only engaging in industrial activities for short-term gain, but also in the conservation of eco-systems for long-term gain. The means to do so, is to make the so far un-economic or non-economized nature a part of the economy, quantifiable and calculable in economic terms. In a word, nature is *economized* (cf. Çaliskan and Callon 2009), it is made into an economic object. As envisioned by the OECD, if the oceans are explored, monitored, governed, and exploited in the best possible way, we may in 2030 have realized the "trillion dollar ocean" (cf. Reinertsen and Asdal 2018). The OECD's ocean economy concept is becoming widely influential and adopted into policy and industry discourse on a global scale (as illustrated by the United Nations' High-level Panel on Building a Sustainable Ocean Economy (WRI 2019)).

The integration of ecosystem services into a calculation of the ocean's total value in fact follows a relatively straight-forward neoclassical approach to economics, a model for taking nature into account which, historically, has proven highly difficult to realize in practice (Asdal 1998). Yet the ecosystem services approach is not the only mode of economizing the ocean which are being put forward as part of larger bioeconomy strategies. These diverging tools for valuation and calculation may in effect produce widely different policy visions and initiatives.

A contrasting example illustrates this point. Whereas the OECD method is to quantify the ocean's nature values for then to add these to the economic values already calculated (hence demonstrating how the overall value of the ocean will potentially be reduced if nature is degraded), a related report within the national Norwegian context adopts a most different approach (SINTEF 2012, cf. Reinertsen and Asdal 2019). Far from pursuing a meticulous neoclassical method, this report freely combines tools from business and consultancy, notably value chain analysis and SWOT analysis. Also here, environmental and climate-related challenges to future growth in the Norwegian marine sectors are actively articulated. Yet when moving on to calculating the potential value creation in the marine sectors (using the year 2050 as the time-frame) the challenges are reformulated into "criteria for growth". Again, this may seem equal to the ocean-economy of the OECD. However, in this latter case, these criteria are in effect defined as already having been solved, hence, adding to the vast calculated potential, but without a calculated potential for degradation. Somewhat ironically then, the "final number", the outcome and end result of the calculation, is greatly enhanced, not despite great chal-

lenges, but *because* of them. In other words: The great environmental challenges and unsolved problems paradoxically contributes to even greater expectations on behalf of the marine sectors; a potential five-fold increase by the year 2050. Hence, by way of business school tools, the two-sided nature of nature – as both challenge and potential to the economy – is taken into account in a different way than by the employment of the ecosystem-service approach: First both challenges and potentials are integrated in a qualitative deliberation, then the former is being put aside, transforming only the potential into quantified numbers.

In practice, these two methods economize nature and recombine the “bio” with the “economy” in interestingly different ways. Yet despite their widely diverging methods of valuation and calculation, their results – quantified growth potentials and policy provisions – may in practice be pragmatically combined by policy and industry actors: In follow-up documents in the Norwegian context, references to both are made interchangeably (cf. NFD and OED 2016; Almås and Ratvik 2017; Edvardsen and Almås 2017; NFD 2019).

To summarize, different versions of a good economy co-exist in parallel documents and government initiatives. In practice, the tensions between them remain largely un-addressed. As noted above, the same documents may call for more bio-based growth while also aiming to sustain fossil-based industries. The notion of a “transition” and the importance of “sustainability” emerge in all versions, yet with different practical applications. To add to this situation, let us now turn to our final tension of the bioeconomy, that of between the good economy and good science. More specifically, we will point to how the specific ethos of science–society relations that underpin the current notions of a good economy is in tension with a long-standing ethos of science.

Tensions between versions of the good III: The ethos of science versus the ethos of science–society relations

What we so far have addressed as the good economy does not only draw upon the bio–economy relation. It also draws upon a renewed science–economy relation: The emerging bioeconomy is continuously alerting us to how science in general, and the life sciences in particular, are key to the much needed and ongoing transformations. Hence, the production of scientific knowledge and innovation is made integral to “good economy projects”, a redefinition which stands in interesting tension with what *used to be* defined and understood as good science. Is there, we ask, a tension between what used to be the ethos of science versus what is becoming a new ethos of science–society relations integral to the good economy of the bioeconomy?

As is being repeatedly stated in the policy documents, the bioeconomy is to be driven by research and innovation. Significant to this is the recent development of the policy measure *Responsible Research and Innovation* (RRI), which in the last few years has become increasingly important in research and innovation policy and funding, and particularly at the level of the EU (see Morsman 2017). A short leaflet issued by the European Commission in 2012 states that “Responsible Research and Innovation means that societal actors work together during the whole research and innovation process in order to better align both the process and its outcomes, with the values, needs and expectations of European society” (EU 2012c). Hence, this version of responsible science is about aligning its processes and outcomes with the values and wants of society at large.

A related but more open version of responsibility can be found in the EU document

introduced above, *Innovating for Sustainable Growth: A Bioeconomy for Europe* (EU 2012a). As well as having a principal focus on tackling societal challenges, the document states that: “A responsible bioeconomy calls for participatory models that engage citizens and end-users in order to reinforce the relationship between science, society and policy making” which, in turn, “will allow science and innovation to provide a sound basis for policy making and informed societal choices, while taking into account legitimate societal concerns and needs in the bioeconomy” (EU 2012a: 12).

There are, however, tensions inherent in these particular versions of responsibility. We may get a view of these by contrasting the RRI version of responsibility to another version, in which responsibility is evaluated on quite contrasting criteria. Namely, in terms of an “ethos of science”, and more specifically, to Robert Merton and his book *Science and the Social Order* (1938). Merton argued that the goodness of science should not be based upon criteria of societal applicability, be it religious, political or economic. “For if such extra-scientific criteria of the value of science as presumable with religious doctrines or economic utility or political appropriateness are adopted”, Merton warns, “science becomes acceptable only insofar as it meets these criteria” (Merton 1938: 328). In this version, the goodness of science relies on a quite specific set of values and practices, a distinctive ethos (characterized by intellectual honesty, integrity, organized scepticism, disinterestedness and impersonality) and its autonomy from other spheres of life is essential for this particular mode of doing good.

In contrast, making responsible research and innovation (RRI) integral to the economy, addresses the question of the responsibility of science in a radically different way; the goodness of science is measured by its capacity to align with or respond to social, economic and political values and aspirations. So are we, to pick up on Thompson’s (2013) vocabulary, amidst a shifting choreography of science, its direction being the alignment of the values of science with those of society at large? The tension of these movements exists between what until recently used to be put forward as the ethos of science versus what might emerge as a new ethos of science–society relations. Both versions sketched out are versions of the good, that is, the promise of science to be good and to do good, but by (radically) different choreographies. The fundamental issue and tension remain to be investigated, traced and analysed: What is the “good science” (Thompson 2013) of the good economy, and by what means, measures and practices does it come about?

Conclusion

The overriding objective of this paper, and of the larger research project of which is a part, is to suggest a re-casting of the bioeconomy, most notably by putting forward the notion “the good economy” as an analytical working-tool made for opening up and investigating this economy further. We here return to Max Weber as a source of inspiration: Working conceptually was precisely Weber’s suggested method. In *The Protestant Ethic and the Spirit of Capitalism*, the argument was precisely that even if put forward conceptually already at the very beginning of the study (in Weber’s case the notion of a distinct “spirit of capitalism”), an eventual precise definition of the proposed concept could only be substantiated step-by-step as the study was moving forward, and thus only defined at the study’s very end (Weber 2001). Importantly then, methods-wise, Weber’s aim was not “to grasp historical reality in abstract general formulae but in concrete genetic sets of relations which are inevitably of a specifically unique and individual character.” (Weber 2001: 13-14). Weber noted that such conceptual moves would always have an individual tone; analysing the relevant phenomena from the cho-

sen viewpoint would never be the only possible alternative as others could always see these phenomena differently. And rather than working from a precise definition at the start of the study, the conceptual innovation is more like a way of envisioning the relevant phenomenon; what Weber formulated as “a provisional description” (Weber 2001: 13-14), and which may also be linked to his famous concept of “ideal types” (Weber 2012).

“The good economy” is our point of departure in a quest for grasping the emerging bioeconomy and the normativities that seem to be involved. The bioeconomy is often presented as something radically new; an economy that is coming, will and must come *after* our current economy. Ironically, however, one could argue the other way around: that bioeconomies are the oldest of all economies, the economy that we have and currently also still heavily rely on. So the newness, we suspect, is not so much in itself an economy that relies on the biological, but *how* the bio-economy relation is envisioned and done and, as the more overriding point, the normativities that seem to be involved: the bioeconomy as a new form of good economy. This is also why, we suggest, we need this conceptual innovation as our tool to work with: In staying with a singular notion of “the bioeconomy” we risk either taking this economy for granted, reducing it to versions of economy we already think we know (simply a neoliberal or already well-established capitalist logic) conflating it with former versions of bioeconomies or, most importantly, not grasping what is at stake: this economy’s emerging, promising as well as promissory, but also genuinely troubling relations to “the good” and “the bio”.

However, as we have laid out in this paper, the “good economy” concept is also composed for another related reason; to address a scholarly question in another sense: to give rise and inspiration to a discussion about which methods and scholarly traditions that are best fitted and most fruitfully drawn upon to approach empirical objects and scholarly subjects such as economics and the economy. Because, luckily, and as we hope to have demonstrated, we do not walk alone. There are already scholarly contributions and traditions that lend themselves easily to such studies; studies that have already worked upon and theorized the bioeconomy, but also economic practices far more broadly.

The “good economy” concept, we suggest, is a way of recombining two strands of literature that are related, but regrettably seldom meet: valuation studies and bioeconomy studies. In doing so, we seek to bring the open-ended, everyday practice perspective from valuation studies into the critical analyses of bioeconomy machineries, and simultaneously to bring the concern with the “bio” in the bioeconomy literature into conversation with the concern for value-making practices in valuation studies. The encounter and recombination of these two species of literature is precisely what we need in order to understand both the economy in its relations to ‘the bio’ and to characterize and investigate the different versions of the good that go with it.

As illustrated by our empirical examples of policy documents from the EU, OECD, and Norway, these versions do not always sit nicely together, but rather emerge in tension with one another. Yet paradoxically and even surprisingly, these may also easily be comprised and recombined in other policy settings, regardless of the inherent tensions we as scholars so eagerly seek to disentangle and accentuate. Yet our ambition goes beyond merely highlighting inherent contradictions of bioeconomy documents. Our empirical examples show how the bioeconomy is rich and diverse, encompasses real tensions and diverging methods, and may cause both contradictions, conflicts, confluences and re-combinations. What the bioeconomy is and what it should be – its ontology

and normativity – is far from settled.

This is precisely why we propose the notion of a “good economy”: not to suggest that this economy is good, but as a starting point to investigate in what ways it proposes to be good and perhaps also becomes good. This makes us shift from describing what the bioeconomy is to include what it does, to understand its shifting choreographies, and to explore the normativities and values that come into play when a new version of the economy is put forth as the good economy of the future.

References

- Almås, K. A. and Ratvik, I. 2017. *Sjøkart mot 2050. Tiltak for utvikling av biologisk baserte marine næringer mot 2050*. Report OC2017 A-092. Trondheim: SINTEF OCEAN.
- Asdal, K. 1998. *Knappe ressurser? Økonomenes grep om miljøfeltet*. [Scarce resources? The economists' hold on the environment]. Oslo: Scandinavian University Press.
- Asdal, K. 2008. Enacting things through numbers: taking nature into account/ing. *Geoforum* 39(1): 123-132.
- Asdal, K. 2014. From climate issue to oil issue: Offices of public administration, version of economics and the ordinary technologies of politics. *Environment and Planning A* 46(9): 2110-2124.
- Asdal, K. 2015. Enacting values from the sea: On innovation devices, value practices, and the co-modification of markets and bodies in aquaculture. In: Dussauge, I., Helgeson, C.-F., and Lee, F. (eds.), *Value practices in the life sciences and medicine*. Oxford: Oxford University Press, 168-185.
- BioVerdi. 2014. *BioVerdi - Slik kan bioøkonomien bli den nye oljen*. Retrieved from: https://issuu.com/businessmemo/docs/bioverdi_rapport_final160514/2.
- Birch, K. 2017a. The problem of bio-concepts: biopolitics, bio-economy and the political economy of nothing. *Cultural Studies of Science Education* 12(4): 915-927.
- Birch, K. 2017b. Rethinking Value in the Bio-economy: Finance, Assetization, and the Management of Value. *Science, Technology, & Human Values* 42(3): 460-490.
- Birch, K. and Tyfield, D. 2013. Theorizing the bioeconomy: biovalue, biocapital, bioeconomics or... what? *Science, Technology & Human Values* 38(3): 299-327.
- Bugge, M. M., Hansen, T., and Klitkou, A. 2016. What is the bioeconomy? A review of the literature. *Sustainability* 8(7), 691.
- Çalışkan, K., and Callon, M. 2009. Economization, part I: shifting attention from the economy towards processes of economization. *Economy and Society* 38(3): 369-398.
- Callon, M., Millo, Y. and Muniesa, F. (eds.) 2007. *Market devices*. Oxford: Blackwell Publishing.
- Chiapello, E. 2015. Financialisation of Valuation. *Human Studies* 38(1): 13-35.
- Cochoy, F. 2008. Calculation, qualculation, calculation: shopping cart arithmetic, equipped cognition and the clustered consumer. *Marketing Theory* 8(1), 15-44.
- Cooper, M. 2007. Life, Autopoiesis, Debt: Inventing the Bioeconomy. *Distinktion: Scandinavian Journal of Social Theory* 8(1): 25-43.
- Cooper, M. 2008. *Life as Surplus. Biotechnology and Capitalism in the Neoliberal Era*. Seattle: University of Washington Press.
- Dewey, J. 1939. *Theory of valuation*. Chicago: University of Chicago Press.

Edvardsen, T. and Almås, K. A. 2017. *Norsk havøkonomi mot 2050 – en videreføring av OECDs rapport The Ocean Economy in 2030*. Report OC2017 A-041. Trondheim: SINTEF OCEAN.

EU. 2012a. *Innovating for sustainable growth. A bioeconomy for Europe*. Directorate-General for Research and Innovation, European Commission. Luxembourg: Publications Office of the European Union. Retrieved from: <https://publications.europa.eu/en/publication-detail/-/publication/1f0d8515-8dc0-4435-ba53-9570e47dbd51>

EU. 2012b. *Blue growth. Opportunities for marine and maritime sustainable growth*. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. COM(2012) 494 final. Directorate-General for Maritime Affairs and Fisheries, European Commission. Luxembourg: Publications Office of the European Union. Retrieved from: https://ec.europa.eu/maritimeaffairs/sites/maritimeaffairs/files/docs/publications/blue-growth_en.pdf

EU. 2012c. *Responsible Research and Innovation: Europe's ability to respond to societal challenges*. Policy brief. Directorate-General for Research and Innovation, European Commission. Luxembourg: Publication Office of the European Union. Retrieved from: https://ec.europa.eu/research/swafs/pdf/pub_public_engagement/responsible-research-and-innovation-leaflet_en.pdf

EU. 2013. *A Bioeconomy Strategy for Europe. Working with nature for a more sustainable living*. Policy brief. Directorate-General for Research and Innovation, European Commission. Luxembourg: Publication Office of the European Union. Retrieved from: <https://publications.europa.eu/en/publication-detail/-/publication/26b789d4-00d1-4ee4-b32e-2303dfd2207c>

EU. 2014. *Innovation in the Blue Economy: Realising the potential of our seas and oceans for jobs and growth*. Communication from the Commission to the European Parliament, the European Economic and Social Committee and the Committee of the Regions. COM(2014) 254 final/2. Brussels: European Commission. Retrieved from: [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014DC0254R\(01\)&from=EN](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014DC0254R(01)&from=EN)

EU. 2015. *Closing the loop - An EU action plan for the Circular Economy*. Communication from the Commission to the European Parliament, the European Economic and Social Committee and the Committee of the Regions. COM(2015) 614 final. Brussels: European Commission. Retrieved from: https://eur-lex.europa.eu/resource.html?uri=cellar:8a8ef5e8-99a0-11e5-b3b7-01aa75ed71a1.0012.02/DOC_1&format=PDF

EU. 2018a. *A sustainable Bioeconomy for Europe: strengthening the connection between economy, society and the environment*. Updated Bioeconomy Strategy. Directorate-General for Research and Innovation, European Commission. Luxembourg: Publication Office of the European Union. Retrieved from: https://ec.europa.eu/research/bioeconomy/pdf/ec_bioeconomy_strategy_2018.pdf#view=fit&pagemode=none

EU. 2018b. *Blue bioeconomy. Situation report and perspectives*. Report from European Market Observatory for Fisheries and Aquaculture Products (EUMOFA) and Directorate-General for Maritime Affairs and Fisheries, European Commission. Luxembourg: Publications Office of the European Union. Retrieved from: http://www.eumofa.eu/documents/20178/84590/Blue+bioeconomy_Final.pdf

- EU. 2019a. *On the implementation of the Circular Economy Action Plan*. Report from the Commission to the European Parliament, the European Economic and Social Committee and the Committee of the Regions. Commission staff working document, accompanying the document. SWD(2019) 90 final. Brussels: European Commission. Retrieved from: https://ec.europa.eu/environment/circular-economy/pdf/report_implementation_54_actions.pdf
- EU. 2019b. *Circular Economy - Overview*. Eurostat, European Commission. Retrieved from: <https://ec.europa.eu/eurostat/web/circular-economy>
- Fourcade, M. 2011. Cents and Sensibility: Economic Valuation and the Nature of “Nature”. *American Journal of Sociology* 116(6): 1721-1777.
- Geiger, S., Harrison, D., Kjellberg, H. and Mallard, A. (eds.) 2014. *Concerned Markets: Economic Ordering for Multiple Values*. Cheltenham: Edward Elgar.
- Goven, J. and Pavone, V. 2015. The bioeconomy as political project: a polanyian analysis. *Science, Technology, & Human Values* 40(3): 302-337.
- Gregson, N., Crang, M., Fuller, S. & Holmes, H. 2015. Interrogating the circular economy: the moral economy of resource recovery in the EU. *Economy and Society* 44 (2): 218-243.
- Helmreich, S. 2008. Species of biocapital. *Science as Culture* 17(4): 463-478
- Helmreich, S. and Labruto, N. 2018. Species of Biocapital, 2008, and Speciating Biocapital, 2017. In: Meloni, M., Cromby, J., Fitzgerald, D. and Lloyd, S. (eds.), *The Palgrave Handbook of Biology and Society*. London: Palgrave Macmillan, 851-876.
- KMD. 2017. Meld.St. 45 (2016-2017). *Avfall som ressurs – avfallspolitikk og sirkulærøkonomi*. [White paper on the circular economy]. Oslo: Ministry of Climate and Environment (KMD). Retrieved from: <https://www.regjeringen.no/contentassets/4c45f38bddee47a7b7847af108894c0c/no/pdfs/stm201620170045000dddpdfs.pdf>
- Latour, B. and Woolgar, S. 1986. *Laboratory Life: The Construction of Scientific Facts*. New Jersey: Princeton University Press.
- Law, J. 1994. *Organizing Modernity: Social Ordering and Social Theory*. Oxford: Blackwell.
- Merton, R.K. 1938. Science and the Social Order. *Philosophy of Science* 5(3): 321-337.
- Morsman, S.R. 2017. *Responsible Research and Innovation: Economies of worth and situations of dissonance in the case of a new policy concept*. Master’s thesis, TIK Centre for Technology, Innovation and Culture, Faculty of Social Sciences, University of Oslo.
- Muniesa, F. 2012. A flank movement in the understanding of valuation. *The Sociological Review* 59(s2): 24-38.
- NFD. 2016. *Kjente ressurser - uante muligheter*. Regjeringens bioøkonomistrategi. [The government’s bioeconomy strategy]. Oslo: The Ministry of Trade, Industry and Fisheries (NFD). Retrieved from: https://www.regjeringen.no/contentassets/32160cf211df4d3c8f3ab794f885d5be/nfd_biokonomi_strategi_uu.pdf
- NFD. 2019. *Blå muligheter*. Regjeringens oppdaterte havstrategi. [Updated ocean strategy from the Ministries]. Oslo: Ministry of Trade, Industry and Fisheries (NFD).

Retrieved from: https://www.regjeringen.no/globalassets/departementene/nfd/dokumenter/strategier/nfd_havstrategi_2019_norsk_uu.pdf

NFD and OED. 2017. *Ny vekst, stolt historie. Regjeringens havstrategi*. [The government's ocean strategy]. Oslo: The Ministry of Trade, Industry and Fisheries (NFD) and the Ministry of Petroleum and Energy (OED). Retrieved from: https://www.regjeringen.no/contentassets/097c5ec1238d4c0ba32ef46965144467/nfd_havstrategi_uu.pdf

OECD. 2009. *The bioeconomy to 2030: designing a policy agenda. Main findings and policy conclusions*. Paris: OECD. Retrieved from: <https://www.oecd.org/futures/long-termtechnologicalsocietalchallenges/42837897.pdf>

OECD. 2016. *The Ocean Economy in 2030*. Paris: OECD. Retrieved from: <http://www.oecd.org/sti/futures/the-ocean-economy-in-2030-9789264251724-en.htm>

OECD. 2018. *RE-CIRCLE: resource efficiency and circular economy*. Retrieved from: <http://www.oecd.org/env/waste/recircle.htm>

OECD. 2019. *Rethinking Innovation for a Sustainable Ocean Economy*. Directorate for Science, Technology and Innovation Policy. Paris: OECD. Retrieved from: <http://www.oecd.org/publications/rethinking-innovation-for-a-sustainable-ocean-economy-9789264311053-en.htm>

Pavone, V., and Goven, J. 2017. Introduction. In: Pavone, V. and Goven, J. (eds.), *Bioeconomies: Life, Technology, and Capital in the 21st Century*. Cham: Springer International Publishing, 1-12.

Rajan, K. S. 2006. *Biocapital: The Constitution of Postgenomic Life*. Durham: Duke University Press

Reinertsen, H. and Asdal, K. 2018. Ikke lenger uberegnelig og uregjerlig? Visjoner om et kalkulerbart, produktivt og bærekraftig hav i politiske dokumenter. Arr. *Idéhistorisk tidsskrift* (3-4): 3-17.

Reinertsen, H. and Asdal, K. 2019. Calculating the blue economy: producing trust in numbers with business tools and reflexive objectivity. *Journal of Cultural Economy* (July 2019): 1-19.

Rose, N. 2001. The Politics of Life Itself. *Theory, Culture & Society* 18(6): 1-30.

SINTEF. 2012. *Value created from productive oceans in 2050*. A report prepared by a working group appointed by the Royal Norwegian Society of Sciences and Letters (DKNVS) and the Norwegian Academy of Technological Sciences (NTVA). Trondheim: DKNVS and NTVA. Retrieved from: <https://www.sintef.no/contentassets/f025260af6b8435394eced5e03939e11/value-created-from-productive-oceans-in-2050.pdf>

Thompson, C. 2005. *Making Parents: The Ontological Choreography of Reproductive Technologies*. Cambridge, M.A.: MIT Press.

Thompson, C. 2013. *Good science: the ethical choreography of stem cell research*. Cambridge, M.A.: MIT Press.

Weber, M. 2001 [1904]. *The Protestant Ethic and the Spirit of Capitalism*. London: Routledge.

Weber, M. 2012. The 'Objectivity' of Knowledge in Social Science and Social Policy. In: Weber, M., Bruun, H.H. and Whimster, S. (eds.), *Collected Methodological Writings*. London: Routledge, 100-138.

WRI (2019). *High-level panel for a sustainable ocean economy*. World Resources Institute (WRI). Retrieved from: www.oceanpanel.org

Yoxen, E. 1981. Life as a productive force: Capitalising the science and technology of molecular biology. In: Levidow, L. and Young, R. (eds.), *Science, Technology and the Labour Process*. London: Blackrose Press, 66-122.