What we disagree about when we disagree about sustainability

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Abstract
Criteria for sustainability are frequently contested and changed based on competing or new types of knowledge. This is a potential problem for policy and decision makers struggling to come up with policies regarding environmental threats and pondering which technologies to promote, which to avoid, and when dealing with past choices made on different or false knowledge claims. Such questions may be incentives for status quo as making mistakes might cause public contempt for politicians and experts. Complex issues like environmental impacts cannot be expected to be managed through criteria without controversy and change. Understanding the dynamics of such controversies is important to be able to cope with them. In this article I propose an analytical approach based on the notion of 'framing' intended to contribute towards this goal. Empirically it builds upon the study of two controversies about the sustainability of energy sources: One about peat, the other about bioenergy

Key words: Frame analysis, sustainability, controversy, natural resources, renewable energy, bioenergy, peat

Introduction[1]

Human action impacts the environment. This insight has caused centuries of intellectual headache, leading thinkers like Thomas Malthus (1798) and Garret Hardin (1968) to prophesize doom and gloom in different, but related ways. In the industrial era, scholars, policymakers and practitioners have conducted research, formulated policy and created technology to avoid catastrophe. The challenge is commonly addressed via the term 'sustainable development'; defined by the World commission on Environment and Development (WCED 1987) as: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs".

They note that this definition tries to resolve a concern for the relationship between 'needs' and 'limitations', potential temporal tensions; current versus future needs, and point to

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frictions between economic and environmental issues. Actually, such tensions are found in most attempts to resolve the problems of human activity and environmental degradation, but the prescribed cure varies. The school of thought that formed around the 'limits to growth study' of the 1970s, for example, advocated 'no-growth' policies (see e.g. Taylor and Buttel 1992) while proponents of ecological modernization called for a 'win-win' combination of economic growth and environmental protection (Hajer 1995). This is echoed today, for instance by the European Commission (2011), who recently formulated a strategy for 'smart, sustainable and inclusive growth' in Europe.

Despite the backing of diverging policies, the approaches share dilemmas of priority where the economy and environment are weighed against each other. Related dilemmas are recognizable in climate abatement policies where questions of promoting or restraining different technologies are prominent. This is particularly visible for technologies meant to exploit natural resources for energy production. These dynamics invite debates about (at least) two types of questions:

- The relative importance of economic and environmental concerns. This question is clearly recognizable as a political issue where the value-evaluation of one aspect over the other is central. We can refer to such issues as 'matter of value'.
- How to measure the environmental friendliness or sustainability of particular efforts such as technologies, practices of natural resource exploitation and policies. Commonly, this is understood as an instrumental task to be handled objectively, preferably through the application of scientific knowledge as 'matters of fact'.

In this paper, I am interested in the latter type of issues and facts; the establishment of efforts as 'environmentally friendly' or not. However, in line with Bruno Latour (Latour 2004b, 2004a, 2008, 2011) and others (e.g. Ripley, Thün, and Velikov 2009; François 2011; Callon and Rabeharisoa 2008) I see knowledge claims anchored in scientific production as 'matters of concern' rather than 'matters of fact'. This implies a recognition of "the political dimension of the representation of nature" (François 2011, 167). In other words such facts do not 'speak for themselves', they have advocates, they are negotiable. Matters of concern are 'collections' in the sense that their production can be accounted for. Evoking a theatrical metaphor Latour writes: "A matter of concern is what happens to a matter of fact when you add to it its whole scenography, much like you would do by shifting your attention from the stage to the whole machinery of a theatre" (Latour 2008, 39).

While environmental criteria are often treated purely as 'matters of fact', they are frequently subjects of controversy which reveals their 'backstage' qualities: the politics of their making. Past research has demonstrated this on a number of occasions, for example in relation to criteria for 'environmentally friendly buildings', which have been found to be created on a project-to-project basis without agreements on how to calculate e.g. sustainable use of energy (Moe 2006). Similar observations have been made elsewhere. Criteria based on the limits to growth study were questioned on empirical grounds, (Cole et al. 1973), it was highlighted that many variables were based on 'best guesses' rather than empirical data (Edwards 1996). The Environmental Sustainability Index, the Commission on Environment and Development, the IPCC and other developers of environmental criteria have been victims of similar deconstruction (Moe 2006). More recent studies have shown how concepts like

'Forest Health' (Warren 2007) and the 'Ecological Footprint index' (Franz and Papyrakis 2011) have faced some of the same challenges.

While scientists and other advocates involved in the shaping of environmental criteria will recognize the backstage characteristics of 'matters of concern', their qualities do muddy decision making processes. After all, it is not strange that implicated actors might be confused in the face of conflicting advice. However, climate change renders status quo problematic, while decisions based on contestable criteria might lack legitimacy. Consequently, one cannot expect complex issues like environmental impacts of new technology or natural resource exploitation to be managed by uncontroversial and stable criteria and indicators. The characteristics of matters of concern lead them to "overflow their boundaries, […] reveal the fragile envelopes in which they are housed" (Latour 2008, 39).

This paper proposes an analytic approach anchored in the notion of 'framing' (e.g. Callon 1998, 1999; Goffman 1974) intended to contribute to the understanding of controversies around environmental knowledge claims and related environmental criteria as matters of concern. One goal is to display the dynamics of such controversies. This could prove productive in a policy perspective, since it allows us to identify and give voice to interests who might otherwise have remained mute, only to surface retrospectively in the form of a backlash.

Empirically this paper studies two controversies over the exploitation of natural resources as fuels; peat and bioenergy (from Norwegian forests). Current classification schemes usually treat peat as a non-renewable, whereas bioenergy is normally classified as a renewable and climate neutral fuel. For both resources, there exist – seemingly – simple environmental indicators, namely the degree to which they are renewable and the amount of CO_2 emitted. Despite apparent simplicity the categorising of the fuels are contested, and the question of how to calculate sustainability in the two cases is heavily debated. I will address the controversies as controversies over framing. Empirically I will investigate how the two resources are framed, and further I will discuss how the results of frame analysis could be employed in decision making processes.

Framing and environmental knowledge

The framing metaphor is borrowed from Erving Goffman (1974), who used it to develop a situational, interactionist sociology. The idea was that interaction occurs within 'frames', establishing socio-physical boundaries to the 'world around'. Within these boundaries there are rules, contingent on the frame and the actors in it. However, frames are always linked to the outside-world, which means that they are unstable by default; frames can be overflowed and situations re-framed.

The ideas of frames and framing have been picked up by scholars across the humanities and social sciences. The concept has been of particular importance in the study of mass media communication, but also in political communication more generally (e.g. Entman 1993; Scheufele 1999). Entman (1993) highlights that

> "[…] to frame is to select some aspects of a perceived reality and make them more salient in a communicating text, in such a way as to promote a particular problem definition" (p.52)

This suggests that in communication framing can be a strategic endeavour. One example which has been highlighted in the environmental communication field is the Bush administration's decision to start talking about "climate change" rather than "global warming". As Lakoff (2010) suggested this implied "more swaying palm trees and less flooded coastal cities" (p. 71). The framing perspective has also been used to study emerging trends in journalism and reporting on particular phenomena, for instance on the way American television and newspapers have reported on climate change (e.g. Boykoff 2007; Foust and O'Shannon Murphy 2009).

We can take away from this that framing is about inclusion and exclusion, or as Entman (1993, 52) point out: selection and salience. Returning to a more Goffmanian take on framing, Brewster and Bell (2010) highlight that framing can affect how we perceive nature and the environment. Natural frames are 'material designs' and 'social fabrications' of the natural; 'scene management' where the scenery 'design' is kept backstage. They cite Goffman who provide the safari as an example:

> "[…] Even what a safari gets to see of the jungle can be fabricated – as when a hunting guide arranges to have a pride of lions learn to look for food […], and then, after a two week buildup through the forest […] a lion kill will assuredly occur, leaving his clients deeply satisfied" (1974, 86)

The 'scenes' studied in this paper are knowledge claims about the environmental qualities of peat and bioenergy, often anchored in calculations. Calculations are a way to model and portray certain elements of the world. Inclusion and exclusion are central elements in their production. Davies (2006, 239), argues that calculations can be understood as "[…] a levelling out of difference, a radical reduction of complexity in the pursuit of closure". This suggests that opposing environmental knowledge claims can be fruitfully analysed through the application of frame analysis because the making of calculations and models by default implies the acts of highlighting some elements over others.

Michel Callon's (e.g. 1998, 1999) studies are of particular relevance here. Callon highlights how framing is a central aspect in market activities, and shows that calculations are essential in this respect. Callon claims that framing is important in markets because it facilitates decision making and evaluations. It is through shared definitions that one can agree on the terms in a market: what is traded, how it is traded, and who is involved in the transaction. However, these are not purely objective definitions, but matters of concern dependent on the attributes given to them by various advocates. In collaborative paper by Fabian Muniesa, Yuval Millo and Michel Callon (2007) the authors write: "the qualities of goods and services are the output of complex operations of qualification, of framing and reframing, of attachment and detachment" (p. 5). Extensive framing is needed for objects like balls of cotton (Çalışkan 2010) or fish quotas (Holm and Nielsen 2007) to become ready for the market. In this paper, the crucial aspect lies in the work to done to qualify or disqualify peat and forest from being 'sustainable', 'renewable' or other similar categorizations.

For markets to function, the objects in question need to be as clear-cut as possible, in other words one should be unable to mistake one good from another. A perfectly sealed off object would be inside a 'total frame'. However, Callon highlights that total frames are non-existent, because everything mobilized in a frame is somehow linked to the outside world. This opens up for the possibility of 'leaks' from the outside world, for which Callon suggests

the ‘overflowing’ metaphor (interestingly a metaphor shared by Latour (2008) in his description of how matters of concern are fragile). Such overflows might destabilize frames to the point where objects become re-defined or re-framed, and in some instances the framing might collapse, resulting in an altered understanding of the framed object.

In line with the framing literature one can see environmental criteria and environmental knowledge claims as management devices which facilitate decisions on complex matters such as sustainability (Callon 2002). This means that for policymakers, the knowledge claims and criteria should be as clear and uncontroversial as possible. However, we have seen that environmental criteria are notoriously unstable. This hampers their employment as management devices. How do you deal with competing knowledge claims?
This paper explores the potential of the framing perspective to provide new insights into the dynamics with respect to categorizations like ‘sustainable’ and ‘renewable’. The point is not to relativize the categories even more, something that has already been achieved by many actors, but to make us better prepared to manage the potential volatility of such categorizations. What is it that we disagree about when we disagree about sustainability?

Methodology

As a researcher studying the framing of natural resources I face an interesting dilemma. How do *I* frame the controversies at hand? The studied controversies unfolded in different arenas, and in slightly different ways. The controversy over the use of the forest as bioenergy has arguably been the most salient controversy around climate mitigation strategies in Norway over the last years, and as such it deserves scrutiny. Publicly, it has been particularly visible in the newspaper *Klassekampen* and at the online news portal for research *forskning.no,* where protagonists and antagonists of bioenergy as ‘sustainable’ or ‘climate neutral’ have presented their arguments. Thus, I analyse the framing strategies of scientists and other advocates in the controversy who have presented their views through chronicles in these forums from March 2010-May 2011. This material consists of 19 chronicles from *Klassekampen* and 17 chronicles from *forskning.no*.

The story of peat is slightly different, because the controversy is not limited to one or two mediums in the same way. However, the lines of argument are relatively clear: on the one hand you have a group of actors who frame peat as non-renewable; on the other you have those who frame it as renewable. Thus, much of my practical work in relation to this controversy consisted of collecting and organizing the arguments from various sources, such as websites, pamphlets, brochures and manuals published by the IPCC, the IEA, the Swedish government, environmental NGO’s and the peat industry.

For illustrative purposes, the following analysis contains a number of quotes from both controversies. This is my chance to practice inclusion and exclusion, to select and highlight, in other words: to frame. My ambition in this respect has been to give the reader a fair overview of the relevant positions of the controversies, in other words I have tried to provide a fair and balanced account. To achieve this, all the data was read carefully to gain an overview of relevant positions and ways of framing the natural resources. Through a second reading of the data, quotes from the material were sorted carefully and selected for inclusion in the manuscript. For the controversy on forest this was done with both clarity and

chronology in mind, while chronology was less of an issue in the case of peat. For readability, quotes which were originally written in Swedish or Norwegian have been translated into English.

Disagreeing about sustainability

This paper recognizes the difficulties faced by decision makers in complex issues like sustainability. It encourages new ways of thinking about such controversies because they might hamper decisions and critical evaluation when there are disagreements over facts. I suggest studying the arguments and environmental knowledge claims as controversies over framing. How are natural resources like peat and forests operated on, talked about and mediated, and what types of issues are included and excluded by advocates of diverging views? In sum: how are the natural resources framed as 'sustainable' or non-sustainable?

Peat: landscape complexity and temporality

Peat has been a much used fuel in difficult times, e.g. during the European energy crisis of the 1500s and the Second World War (Energilink 2011). It has a long history of being criticised as a non-sustainable energy source, with Carl von Linné as a prominent example (1749) . It has been framed as non-sustainable, with focus on environmental externalities. During crisis, however, peat has been re-framed through overflows from events external to the considerations of Linné and others. Peat is now a marginal fuel, but some countries still burn substantial amounts of peat to produce heat and electricity (IEA 2011).

However, the status of peat is contested. While the dominant framing sees peat as a non-renewable, the climate issue has led several actors to highlight 'green' qualities, suggesting a classification as 'renewable'. A glance at the characteristics of peat brings us to the controversy. Peat is non-decayed, accumulated biomass. Dead biomass piles up under certain conditions of low bacterial activity and forms peat. Thus, in mires the carbon cycle is incomplete; carbon is removed from the carbon cycle (Clarke and Joosten 2002). This makes peat rich in energy, but it is a slow process. The Swedish peat research foundation suggests that it commonly increases in depth with around 0,5mm annually (Torvforsk 2011). Thus, burning peat releases absorbed CO_2. The question is if peat is replenished quickly enough to be characterized as sustainable in a climate perspective.

The IPCC and the IEA answer this question 'no'. Their framing highlights what occurs in the moment of combustion, their calculations account for the CO_2 emitted in this instance. Thus, peat is framed as unsustainable. The 1996 IPCC guidelines for national greenhouse gas inventories classified peat as a 'solid fossil fuel' (IPCC 1996), while a 2006 revision re-classified it as the separate category 'peat'. This may be seen as a mild re-framing based on an overflow. However, the report stated:

> "Although peat is not strictly speaking a fossil fuel, its greenhouse gas emission characteristics have been shown in life cycle studies to be comparable to that of fossil fuels […].Therefore, the CO2 emissions from combustion of peat are included in the national emissions as for fossil fuel" (IPCC 2006, 15).

The IEA largely presents the same argument, classifying peat under the "coal and peat" header (Lappi and Byrne 2005, 3), clearly not sustainable in a climate perspective. A similar example is found with The World Wildlife Fund, who frames peat in the same way:

> "In Finland, the burning of peat […] accelerates the climate change. The effect is approximately 10 million tons of greenhouse gas emissions per year." (WWF 2008, 1).

In these accounts the calculation 'input' was peat extraction and combustion, the 'output' CO_2 emissions. The result was a non-sustainable framing of peat.

However, others have tried to overflow this frame, re-framing peat as sustainable. This was not done by contesting the CO_2 emissions from peat, but by highlighting that their adversaries approach was too simplistic, calling for the inclusion of aspects previously left external to the calculation. Thus, they agree about the CO_2 emitting qualities of peat, but the importance of this fact was contested. Instead, an expanded understanding of peat as part of a broader story about sustainability was sought through the production of narratives about mire extraction highlighting other elements than those of the combustion moment. This moment alone, they argued, did not determine the sustainability of peat. They expanded the frame of peat, a) through including more complex notions of landscapes, and b) through a temporal expansion.

The first expansion concerns the complexities of peat and landscapes in a sustainability perspective. The Swedish peat organization told a story about the 'mire itself', highlighting that peat was mostly cut from mires that 'leak' CO_2 because of drainage or previous agricultural use of the land. This overflow of the non-sustainable frame brought historical elements to the table, resulting in a differentiation between 'good' and 'bad' mires. Framed in this way the peat industry could take credit for curbing an emission source. Further, the cutting of peat was situated in a broad story about forestry and agriculture where peat cutting was one node in a chain which could constitute sustainable land use. They wrote:

> "Even though peat is not 'climate neutral' like wood fuels, the climate effect is reduced if you consider the life cycle. The reason is that we use mires that leak CO_2 because of drainage or agricultural use. We eliminate a source of emissions. After this we can quickly rehabilitate the soil" (Svensk Torv, 2010).

The international peat society also expanded the framing of peat to include elements beyond the combustion moment:

> "[The IPCC] classification and calculation model has been strongly criticised, […] because it does not take into account annual growth of peat and the possibility of producing biomass on cut-over peatlands" (International Peat Society, 2011)

Thus, they argue for replacing extracted peat with a 'green' substitute e.g. wood. Brewster and Bell (2010) have noted how this is often a quite successful re-framing strategy amongst natural resource managers. With reference to Magill (1994) they claim that the public prefers "landscapes that support trees or […] vegetation" because it is difficult for the public to determine if a landscape is 'really' sustainable.

The second strategy of re-framing focused on the temporal dimension and 're-growth' with the goal of nuancing the non-sustainable frame by expanding temporality. The non-sustainable peat frame calculated sustainability through looking at one instance, while the antagonists took a longitudinal stance. They admitted that peat formed slowly, but highlighted

that it was a very swift process compared to the formation of fossil fuels. The question, then, is what timeframe one should apply in the definition of sustainability.

In 2002 the Swedish government set out to tackle this and related questions. The result was an official report, popularly dubbed 'the peat review', where peat was in fact successfully re-framed. The CO_2 emitted in the moment of peat combustion remained un-contested, but the temporal scale to consider was expanded. The report stated that: "A model of classification means that you simplify reality. This is particularly difficult when it comes to peat." (SOU 2002, 29). The report then introduced a concept that took re-growth into account, bringing peat halfway out of the non-sustainable frame. The result was a framing of peat as semi-sustainable:

> "It is difficult to find a concept that reflects the properties of peat in one dimension better than the concept of a *slowly renewable* biomass fuel" (ibid.)

This complicated the image further; 'renewable' was no longer a dichotomous category but a graded scale. Panning from a single point in time to a longitudinal stance made peat a 'slowly renewable', which has since been adopted as the official Swedish view.

The practical result of the re-framing is that in Sweden, peat is treated with both stick and carrot. Since Sweden participates in international agreements framing peat as non-sustainable, it is sanctioned negatively. On the other hand peat is included in Sweden's domestic scheme for stimulating increased use of renewable energy. Thus, it is a very direct example of how re-framing fuels can be linked to altered policy outcomes and decisions.

The controversy over peat circled around the framing of matters of concern. Narrowed down, the controversy concerned: a) the role of land use or space in questions of sustainability and b) the role of time. Those framing peat as non-sustainable maintained quite minimalistic views on these matters: it was the extraction and burning of peat from one slice of time/space that was important. Their opponents tried to expand on these dimensions of sustainability.

Having said this, the peat controversy has not been very intense. Peat is a marginal energy source, and no scenarios portray it as important for solving the climate change problem. However, if it is possible to contest the space-time conditions of what appears to be a robust non-sustainable frame for a marginal fuel, what happens if we turn our attention to a natural resource that many see at the centre stage of the green and sustainable energy system of the future? In the following I will do this by examining a debate where the status of bioenergy from Norwegian forests is at stake.

Bioenergy from Norwegian forests: temporality, complexity of practice/space and alternative use

While peat is predominantly framed as non-sustainable, bioenergy from Norwegian forests face a different reality. The logging and combustion of wood is often considered 'climate neutral' and bioenergy is framed as 'sustainable'. Consequently much Norwegian bioenergy policy resembles ecological modernization (Hajer 1995), highlighting 'win-win' possibilities where we can have sustainable economic growth.

As for peat, some central assumptions about calculation underpin this frame. One example is found in a 2009 report, written by two scientists commissioned to assess how a newly built pellets factory meant to substitute coal in European power plants would affect the

atmosphere. The report concluded that the substitution would reduce CO_2 emissions considerably. At the core of the calculations was the carbon cycle:

> "When the plant dies and decays, the carbon is emitted and forms CO_2. Bioenergy is an extension of this circle, emitting the same quantity of carbon when combusted as would have been emitted if the plant had decayed instead of being burned" (Sjølie and Solberg 2009, 7)

The burning of biomass was seen as speeding up the process. Once the biomass re-grows, the CO_2 emitted from combustion would be re-absorbed. Thus, the report saw bioenergy as 'climate neutral' if the re-grown biomass equalled or exceeded the annually burned quantity. A mathematical consequence is that when comparing wood and coal combustion, CO_2 from wood can be disregarded, while CO_2 from coal combustion is added to the carbon cycle. Thus, in the sustainable frame, CO_2 from combustion is externalized when assessing the sustainability of bioenergy. This points to the importance of temporality for sustainability; the time a forest takes to re-grow is considered short enough to be disregarded, whereas the millions of years it takes to form coal is obviously too long. Peat is an outsider, somewhere in-between the two.

Since March 2010 there has been a public debate about these assumptions in Norway. As for peat the arguments first circled around how to calculate, and then about how to interpret the results in a sustainability perspective. The actors who first sought to re-frame bioenergy were a group of energy economists and statisticians. They questioned what they considered an unfair black-boxing of the carbon cycle and found the calculations too reductionist to capture the 'reality' of bioenergy. Their concerns were fundamental in character, and can be read as attempts at collapsing the sustainable framing of bioenergy.

Their point is that policy for more logging and more bioenergy equal policy for a decreased body of standing biomass. In other words – less absorbed CO_2 at any given time. Less absorbed CO_2 means more CO_2 in the atmosphere. In the chronicle that sparked the debate they wrote:

> "[To understand this] we need a dynamic perspective of the forest. A typical Norwegian Spruce might live for 200 years if it is not logged. After its death it might stand as dry wood for another 30 years. Then it falls to the ground and is gradually destroyed over a period of roughly 100 years. A 100 year old Spruce that is logged might alternatively exist as carbon storage for 100-200 years" (Holstmark et al. 2010).

In one of the many related opinion pieces the same message was conveyed:

> "When you claim that wood as fuel is CO_2 neutral, you make the assumption that the increase in CO_2 absorption happens immediately after the cutting and burning of the trees and disregard that there is a lasting decrease in the sum of biomass" (Holtsmark 2010).

The argument overflowed the sustainable bioenergy frame through internalizing CO_2 emitted from wood combustion to the frame and expanding the temporal dimension through a call for including the time a tree takes to grow when considering the sustainability of bioenergy. Further, these actors introduced a more complex view of 'the tree' and 'the forest', by evoking the forest 'in itself' as something beyond the current calculations in need of accounting.

Throughout the year and a half long debate these scientists contested the interpretation of facts, but also their political implications. The calculations were largely seen as unproblematic, but the links between the calculations and policy were. Their attempts at overflowing and collapsing the sustainable frame could be read as a distinct critique of the currently dominant calculations and framings as management devices:

> "This policy [for increased logging] will substantially increase Norwegian emissions through most of the 21st century" (Holstmark et al. 2010).

A collapse of the sustainable bioenergy frame would have serious consequences for current climate policy in Norway and internationally; bioenergy is a key ingredient in most climate change mitigation scenarios. Thus, it was no surprise that controversy ensued. What followed was a tug-of-war style duel between two camps of scientists to frame, re-frame and to contain the overflows attempted by their adversaries. The scientists who answered the challenge were affiliated with the Norwegian University of Life Sciences, a group of scientists who in many ways are the embodiment of the scientific legitimacy behind the sustainable bioenergy frame in Norway. Their strategy of defence resembled their opponents' offence. The fundamental arguments were never contested; instead the relevance, meaning and interpretation of facts differed substantially. One example of how facts were presented relatively similar stated:

> "[our opponents model] shows the effect of increased logging in a principally correct way. When we increase the logging, net emissions will increase, but decline over time as the uptake in new biomass increases" (Rørstad 2010) .

Despite the principal agreement, the facts were framed in a distinctly different way. CO_2 from wood combustion was re-externalized, shrinking the temporal scale. Further, their opponents' arguments about the nature of the forest as a carbon storage was portrayed as too simplistic. Thus, temporal overflows were contained with re-externalization. Following this, the non-sustainable frame was counter-overflowed with arguments about the complex nature of forests. In one example these scientists stopped debating wood combustion, bringing general forest management to the scene. Bioenergy then became one aspect of potentially sustainable forestry, one piece in a complex puzzle:

> "[Their] arguments are completely devoid of considerations of what it means that different qualities of wood are produced in the same area […] After logging roughly one quarter is turned to lumber, the rest becomes paper, fibre boards or energy" (Solberg, Bergseng, Sjølie, and Astrup 2010)

Thus, they underlined the fact that the question of the sustainability of bioenergy does not deal exclusively with 'the forest', but also relates to a broader notion of society including various industries and other elements previously seen as external to the frame. In another variant of the same argument we could read:

> "A substantial part of the logged wood will go into building houses out of wood rather than concrete and steel […] which has great positive climate gas effects" (Solberg, Bergseng, Sjølie, and Astrup 2010)

The frame was further flooded with external elements, and the counter-overflows did not stop here. At one point the following challenge was put forward:

> "[You need to] consider carbon capture in the soil, how the mode of forestry (choosing breed of wood, plant density, thinning, fertilizer, main logging etc) affects the carbon

dynamics […] All these factors must be optimized over time. This is complicated" (Solberg, Bergseng, Sjølie, and Hobbelstad 2010).

Arguments resembling these were repeated throughout the debate. However, a closure of the controversy seems distant. This brings us to the third element in the controversy of sustainability about bioenergy from Norwegian forests. This is the aspect of alternative use of the forest in a climate perspective. The forest is a resource that can be used for energy purposes, but in this controversy the forest has an alternative fate as carbon storage.

Through reading the controversy over the sustainability of bioenergy the repertoire of what we disagree about when we disagree about sustainability have been increased. Following the analysis above it is a) a disagreement over the correct timeframe, b) a disagreement over space and spatial practice, and c) a disagreement about alternative uses of the resource (carbon storage vs. energy). A resolution between the two camps of scientists seems unlikely.

Seeing the politics of nature through framing

This paper has considered controversies anchored in environmental knowledge claims through the notion of 'framing'. It has done so through a study knowledge claims about sustainability as 'matters of concern', a notion that can be distinguished from obvious matters of value: how to weigh environmental and economic concerns. We have seen that the way actors frame natural resources leads them to different conclusions in the question of sustainability. In the accounts studied, three elements have stood out as particularly important in the actors' consideration of whether or not the resources should be considered sustainable: a) the way to consider time, b) alternative use of the resource, and c) the link between the particular resource and general landscape. With respect to these aspects, different knowledge claims has been put forward based on a range of different calculation assumptions. In other words, there are multiple 'sustainabilities' which are spoken for by different actors through different ways of framing the resources in question.

For policy and decision makers who have been used to rely on such environmental knowledge claims and calculations as solid management devices this represents a challenge. As Bruno Latour recently noted this new 'politics of nature' is "rather troublesome" (2011, 72). But how do we proceed? We can do nothing, which will result in generic calls for "all facts on the table", which in practice often translates to status quo. Another possibility is to make decisions based on highly contested knowledge claims, which in turn might result in highly fluctuating policies and public contempt for both expertise and politicians.

Latour and others have pointed to a third alternative, which involves re-working the way we make decisions through recognizing the highly deliberative and political character of things like natural resources and technologies, for instance through implementing a 'parliament of things'. However, things do not 'speak for them selves'. As we have seen in the cases studied in this paper, they have advocates or representatives who speak for them. One of Latour's suggestions involves these spokespersons taking on the role as 'diplomats'. With such a perspective, the question of the sustainability of a particular natural resource would be recognized as a truly deliberative process. I will not speculate on the shaping of such a parliament here, but it is clear that it would not only imply changing what is commonly considered politics, but that it would also imply changing the scientific discourse (see e.g.

Wynne 1992, for a discussion). Regardless of practical layout, however, grasping the 'voices' of things such as peat, forests and 'sustainability' would be essential.

It is in this light that I see promise in an approach anchored in frame analysis as a practical tool in the process of decision making. Frame analysis can be used to identify key aspects faced with insecurity or disagreement, but it might also serve as a way to make audible the 'voices' of things and actors who would otherwise have remained mute. Mobilized in this way, frame analysis could identify matters of concern and 'collect' arguments and voices. As our democratic institutions are currently shaped, these voices and arguments could be evaluated and decided upon by current decision makers. This would not free them from the burden of making decisions under uncertain conditions. However, it might make the dynamics of uncertainty more visible and thus provide a more realistic image of their task. A more radical approach could be to use the emergent voices, arguments, and actors as a basis for the establishment of some sort of temporary parliament which would deliberate and make decisions on questions of sustainability or other highly complex and uncertain matters of concern (see Borch and Lind 2009, for a related discussion on the practicalities of what they call a 'mobile parliament').

Certainly, the application of frame analysis in the decision making process would be no quick-fix. In fact it would probably be the opposite; a time-consuming and quite slow way to reach decisions on complex and controversial issues. However, we know that that choices we have made hastily in the past has come back to bite us on all too many occasions. As Perrow (1984) quite famously have postulated accidents are the norm. This has been particularly prominent in the field of natural resource management where 'environmental nasty surprises' have emerged, long after the entrenchment of technologies and practices (Howard 2011).

It is possible to read this paper as a pessimistic cry in the face of challenges raised by questions of sustainability and other highly complex and uncertain issues. How on earth can we make decisions about the management of natural resources and the application of technology when we see so many different and conflicting knowledge claims? My intention has not been to project despair and doom, but rather to highlight that there are possibilities inherent in the dynamics of the situation. However, I have no illusions that these will be found as catch-all, quick-fix solutions. Rather, it seems like we have to take the long and painstaking path of incorporating the insecurities and dilemmas which surround matters of concern into our democratic systems. Perhaps frame analysis could play a small, but important role in these endeavours?

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