Public participation in policy

The case of defining ‘sustainable hydropower’ in the EU taxonomy

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Abstract

Technoscientific controversies have exposed the uncertainty of scientific facts, and that science cannot always provide the 'solution' to public issues. Public participation is meant to increase legitimacy of the outcomes, and to restore trust in political and scientific institutions. Scholars within the field of Science and Technology Studies (STS) have cautioned that 'technologies of elicitation' may affect public participation by for example imposing a framing of the issue at hand on the public. Thus, debates may be reduced to technical questions rather than discussions of the public meaning of the issue.

This thesis explores public participation in one technoscientific controversy in a policy context. The European Union (EU) is developing a classification system of sustainable activities (EU taxonomy), where each activity becomes classified through a set of technical criteria. Through practice-oriented document analysis, the thesis studies the process of defining the sustainability of hydropower. The thesis follows the drafts of the sustainability definition, the public consultations and the feedbacks from the first rough outline of 'sustainable hydropower' to the adoption of the definition. The aim of the thesis is to explore whether the public consultations affected the definition of 'sustainable hydropower'.

This entails a twofold research interest, both in how the technologies of elicitation affected feedback, and how in turn feedback on sustainable hydropower attempted to modify or reframe the issue. The three public consultations on the sustainability definition employed two different formats. Two were structured as questionnaires and one was an open public consultation. The thesis finds that there were highly diverging views on the issue and that the format of the technologies of elicitation affected the feedback. For the questionnaires, the feedbacks mostly attempted to introduce small modifications of the issue, but maintained the same framing of sustainable hydropower as proposed by the EU. The open consultation significantly increased participation, especially since it facilitated for large-scale campaigns. Although most submissions still addressed the technical details, there was a larger variety of feedback. Many respondents attempted to reframe sustainable hydropower by introducing a broader definition of 'sustainability'. Thus, the format of the public consultations had an impact on the public's opportunity to affect the definition of sustainable hydropower.

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Any errors or analytical deficiencies are, of course, entirely mine.

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List of abbreviations

CBI	Climate Bonds Initiative
CDM	Clean Development Mechanism
CSRD	Corporate Sustainability Reporting Directive
DNSH	Do No Significant Harm
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EU	European Union
GHG	Greenhouse gas
HLEG	High-Level Expert Group on Sustainable Finance
IHA	International Hydropower Association
IPCC	Intergovernmental Panel on Climate Change
LCA	Life Cycle Assessment
LCE	Life Cycle of Emissions
NFRD	Non-Financial Reporting Directive
NGO	Non-governmental organisation
PSH	Pumped storage hydropower
SFDR	Sustainable Finance Disclosure Regulation
STS	Science and Technology Studies
TEG	Technical Expert Group on Sustainable Finance
TSC	Technical screening criteria
WFD	Water Framework Directive

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1 Introduction

1.1 Defining sustainability

How many times have you seen an advertisement for ‘sustainable’ products, or heard that we need to act ‘sustainably’? Have you always understood what it takes for one product to be considered more sustainable than others, or have you perhaps thought that the advertisement is simply using one of the decade’s most prominent buzz words to sell more products? The concept of sustainability has gained wide traction in policy, academic and business circles. Sustainability is often said to cover three dimensions: environmental, economic and societal sustainability (Purvis et al., 2019). Yet, there is no consensus on the definition of the concept.

Ensuring sustainable development has proved to be a difficult task. There is a myriad of examples where different considerations must be weighted up against each other, especially within the environmental dimension. We must protect nature while at the same time reduce climate change and, in some cases, it has been difficult to reconciliate these two considerations. For example, to reduce the carbon impact of our energy use, we need to increase the share of renewable energy technologies such as wind power and hydropower. However, these types of technologies often lead to interventions in nature. How do we decide whether reducing climate change or preserving nature should be prioritised? The same type of issue has often been brought up within forestry. Do we keep the forest, ensuring biodiversity and absorption of carbon emissions, or do we cut it down to replace more carbon intensive materials in products and buildings? How do we know which options are the most sustainable?

The European Union (EU) has recognised the difficulty of determining what constitutes a sustainable activity. The EU claim to be ‘global climate leaders’, striving for more ambitious international climate commitments (European Commission, 2019b). At home, they have set targets to reduce the EU’s climate change impact, and placed sustainability high on the political agenda. In 2019, the EU launched the European Green Deal, a growth strategy to transition into a green economy (European Commission, 2019b). In order to achieve a transition to a more sustainable society, the EU has recognised that we need more investments into sustainable activities. However, private investors often find it difficult and time-consuming to assess the sustainability of activities (G20 Green Finance Study Group, 2016). Greenwashing, that is, marketing a product as environmentally sustainable without

complying with environmental standards, has also increasingly made it more difficult to know which activities are truly sustainable (Taxonomy Regulation, 2020).

The EU decided to create a classification system for sustainable activities, called the EU taxonomy. Similar classification systems already existed, however differences between them could hinder investments across borders (Taxonomy Regulation, 2020). The EU taxonomy is meant to be "granular and detailed enough to provide the basis for a common and unique language on sustainability" (European Commission, 2018d, p. 6). It does not provide one common definition of sustainability, but rather identifies the sustainability of each activity through a set of 'technical screening criteria'. The taxonomy may have large repercussions on how we understand sustainability. Thus, one important question is: who should have the power to decide what is 'sustainable' in the EU taxonomy?

The EU have procedures regarding who, and what, should influence its policy processes. Its policies should be evidence-based and for the EU taxonomy, they specify that the sustainability definitions should be "based on scientific evidence and input from experts" (Taxonomy Regulation, 2020, p. 21). However, the European Commission has also stressed that "the active participation of stakeholders, including citizens, is essential – especially in times of uncertainty" (European Commission, 2021b, p. 4). The public should be heard, and the policies should "reflect the values and concerns of citizens" (European Commission, 2021b, p. 4). Thus, the EU involved both experts and the public in its policy process on the EU taxonomy. Three expert groups have worked on developing the sustainability definitions, and the public was invited to share their feedback in several public consultations. But how do we know that the public was actually listened to, and that they were not just invited as a gimmick?

For an institution such as the EU which strives to increase its legitimacy and have transparent democratic processes, it would seem strange if they simply dismissed feedback from the public. But the public's impact on policies may still be limited. For example, the EU may choose to prioritise expert advice over public opinion. The format of the participatory technology may also restrict debate. Scholars within the field of Science and Technology Studies (STS) have demonstrated that the choice of questions and predefined problem-definitions may restrain the debate to a certain framing of an issue (e.g., Lövbrand et al., 2011). It is therefore interesting to study whether the public consultations on the EU

taxonomy allowed the public to present alternative ways of understanding sustainability, and whether the public's feedback was reflected in the final sustainability definitions.

1.2 Research question

In this thesis, I will explore the process of defining 'sustainable hydropower' in the EU taxonomy. Hydropower is an interesting case as its sustainability is highly contested, which has become evident in debates on the EU taxonomy. I want to explore whether the opposing views on hydropower's sustainability definition reflect different understandings of sustainability. This entails studying whether the submissions to the public consultations attempt to introduce new framings of the issue of sustainable hydropower. Further, I want to explore how the public consultations as 'technologies of elicitation' facilitated or restrained the debate on the sustainability definition. My research question is thus:

How have the public consultations on the EU taxonomy affected the definition of 'sustainable hydropower'?

In my attempt to answer this question, I will use practice-oriented document analysis. This approach will allow me to study the active role documents play in shaping the issue of sustainable hydropower. Many documents were involved in creating the EU taxonomy, and in this thesis I will focus on the documents closely related to the sustainability definition for hydropower. This includes submissions received during three public consultations, five drafts of the technical screening criteria and the Climate Delegated Act, which contains the adopted definition of sustainable hydropower. The documents allow me to study the context of the public consultations and how the feedbacks attempted to modify the issue of sustainable hydropower.

1.3 Structure of the thesis

This thesis consists of seven chapters. After this introductory chapter, I will present theoretical insights from STS that this thesis draws upon. This includes how we can understand the role of the public and expertise in policy processes, and how the structure of technologies of elicitation, such as the public consultations, may shape feedback. Chapter three presents the methodological approach of the thesis and the process of collecting and analysing the documents. In chapter four, I will go more into detail on the purpose of the

taxonomy, the process of classifying activities and the central documents. This will provide the background for the analysis. In chapter five, I analyse five drafts of the technical screening criteria for hydropower along with the feedback received on three of the drafts. The sustainability definition is quite technical, so the chapter will also explore how these technical criteria affects the understanding of sustainability. The chapter ends with the adopted definition of sustainable hydropower. In chapter six, I discuss the role of the public in the EU taxonomy. I will look at how the structure of the technologies of elicitation might have affected participation and the feedback. I will also discuss how the drafts and the submissions modified the issue of sustainable hydropower. Chapter seven concludes the thesis.

2 Theory

The thesis is located within the field of Science and Technology Studies (STS). Scholars within the field are generally interested in the construction of science and technology, and how these relate to society. One strand of the field has used insights from STS to explore the relationship between science and policy. These contributions are especially relevant to the thesis, as they discuss the role of the public and experts within policy processes. Some scholars have used tools and methods from STS to describe practices of public participation, while a more 'activist' strand have discussed which role the public should have in policy processes. The theory presented in this chapter will help to understand the relationship between the EU's expert groups and the Commission, on one side, and the public, on the other, including the public consultations that mediate interaction between them.

2.1 Science, policy and democracy

Although contributions from an academic discipline cannot be reduced to a single sentence, Sismondo (2008) stresses that one important feature of STS is that it "looks at how the things it studies are constructed" (p. 13). In the 1970s, this unfolded as a focus on the construction of scientific knowledge. STS scholars went into laboratories to study 'science in the making', or the *practice* of creating scientific facts (e.g., Latour & Woolgar, 1986). Scientific knowledge was thus not seen as something natural or given, but rather as constructed through the work occurring within laboratories, both by humans and non-human artifacts such as instruments. STS has later gone out of the laboratory to study the spread and use of scientific knowledge and the construction of diverse objects such as artifacts, classifications, institutions and cultures (Sismondo, 2008, p. 13; Sundqvist & Soneryd, 2019). STS scholars have not only been concerned with understanding science and technology, but also how it can be made accountable to public interests (Asdal, 2008; Sismondo, 2008). The preoccupation with accountability has led to questions on how science, policy and the public should interact.

2.1.1 The linear model and the deficit model

One of STS' approaches to this topic has been to formulate a critique against traditional interpretations of the science, policy and democracy relationship. The relation between science and policy was, and still often is, depicted as a linear, unidirectional relationship: science informs policy and ensures a sound knowledge base. This type of linear relationship is said to characterise policy debates on climate and environmental issues. For example, the

Intergovernmental Panel on Climate Change (IPCC) aims to produce 'policy relevant' scientific evidence to inform decision makers on policy responses to climate change (Beck, 2011; Jasanoff & Wynne, 1998). The 'linear model' of the science-policy relationship is, according to Beck (2011), based on three assumptions: 1) more research leads to more certainty, 2) science will solve political disagreements and 3) science makes policies more rational (p. 298). As we will see later, these assumptions are questioned by STS scholars, especially in the context of technoscientific controversies.

The linear model portrays science and policy as two separate realms, while at the same time placing science at the centre stage of political debates. Consequentially, political debate often becomes reduced to a debate over 'getting the science right' (Beck 2011). In the context of the IPCC and climate change adaptation, Beck (2011) demonstrates how a political controversy concerning policy responses to adaptation effectively became a scientific controversy over the scientific evidence for anthropogenic climate change (Beck, 2011). Consequentially, when "winning a scientific debate means attaining a privileged position in political battle", political interests and values are put aside (Beck, 2011, p. 299). The linear model can thus be said to reduce the independence of the policy 'realm' (Sundqvist & Soneryd, 2019).

The traditional view of the science-policy relationship favours input from experts over the public. The public is depicted as being in deficit of knowledge, specifically scientific knowledge, which leads to an "inability to understand and appreciate the achievements of science" (Bucchi & Neresini, 2008, p. 450). As with the linear model, this 'deficit model' builds on three underlying assumptions: 1) public understanding of science can be equalled to "the ability to understand science 'correctly' as it is communicated by the experts", 2) once the public achieves scientific literacy they will favour scientific and technological innovation, and 3) the problematic relationship between science and the public is caused by the public's ignorance (Bucchi & Neresini, 2008, p. 450). Again, the model establishes a linear relationship where science, or experts, are expected to inform the broader public. Both models have been heavily criticised within the STS community. There have been discussions within the field on how we should instead understand the relationship between science, policy and democracy. These debates give important insights into which role the public and experts (should) play in policy processes such as the one analysed in this thesis.

2.1.2 Expertise

Scholars within STS have attempted to demonstrate what role the public and experts may have in different policy settings, and how these two actor groups interact. Both expert groups and the public was involved in creating the EU taxonomy's definition of 'sustainable hydropower'. Debates within STS can help us understand what these actors were expected to or could contribute with in the policy process. One such debate was brought up in a discussion paper by Collins and Evans (2002). The two STS scholars argue that previous developments within the field blurred the distinction between experts and the public by breaking down the barrier between scientific and other forms of knowledge (Collins & Evans, 2002, p. 239). Collins and Evans (2002) explain that by removing the boundary between expertise and democracy, STS solved the 'problem of legitimacy', that is, how to achieve political legitimacy for technical decisions. Contributions within the field had demonstrated that "the basis of technical decision-making can and should be widened beyond the core of certified experts", thus opening the policy process to public participation (Collins & Evans, 2002, p. 237). Nevertheless, Collins and Evans (2002) argued that by solving the problem of legitimacy, another problem arose: "how far should participation in technical decision-making extend?" (p. 237).

To solve this new problem, Collins and Evans (2002) concluded that STS needs a 'normative theory on expertise'. This theory includes a classification of expertise as the authors claim that recognising different types of expertise will make it easier to distinguish who should participate in policy processes (Collins & Evans, 2002). Sometimes, they write, the theory would argue for less public participation. However, their classification also redefines the boundary between experts and lay people. As an example, Collins and Evans (2002) demonstrate that the sheep farmers in Wynne (1992)'s much-cited case study on the Chernobyl accident and Cumbrian sheep farmers, "were not 'lay' anything" but rather "they were experts who were not certified as such" (p. 261). Thus, they define experts broader than the traditional view, which usually defines them as those with a "good scientific training" (Collins & Evans, 2002, p. 239). The normative theory on expertise is meant to help sort out who possesses relevant knowledge for a policy debate, and who are just 'lay people' with little to contribute to such debates.

Other STS scholars point out that Collins and Evans (2002) ignore key contributions within the field on the role of experts and the public in policy processes (Jasanoff, 2003; Wynne,

2003). Beginning with practical implications, Collins and Evans (2002)'s classification of expertise does not seem to be applicable in all cases, particularly in controversies concerning scientific or technical issues. In the past decades, we have seen a proliferation of technoscientific controversies, especially within the environmental field concerning diverse issues such as the use of gene-modified organisms and the safety of nuclear power plants (Chilvers & Kearnes, 2016). The EU taxonomy has also sparked several controversies concerning the sustainability of the activities it attempts to classify. Paradoxically, "the cases in which scientific advice is asked most urgently", as in technoscientific controversies, "are those in which the authority of science is questioned most thoroughly" (Bijker et al., 2009, p. 1). This is due to the nature of these controversies, which often arise because of the uncertainty of scientific facts (Sundqvist & Soneryd, 2019).

Venturini (2010) has presented other, general characteristics of technoscientific controversies. They involve all kinds of human and non-human actors, including scientists, documents and classification systems. They are dynamic, and alliances forged in the beginning of a controversy may quickly change as the controversy develops. Controversies are subject to debate, and there are conflicting views involved. Importantly, it is also difficult to reduce the controversy to a single question. If one attempted to ask, 'what is really the issue here?', the involved actors may give conflicting answers. In technoscientific controversies, the disagreement may not only revolve around scientific facts, political interests and values, but also about the very nature of the controversy (Venturini, 2010). The complexity of technoscientific controversies makes them a good site to test out theory on the science-policy relationship and the role of publics and expertise.

Collins and Evans (2002)'s classification of expertise is meant to find relevant expertise for policy processes. But when issues are complex, such as in the case of technoscientific controversies, it is often "hard to define and discern which forms of scientific competence can contribute to any given issue" (Lidskog & Sundqvist, 2018, p. 321). The classification cannot give any guidance if one does not know what (or who) one is looking for. In controversies, opposing sides of a conflict may draw on different types of expertise (Nelkin, 1975). By bringing forward conflict between experts, their political impact may effectively be reduced, and attention may be redirected towards the "non-technical and political assumptions that influence technical advice" (Nelkin, 1975, p. 54). Thus, technoscientific controversies demonstrate that science and policy are not separate realms, but rather affects

each other. In addition, they show that finding the 'right' expertise may not help to neither solve the policy issue nor gain political legitimacy for the outcome. This opens for the public to participate in policy processes.

2.1.3 The public

The increased focus on sustainability have spurred several technoscientific controversies. As we saw in the introductory chapter, there is seldom one 'correct' path to sustainability. This also implies that science have not been able to provide one solution to such issues. With the increase of these technoscientific controversies, it has become more difficult for science and policy institutions to maintain their authority and credibility (Chilvers & Kearnes, 2016). To restore legitimacy, these institutions have taken a 'participatory turn', including a shift away from the deficit model of "*educating* the public to *involving* or *engaging* the public" (Braun & Schultz, 2010; Schneider et al., 2019, p. 176). It is assumed that by making science and policy institutions accountable to the public, the outcomes from such institutions will become socially acceptable (Chilvers & Kearnes, 2016; Lezaun & Soneryd, 2007). As stressed by the European Commission, "legitimacy today depends on involvement on participation" (2001, in Felt & Fochler, 2008, p. 489). It seems like policy institutions want to engage citizens to ensure that they will favour suggested scientific and technological innovations, which is very similar to the arguments for *educating* the public under the deficit model. However, some have also argued that the knowledge and values of the public are useful inputs to a policy process in themselves (Lezaun & Soneryd, 2007).

To continue to draw insight from the debate on expertise and the public, the 'issue-oriented' perspective have also pointed out some flaws in Collins and Evans (2002)'s normative theory on expertise. According to Wynne (2003), the authors have misinterpreted the problem of legitimacy. Instead of concerning non-certified experts' restricted access to expert deliberations, Wynne (2003) believes the problem is rather about "the institutional neglect of issues of public meaning, and the presumptive imposition of such meanings (and identities) on those publics" (p. 402). Wynne (2003) further explains that the problem of legitimacy also concerns "how dominant actors have illegitimately excluded people from negotiating what the salient questions are in the first place" (p. 410). Thus, the relevant question is not who, with which type of expertise, should participate in policy processes, but rather how we can

ensure to include different understandings of the issue in question. To exemplify this, let us return to Wynne (1992)'s case study on the Cumbrian sheep farmers.

Both Wynne (2003) and another STS scholar, Jasanoff (2003), believes that in reconceptualising the Cumbrian sheep farmer case, Collins and Evans (2002) left out some important insights from STS. The authors were correct in acknowledging that both scientists investigating possible pollution from the Chernobyl accident and non-certified sheep farmers in the area possessed relevant knowledge, or expertise, to discuss the issue at hand. However, Wynne (2003) states that Collins and Evans (2002) "do not appear to recognise that issues of public meaning or framing of the issue are open, and usually disputed, before we reach the propositional questions about risks, benefits and so on" (p. 405).

Collins and Evans (2002) rather focused on how these two groups could discuss questions about risk, and they concluded that the sheep farmers lacked 'interactional expertise' which resulted in an inability to communicate with the scientists. This sounds similar to the assumptions underlying the deficit model, that is, that the public and their ignorance or lack of scientific literacy is to blame for the miscommunication between the public and experts. Collins and Evans (2002) failed to recognise a key insight from the case study, which is that the differences in the scientists' and sheep farmers' knowledges "were rooted in different life worlds, entailing altogether different perceptions of uncertainty, predictability and control" (Jasanoff, 2003, p. 392).

By ignoring key contributions within STS, Collins and Evans (2002)'s normative theory on expertise ended up portraying the relationship between science, policy and democracy similar to that of the linear and deficit models. Collins and Evans (2002) ignored that the sheep farmers had a different 'civic epistemology' than the scientists, that is, different "criteria by which members of that society systematically evaluate the validity of public knowledge" (Jasanoff, 2003, p. 394). The scientists and the sheep farmers did not solely disagree because they lacked 'interactional expertise' (as defined in Collins & Evans, 2002), but rather because they possessed different knowledges which "represented radically 'other' ways of understanding the world" (Jasanoff, 2003, p. 392).

In their reading of Wynne (1992)'s case study, Collins and Evans (2002) seem to take for granted that "science is anyway the proper, 'natural' frame of reference" (Wynne, 2003, p.

404). It is thus "only 'the public' [who] is problematised, and existing institutional cultures of science in policy remain taken for granted as true authority" (Wynne, 2016, p. 102). Science is allowed "to provide and impose (as if revealed from nature) the *meaning* of public issues involving science (…) and thus excluding other legitimate concerns and questions, including (but not only) about scientific knowledge's framing itself" (Wynne, 2016, p. 103). By assuming that science provides the 'correct' framing of a public issue, the issue is reduced to 'technical decision making' and to technical questions, leaving little room for the public to discuss alternative framings.

Instead of taking the scientific framing of an issue for granted, Wynne (2003) suggests that one should rather ask about "how public issues are framed and thus given meaning" (p. 402). The public should not only participate in policy processes to legitimise a policy outcome, but to debate "the proper public meaning and definition of the issue(s) being contested" (Wynne, 2003, p. 404).

To summarise, scholars within STS understands the relationship between science, policy and democracy as multi-directional and co-produced. Instead of belonging to separate 'realms', science and policy affect each other. In contrast to Collins and Evans (2002), many STS scholars do not define a clear boundary between who is an expert or not, but rather sees expertise as dependent on the historical, political and cultural context (Jasanoff, 2003). STS scholars believe that "we need both strong democracy and good expertise to manage the demands of modernity, and we need them continuously" (Jasanoff, 2003 in de Vries, 2007, p. 782). Both the public and experts are needed within policy to debate the meaning of public issues and how they can be resolved.

2.1.4 Public participation

Just as in the earlier laboratory studies, several STS scholars studying the relationship between science, policy and democracy are interested in *practices*. To understand the public's role in policy processes, it is not sufficient to see whether they are invited into the process. We must also look at *how* the public is involved, and whether the process may affect the public's ability to frame policy issues. Scholars within STS have reflected upon "which impact and effect certain participatory exercises" have had (Braun & Schultz, 2010, p. 406). The main focus has been on experimental methods, such as citizen juries or citizen

consultations (Braun & Schultz, 2010; Felt & Fochler, 2008; Lezaun & Soneryd, 2007). Most of these studies have explored the relation between science and the public, overlooking the policy dimension. As Asdal and Hobæk (2020) write, "ordinary political institutions such as parliaments remain under-explored" in STS (p. 252). Mundane participatory technologies, such as the public consultation, have also to a large extent been neglected within the field. Nevertheless, some scholars, especially within the 'issue-oriented' perspective, have approached the practices of public participation in ways that will be useful to understand the public's role in developing the EU taxonomy's sustainability definitions.

Not only actors are involved in policy processes, but also technologies. Public consultations can be called 'technologies of elicitation', as they are "designed to generate lay views on the issues at hand, and feed those opinions into the policy process" (Lezaun & Soneryd, 2007, p. 279). They are thus an important element of the process, functioning as a bridge between the public and the policy process. To understand how the public can access the policy process, we must therefore understand how the technology of elicitation works. It is for example important to be aware of whether the technology makes it more difficult for the public to enter the policy process by narrowing the bridge or only letting some through, to continue the analogy. As Lezaun and Soneryd (2007) explain, "'consultation' suggests a highly formalized and carefully choreographed form of engagement" (p. 282). The public consultation is structured, in one way or another, and the structure of the consultation may affect who participates and which types of feedback the public submits.

The formulation of questions, the decision makers' expectations and the timing of involving the public into the policy process may all shape the outcome of the public consultation (Braun & Schultz, 2010; Scheer & Höppner, 2010; Stirling, 2008). Some STS scholars have demonstrated that the structure of technologies of elicitation may impose a certain framing of the issue on the public (Braun & Schultz, 2010; Marres, 2007). As an example, researchers have shown that the problem-definition in participatory exercises on the use of gene modified organisms in agriculture effectively narrowed the debate to issues of risk and safety, thus marginalising issues concerning for example power relations within agriculture and the role technology should play in the industry (Braun & Schultz, 2010). Technologies of elicitation may thus predefine which feedbacks are considered 'relevant' to the policy process.

These types of technologies are not, however, "techniques of domination" (Asdal, 2008, p. 13). They can also be "tools for public involvement, for democratization or deliberation" (Asdal, 2008, p. 13). Just as important as exploring whether technologies of elicitation restrain or shape the formulation of certain types of opinions, is to explore whether they open up the policy issue and allow the public to reframe the issue. As Lezaun and Soneryd (2007) stress, the 'success' of a public consultation should also concern how well it generates "new articulation of the issues under deliberation, and the degree of mobility they generate" (p. 295). This will be further explored in the next subchapter.

2.2 Documents as tools

We have seen that scholars within STS do not take neither scientific facts nor policy outcomes for granted. These scholars focus on the processes, or the *practice* of constructing such outcomes. Not only humans but also artifacts and technologies may affect these processes. Reports such as those provided by the IPCC describe the consequences of climate change and the status of the environment. But these documents are more than mere messengers: they actively partake in shaping climate and environment. Documents may render invisible greenhouse gases visible (MacKenzie, 2009), create connections between previously separated issues such as rainforest deforestation and climate change (Hermansen, 2015) or shape our valuation of 'nature' (Fourcade, 2011). Asdal (2015) explains that documents "take part in working upon, modifying, and transforming" the reality (p. 74). Together with Reinertsen, she has presented some analytical tools to study the active role of documents (Asdal & Reinertsen, 2020).

One of Asdal and Reinertsen's (2020) analytical approaches is to view documents as tools, or 'technologies of politics'. Documents are created by someone with an aim of achieving a specific outcome. They *do* something, whether it is to "point at, formulate, suggest, decide, move an issue in a particular direction and from one site to another" (Asdal & Reinertsen, 2020, p. 53, my translation). In Asdal (2008)'s article 'On Politics and the Little Tools of Democracy: A Down-to-Earth Approach', she demonstrates how respondents to a public consultation on the establishment of a power plant managed to reframe, or modify, an ordinary license application into an issue of emissions and their local consequences. Analysing documents as technologies allows the researcher to explore the "practical, active, action-oriented aspects of documents" (Asdal & Reinertsen, 2020, p. 53, my translation).

When exploring a document's relation to an issue, three concepts can be of guidance: issue formation, modifying work and contexting.

The concept of issue formation can help us explore how an issue becomes established through documents. Asdal and Reinertsen (2020) explain that establishing an issue can either mean to open up, bring attention to and making an issue controversial, or "to define, frame, describe and make something manageable" (p. 112, my translation). As we saw in section 2.1.3, scientific framings of public issues tend to dominate within policy processes and are usually established through the latter process. To study issue formation, one should focus on the way documents structure and present the issue. Asdal and Reinertsen (2020) describe that one should focus on the framing of the issue, who and what is included or not, and the references that the document makes to other sources and actors (p. 112).

Establishing an issue does not mean settling the issue. It can still be modified by new descriptions, reformulations and redefinitions and by creating new connections (Asdal & Reinertsen, 2020). Asdal and Reinertsen (2020) recommend to 'follow the documents' to trace how this 'modifying work' occurs. The modifications may be small changes from document to document, but they may end up transforming the issue. When following the documents, Asdal and Reinertsen (2020) also suggest to pay attention to the process of contexting. This implies to both understand which context the document is written into, but also how the document constructs new contexts. This may occur through for example connecting the document to other issues, processes or actors. These analytical approaches to studying the active role of documents are part of the 'practice-oriented' document analysis. By studying documents as tools, I will be able to both explore how the documents involved in defining 'sustainable hydropower' framed and modified the issue, and whether the technologies of elicitation actively mediated public participation.

3 Methods

The aim of this thesis is to understand one process of defining sustainability, namely defining 'sustainable hydropower' in the EU taxonomy. It is a qualitative case study, where the process is analysed through practice-oriented document analysis. In this chapter I will explain the choice of case, methodology and research method. Then I will describe the process of collecting and analysing the data. Lastly, I will discuss some ethical and practical considerations.

3.1 The case

As described in the introduction chapter, it is difficult to identify sustainable activities. The EU taxonomy is an interesting case as it attempts to define, in detail, the sustainability of almost 90 economic activities. Many actors have been involved in the process, and it has received wide attention. As it is expected to have a large financial impact by redirecting private investments towards 'sustainable' activities, financial and industry actors, as well as media and the public, have been interested in the process of defining the sustainability of these activities. In addition to the European Commission and its expert groups, the public entered the policy process through public consultations. I want to explore how these technologies of elicitation affected the process of defining the sustainability of one activity. This entails to a twofold research interest, both in how the structure of the public consultations affected the public's submissions, and how the submissions affected the framing of sustainability.

In this thesis, I will trace the process of defining 'sustainable hydropower' through documents. The taxonomy is composed of, and built upon, many documents. Most central to this case is the drafts of the taxonomy and submissions to the public consultations. The drafts are both consultation documents, technical reports and legislative drafts, while the submissions are either responses to questionnaires or feedback documents. Some of the respondents also attached other types of documents, for example scientific articles or pictures, to the submissions. As I will come back to in the next chapter, the taxonomy creates six definitions of an activity's sustainability. I will focus on one of these definitions, related to the objective of 'climate change mitigation'.

It could have been both interesting and relevant to study other factors influencing the sustainability definition, such as the expert groups and their actor composition, use of knowledge and work processes. However, I wanted to focus on how the issue was modified by the public. Did they agree with how the issue was framed by the expert groups and the Commission, or did they attempt to modify it? I also wanted to see whether the structure of the technologies of elicitation shaped the submissions. The taxonomy is especially interesting here as it has used two formats for its three public consultations, making it possible to explore whether different formats affected the type of feedback received.

I decided to focus on the activity hydropower. In my preliminary review of the taxonomy, I noticed that the definition of sustainable hydropower received much attention. It seemed like there were fundamentally different views on the sustainability of hydropower. I wanted to explore whether these views were reflected in the public consultations, and whether the submissions modified the issue. If that was the case, *how* did they modify the issue? What kind of tools and knowledge did they use? How was the public and their knowledge weighted, against expertise?

3.2 Qualitative case study

Qualitative case studies are suitable for investigating complex social phenomena. The case is often "chosen, conceptualised and analysed empirically as a manifestation of a broader class of phenomena or events" (Vennesson, 2008, p. 226). This does not mean that it necessarily is generalisable to other processes, but as in this thesis it can serve as an example of similar processes (Bryman, 2012). A case study allows the researcher to study one case in depth, explore its nuances, the surrounding context, and the possible explanations of the case (Baxter, 2016, p. 130). Yin (2003) has recommended to use the research approach on contemporary cases where the researcher aims to explore the 'how' or 'why' of a case, and where the researcher cannot control the phenomenon (p. 2). In this case, I want to explore how the public consultations on the EU taxonomy have affected the definition of 'sustainable hydropower'.

This thesis studies the EU taxonomy and its definition of sustainable hydropower as an exemplifying case (Bryman, 2012, p. 70). It cannot be directly generalised to other processes of involving the public in controversial policy issues, however it can serve as an example of

how such processes may occur. The case may also demonstrate the effect of public consultations, both how the format may affect the submissions, and how the submissions may modify the issue.

3.3 Practice-oriented document analysis

In this thesis, I study the active role documents play in shaping the definition of sustainable hydropower. I use practice-oriented document analysis as described by Asdal and Reinertsen (2020), and their analytical approaches presented in section 2.2.

The EU taxonomy is composed of a vast set of documents. When searching for relevant documents, I set some limitations to focus on documents directly relevant to the taxonomy's activity 'hydropower' and the environmental objective 'climate change mitigation'. I identified the drafts and the adopted legislation of the taxonomy's technical screening criteria, which contains the sustainability definitions for the activities. This led to five drafts written by two expert groups and the Commission, and one adopted legislation. I proceeded to 'follow the documents', by going through the documents referenced in my data material and relevant to hydropower's sustainability definition. Most of these documents were not relevant to include in my data material, but they have increased my understanding of the process of creating the sustainability definition. However, I decided to include the draft and adopted version of the Taxonomy Regulation, as they also were directly relevant to the definition of sustainable hydropower. These documents are listed in Appendix 1.

I proceeded to collect the submissions to the taxonomy's public consultations. Three public consultations asked for feedback on the definition of sustainable hydropower. The two first consultations had a similar format and were published as questionnaires on the EU Survey website. The responses could be downloaded into Excel, and the questions were sorted by type of activity. For these, I included all submissions that answered at least one of the questions for the hydropower activity to my data material. The public consultations received around 175 and 642 publicly available submissions, of which 30 and 40 submissions commented on hydropower, respectively. It should be noted that some respondents did not agree to publish their submissions online and these submissions are thus not included in my data material. In total, the public consultations received around 250 and 830 submissions, respectively (European Commission, 2021e).

The third public consultation was published on the EU's *Have Your Say* portal, and it was open-ended. This meant that respondents could write feedback on several different activities within the same textbox and/or PDF, and they could also write in all EU languages. The third consultation received significantly more submissions than the two previous ones, with more than 46 000 submissions. Since these submissions were not sorted by activity and it would be too time consuming to read all of them, I had to find another method of selecting submissions relevant to hydropower's sustainability definition.

The *Have Your Say* portal sorted submissions into two groups. Feedback was either classified as 'unique' or as campaigns. The feedback classified as campaigns are identical to other feedbacks. In total, the EU identified seven campaigns, which included 44 964 of the 46 589 feedbacks to the public consultation (European Commission, 2021h). While most of the campaigns ranged from 14 to 59 submissions, one had 44 786 submissions. I read through each of these campaigns and found that two were relevant to sustainable hydropower. One campaign was only concerned with the activity hydropower, while the other covered several activities.

For the unique feedback, I extracted the submissions through a web scraping tool into Excel. 670 of the 1 627 unique feedbacks had a PDF attached, which were downloaded manually. I began the selection process by excluding all submissions in other languages than English, to avoid issues with translation. During the analysis of the other two public consultations, I noticed that respondents either referred to 'hydropower', 'hydro power' or 'hydroelectric'. Thus, I searched through the submissions and the PDFs using the word 'hydro', and later excluded feedback that only referred to 'hydrogen' or other non-related derivates. I also excluded feedback that did not comment on the definition of sustainable hydropower. These types of feedbacks usually referred to hydropower as part of statistics on electricity production in a region. Finally, I removed duplicates.

During the selection process, I also noticed that some of the 'unique' feedbacks were very similar to some of the EU identified campaigns. The difference could be for example an extra space, which made the text identical in content but not similar enough to be picked up by the EU's tool to recognise campaigns. Thus, I reclassified some of the 'unique' feedback as campaigns, and ended up with 166 unique feedback and two campaigns with 67 and 44 801 submissions which commented on hydropower's sustainability definition. It should be noted

that the unique feedback also contained some minor campaigns and collaboration where the feedback was not identical but contained some similar sentences to other submissions. Appendix 2 lists the submissions included in my data material, and the codes I use to refer to the feedbacks in my analysis.

When analysing my data material, I have paid attention to how the issue of sustainable hydropower was presented. This includes any attempts to place the issue into a certain context, establish connections to other issues and attempts at modifying the framing of the issue. For example, I looked for which arguments and evidence the feedbacks and drafts provided. I also analysed how the expert group and the Commission elicited feedback from the public, and whether the technologies of elicitation imposed a certain framing of the issue. In the drafts and the adopted legislation following the public consultation, I studied whether the expert groups and the Commission had incorporated any of the feedback, and if this led to a different understanding of hydropower's sustainability. The process of analysing was iterative, going back and forth between the drafts and the submissions, to be able to understand how even a single sentence may modify the issue of sustainable hydropower.

3.4 Ethical and practical considerations

When writing a thesis, a student must ask herself several questions, such as: does my thesis raise any ethical issues? Can any type of bias have affected my analysis? Do the data I use represent the case in a credible manner? How can I ensure that readers trust my analysis? Can my findings help understand any other cases? In this section, I will attempt to answer these questions.

The thesis relies solely on publicly available documents. Research projects that only includes public documents usually do not need to be registered at the Norwegian centre for research data to ensure compliance with data protection regulations, however one still needs to ensure ethical use of the data. All my data material have been downloaded from various EU websites, which I consider to be credible sources. I have only included publicly available submissions to the public consultations, which means that the respondents have agreed to have their feedback published on EU's websites. As the feedbacks were published for another purpose than this thesis, I decided to anonymise the individuals who replied to the

consultations. Since organisations have a more public role, I have included their names in Appendix 2.

I was not particularly familiar with hydropower and its technical aspects. I believe this helped me to approach my data material with an open mind, as I did not have any preconceptions on the sustainability of hydropower. I have treated all feedbacks, including the different opinions and knowledges reflected in them, with respect (The Norwegian National Committee for Research Ethics in Science and Technology, 2016). In cases where the feedbacks reflect conflicting understandings of hydropower's sustainability, I have attempted to present both sides and give an indication of how many shared the same view. Although I cannot exclude that bias or misunderstandings have affected my analysis, I have tried to minimise such impacts. Since I was not familiar with the topic, I read my data material several times to ensure that I had sufficient understanding of the technical aspects to present feedback correctly. Instead of only relying on my own interpretation of the documents, I have included several quotes, which I have attempted to present in their context. I have also referenced the analysed material thoroughly, which should make it easier to verify.

For case studies, it is usually recommended to triangulate using different research methods (Yin, 2003). However, the documents included in my data material provide a rich description of the case. They present the case as seen from different viewpoints – from expert groups, the Commission and several organisations and individuals. The data material in this thesis can, however, only give indications as to whether the feedback affected the definition of sustainable hydropower. Since the expert groups and the Commission also received input from other sources, the thesis cannot demonstrate whether it was in fact submissions or other sources that caused specific changes to the definition of sustainable hydropower. In addition, the submissions that were not publicly available, and those I excluded through the selection process (due to e.g., language) could also have impacted the definition of sustainable hydropower.

If I had interviewed the expert groups and/or the Commission, the interviewees could have explained the reasons for certain changes and why they decided to listen to either feedback or other sources of information. Interviews with participants in the public consultations could have provided insights into how they believe the technologies of elicitation affected their feedback. Nevertheless, due to time limitations I did not consider it feasible to both analyse

the documents and conduct interviews. I chose to focus on the documents to explore their active role in the policy process. The documents contain both the opinions of the public, expert groups and the Commission, and the technologies of elicitation that mediated the public's entry into the policy process.

The thesis does not aim to be generalisable to other processes of defining sustainability, nor to other public consultations. It does, however, aim to produce a thick description of one case (Bryman, 2012). It will therefore produce one example of such a process. Understanding the process of defining sustainable hydropower in the EU taxonomy is valuable in itself. The European Commission (2021b) aims for its policies "to take into account and reflect the values and concerns of citizens" (p. 4), while it also highlights that "scientific evidence is another cornerstone of better regulation, vital to establishing an accurate description of the problem" (p. 3). Does the EU manage to involve the public? Are they free to suggest alternative framings of the issue, or does the format of the consultations limit the debate to a certain framing? Does the EU listen to the public, or do they mostly rely on experts?

These are the kind of questions this thesis attempts to answer, and which may provide valuable insights into other policy processes. Especially concerning sustainability, a constructed concept which increasingly affects how we value products and technologies, it is important to understand who is allowed to have a voice in defining the meaning of the concept.

4 The EU taxonomy

The EU strives to achieve sustainable development. Through the European Green Deal, the EU has committed itself to decouple economic growth from resource use, and to reach net zero greenhouse gas (GHG) emissions by 2050 (European Commission, 2019b). To achieve the transition to a more sustainable economy, the EU needs investments into sustainable activities. Even though the EU has directed public investments towards sustainability, it has long been aware that additional investments are needed to finance the transition (European Commission, 2015). Estimates of the investment gap have ranged from €180-480 billion additional annual investments, compared to business as usual (European Commission, 2018a, 2019c, 2020b, 2021g).

In 2016 the European Commission stated that reforms for sustainable finance were necessary (European Commission, 2016a). One aim of these reforms was to redirect private capital towards sustainable investments to close the investment gap (European Commission, 2016b). The Commission appointed the High-Level Expert Group on Sustainable Finance (HLEG) to suggest reforms, and one of their recommendations was to create a classification system for sustainable activities (HLEG, 2018a). The Commission agreed with the recommendation, and highlighted it as the "most important and urgent action" (European Commission, 2018a, p. 4).

The EU taxonomy provides guidelines on how economic activities can be classified as sustainable. Many such classification systems already existed, but they were slightly different in terms of both scope and criteria (Taxonomy Regulation, 2020). Thus, the aim of the taxonomy is to make it easier to invest in sustainable activities by creating uniform criteria applicable across the EU (Taxonomy Regulation, 2020). The taxonomy consists of criteria to classify economic activities as sustainable and disclosure requirements for companies and investors (Taxonomy Regulation, 2020). The taxonomy is, however, not just one single document. It is composed of many parts, some of which are still under development. In the following, I will go through these parts and the process of developing the taxonomy.

4.1.1 The taxonomy framework

The EU taxonomy has been created in a step-by-step manner. The first step was to create a framework, the Taxonomy Regulation. The taxonomy framework was adopted in 2020 and establishes the overarching criteria to determine the sustainability of economic activities

(Taxonomy Regulation, 2020). For now, sustainability refers to environmental sustainability, but the framework opens for including social sustainability at a later stage. The framework also contains disclosure requirements. These are part of a "disclosure regime" (European Commission, 2021d, p. 2). Other regulations within the regime are the Sustainable Finance Disclosure Regulation (SFDR) and the Non-Financial Reporting Directive (NFRD), which amends the Accounting Directive.

The SFDR regulates disclosure requirements for financial market participants such as investment companies, while the NFRD regulate companies' disclosure obligations. Not all companies are required to disclose information. The NFRD requires large public-interest companies or undertakings with 500 employees or more to disclose a non-financial statement (NFRD, 2014, art. 19a), while public-interest parent companies of a large group, also with 500 employees or more, should disclose a consolidated non-financial statement (NFRD, 2014, art. 29a). This results in reporting requirements for around 11 600 companies within the EU (KPMG, 2021).

In April 2021, the Commission proposed to adopt a Corporate Sustainability Reporting Directive (CSRD) to replace the NFRD. Here, they suggest lowering the employee criterion down to 250. If adopted, the reporting requirements would apply to around 49 000 companies and cover more than 75% of turnover for companies within the EU (KPMG, 2021). The Taxonomy Regulation states that companies subject to NFRD's reporting requirements must disclose "how and to what extent the undertaking's activities are associated with economic activities that qualify as environmentally sustainable" (Taxonomy Regulation, 2020, art. 8(1)). Thus, if the EU adopts the proposed CSRD, the taxonomy's disclosure requirements will apply to more companies.

For companies to find out whether an economic activity can be classified as sustainable, they must first consult the Taxonomy Regulation. The framework operationalises environmental sustainability into six environmental objectives:

1. climate change mitigation
2. climate change adaption
3. sustainable use and protection of water and marine resources

4. the transition to a circular economy
5. pollution prevention and control
6. protection and restoration of biodiversity and ecosystems (Taxonomy Regulation, 2020, art. 9)

The relation between these objectives is explained in the 'criteria for environmentally sustainable economic activities' in article 3 of the Taxonomy Regulation, and shown in figure 1 (Taxonomy Regulation, 2020). The article states that an economic activity must contribute substantially to at least one of these environmental objectives. In addition, the activity cannot significantly harm any of the other objectives. This is to ensure that any environmental benefits would not be outweighed by environmental damages (Taxonomy Regulation, 2020). The activity must also comply with technical screening criteria (TSC).

Figure 1. Criteria for classifying activities as sustainable, as defined in the Taxonomy Regulation art. 3.

The TSC provide guidance on how the activity may contribute substantially and not harm the environmental objectives. They have been developed gradually, and currently the Commission has adopted the TSC for two environmental objectives (Climate Delegated Act, 2021c). For each activity, the TSC contains 'substantial contribution' criteria for one environmental objective and 'Do No Significant Harm' (DNSH) criteria for the other five objectives. Thus, if an activity complies with the TSC, it will comply with the criteria to contribute substantially to an environmental objective and to not significantly harm other objectives.

The Taxonomy Regulation contains one more requirement to be considered sustainable. Companies must comply with some 'minimum safeguards'. This entails implementing

procedures to ensure that the economic activity aligns with the OECD Guidelines for Multinational Enterprises and the UN Guiding Principles on Business and Human Rights (Taxonomy Regulation, 2020, art. 18). These principles incorporate a few aspects of social sustainability into the taxonomy.

Currently, activities can only be classified as sustainable. The taxonomy does not classify activities as unsustainable, meaning that non-compliance with the TSC does not necessarily indicate that an activity is harming the environment. The taxonomy neither operates with 'shades'. It only identifies activities that *substantially* contribute to an environmental objective, and not those who only contribute. However, the expert group working on the future development of the taxonomy, the Platform on Sustainable Finance, will advise the Commission on including a classification of unsustainable or brown activities and of activities that contribute – but not substantially – to the green transition (European Commission, 2022). The Platform on Sustainable Finance (2022a) has also provided recommendations on developing a social taxonomy.

4.1.2 Delegated Acts

The TSC were not included in the Taxonomy Regulation. Unlike the taxonomy framework, the TSC should be reviewed regularly to be in line with technological and scientific progress (Taxonomy Regulation, 2020). The Taxonomy Regulation gives the Commission power to adopt separate 'delegated acts' which are amendments to the Regulation. These acts do not have to follow the ordinary legislative procedure where the Council of the EU and the European Parliament adopts legislation (European Commission, 2021f). Instead, the acts are adopted by the Commission, resulting in a faster policy process. According to the Taxonomy Regulation, the TSC should be "up to date, based on scientific evidence and input from experts as well as relevant stakeholders" while remaining "granular and calibrated" for each economic activity (Taxonomy Regulation, 2020, p. 21). Thus, creating such detailed TSC for six environmental objectives still takes time.

The Commission decided to begin by developing the TSC for two environmental objectives, climate change mitigation and climate change adaptation. They tasked the Technical Expert Group on Sustainable Finance (TEG) to create a recommendation for the TSC. Based on the *Nomenclature statistique des activités économiques dans la Communauté européenne*

(NACE) classification system, the TEG identified ten economic sectors that in total were responsible for 93.5% of direct GHG emissions within the EU (TEG, 2020b). Two sectors were selected because of their ability to enable reductions of GHG emissions within other sectors, while the remaining eight were selected because of their high GHG emissions. The most polluting sector was 'electricity, gas, steam and air conditioning supply', releasing more than a billion tonnes of CO_2-equivalents in 2018 (TEG, 2020b). The TEG developed TSC for several activities in the selected sectors.

Before delivering their recommendations to the Commission, the TEG further refined their suggestions for the TSC. They received inputs from various stakeholders and the public, through workshops and two public consultations. The expert group's final recommendations were delivered to the Commission in 2020, who used these recommendations to develop a draft delegated act. During a four-week period, the Commission held a public consultation on the draft. The Climate Delegated Act (2021c) containing the sustainability definitions for climate change mitigation and adaptation was formally adopted in June 2021.

The Platform on Sustainable Finance continued to work on the TSC for the four remaining environmental objectives. After 15 months of work, the expert group delivered their recommendations to the Commission in March 2022 (Platform on Sustainable Finance, 2022b). This thesis, however, only focuses on hydropower's TSC for the environmental objective 'climate change mitigation'. Before we begin exploring the process of creating hydropower's sustainability definition, I will introduce the expert groups and the practice of using public consultations within the EU.

4.1.3 Expert groups

The Commission use expert groups for several purposes. They can help to prepare legislative proposals, policy initiatives, delegated and implementing acts, and to guide the implementation of legislation (European Commission, 2016c). The expert groups are described as "consultative bodies" whose "primary role is to provide specific advice and expertise to the Commission" (European Commission, 2016c, pp. 2-3). Krick and Gornitzka (2020) describe the Commission's approach to expertise as "particularly open", since they call all members of the expert groups for experts (p. 1). The members are from the public and/or private sector, and the Commission aims to ensure "a balanced representation of the

relevant areas of expertise and areas of interest" when selecting the group composition (European Commission, 2016c, p. 4).

The expert group who first proposed to develop the EU taxonomy was HLEG. The group was composed of 20 members, and more than half of these came from the financial sector (European Commission, 2016d). The second largest sector was civil society, while two members represented academia and research. Rather than representing themselves or their organisations, the members were expected to represent "a policy orientation common to several stakeholder organisations" (European Commission, 2016b). The Commission expanded the number of members when appointing the TEG.

The second expert group was composed of 35 members, who were selected based on "their personal expertise, their contribution to work relevant to sustainable finance, as well as the prominence of their affiliation in this area" (European Commission, 2018b, p. 1). The Commission also invited some institutions working within sustainable finance, of which the EU institutions became members and the international organisations became observers to the TEG. The expert group was divided into different subgroups and the Taxonomy Working Group was composed of two individuals and ten organisations. The composition of the TEG and the subgroup working on the taxonomy was similar, with most of the members working within finance, and the second largest sector was civil society. Other sectors represented were academia, research and business (European Commission, 2018b).

4.1.4 Public consultations

The EU's public consultations are often called 'calls for feedback' or 'calls for evidence' (European Commission, 2021b). The purpose of inviting the public into the policy process is to "sustain trust" in the EU by taking into account its citizens' concerns and values, and to gather evidence to ensure that the EU's policies are evidence-based (European Commission, 2021b, p. 4). The Commission defines evidence as "multiple sources of data, information, and knowledge, including quantitative data such as statistics and measurements, qualitative data such as opinions, stakeholder input, conclusions of evaluations, as well as scientific and expert advice" (European Commission, 2021b, p. 4). Even though the Commission highlights scientific evidence as a "cornerstone of better regulation", we see that they ask for evidence

in the form of public opinions as well (European Commission, 2021b, p. 3). The public can therefore use multiple types of evidence to support their feedbacks.

To improve public involvement, the EU has created guidelines and tools. The 'Better Regulation' guidelines set out when, how and for how long the public should be consulted (European Commission, 2021a). There are, for example, specific requirements for delegated acts. The guidelines do not cover public consultations conducted prior to the draft delegated act, such as consultations held by expert groups (European Commission, 2021a). However, it is still expected that these consultations hold the same standard as those arranged by the Commission. They should last for 12 weeks, and it is common to use questionnaires to elicit feedback. The guidelines state that the Commission must hold a public consultation on the draft delegated act lasting at least 4 weeks. Even though most delegated acts "are very technical and may in reality only trigger comments from a specialised group of stakeholders", the guidelines emphasise that the public, including citizens, should still have an opportunity to comment on draft delegated acts (European Commission, 2021a, p. 451). In the following chapter, I will detail the structure of the public consultations on the taxonomy's sustainability definitions and the submissions they received.

In the next chapter, I will follow the process of defining 'sustainable hydropower' in the EU taxonomy. My analysis begins in 2018, when HLEG created the first outline of the criteria to classify hydropower as sustainable, and ends in 2021, when the Commission adopted the sustainability definitions with the Climate Delegated Act. Figure 2 shows a timeline of the analysed documents.

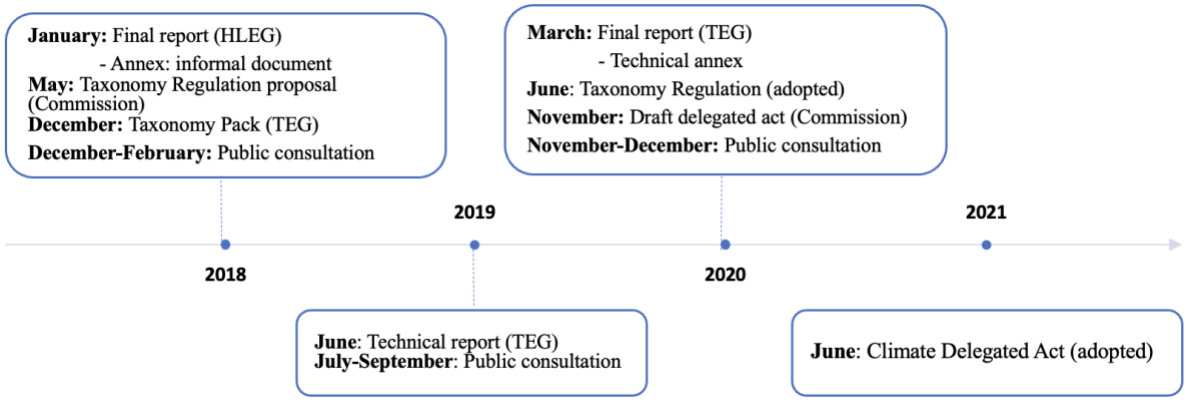

Figure 2. Timeline with analysed documents.

5 Defining sustainable hydropower

We have seen that the EU taxonomy is expected to redirect large sums of investments towards sustainable activities. But how do they decide which activities are sustainable? In this chapter, we will explore how the expert groups and the European Commission have worked to develop the technical screening criteria (TSC) for one of the taxonomy's activities, namely electricity generation from hydropower. The public have been brought into the policy process through three public consultations. They have given feedback on whether hydropower *is* a sustainable activity, and if so, how it is possible to measure and demonstrate its sustainability. We will see that the participation in the public consultations grew the closer the EU came to adopting the sustainability definitions, and with the growing number of participants conflicting understandings of hydropower's sustainability became more evident.

The respondents to the public consultation can broadly be divided into two groups based on their view of hydropower's sustainability. One group is generally positive to hydropower, while the other is generally negative. We will see that the debate about the TSC ranges from overarching questions on the sustainability of hydropower, to detail-oriented discussions of methodologies, GHG emissions and standards. Based on their understanding of sustainability, these two groups disagree on how the TSC should work. Should it be more ambitious – aiming to include only the most efficient hydropower plants? Or should it be easy to use – ensuring that most hydropower facilities become classified as sustainable? The EU has said that its "policies need to take into account and reflect the values and concerns of citizens" (European Commission, 2021b, p. 4). How have the expert groups and the Commission incorporated these values and concerns, when the feedbacks reflect two almost opposite understandings of hydropower's sustainability? Whose concerns have they aimed to meet, and which values are enshrined in the TSC?

This chapter will go through each draft of the taxonomy's TSC on climate change mitigation for hydropower, the format of the public consultations and the submissions. We will explore changes between the drafts, how they were received by the public and how the submissions attempted to introduce new changes. To understand how changes that may seem subtle may in fact modify the issue of sustainable hydropower, the chapter also contains explanations of the technical details in the TSC. The chapter ends with the adopted legislation – the 'settled' definition of sustainable hydropower – and will be followed with a discussion in chapter 6.

5.1 HLEG's informal document

The development of the technical screening criteria for the EU taxonomy began in 2018. A couple years earlier, the European Commission had assembled an expert group and asked them to provide recommendations on how the EU could 'hardwire' sustainability into the financial system (European Commission, 2016d). In their final report, the High-Level Expert Group on Sustainable Finance (HLEG) suggested several financial reforms, of which the taxonomy was listed as the first recommendation (HLEG, 2018a). HLEG emphasised that such a taxonomy should not be created from scratch, but rather build upon pre-existing classification systems.

In an informal document attached to the final report, HLEG provided a rough draft of how the taxonomy could look like. They had also invited the European Investment Bank (EIB), who already had a framework for classifying sustainable activities, to participate in the development of the draft (HLEG, 2018b). HLEG suggested some sustainability objectives, including that of climate change mitigation. For hydropower, the expert group suggested a principle which explained how the hydropower facilities may contribute substantially to climate change mitigation. They also suggested a couple of screening metrics which are used to demonstrate the facilities' sustainability (HLEG, 2018b). Before going into the technical aspects, we will first look at how HLEG defined hydropower.

Hydropower is not one technology. Even though the general principle is straightforward – using water flow to create electricity – the process can be carried out in many ways. Hydropower facilities can be adjusted to the location and the local electricity mix, which provides flexibility as the water may, for example, be stored until the electricity is needed. Facilities also range in size from very small to very large (Kumar et al., 2011). Consequentially, the environmental impact of hydropower facilities varies. The largest differences in impacts are seen between types of hydropower facilities. Thus, hydropower is commonly classified by facility type: run-of-river, reservoir and pumped storage hydropower (PSH) facilities (Kumar et al., 2011). Other facility types exist, but they are less established than the three mentioned above (IHA, 2020). HLEG's informal document also follows this classification system. However, they do not define all facility types as hydropower. To understand why, I will give a short presentation of run-of-river, reservoir and PSH facilities.

Most of the EU's hydropower is produced by reservoir facilities. EU's total installed hydropower capacity was 155,7 GW in 2018, of which 83,4 GW came from reservoirs (Kougias, 2020). Reservoir hydropower use dams, either artificial or natural, to store large quantities of water. They offer flexibility and are used for both base and peak load, as the electricity generation can be adjusted quickly to meet demand changes by altering the release of water from the reservoir (International Hydropower Association, 2020). These facilities may also be used for non-energy purposes, such as flood risk mitigation and providing irrigation water (IPCC, 2011).

As the name implies, run-of-river facilities use a river. They often channel a portion of the river through a canal or penstock to spin a turbine (International Hydropower Association, 2020; Kougias, 2020). The plants can be built on a large river with a gentle gradient, or on small steep rivers in mountainous areas. These facilities usually have little storage capacity, but they may have a pondage for short-term storage of water. Run-of-river facilities provide base load electricity and have some flexibility for responding to daily fluctuations in demand. In 2018, run-of-river facilities in the EU produced 23,7 GW, which accounts for around 15% of the EU's electricity production from hydropower (Kougias, 2020).

Pumped storage hydropower facilities balance the load in the electricity system. They have a lower and an upper source of water, and balance the load by transporting water between these two reservoirs (International Hydropower Association, 2020; Kougias, 2020). When electricity supply is high, PSH facilities store excess electricity by using that electricity to pump up water from the lower reservoir to the upper reservoir. The electricity is then stored in the form of water in the upper reservoir. When demand is high, they release the water down again through turbines and into the lower reservoir. This system can be described as closed loop, as the water keeps cycling between these two reservoirs. However, the lower water source can also be a river, and in fact this kind of open loop system is currently the most common (Blakers et al., 2021). These two different versions of PSH facilities are often referred to as pure and mixed PSH, respectively.

Pumped storage hydropower facilities can rather be seen as storage devices than electricity producers. They are net energy consumers, i.e., they consume more energy than they produce. However, they play an important role in balancing the load in grid systems. Globally, PSH facilities provide 99% of electricity storage for grid systems (Kougias, 2020).

They are expected to be even more important when renewable energy sources make up a greater proportion of the electricity system (Blakers et al., 2021). Energy sources such as solar and wind are naturally dependent on the weather, and PSH facilities can store energy when production of solar and wind power is high, and then produce electricity when the weather is less favourable for these energy technologies. Even though production from PSH facilities is expected to grow, they already produced 48,6 GW in 2018, which was more than 30% of the EU's hydropower production that year (Kougias, 2020).

So, how did HLEG define hydropower? Their final report gives the impression that the expert group did not define it. It says that "the identification and classification of sectors, sub-sectors and associated assets (…) are based on already existing classifications by various stakeholders (HLEG, 2018a, p. 18). It can therefore seem like HLEG prioritised alignment with existing frameworks, or perhaps they regarded these definitions as precise. Using the unidentified 'existing classifications' resulted in a division between facility types. Run-of-river and reservoir facilities was placed into the sub-sector "hydropower plants" and PSH facilities into "electricity storage", along with technologies such as batteries and thermal energy storage (HLEG, 2018b). Consequentially, the hydropower facilities would have to comply with different TSC.

The separation of hydropower facilities may at first appear artificial, especially considering that reservoir facilities also store electricity. However, the division becomes more evident when moving up to the sectoral level. The facilities were also separated here – hydropower plants were classified as "electricity production" and electricity storage as "electricity transmission, distribution and storage" (HLEG, 2018b). In the screening criteria for electricity storage, it says "pumped storage facilities consume significant amounts of electricity for pumping" (HLEG, 2018b, section 3). Therefore, the boundary between hydropower and storage of electricity seems to have been drawn between net consumers and net producers of electricity, rather than being based on storage capacity. As we will see later, the boundary was not cut in stone.

Even though run-of-river and reservoir facilities were both defined as hydropower, they were treated differently. They had the same principle, to "demonstrate substantial GHG emissions savings" (HLEG, 2018b, section 3). But the informal document included an example of how facilities may 'save' GHG emissions: "by avoiding substantial methane emissions from the

anaerobic decomposition of biomass in reservoirs" (HLEG, 2018b, section 3). Substantial contribution to climate change mitigation then seems to imply mitigating emissions caused by reservoirs. But what about run-of-river facilities without reservoirs? Would they still need to mitigate emissions, and how should they demonstrate such mitigation? Does 'hydropower plant' only cover reservoir facilities, or are run-of-river facilities considered automatically sustainable, since they do not cause emissions from reservoirs? The informal document leaves these questions unanswered.

HLEG suggested two methods to demonstrate hydropower's substantial contribution to climate change mitigation. The primary method, or screening metric, was to demonstrate the "release of GHG emissions < XX gCO2e/kWh", and the secondary was "power density > XX W/m3" (HLEG, 2018b, section 3). To understand the relation between these metrics and climate change mitigation, we must look beyond the informal document. The informal document is exactly as it claims – informal. It was not necessarily meant to be combed through, but rather to visibly demonstrate to the European Commission what a taxonomy could look like. Since these metrics are suggested as the gateway to sustainability for hydropower, we will take a brief detour to understand what the metrics measure and why they are used to demonstrate sustainability.

GHG emissions are commonly used to compare the climate change impact of energy sources (IPCC, 2011). The measurement unit is 'grams of CO_2-equivalents emitted per kilo watt hour of electricity produced', or 'gCO_2eq/kWh'. GHG emissions can be calculated in different ways. One may for example focus on emissions during only one phase of an activity's economic lifetime, or emissions throughout its life cycle. If focusing on only one phase, emissions from the operational phase is commonly measured. The emissions from this phase are called direct emissions and for hydropower facilities these emissions mostly result from flooding land, due to the decomposition of biomass (Raadal et al., 2011; Steinhurst et al., 2012). As we saw, these are the emissions that HLEG referred to in their example on how to mitigate GHG emissions. Other direct emissions can come from fuel use and goods and services consumed during operation (Steinhurst et al., 2012, p. 8).

Life cycle emissions include both direct and indirect emissions. Most life cycle assessments (LCA) use a time horizon of 100 years to compare the impact of different GHGs, as recommended by the IPCC (2006, in Steinhurst et al., 2012). For hydropower, indirect

emissions result from manufacture of materials and equipment used in construction and decommissioning, transportation and infrastructure, and waste disposal (Dones et al., 2007; Steinhurst et al., 2012). According to the IPCC (2014) most indirect emissions stem from fossil fuel combustion during the construction phase (p. 1308). However, there is some uncertainty concerning the emissions from decommissioning, as only a limited number of dams have been removed (IPCC, 2011, p. 471).

The secondary metric power density is also used to compare energy sources. It can be measured in many ways, but a common method is to divide the amount of energy produced with the area used, i.e., W/m^2 (Smil, 2015). The International Hydropower Association (IHA) has adapted the calculation of power density to hydropower, and recommends dividing the installed capacity by the (reservoir) area (Prairie et al., 2017). Installed capacity refers to "the maximum capacity that the system is designed to run at, i.e. sum of all turbines" (Prairie et al., 2017, p. 19). The installed capacity will usually be higher than the electricity produced by a hydropower plant. This is due to variations in the capacity factor caused by for example water supply and competing water uses such as flood prevention and withdrawals for irrigation (Smil, 2015). In general, the capacity factors are usually below 50% and may be as low as 20% during dry years (Smil, 2015).

The informal document on the taxonomy was a rough draft, but nevertheless provided an outline on which to base the future development of the TSC. The draft did not provide any details on the metrics, such as which GHG emissions should be measured, and which methodology should be used to calculate GHG emissions and power density. Further, the draft only based the sustainability of hydropower on its climate change impact. However, HLEG's mandate was to suggest recommendations, not to develop the EU taxonomy. They left the work of defining sustainability to their successors, the Technical Expert Group on Sustainable Finance (TEG). The TEG built upon HLEG's outline, refined it and made it more technical.

5.2 TEG's taxonomy pack

HLEG's recommendation to create a classification system for sustainable activities was positively received by the European Commission. The Commission followed up by mandating a second expert group, the TEG, to develop the sustainability definitions. "On the

basis of broad consultation of all relevant stakeholders", the Commission wrote, the TEG should "publish a report providing a first taxonomy with a particular focus on climate change mitigation activities" (European Commission, 2018a, p. 4). The taxonomy pack published in December 2018 constitutes the TEG's first step towards creating such a report.

In contrast to HLEG's final report, the taxonomy pack solely focused on the TSC while other financial reforms were developed in separate processes. The aim of the pack was to receive feedback on the TSC for a limited number of activities (TEG, 2018). They also asked for feedback on the usability of the EU taxonomy, and invited experts to register for workshops related to the development of the TSC for the remaining activities and other environmental objectives (TEG, 2018).

The taxonomy pack thus provided the basis for the first public consultation on the definition of sustainable hydropower. The TEG specified that the feedback should "address these requirements and principles" that they had determined for each activity (TEG, 2018, p. 8). The public were thus asked to structure their responses to the public consultation around the TEG's sustainability definitions. The TEG gave further guidance on what kind of feedback they wanted to receive by including a list of questions for each activity. These were compiled into a questionnaire that the respondents had to fill out. Of the 175 respondents who submitted publicly available feedback, 30 commented on the hydropower activity.

The TEG's first draft of the TSC begins by following HLEG's outline. It contains a description of an activity and classification into a sector. The draft continues by describing a principle and metrics for demonstrating climate change mitigation. It then adds a new element, resulting from the Commission's proposal for the taxonomy framework published in May 2018 (European Commission, 2018d). In the proposal, the Commission suggested that activities would have to complete several steps to be classified as sustainable. Activities would have to comply with some minimum social safeguards, which were defined in the proposal. Furthermore, they would need to contribute substantially to at least one environmental objective, while at the same time not doing any significant damage to the other objectives (European Commission, 2018d). HLEG's outline of the taxonomy only covered substantial contribution, and not how activities should avoid significant damage. The taxonomy pack thus adds 'Do No Significant Harm' (DNSH) criteria for each of the five other environmental objectives.

To ensure receiving feedback that the TEG considered relevant, the taxonomy pack includes a list of questions after the TSC. For the hydropower activity, the TEG posed seven questions. These were related to the proposed principle, metrics, threshold, and DNSH criteria, to the consequences of the TSC and lastly on the possibility of applying the taxonomy outside the EU's borders. Most of the questions asked whether the respondents agreed with the TEG's proposals, and the respondents could tick off 'yes', 'no', 'don't know/no opinion/not relevant' or leave it blank.

The TEG encouraged those who disagreed with the TSC to provide an explanation and an alternative suggestion. 27 of the 30 who commented on the hydropower activity wrote at least one explanation. It is these explanations that are interesting when attempting to gain insight into the process of defining sustainability. Why did the respondents disagree with the TEG's definition? What does their definition look like, and why? How do they frame the issue of sustainable hydropower? In the following, I will present the TEG's first suggestion for the substantial contribution and DNSH criteria along with the feedbacks received through the questionnaire. We will see that the feedbacks comment on different aspects of the sustainability definition, where most focus on the technical details and the applicability of the criteria, while others question whether hydropower can be defined as sustainable.

5.2.1 Substantial contribution

5.2.1.1 Exclusion and eligibility

The TEG began their questionnaire by asking whether respondents agreed with the proposed principle of to "demonstrate substantial avoidance of GHG emissions" (TEG, 2018, p. 73). The responses make it evident that a couple respondents would have preferred to begin with a more overarching question: should hydropower be included in the taxonomy? An environmental non-governmental organisation (NGO) answer this question by writing that they did "not support any additional hyrdro [*sic*] power production as 'green'" in Europe (ENG3). The feedback does not provide any reason why European hydropower cannot be classified as sustainable, but it points out that with some adaption, the TSC could be used to classify the sustainability of hydropower outside the EU. Another think tank did not accept any hydropower as sustainable. They wrote that "hydropower can cause significant amounts of GHG emissions during the operational phase", and hydropower should be excluded "as there are renewable energy technologies available with lower carbon footprint" (ENTH2).

Instead of enabling further development of hydropower, they suggested that the taxonomy should focus on financing decommissioning of hydropower plants and rehabilitation projects (ENTH2).

We see that the format of the questionnaire was not designed to address all the respondents' concerns. The questionnaire had not opened for comments on whether hydropower could be sustainable, yet a couple respondents wanted to bring the issue up from the technical details to discuss whether hydropower should be included in the taxonomy. Another overarching comment that the questionnaire did not open for, but still received, concerned the definition of hydropower.

The TEG seemed to share HLEG's definition of hydropower. Like HLEG, the TEG borrowed from existing classification systems. They specified that they used NACE, which is based on classification systems from the UN Statistical Commission and Eurostat, and is used across the EU to classify economic sectors and activities (European Commission, 2021e). In the taxonomy pack, a criterion separates between types of hydropower facilities. It reads: "if the hydropower plant has no reservoir, or it is built on an existing reservoir without introducing any new reservoirs, i.e. the plant does not lead to additional reservoir emissions, the plant is considered eligible" (TEG, 2018, p. 73). Consequentially, run-of-river facilities and reservoir facilities built on existing reservoirs are considered to already contribute significantly to climate change mitigation and would not need to demonstrate any GHG emissions avoidance. Reservoir facilities with new reservoirs would have to comply with other criteria, as we will see later.

The eligibility criterion does not mention PSH facilities, and neither does the rest of the taxonomy pack. However, the taxonomy pack did not include the activity storage of electricity, as the TEG only assessed the sustainability of a limited number of activities. Therefore, it seems like the TEG continued with HLEG's separation of hydropower facilities into different activities.

Even though the questionnaire did not ask for opinions on defining hydropower, some feedback addressed the separation of facility types. Two energy associations argued that PSH facilities should be classified as storage, since "the emission performance depends on the energy composition used" (EA1; EA4). This is relevant since the TEG decided to keep

HLEG's GHG emissions metric. If the electricity mix in a grid system mostly consists of fossil energy sources, PSH facilities will use non-renewable energy to pump up the water for storage. Thus, PSH facilities may not be able to meet the criteria for sustainable hydropower due to external factors, i.e., the energy composition in the system.

Two energy companies also shared their view on the definition of hydropower. One of them seemed to believe that PSH facilities was already included in the hydropower activity. The company suggested to exclude any emissions from the pumping activity, resolving the issue of emissions caused by external factors (EC6). Another company argued that PSH facilities should be defined as hydropower, since "it is supporting the integration of renewable on the system" (EC9). They further added that PSH facilities "can be considered as zero emissions as the energy consumed during the pumping operation is from no CO2 sources and it is compensated by the negative emission during the generation period" (EC9). The company did not provide any evidence to support their claim. However, what is perhaps more interesting than the particular argument, is that they are attempting to define one type of hydropower as a 'zero emitter' or as already contributing substantially to climate change mitigation, similar to what the TEG did for run-of-river facilities and reservoir facilities with existing reservoirs in the eligibility criterion.

The eligibility criterion received much attention due to its separation of hydropower types. It answered the question lingering after HLEG's final report: are run-of-river facilities considered to contribute significantly to climate change mitigation? However, the TEG went further by classifying some reservoir facilities as automatically eligible. A couple of the feedbacks argued for a stricter boundary between hydropower with and without reservoirs. A financial company wrote that existing reservoirs still "have too much side-effect on ecosystems" (FIN8), while a think tank highlighted that investments into existing reservoirs "would lock-in the emissions from the same hydropower project" (ENTH2). They supported their arguments by referring to higher emissions from reservoirs than other types of hydropower, and to other environmental impacts caused by reservoirs.

Reservoir facilities may lead to higher GHG emissions than other facility types. One review of LCA results found average GHG life cycle emissions of 4.9 gCO_2eq/kWh for run-of-river facilities (Raadal et al., 2011). For reservoirs the review found emissions between 0.2-11.2 gCO_2eq/kWh when excluding flooded land, and on average around 30 gCO_2eq/kWh when

including flooded land. However, some life cycle emissions were as high as 152 gCO_2eq/kWh for reservoirs (Raadal et al., 2011). Even though reservoir emissions are often comparable to emissions from other facility types, they vary more. The two respondents seemed to believe that we could not take reservoir hydropower's contribution to climate change mitigation for granted. In their view, all reservoir hydropower should demonstrate their avoidance of GHG emissions, meaning that facilities with existing reservoirs should not be automatically eligible as proposed by the TEG.

On the other side, several respondents believed that all types of hydropower contribute to climate change mitigation. One energy association went even further, concluding "that small and large scale hydropower should be classified as sustainable" (EA4). The difference here, between being eligible for the 'substantial contribution' criteria and being classified as sustainable *per se*, is that in the former case hydropower projects would still have to demonstrate that the plants do not cause any 'significant harm' to the other environmental objectives. The energy association believed that "the significant contribution to decarbonising the power sector outweighs the not significant effect on the environmental goals" (EA4).

Respondents who considered new reservoirs as also contributing significantly to climate change mitigation emphasised its positive social and environmental impacts, and its contribution to decarbonisation. One respondent stated that reservoir hydropower "is most valuable, and increasingly so due to the rapid introduction of intermittent renewable energy sources", such as solar and wind power (EA5). The role as "enabler of other sustainable power sources" (EA2), and its ability to offer "balancing and ancillary services" (EC5), was highlighted. As we saw earlier, the ability to store electricity becomes more important when the electricity system has a high share of renewable energy sources dependent on weather conditions. One of the submissions also pointed out reservoir's "vital non-power uses", in that it can provide services such as flood control and water supply (EC5).

An energy association emphasised the difference between reservoirs. In their country, they wrote, the majority of "hydropower reservoirs are natural lakes and have thus not resulted in any significant inundation of terrestrial areas" (EA2). A couple of feedbacks argued that all reservoir facilities could be called 'zero-emission' technologies (EC9; EA1). One of them supported the claim by referring to a document where the Austrian national regulatory agency has described the activity as a "zero-CO2-emitting technology" (EA1).

We see that the arguments for reservoir facilities' significant contribution to climate change mitigation varies. Some are directly tied to the activity itself, such as the arguments related to hydropower's low emissions. Others are related to hydropower's ability to enable the growth of other low-emission energy technologies. However, some of the arguments are not directly connected to climate change mitigation, such as the feedback on 'vital non-power uses'. It is worth repeating the process of developing the taxonomy's definition of sustainable hydropower. The taxonomy will not lead to one, but rather six different definitions of environmentally sustainable hydropower, and perhaps some definitions of socially sustainable hydropower. Hydropower can be classified as sustainable by complying with the TSC for climate change mitigation, or the TSC for any of the other five environmental objectives. The criteria for climate change mitigation were, however, the first to be developed. Throughout the public consultations, some feedbacks reference aspects that are more related to other environmental or social objectives. This may indicate dissatisfaction with the process of creating the sustainability definitions. Perhaps some respondents believed that the environmental (and social) objectives should have been more integrated?

5.2.1.2 Metrics and thresholds

Turning back to the taxonomy pack, we will now look at how it suggests that facilities with new reservoirs should demonstrate substantial avoidance of GHG emissions. The document clearly builds upon HLEG's informal suggestion. The metrics are similar, "power density Watt/m2 and/or direct GHG emissions from the reservoir (gCO2e/kWh)" (TEG, 2018, p. 73). Power density was changed from measuring depth to horizontal surface, and the GHG emissions metric now specifies which emissions should be counted.

The taxonomy pack contains a 'rationale' section, elaborating on the development of the criteria. Here it says that hydropower's TSC have been built upon existing frameworks and principles, including for example thresholds and criteria defined by the Climate Bonds Initiative (CBI) and the EIB, and an EU guidance note on hydropower and biodiversity (TEG, 2018). As we saw, aligning with existing frameworks was also prioritised in the first draft of the taxonomy. According to the European Commission, respondents to a public consultation on the proposal for a taxonomy framework emphasised that the "EU taxonomy should build upon, or at least take into account, existing international frameworks (…) and

classifications" (European Commission, 2018d, p. 5). Some of these criteria and classifications have been created or updated in parallel with the development of the EU taxonomy, such as the EIB's 'Environmental, Climate and Social Guidelines on Hydropower Development' published in October 2019, and the CBI's criteria for hydropower, proposed in June 2019 and adopted in March 2021. Both organisations were members of the TEG and likely shared preliminary criteria and thresholds with the expert group.

The 'rationale' section further elaborates on the choice of metrics. We can see here that the TEG considered including life cycle emissions, but ended up with direct emissions. The section describes emissions from other phases as "negligible on a per kWh basis", and provides evidence for this claim in a footnote by referring to an IPCC report and two scientific articles (TEG, 2018, p. 75). The TEG explained that the power density metric was included since "it is easier to calculate, has an inversely proportional relationship to emissions intensity, and is also used by the CDM [Clean Development Mechanism] assessment methodology" (TEG, 2018, p. 75). It was therefore already in use by an authoritative organisation, and it could provide similar results as GHG emissions assessments while reducing time and effort spent on calculation.

The TEG did not provide a threshold for power density in the taxonomy pack. In the CDM, one of the frameworks the taxonomy pack builds upon, reservoir hydropower facilities' GHG emissions are considered to be zero if the power density is above 10 W/m^2 (CDM Executive Board, 2006). Reservoir facilities with a power density below 4 W/m^2 were excluded in the CDM, while those falling in between would have to account for their GHG emissions. The CBI had followed in CDM's footsteps and added power density as a metric for hydropower in their taxonomy. Their threshold was set to 5 W/m^2, and they also included a threshold of 100 gCO2eq/kWh for GHG emissions (CBI, 2018). The TEG seemed to favour the CBI's approach, as the rationale section refers to a study by the IHA that demonstrates a correlation between 100 gCO_2eq/kWh and 5 W/m^2.

The IHA found a relationship between GHG emissions and power density, where power densities above 5 W/m^2 usually indicates GHG emissions lower than 100 gCO_2eq/kWh as shown in figure 3 (IHA, 2018). The study was conducted by using the G-res Tool developed by the IHA and UNESCO to estimate life cycle emissions of almost 500 hydropower facilities worldwide with large reservoirs. They excluded emissions from construction

activity, and likely also from decommissioning as the G-res Tool does not account for emissions related to deconstruction (Prairie et al., 2017, p. 36). The study found that 84% of the reservoirs included in the study had emissions lower than 100 gCO_2eq/kWh, and the average was 18.5 gCO_2eq/kWh (IHA, 2018, p. 29).

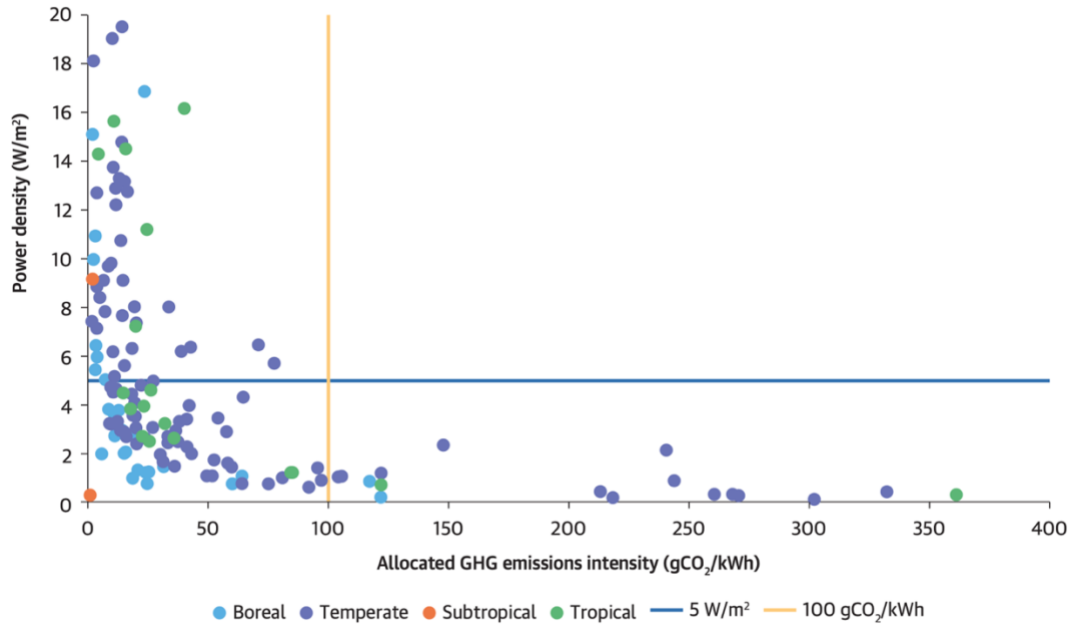

Figure 3. The relationship between power density and GHG emissions. Reference: World Bank (2017), p. 21.

Even though the TEG refers to this correlation between 100 gCO_2eq/kWh and 5 W/m^2, they decided to use a slightly higher GHG emissions threshold in the taxonomy pack. The TEG set the GHG emissions threshold at <125 gCO_2eq/kWh to provide "comparability across lower carbon energy sources" (TEG, 2018, p. 75). The threshold does "ensure consistency with the mitigation requirement for geothermal", but that is the only activity hydropower is consistent with in this draft (TEG, 2018, p. 75). Of all activities covered in the taxonomy pack, only hydropower and geothermal had a GHG emissions threshold. Other renewable energies such as solar and wind energy also had 'direct GHG emissions' as a metric but without any threshold applying, meaning that the activities were automatically eligible (TEG, 2018).

The TEG added that hydropower would comply with the substantial contribution criteria "unless the emissions from their reservoirs are considerably higher than emissions levels caused by most other renewable energy technologies" (TEG, 2018, pp. 74-75). The GHG emissions threshold was therefore meant to exclude the outliers. It should be noted here that the taxonomy was being considered for its applicability outside the EU. Since the rate of

biodegradation is higher in tropical regions, reservoirs in those areas may emit up to 20 times more than reservoirs in boreal regions (Dones et al., 2007; Steinhurst et al., 2012, p. 10).

So how did the public respond to the suggested metrics and thresholds? On the TEG's questions on agreement, 11 of the 30 respondents ticked off 'no' for the metrics, and 16 did the same for the thresholds. We have already seen that some of the disagreement relates to an overarching debate on whether hydropower should be considered as sustainable or contributing to climate change mitigation, without having to demonstrate its impact. Now we will look at the more technical aspects of the criteria. Why are the TEG's suggestions (in)appropriate to demonstrate sustainability?

The arguments against the metrics and thresholds clustered around three topics: technology neutrality, calculation difficulties and lack of ambition. On technology neutrality, three respondents pointed out that hydropower and geothermal are not comparable technologies. Thus, "using the same threshold as for geothermal seems unfounded" (EA4). Furthermore, a couple highlighted that the use of direct emissions rather than life cycle emissions would lead to a misrepresentation of hydropower's climate impact *vis-à-vis* other renewable energy technologies. As an energy association explained, "for other [energy] sources the main emission is from production, transport, and assembly of the hardware" (EA5). It would be unfair if indirect emissions, which are generally low for hydropower, are not counted while direct emissions that may be high for reservoir hydropower are included in the threshold.

On the other hand, a financial company wrote that "there is not yet scientific consensus (…) for comparing the emission profiles of different generating technologies, in ways that reflect life cycle emissions in a comparable manner and on a level playing field" (FIN7). Instead of suggesting to measure life cycle emissions, the company rather wanted the TEG to remove the threshold until scientific consensus was reached.

Many of those who commented on the difficulty of calculation wanted to remove the threshold and the metrics. Most of the respondents seemed to agree with the power density metric, but some concern was raised. An energy company stressed that the metric would give "a disadvantageous result for deep reservoirs" since it only factors in reservoir size and not depth (EC7). Another added that it would be disadvantageous to "small installations located in large reservoirs to keep natural inflows" (EC5). Since the TEG seemed to align with IHA's

5 W/m^2, two respondents decided to highlight a sentence from the IHA's report that was not included in the taxonomy pack's rationale section: "low power density however does not necessarily translate to high emissions intensity, as many projects with low power densities have emissions intensities well below 100 gCO2-eq/kW" (IHA, 2018 in EC5 and EA1). We can also see this in figure 3. The metric would therefore be "less targeted" than a metric based on GHG emissions, as another respondent pointed out (EA5). A company wrote that power density "is not a representative variable for sustainability" (EC5). In other words, the metric did not guarantee to separate between hydropower that contributed to climate change mitigation and those that did not.

The respondents seemed to agree that a GHG emissions metric was appropriate for measuring the contribution to climate change mitigation. However, many agreed more in theory than in practice. Three respondents pointed out the site-specific nature of direct emissions from reservoirs, and one of them added that the metric does not account for situations where one reservoir is used by several hydropower plants (EA2). The TEG did not suggest any calculation methodology. But previously, many LCAs have not accounted for multi-purpose use and rather allocated all GHG emissions to the electricity generation, which may have overstated the life cycle GHG emissions from hydropower facilities (IPCC, 2011). A company questioned the TEG's claim that emissions from other phases were negligible, but added that the expert group should be careful with including life cycle emissions, as it "may be very difficult to obtain" the relevant data and calculate the emissions (ESG2). A company added that "it is a metric that cannot be directly measured, just to be estimated" (EC5). Thus, even though GHG emissions is seen as a relevant metric for measuring climate change impact, it would be difficult to put into practice.

Some respondents rather had an issue with the GHG emissions threshold. They pointed out that the threshold of 125 gCO_2eq/kWh "seems very high" based on the average global emissions of 18.5 gCO_2eq/kWh referred to in the TEG's rationale section (ENG3; IHA, 2018 in TEG, 2018). Three respondents provided alternative thresholds, either 100 or 50 gCO_2eq/kWh. Setting the threshold at 100 gCO_2eq/kWh would ensure alignment with the CBI's taxonomy. Instead of focusing on the practicalities of calculating emissions, these respondents rather focused on increasing the ambition level of the taxonomy.

5.2.2 DNSH criteria

To be considered sustainable, hydropower facilities had to prove more than its significant contribution to climate change mitigation. The facilities also had to demonstrate that they do not cause any significant harm to other environmental objectives. In their final report, HLEG suggested that their successor should explore "the need to assess potential trade-offs between different sustainability themes" (HLEG, 2018a, p. 19). The Commission incorporated these trade-offs into the proposal for the taxonomy framework, and the TEG was mandated to create the criteria. The DNSH criteria for the five other environmental objectives should ensure that activities do not "cause harm to the environment to an extent outweighing their contribution to an environmental objective" (European Commission, 2018d, p. 20). The Commission's proposal gave an overview of what is meant by 'significant harm', but it was up to the TEG to find out what this would entail for the specific activities.

For hydropower, the DNSH criteria varied both in length and specificity. The taxonomy pack's TSC for climate change mitigation included DNSH criteria for the five other environmental objectives: 2) climate change adaptation, 3) sustainable use and protection of water and marine resources, 4) transition to a circular economy, 5) pollution prevention and control and lastly, 6) protection and restoration of biodiversity and ecosystems. The length varies from one sentence on 4) circular economy to half a page for 6) ecosystems. Some of the criteria are general, such as to "ensure resilience to extreme weather events" for 2) adaptation, while others give detailed instructions (TEG, 2018, p. 73). The DNSH criteria for ecosystems, for example, provides a list of "appropriate mitigation measures" (TEG, 2018, p. 74).

In the public consultation on the taxonomy pack, the TEG wanted to know if the respondents agreed with the DNSH criteria, and whether the criteria covered all 'significant harm' potentially caused by hydropower facilities. If the respondents did not agree, the TEG asked for alternatives that referred to "existing market initiatives and best practices" (TEG, 2018, p. 76). Slightly more than half of the respondents agreed with the DNSH criteria. Those who disagreed provided both general feedback and specific comments on the environmental objectives.

5.2.2.1 General comments

The general comments mostly concerned alignment with other standards, refinement of the criteria and social impacts. On alignment with standards, two organisations working within energy suggested that the taxonomy's DNSH criteria should be aligned with some of the environmental and social standards of the EIB, the World Bank and the International Finance Corporation. They believed that 'significant harm' should be defined as "a significant gap with these standards" (EC3; EA1).

The reason why alignment with other standards have both been emphasised by the European Commission, the expert groups and the respondents, is that the taxonomy is meant to provide a "common understanding of what constitutes environmentally sustainable investment" (European Commission, 2018d, p. 3). The taxonomy was therefore not meant to be created from scratch, but rather draw upon and compile the best available standards into one uniform taxonomy. However, it should also be "granular and detailed enough to provide the basis for a common and unique language on sustainability" (European Commission, 2018d, p. 6). It thus goes further than many existing standards, such as those mentioned by the two respondents, by creating technical criteria for each economic activity.

Some respondents believed that the taxonomy pack's DNSH criteria were not good enough at this stage. An energy company wrote that the DNSH criteria were "too vague and open to interpretations" (EC3), while two energy associations pointed out that the TEG should ensure that the reporting requirements and validation process does not become "too heavy" (EA6). One of the associations referred to the taxonomy's aim of redirecting private capital flows towards sustainable investments, and stated that the DNSH criteria could "endanger" the aim by having requirements that are so demanding that the administrative costs of complying with them reaches "an inappropriate level" (EA1).

Other feedbacks rather suggested adding more requirements, especially on social impacts. As we saw, the Commission's proposal for a taxonomy framework contains some minimum social safeguards that all economic activities must comply with to be classified as sustainable (European Commission, 2018d). In addition, it suggests a 'review clause' stating that the Commission should consider extending the taxonomy to other objectives, and "in particular social objectives" (European Commission, 2018d, p. 34). However, the taxonomy pack does not include any activity-specific consideration of social objectives.

The submissions demonstrate some resistance towards the structure of the process of defining sustainability. Rather than waiting for future definitions of 'socially sustainable hydropower', some feedbacks argue that these two dimensions should be integrated. As a financial company wrote, "hydro-dams can easily harm a local community (jobs, social cohesion, (in)equality) by taking away land that used to give them income, or a place to live, and by affecting the cohesion in the community. Hydro-dams that do so, can never be sustainable" (FIN8). To ensure that hydropower facilities with such negative social impacts are never classified as sustainable by the taxonomy, the taxonomy would either need to have one, encompassing definition of sustainability, or include social impacts in all the taxonomy's definitions of environmental sustainability.

Moving over to the specific DNSH criteria, the ecosystems criteria received the most feedback while the other four received a couple each. In general, respondents working within the energy sector typically wanted to remove or clarify parts of the criteria, while non-energy sector respondents wanted the criteria to cover more aspects.

5.2.2.2 Adaptation criterion

The taxonomy pack's proposed adaptation criterion was short and general. It states that hydropower should "ensure resilience to extreme weather events" and assess the design and operation of the plant "to avoid contributing to water and food security, erosion, [and] poor flood control" (TEG, 2018, p. 73). A couple of respondents argued that hydropower projects should do more to demonstrate no significant harm to this objective. A public agency believed the criterion "should not be limited only to extreme weather events" but also take into account "climate and hydrological variability" (PUB13). An environmental organisation suggested to expand the criteria to cover future water availability, and "impact on freshwater and associated ecosystems" (ENG3).

5.2.2.3 Water criterion

The water criterion was slightly more detailed. To comply with the criterion, a new facility would have to conduct a river catchment assessment that "shows no significant adverse impacts on upstream and downstream quantitative and qualitative water resources and uses", and adhere to the UN Economic Commission for Europe "Convention on the Protection and Use of Transboundary, Watercourses and International Lakes" principles (TEG, 2018, p. 73).

A financial company nevertheless believed that the criterion was "qualitative at this stage and need refinement" (FIN6). The feedback did not explain what needed to change.

For the purpose of defining sustainability, these types of statements do not give much guidance. When reviewing the feedbacks, the expert group can see that the company disagrees, but they are not provided with an alternative definition. The word 'qualitative' is also ambiguous here. It could refer to that the criterion was only based on qualitative data, but as we can see that was not the case. Furthermore, it could refer to a qualitative judgement of what 'no significant adverse impacts' entails. The taxonomy pack did not specify what it meant, but stated that in general, the DNSH "analysis is preliminary and will be extended further" (TEG, 2018, p. 8). The TEG may have decided to use a questionnaire to guide the respondents towards providing the information they needed to extend the criteria further. In several of their questions, the TEG asked for specific alternatives to their proposal and explanations. As the example above demonstrates, the feedbacks did not always strictly follow the TEG's structure.

An environmental organisation suggested a more specific change to the water criterion. The feedback insists that "the Water Framework Directive (WFD) should be a minimum requirement", and hydropower projects should especially comply with the directive's 'non-deterioration' requirement (ENG3). The article referred to states that "Member States shall implement all necessary measures to prevent deterioration of the status of all bodies of surface water (…)" (Water Framework Directive, 2000, art. 4(1)(a)(i)). The directive contains exemptions from the non-deterioration requirement for reasons such as "new modifications to the physical characteristics of a surface water body" if the project causing modifications comply with a list of conditions (Water Framework Directive, 2000, art. 4(7)). The organisation argued that if these exemptions are included in the taxonomy, "criteria for exemption need to be followed strictly, in a transparent process" (ENG3).

Compared to the TEG's suggestion of 'no significant adverse impact', the WFD's non-deterioration requirement would lead to stricter requirements for hydropower. Member States are already required to comply with the WFD. However, the exemption to the non-deterioration requirement has been used on more than half of the water bodies in Europe and now, more than twenty years after its implementation, the directive has still not achieved full compliance (European Commission, 2019a).

5.2.2.4 Circular economy criterion

The circular economy criterion was only related to waste. In the document, it reads as follows: “minimise construction-related waste and ensure appropriate recycling/treatment for waste generated” (TEG, 2018, p. 73). A financial company asked to include a LCA requirement, which could help “minimize waste and maximize recycling” (FIN8). The LCA could also inform compliance with other DNSH criteria, the company wrote. Adding such a requirement, and especially including both decommissioning and “full restoration of sites” in the LCA, as the company suggested, would imply a stricter DNSH criterion than suggested by the TEG.

5.2.2.5 Pollution criterion

To some extent, the pollution and water criteria overlap. Both relate to the water quality, but the pollution criterion is more directed towards protecting “fish life and aquatic habitats” (TEG, 2018, p. 73). It states that the water quality should be maintained “at baseline concentrations” and should be measured using relevant parameters listed in an EU Directive on ‘the Quality of Freshwaters needing Protection or Improvement’ and in the WFD (TEG, 2018, pp. 73-74). One feedback added that “recreational uses” should also be protected (ESG2), while another was more preoccupied with the parameters. The feedback states that “status of water body affected needs to be assessed according [to] the WFD requirements” (ENG3). The taxonomy pack only included the WFD’s chemical monitoring of surface water, sediment and biota while the feedback suggested that ecological status should be monitored as well (TEG, 2018). Again, environmental objectives may overlap as ecological aspects are also relevant for the DNSH criterion on ecosystems.

5.2.2.6 Ecosystems criterion

The DNSH criterion is meant to ensure that hydropower facilities do not significantly harm ecosystems and species. It includes an assessment of projects in protected areas, mitigation measures, requirements for non-native species and impacts of inundation. The criterion begins with requiring alignment to existing EU regulation, the Habitats and Birds Directives (TEG, 2018). It states that hydropower projects which may affect protected areas and other important biodiversity sites “shall be assessed with a higher scrutiny in compliance with” the two directives. Only projects who had no “significant negative effect on the” area’s conservation objectives could be implemented (TEG, 2018, p. 74).

An environmental organisation suggested that hydropower projects should conduct an environmental impact assessment (EIA) that confirms "compliance with all relevant national and international laws and conventions" in addition to, "at the very least, identify, evaluate, and mitigate any potential negative impacts (…) on Key Biodiversity Areas" (ENG3). This would entail a more comprehensive assessment for all hydropower projects, not just those located in or affecting important biodiversity sites. The organisation further suggested that "projects with direct or indirect impact on World Heritage Site should not qualify for financing", to ensure a stricter protection of those areas (ENG3).

The next requirement in the ecosystems criterion was to "implement appropriate mitigation measures to minimise possible impacts", followed by a list of suggested measures (TEG, 2018, p. 74). Some responses indicate that the requirement was not well formulated. An energy association asked, *can* these measures be used, or *must* they be used? (EA2). Another association believed that the term "appropriate" was too vague (EA5). For the 'appropriate' mitigation measure "restoration of river continuity", the respondent asked how much continuity should be achieved, and "to what cost?" (EA5). This type of cost benefit considerations are included in the WFD's exemption to the non-deterioration requirement, where some deterioration of the water status is allowed if, amongst other conditions, the benefits of the hydropower plant to sustainable development outweighs the environmental and social benefits of achieving the directive's non-deterioration objective (Water Framework Directive, 2000). Thus, if the listed measures *must* be implemented, the requirement would go further than the existing EU water regulation.

The ecosystems criterion had two more requirements. Firstly, hydropower projects must demonstrate that the facility would not risk introducing any invasive or non-native species. Secondly, new reservoir hydropower plants must ensure that "the area of inundation for the reservoir/dam does not adversely impact on terrestrial ecosystems" (TEG, 2018, p. 74). This final requirement was seen as an exclusion of these plants by a couple of the respondents. One wrote that "you cannot inundate terrestrial ecosystems without adverse effect on the system" (EA5). Thus, including the requirement would consequentially exclude hydropower with new reservoirs, the respondents explained.

5.2.3 Summary

The public consultation on the taxonomy pack gave the TEG several inputs on the definition of sustainable hydropower. Some of the submissions commented on whether hydropower *per se* is sustainable, and we could see that there was some uncertainty and disagreement regarding which facilities should be classified as hydropower. Other comments were more technical, either concerned with how a hydropower project may demonstrate its sustainability, or what it needs to demonstrate. Many respondents agreed with the TEG's proposal or parts of it, but the TEG also received feedback suggesting both stricter and less strict criteria, and to further integrate sustainability objectives. So how did the TEG incorporate these diverse views on hydropower's sustainability?

5.3 TEG's interim report

The public consultation on the taxonomy pack closed in February 2019, and a few months later the TEG published a new draft of the TSC (TEG, 2019). The interim report incorporated feedback from the first public consultation and workshops. The consultation had focused on a limited number of activities, and had invited experts to register interest to participate in developing the TSC for more activities, for climate change adaptation and to further develop the DNSH criteria (TEG, 2018). More than 250 experts applied, of which 160 was selected to participate. The experts were from "academia, industry, civil society and policy organisations" and, according to the TEG, they "contributed substantively to the development of the Taxonomy criteria" presented in the interim report (TEG, 2019, p. 17). In this section we will explore how the TSC for sustainable hydropower changed from the first to the second of the TEG's drafts, and the feedback received during the second public consultation.

In the public consultation on the interim report, the TEG asked for feedback on the TSC for new activities. Even though the TEG did not "seek detailed feedback on screening criteria which have already been reviewed", they opened up for feedback on all activities (TEG, 2019, p. 104). The format of the public consultation was again a questionnaire, but the structure and questions were slightly changed. This time the TEG asked six questions, about the boundary of the activity, its metrics and thresholds, the DNSH criteria and the criteria's applicability outside the EU. Instead of asking for agreement with the expert group's suggestions, the TEG now asked whether the criteria should be changed. The respondents

could reply “yes”, “no” or leave it blank, and they could still provide an explanation in a textbox.

The TEG added a new textbox where respondents could provide ‘links to evidence’. In the proposal for a taxonomy framework, the Commission stressed that the TSC should “be based on conclusive scientific evidence” (European Commission, 2018d, p. 32). During the consultation on the taxonomy pack, only 5 of the 30 feedbacks on hydropower provided a link to evidence. The new textbox was seemingly effective, as close to half of the feedbacks on hydropower in this public consultation included at least one link to evidence. The TEG ended up receiving 40 publicly available feedbacks on the TSC for hydropower, and all but one explained their view on sustainable hydropower.

Compared to the feedback on the taxonomy pack, the responses to the interim report align more with each other. The suggestions are more similar, and even the language – almost half of the respondents had copied at least one sentence from another respondent’s feedback. During the public consultation, two opposing views on sustainable hydropower become evident. I will refer to these as the ‘low emissions’ and ‘environmental’ groups.

The low emissions group portrays hydropower as sustainable because of its ability to produce electricity with almost no emissions. These feedbacks highlight that the taxonomy should not prevent investments into hydropower by setting requirements that are difficult to meet. Technical, detailed criteria that necessitates data that is both costly and difficult to obtain, is seen as one of the issues with the proposed TSC. In the first public consultation, we also saw that these issues were brought forward by several of the feedbacks. Further, the low emissions group question that renewable energy technologies are treated differently in the TSC, and stress that the taxonomy should be technology neutral.

In contrast, the environmental group often portray hydropower as unsustainable. They highlight hydropower’s role in the deterioration of European water quality and believe that hydropower should either not be classified as sustainable or should have stricter criteria. The taxonomy should also be more ambitious when it comes to reducing GHG emissions. The group was also present in the first public consultation, but most submissions aligned with the low emissions group. The division between these groups becomes more visible in the

feedbacks to the interim report. This is partly due to increased participation from the environmental group, but also due to introduction of new, contested technical criteria.

5.3.1 Substantial contribution

The TEG made several changes to the TSC for the activity hydropower. Beginning with the substantial contribution criteria, the expert group removed the power density metric and altered both the GHG emissions metric and its threshold, and the eligibility criterion (TEG, 2019). Instead of measuring direct emissions, the GHG emissions metric now measures life cycle emissions through a Life Cycle of Emissions (LCE) assessment (TEG, 2019). In the taxonomy pack, the TEG had called emissions from other phases 'negligible', but nevertheless they decided to include these in the current draft as suggested by a couple of respondents. They also lowered the threshold down to 100 gCO_2eq/kWh. Furthermore, they added that the threshold should decline down to 0 gCO_2eq/kWh in 2050 (TEG, 2019).

5.3.1.1 Exclusion and eligibility

Just as in the taxonomy pack, the eligibility criterion in the interim report allows some hydropower facilities to be considered as automatically contributing substantially to climate change mitigation. In the taxonomy pack, hydropower facilities without reservoirs or built on existing ones were eligible and did not have to comply with any metrics. The response in the first consultation was either to argue for a stricter division, or for classifying all facilities as substantially contributing to climate change mitigation. The TEG ended up creating a new division– between new and existing hydropower facilities.

In the interim report, new facilities must conduct a LCE assessment while existing hydropower facilities are exempted from performing the assessment (TEG, 2019). Since the power density metric was removed, the exemption from a LCE means that these facilities do not have to demonstrate their contribution and are thus considered automatically contributing substantially to climate change mitigation. The TEG added that capacity improvements of facilities that do not enlarge reservoirs would also contribute substantially to climate change mitigation (TEG, 2019). In contrast to the last draft, construction of new run-of-river facilities would now have to prove its sustainability.

By removing the automatic eligibility of run-of-river facilities, it seems like the TEG moved away from focusing solely on GHG emissions from reservoirs. However, as we see with the capacity improvements eligibility, reservoir hydropower projects would still need to demonstrate their GHG emissions more often than projects without a reservoir.

In the feedback on the exemption from LCE and capacity improvement eligibility, the division between the environmental and the low emissions group becomes visible. Beginning with the environmental group, we see that the question of including new hydropower in the taxonomy was brought up again. The arguments circled around the negative impacts of hydropower, low electricity production and better available alternatives.

Three environmental organisations argued for excluding new hydropower facilities from the taxonomy. They described hydropower as "one of the key degraders of freshwater biodiversity" (ENG4), with the "highest risk of environmental harm and low mitigation value" (ENG2). They further wrote that hydropower has degraded more than half of European waters, and that the European Commission has already recognised the negative impacts caused by hydropower. The feedback includes a quote from a guideline document by the Commission that the taxonomy pack was built upon: "It may be that one HP [hydropower] project, taken on its own, will not have a significant effect, but if its effect is added to those of other already existing activities or approved projects their combined effects can become significant" (European Commission, 2018c, in ENG3). It is almost as if they are writing, 'you do not have to believe us, listen to your own experts'.

The environmental group further argued that new hydropower facilities would not greatly increase the EU's electricity production and emphasised that other renewable energies are more beneficial. One wrote that since the EU already has exploited most of the potential for large hydropower facilities, new facilities would likely be small and produce "negligible amounts of energy" (ENG3). Currently in the EU, only 9% of hydropower facilities are large (> 10 MW), but they generate around 87% of the electricity production from hydropower (European Commission, 2018c). Furthermore, the group explained that other renewable energies can replace the loss of production from new hydropower facilities. One of the organisations demonstrated this by cross referencing three studies and showing the growth potential for other renewable energy technologies (ENG3). Another organisation added that if the taxonomy must include hydropower, the criteria should state: "new hydropower could be

used only as a last resort when a strategic assessment shows that alternatives such as solar, wind or demand-side energy efficiency are unavailable" (ENG2).

It seems like these organisations are trying to decouple hydropower from the decarbonisation and electrification processes that are occurring. As we saw in the last public consultation, many respondents argued that hydropower would play an important role in decarbonising the power system, and even believed its role in this process was so fundamental that it should be considered to automatically contribute to climate change mitigation. Here, the environmental group argues against this view and downplays hydropower's role in electricity production. They stress that other renewable energy technologies can contribute to decarbonising the system, and thus what we are left with is the question of who can produce electricity with the least negative environmental impacts. Here, the environmental group highlights the negative impacts of hydropower, and thus, in comparison with other alternatives, the group does not see hydropower as a sustainable activity.

A few other respondents argued for excluding only some types of hydropower. A financial company believed the taxonomy should include run-of-river facilities, while a public agency wanted to exclude small hydropower facilities with an installed capacity below 100 kW (FIN8**;** PUB2). In the feedback, the agency argues that small facilities "cause the same negative environmental effects as large hydropower plants", but the contribution to electricity production is so low that it does "not overweigh the adverse effects on ecological status" (PUB2). This is a similar argument to the environmental organisations above, but the agency believed that large hydropower can play an important role in decarbonising the power system and should therefore be included in the taxonomy.

Some respondents did not go as far as excluding types of hydropower, but they wanted hydropower to demonstrate its sustainability. A public authority was concerned about carbon leakage and claimed that the exemption from LCE assessments would facilitate for production of renewable energy parts "in third countries with low to zero environmental and climate protection standards" (PUB7). An energy association asked to either have no exemption or exemption for all types of hydropower – as long as hydropower would be on a level playing field with other renewable energy technologies (EA10).

Both wind and solar energy had exemptions from LCE assessments. One of the feedbacks on hydropower states that the taxonomy "unduly favours certain renewable technologies over others" by applying the LCE exemption differently (FIN1). Two energy associations representing nuclear energy and gas did not want any exemption for hydropower. One of them wrote that they "would strongly underline the need for a coherent and systematic application of LCA to all technologies (…) as no technology can be considered to have no carbon footprint by default" (EA9). These argued for technology neutrality for all technologies, not just the renewable energy technologies.

Respondents within the low emissions group seem to have cooperated when writing the feedbacks. Several wrote the same sentences and suggested similar changes. For example, four feedbacks state, "it is not clear from the TEG report why this split has been made", about the division between hydropower facilities for the LCE exemption (EC12; EC10; EC1; EC4). This group emphasised that the criteria should be easy to comply with, so hydropower facilities can be classified as sustainable.

In contrast to the suggestion of excluding small hydropower facilities, two respondents in the low emissions group suggested a *de minimis* MW threshold where hydropower facilities with low production would be exempted from conducting a LCE assessment (EA4; EC8). Several of the respondents in this group supported LCE assessments, but they wanted all hydropower - or all renewable energy technologies - to be exempted from the assessment. In practice, this would mean that hydropower would not have any substantial contribution criteria applying, and thus be considered to substantially contribute to climate change mitigation.

The reason provided by most of the respondents was that hydropower averagely emits far less emissions than the life cycle GHG emissions threshold of 100 gCO_2eq/kWh. Several referred to a study that found emissions ranging "from 2.7g (run-of-river) to 25.7gCO2e/kWh (storage and pumped storage)" (EC10; EC5; EC4; EC12; EA1). A company also pointed out that hydropower averagely has lower life cycle emissions than solar energy (EC4). In contrast to respondents within the environmental group, these respondents are saying that hydropower can be better than the alternative renewable energy technologies, at least when it comes to decarbonisation.

The ‘low emissions’ respondents highlighted that hydropower is strictly regulated. Hydropower projects must already perform an EIA, and a company stressed that “it is key to avoid policy overlap” between the demands of the EU taxonomy and other EU legislation (EC1). The low emissions group emphasised that any further requirements imposed by the taxonomy are not necessary, as most hydropower projects are far below the TEG’s suggested threshold and must already adhere to other EU legislation that regulates its environmental impact.

We have now looked at the interim report’s exemptions from LCE assessments. But as written above, the TEG also introduced an eligibility criterion for capacity improvements that do not enlarge reservoirs. This will likely impact many hydropower projects in the years to come. The International Energy Agency predicts that modernisation of existing facilities will account for around 90% of Europe’s investments in hydropower this decade. This is because most hydropower facilities in Europe are old, with an average age of 45 years (International Energy Agency, 2021).

Many of the respondents to the TEG’s second public consultation struggled to understand what the TEG meant by their eligibility criterion. The confusion was summarised by one of the stakeholders: “Does it mean that any investment excluding the reservoir enlargement is always eligible, or alternatively that, the only investments that could be eligible are those excluding the enlargement of the reservoirs?” (EC5). The latter case would imply that capacity improvements which enlarge reservoirs could not be classified as sustainable by the taxonomy.

This was not the only confusion regarding the eligibility criterion. Some respondents also asked the TEG to clarify what they meant by ‘reservoir’ (e.g., EC6). Where do they draw the boundary between reservoirs and pondages? Run-of-river facilities may have a pondage, so depending on the boundary, capacity improvements of run-of-river facilities may not be considered as automatically contributing to climate change mitigation.

Even though the environmental organisations did not believe new hydropower should be included in the taxonomy, they supported retrofits or capacity improvements of existing facilities. A couple of them suggested to separate retrofits into its own activity in the taxonomy, similar to TEG’s division between construction of new buildings and renovations

of existing buildings (TEG, 2019). Another emphasised that retrofits should be prioritised, "but only if they are more beneficial to society and environment than decommissioning" (ENG4). Some respondents within the low emissions group believed that retrofits should not comply with any GHG emissions metric, but rather demonstrate that it "substantially improves the climate and environmental performance" of a facility (EA4). However, they did not suggest how this would be demonstrated.

5.3.1.2 Metrics and thresholds

In the interim report, hydropower facilities neither covered by the exemption nor the eligibility criterion must conduct an LCE assessment, compliant with ISO standard 14044, to demonstrate their substantial contribution to climate change mitigation (TEG, 2019). The TEG further specified that "project specific-data" should be used "where relevant" (TEG, 2019, p. 245). The interim report was the first draft to introduce a methodology, and many respondents seemed dissatisfied with the choice of the ISO standard.

The low emissions group stressed that ISO 14044 does not provide clear guidance on how to conduct a LCE analysis for hydropower. An energy association described that the methodology was missing elements such as "how to set system borders" and "the use of possible valuation methods" (EA1). Two of the respondents suggested alternative methodologies: ISO 14040 and ISO 14025 (EA1) and the G-res Tool (EC3). While TEG's proposed ISO standard provides requirements and guidelines for conducting LCAs, the ISO 14040 specifies the principles and framework for LCAs without describing how to conduct an LCA (ISO, 2006a, 2006b). ISO 14025 is a standard for environmental declarations primarily used in business-to-business situations, while the G-res Tool is used to measure life cycle emissions from hydropower facilities with reservoirs (ISO, 2020).

Respondents in the environmental group were also preoccupied with the choice of methodology. An environmental agency did not believe neither ISO 14044 nor ISO 14040 was "specific enough regarding GHG" emissions, and suggested ISO 14067:2018 as a more appropriate methodology (PUB1). This standard guides users on how to quantify and report the carbon footprint of a product, and the agency specified that in this case "electricity is the product" (PUB1; ISO, 2018). The standard focuses on impacts related to climate change and is consistent with the two abovementioned ISO standards on LCAs.

The TEG's change from measuring direct to life cycle emissions was welcomed by the environmental organisations. A couple gave suggestions on the system boundaries, such as that emissions from constructing access roads, nearby transmission lines and decommissioning of a facility should be accounted for in the LCE assessment (ENG28; ENG2). They wanted to ensure that the GHG emissions metric accounted for all of hydropower's direct and indirect impacts on climate change.

Additionally, the organisations suggested a stricter application of project-specific data. Instead of TEG's "where relevant", the organisations suggested that project-specific data should "always" be used (ENG2; ENG28). They referred to a journal article and argued that hydropower emissions are "highly site-specific" (ENG2; ENG28). This is in line with an IPCC report which explains that factors such as "climatic conditions, pre-impoundment land cover types, ages, hydropower technologies, and other project-specific circumstances" all affect the GHG emissions of hydropower plants (IPCC, 2011, p. 84).

The low emissions group had a somewhat opposite view on the LCE assessment. These feedbacks argue that the site-specificness of emissions should rather lead to not using project-specific data. Since emissions are site-specific, the "bureaucratic burden" and "administrative costs" of collecting the data would be high (EA4; EC6; EC10; EC8; EA1; EA6). They suggest using "technology-specific standard values for the upstream LCE instead of project-specific individual measurements" (EC6; EA4; EC10; EA1; EA6). Upstream emissions are indirect emissions excluding the decommissioning phase.

Some respondents also suggested to revert to direct emissions, either permanently or while the technology-specific standard values were developed. A financial association pointed out that measuring life cycle emissions "would add a severe layerof [*sic*] complexity in the assessment (…) given the variability of parameters to take into consideration" (FIN1). Generally, these feedbacks wanted to keep the LCE criterion and extend it to "all electricity and heat / cool generating technologies to create a level playing field and non-discriminatory competition between technologies" (EA4; EC6; EC10). However, as we saw earlier, most of them also wanted hydropower and other renewable energy technologies to be exempted from the LCE assessment.

The TEG lowered the GHG emissions threshold to 100 gCO_2eq/kWh, in line with some of the feedback from the last public consultation. In addition, they brought in a new element that was not mentioned by any of the respondents: a declining threshold. The threshold would begin at 100 gCO_2eq/kWh and then be reduced every five years until it reaches 0 gCO_2eq/kWh in 2050 (TEG, 2019). The TEG expanded the threshold to several activities, and described it as "an overarching, technology-agnostic emissions threshold" for electricity generation (TEG, 2019, p. 245).

Even though the GHG emissions threshold was lowered, some respondents within the environmental group wanted the TSC to be even more ambitious. They referred to studies that demonstrate emissions lower than 50 gCO_2eq/kWh for hydropower and other renewable technologies. According to these feedbacks, renewable energy technologies "should be used to their full potential" (ENG2), and the taxonomy's threshold should "encourage the least energy intensive technologies" (ENG5). Consequentially, the GHG emissions threshold should be set at 50 gCO_2eq/kWh. A financial company referred to the IPCC's 1.5 degree pathway and stated that keeping within 1.5 degrees of global warming "would demand net zero Co2 emissions in less than 15 years" (FIN8). Thus, the company stressed that the declining threshold should reach 0 gCO_2eq/kWh by 2035.

The low emissions group was mostly concerned with the declining element of the threshold. Many of them agreed that the threshold can be tightened over time but did not see it as feasible to reach 0 gCO_2eq/kWh in 2050, especially "if construction and decommissioning phases are taken into account" (EC4; EA1; EC12). Two companies suggested that the threshold should not decline linearly, but rather follow technology updates for hydropower (EC9; EC6). Another company proposed that the threshold should apply to the electricity sector as a whole, since the respondent considered it "unpractical, uneconomical and unrealistic" for a single hydropower project to reach 0 gCO_2eq/kWh (EC3). Two respondents from finance stressed that "there must be more diversity in terms of criteria" so hydropower project owners can choose to comply with one out of several thresholds (FIN11; FIN2). As we can see, the low emissions group was more concerned with what would be most practical and achievable for hydropower projects, while the environmental group focused on how to reach climate objectives most efficiently.

5.3.2 DNSH criteria

The TEG updated the DNSH criteria for hydropower in the interim report. The two groups of feedbacks also have different opinions on these criteria. In the general comments on the DNSH criteria, the environmental group focused on the taxonomy's lack of criteria for social impacts. They proposed to for example exclude hydropower projects that led to resettlement of local populations, include criteria that would take indigenous people's rights into account and to align with recommendations from the World Commission on Dams on socioeconomic impacts of large dams (FIN8**;** SOC1; PUB2). On the other side, the low emissions feedbacks emphasise that the DNSH criteria are not technology neutral, that the criteria should be aligned with EU directives and should "not impose additional administrative burden on the hydropower producers" (EA2). As we will see in the following, the groups also had different preferences about how each of the DNSH should be formulated.

5.3.2.1 Adaptation criterion

For the DNSH criterion on adaptation, the greatest change from the taxonomy pack is that it now applies similarly to all activities in the taxonomy. For hydropower, the criterion is no longer limited to "extreme weather events" (TEG, 2018), and instead asks activities to conduct a risk assessment and "reduce all material physical climate risks (…) to the extent possible and on a best effort basis" (TEG, 2019, p. 246). The TEG also added that activities "must not adversely affect adaptation efforts of others" (TEG, 2019, p. 246).

Some respondents within the environmental group wanted to bring the criterion closer to hydropower again, while respondents within the low emissions group mostly asked for clarification of the reporting requirements. An environmental organisation suggested to add a reference to the EU's Floods Directive (ENG3), while another suggested to add: "the activity does not lead to loss of resilience in river basin ecosystems and ecosystem services they provide and is coordinated with river basin management plans" (ENG2). Each of these suggestions would imply stricter criteria and more reporting requirements. For respondents within the low emissions group, it was not evident how the risk assessment should be conducted, what the phrases "extent possible" and "best effort basis" signifies, and how they should demonstrate that hydropower projects do not affect adaptation efforts of others (e.g., EA4**;** EC12).

5.3.2.2 Water criterion

For the water criterion, the TEG seemed to have incorporated some of the feedback received on the taxonomy pack. For the construction phase, the taxonomy pack stated that hydropower projects must conduct a "river catchment assessment", which should demonstrate "no significant adverse impacts on (…) water resources and uses" (TEG, 2018, p. 73). In the interim report, the TEG added that the assessment should be "conducted in consultation with local stakeholders", and be "in accordance with EU Water [Framework] Directive" (TEG, 2019, p. 246). A few respondents in the previous public consultation highlighted the potential negative socioeconomic effects on the local community living near a reservoir hydropower facility, and one asked for alignment with the WFD. The interim report further adds that a "catchment management plan" should be implemented "to minimise and mitigate impacts identified in the assessment" (TEG, 2019, p. 246).

The local consultation may either have been included to focus on social impacts or to align with a WFD article. The article states that Member States "shall encourage the active involvement of all interested parties (…) in particular in the production, review and updating of the river basin management plans" (Water Framework Directive, 2000, art. 14). The TEG's requirement for a local stakeholder consultation may have been added to ensure that not only Member States but also hydropower project owners consult local stakeholders.

Most of the feedback on the water criterion commented on the alignment with WFD. The TEG was asked to use "precise reference terms" to demonstrate that the criterion aligns with the WFD (EC6; EC8; EA4). By this, the respondents meant that for example the terms 'river catchment assessment' and 'catchment management plan' should be replaced by the WFD's term 'River Basin Management Plan'. However, the River Basin Management Plan is directed towards Member States, while the river catchment assessment seems to be more comparable to an EIA.

Most of these respondents suggested that 'significant adverse impacts' should refer to WFD's environmental objectives, which are to "prevent deterioration" and to "protect, enhance and restore all bodies of surface water (…) with the aim of achieving good surface water status" (Water Framework Directive, 2000, art. 4(1)(a)(i)). A couple environmental organisations were more specific, requiring that the "ecological, hydromorphological and chemical status of water bodies" should be assessed (ENG2). They also suggested to add a requirement on

environmental flow, as it "is a key parameter to maintain the ecological status of surface water" (ENG28). Respondents within the low emissions group asked that the requirement to mitigate identified impacts should be subject to the exemptions listed in WFD's article 4(7) (EA3; EC10; EA4). These exemptions were also mentioned in the first public consultation, but the TEG did not incorporate them into the interim report.

A few from the low emissions group did not want the TSC to align as closely with the WFD. Since the WFD is directed towards Member States and not hydropower companies, some respondents emphasised that "the river basin related assessments, stakeholder consultation and management plans are in the responsibility of the competent authority" (EC6; EC8; EA4). Local stakeholder consultations were therefore seen as outside the project owner's control. A couple of these respondents suggested that the competent authority and the project owner should share the responsibility to comply with the water criterion, but they did not explain how this could occur. Lastly, a few respondents from both groups did not believe that the river catchment assessment and the mitigation of impacts should be limited to the construction phase, but also apply to the operational phase (e.g., EA4; ENG3). As an environmental organisation explained, "the operation of a hydropower plant can make a great difference on the impacts it has" (ENG3).

5.3.2.3 Circular economy and pollution criteria

The criteria for circular economy and pollution are almost identical to the ones suggested in the taxonomy pack. The TEG added threshold values for the circular economy criterion, and added "recreational uses" to the list of what should be protected and supported by the pollution criterion (TEG, 2019, p. 246). These two criteria did not receive many comments. For circular economy, an environmental organisation advised that hydropower projects should include considerations of decommissioning and river restoration (ENG3). Environmental organisations further suggested to add "effects of thermal pollution" (ENG2) and "water temperature" to the pollution criterion (ENG1; ENG3). On the other side, an energy company claimed that the requirement to "maintain the quality of the waters at baseline concentrations" would not be "realistic" for hydropower projects, as all hydropower projects cause impacts on rivers (TEG, 2019, p. 246; EC3). Thus, the company proposed instead to evaluate hydropower projects on their "capacities to avoid, mitigate and compensate these impacts", while complying with the WFD (EC3).

5.3.2.4 Ecosystems criterion

The TEG made several changes to the ecosystem criterion. They added a requirement to complete an EIA in line with the EU Directives on EIAs and on Strategic Environmental Assessment, which should cover electricity production and the area of inundation (TEG, 2019). The list of mitigation measures was now replaced with a general requirement to do "any required mitigation measures" (TEG, 2019, p. 246). For biodiversity sensitive areas, the TEG added a requirement to implement a site-level biodiversity management plan in line with one of the International Finance Corporation's performance standards. The TEG thus aligned with several of the suggestions in the last feedback round, such as an environmental organisation's recommendation to include an EIA and the comments from respondents within the energy sector on the mitigation measures and on removing the requirement for the construction phase on having no adverse impacts from inundation.

In the second public consultation, the environmental group focused on extending the EIA and ensuring stricter protection for biodiversity sensitive areas. Some respondents proposed that the EIA should at least consider the whole subbasin since areas upstream and downstream may be influenced by a hydropower project (e.g., PUB2). A couple also suggested that the criterion should ensure that no other energy technologies would have been better in terms of impacts and GHG emissions, similar to the feedback on the substantial contribution criteria. Furthermore, some suggested that hydropower plants should be excluded if they are in protected areas or other important biodiversity sites (ENG28; ENG2; ENG3).

The low emissions group's feedbacks mostly comment on the EIA. Some respondents pointed out that hydropower projects do not always have to conduct a full EIA, and therefore projects should first be 'screened' to assess whether they need to conduct a full EIA (e.g., EA4). Several respondents commented that "any additional assessment", i.e., the Strategic Environmental Assessment, "would be inefficient" and is also "well beyond the company control" (EC10; EA3; EC12). One of the companies explained that the EU directive on Strategic Environmental Assessments is applied to governments and not companies, and should not be applied to hydropower project owners by the taxonomy (EC12). On the protection of biodiversity sensitive areas, three respondents pointed out that compliance with the EU Habitats and Birds Directives should be enough for hydropower projects based within the EU, and therefore the alignment with the International Finance Corporation's performance standard should only apply to projects outside the EU (EC8; EA4; EC6).

5.3.3 Summary

Interestingly, the feedbacks largely use the same type of language as the expert group. They participate in technical discussions on ISO standards and EIAs, reference EU regulations and guidelines and refer to sources stating the climate change impact of hydropower facilities. The language of the draft is very technical, and so are many of the feedbacks. Nevertheless, we see two different versions of sustainable hydropower in the public consultation on the interim report.

The environmental group paints a picture of hydropower as environmentally damaging and upholds that alternative renewable energy technologies would often be a more sustainable option. In many cases, the feedbacks frame hydropower, or types of it, as unsustainable. In the other cases, the question becomes what does it take for hydropower to be sustainable? Here, their answer is more ambitious criteria. They explain how the criteria may contribute to reducing the negative environmental impacts and when the environment should be prioritised over hydropower production, by for example suggesting to exclude hydropower inside protected areas. Further, they recommend lowering the GHG emissions threshold so only the most climate effective hydropower projects can be called sustainable.

On the other side, the low emissions group frames hydropower as already sustainable. The feedback here highlights that hydropower not only has much lower emissions than the GHG emissions threshold, but also lower than some of the alternatives. The respondents are mostly quiet when it comes to hydropower's environmental impact, but they emphasise that hydropower projects are already highly regulated. Since these respondents already see hydropower as sustainable, the question for them is not about demonstrating its sustainability. It is rather about how to ensure that hydropower will continue to receive investments in the future. Therefore, they attempt to ensure that it would not become easier for the competitors, i.e., other renewable energies, to be classified as sustainable. This leads to a focus on technology neutrality. They further want to ensure that hydropower projects can meet the criteria. Thus, they ask for clarifications, for removing difficult or strict criteria and for alignment with regulations that they already must comply with. Neither of these portrayals of hydropower can be called false, they are just based on different understandings of sustainability. Now we will see whether the TEG aligned with any of these views.

5.4 TEG's final report

After two drafts and two public consultations, the TEG handed their final recommendations for the sustainability definitions to the Commission in March 2020 (TEG, 2020b). It was then up to the Commission to either incorporate the TEG's recommendations into the TSC, or to come up with new sustainability definitions. Before we move on to the Commission's draft delegated act and the final public consultation, we will look at how the expert group responded to the feedback received in the second public consultation.

5.4.1 Substantial contribution

Beginning with the substantial contribution criteria, the TEG changed the methodology for calculating GHG emissions. In the final report, they suggest that life cycle emissions should be demonstrated using either the ISO 14067 standard or a GHG Protocol Product Lifecycle Standard-compliant Product Carbon Footprint assessment (TEG, 2020a). As we remember, the ISO 14067 standard was recommended by a respondent from the environmental group, but the GHG Protocol's assessment was not mentioned by any respondents. Furthermore, the criteria state that both the G-res Tool and the International Energy Agency's Hydro Framework can be used as part of the ISO 14067 assessment (TEG, 2020a). Again, a respondent from the low emissions group proposed the G-res Tool, while the Hydro Framework is new.

The TEG also reintroduced power density in their final report. They explained that the metric was included "to ease the administrative burden for conducting" Product Carbon Footprint assessments (TEG, 2020a, p. 224). The metric replaced the interim report's exemption from LCE assessments for existing hydropower facilities and the automatic eligibility of capacity improvements which did not enlarge reservoirs. Hydropower facilities with a power density above 5 W/m^2 were now exempted from demonstrating life cycle emissions (TEG, 2020a). Respondents to the first public consultation mostly agreed with the power density metric, yet the TEG removed the metric in the interim report. None of the respondents in the second feedback round asked for its reintroduction, but many from the low emissions group wanted to either exempt hydropower from LCAs or simplify the calculation methods. The reintroduction of power density may have been a compromise between the two groups, as facilities would now demonstrate their contribution to climate change mitigation but could use a less time-consuming method than the LCAs.

In the substantial contribution criteria, the TEG wrote that "these criteria also apply to pumped-storage facilities" (TEG, 2020a, p. 224). The TEG did not mention PSH facilities in their previous report. However, it seemed like the interim report included PSH facilities in the activity 'storage of electricity' as the definition of the activity was: "construction and operation of facilities that store electricity and/or renewable energy, and return it at a later time, in the form of electricity or other vectors" (TEG, 2019, p. 259). Including 'renewable energy' in the definition could refer to PSH facilities, that store water and release it to produce electricity. In the second public consultation's feedback on the activity 'storage of electricity', respondents appeared to believe PSH facilities were included in said activity, but they asked for further clarification (e.g., EA1). In the final report, the TEG either clarified or changed their opinion on where to place PSH facilities. This was the first time pumped storage hydropower was explicitly classified as hydropower in the drafts of the TSC.

5.4.2 DNSH criteria

The TEG made changes to all the DNSH criteria to varying degrees. The adaptation criterion was still applicable to all activities in the taxonomy. The TEG made some changes to the criterion, but none that addressed the feedback on the hydropower activity (TEG, 2020a). The TEG removed the circular economy criterion without providing an explanation of their decision. For the pollution criterion, the TEG listened to the respondent suggesting to remove the requirement to "maintain the quality of the waters at baseline concentrations" (TEG, 2019, p. 246). They replaced it with requirements to establish a River Basin Management Plan, which is a part of the WFD, and to comply with EU regulations (TEG, 2020a). The TEG made more changes to the DNSH criteria for ecosystems and water.

The ecosystems criterion became stricter concerning biodiversity sensitive areas. The TEG added a list of these areas, including for example UNESCO World Heritage sites (TEG, 2020a). According to the interim report, hydropower projects located in such areas had to conduct an assessment in line with the EU Birds and Habitats Directives, and in the final report the TEG added that the assessment should also be comply with the EU Biodiversity Strategy (TEG, 2020a). Furthermore, projects must now ensure that "all necessary mitigation measures are in place to reduce the impacts on species and habitats" and have a "long-term biodiversity monitoring and evaluation programme" (TEG, 2020a, p. 227). This then seemed to be a response to the feedbacks from the environmental group, without going as far as

excluding hydropower projects in protected areas. The criterion was, however, made more similar for several economic activities, meaning that the TEG may have incorporated feedback received on other economic activities into the criterion.

The TEG seemingly incorporated many of the respondents' comments on the water criterion. The expert group aligned the criterion further with the WFD, both by using correct reference terms and by including the directive's environmental objectives and exemptions (TEG, 2020a). Both the pollution and the water criteria thus require implementation of a River Basin Management Plan, but in the water criterion the River Basin Management Plan only applies to new hydropower projects. These new projects would still need to ensure that an assessment was undertaken, this time called a "cumulative impact assessment", which should identify and address "any significant regional or basin-level environmental and social impacts" (TEG, 2020a, p. 225). The TEG then brought social impacts into the TSC, as suggested by the environmental group. The requirement goes further than the WFD and other EU legislation, as not all hydropower projects need to conduct impact assessments (Directive 2011/92/EU, 2011, Annex II).

The TEG seemingly listened to the low emissions group as they decided to include the WFD's exemptions in the water criterion. The criterion now states that hydropower projects must "ensure that the conditions outlined in article 4(7) of the WFD are met based on ground evidence" and then summarises the WFD's conditions (TEG, 2020a, p. 225). The criterion further specifies that these exemptions are applicable to both new hydropower and extension of existing hydropower.

For the operation phase, the TEG included mitigation measures as suggested by a few respondents from each group. These mitigation measures should lead to "good ecological status or potential", which is the environmental objective of the WFD (TEG, 2020a, p. 226). Furthermore, the TEG stressed that "ecological continuity and ecological flow" should be prioritised, in line with the environmental group's feedback (TEG, 2020a, p. 226).

The TEG added a paragraph to the water criterion that made it significantly stricter than the previous draft. The paragraph begins by stating that the "construction of new hydropower should not lead to increase fragmentation of rivers" (TEG, 2020a, p. 225). This was not directly suggested by any of the respondents, although we have seen that the environmental

group was concerned with hydropower's impact on the whole river basin. The paragraph further states, "consequently refurbishment of existing hydropower plant and rehabilitation of existing barriers should be prioritised" (TEG, 2020a, pp. 225-226). This is in line with the suggestions from the environmental group. In the previous public consultation, an agency also suggested to exclude small hydropower below 100 kW or 0.01 MW. The TEG apparently listened to this suggestion, but they went for an even stricter option. The final sentence of the paragraph reads: "construction of small hydropower (<10MW) should be avoided" (TEG, 2020a, p. 226). As we will see in the last public consultation, this sentence did not go unnoticed by the public.

5.5 European Commission's draft delegated act

After receiving the TEG's final report, it was finally time for the European Commission to prepare a draft delegated act. The Commission received feedback from the Member States on the TEG's final report and held a stakeholder dialogue, but mostly relied on the TEG's recommendations when creating their draft of the taxonomy's sustainability definitions (European Commission, 2020a). The Commission's draft delegated act received by far the most attention. While the TEG's public consultations received around 260 and 830 feedbacks, the Commission's draft received close to 46 600 feedbacks during its four week consultation period (Climate Delegated Act, 2021c). Before going into the Commission's definition of sustainable hydropower, we will look closer at the feedbacks and the structure of the public consultation.

The Commission received 46 589 feedbacks, of which 1 627 were registered as 'unique' feedback and the rest as seven campaigns (European Commission, 2021h). Around 44 800 submissions were part of one campaign – referred to as the 'stopfakegreen.eu' campaign by the Commission (European Commission, 2021e). This campaign included a PDF with "joint civil society organisation analysis and recommendations" which covered 50 of the activities in the draft delegated act. One of these activities were hydropower (CAMP2). Another campaign with almost 70 contributions commented solely on hydropower's sustainability (CAMP1). Of the unique feedbacks, around 10%, or 166 feedbacks, commented on the TSC for hydropower. In contrast to the prior public consultations, the majority of feedbacks on the draft delegated act came from citizens.

The structure of the public consultation facilitated for campaigns. While the TEG's two public consultations used questionnaires, the public consultation on the draft delegated act only provided respondents with a textbox and the opportunity to upload a document. Since the respondents did not have to check several boxes and write in many textboxes, it was easier to create a standardised submission and distribute it. This was what the stopfakegreen.eu campaign did (StopFakeGreen, 2020). Instead of having to navigate the EU's websites, find the public consultation and register an EU Login account, respondents could simply go to a website, fill out their name, e-mail and country, and publish a standardised response. This made the public consultation easy and accessible for many citizens. During the three public consultations, citizen participation increased from almost 9% in the first consultation to 45% in the second, and up to 98% in the last public consultation.

In the public consultation, we will again see that the feedback clusters into two groups: those emphasising the negative environmental impacts of hydropower, and those emphasising its contribution to decarbonisation and its low emissions. Both the stopfakegreen.eu campaign and the smaller hydropower campaign portrayed hydropower in a similar fashion as respondents within the environmental group. So did 61 of the unique respondents. These were mainly registered as citizens, NGOs, environmental organisations and anonymous. The remaining 105 unique respondents were positive to hydropower production and thus aligns with the low emissions group. These respondents were mostly companies, business associations and public authorities. Around 40 of the unique feedback in each of the groups wrote responses similar to at least one other respondent, which again demonstrates that respondents coordinated their feedbacks. For the low emissions group, most of these feedbacks clustered around the feedback from one energy association, while the largest cluster in the environmental group aligned with the stopfakegreen.eu campaign.

5.5.1 Substantial contribution

5.5.1.1 Exclusion

One central debate in previous public consultations has been whether the taxonomy should exclude some types of hydropower. In the draft delegated act, the Commission decided that new hydropower facilities can still be classified as sustainable. Some feedbacks have previously argued to exclude new hydropower due to the activity's negative environmental impact. In the third public consultation, these types of comments grew in number. In fact, the

smaller hydropower campaign was dedicated to excluding new hydropower from the taxonomy. The campaign submission has an emotional language, which has not been common in the feedback received during the previous consultations, perhaps because the respondents had to limit the feedback to the TEG's technical questions. In contrast, this campaign does not go into the technical details. Rather, it states that "environmentally friendly hydropower plants only exist in propaganda" (CAMP1).

The smaller hydropower campaign describes hydropower's negative impacts and refers to different types of evidence to support its claims. Hydropower facilities are seen as causing "colossal, irreversible destruction of the landscape, including huge biodiversity loss" (CAMP1). Small hydropower facilities are described as most harmful, causing "the most revolting destructions" (CAMP1). Here, they refer to the TEG's exclusion of small hydropower, as a way of proving that the expert group realised the negative consequences of these facilities. They also refer to a couple evaluations by the European Commission and the European Environmental Agency, showing that few EU rivers have reached good ecological status, and that dams are one of the "top threats to nature" (CAMP1).

The campaign appears to stem from Romania, and it gives a national example of a proposed "devastating and illegal hydropower project" in a national park, that was pushed forward by the government, but eventually stopped in court (CAMP1). They attempt here to highlight that hydropower projects do not only harm the environment, but they are also, in some cases, against the law.

Several respondents within the environmental group shared the smaller hydropower campaign's sentiments. Again, we see a mix of emotional language, description of impacts and evidence. Hydropower's unsustainability was self-evident to many responders, such as this citizen: "Do not kid yourself - hydropower plants are choking rivers. Choking rivers is not green" (IND8). Many pointed out that construction of new hydropower projects with all the negative impacts that comes with it, would go against the EU's own commitments. They highlight that the EU has committed to restoring 25 000 km of free-flowing rivers in the EU Biodiversity Strategy (e.g., ANON12). Thus, an NGO wrote that "we have no right to plan for the expansion of hydropower and the destruction of rivers" (ENG22). Around 25 of the unique feedback agreed with the smaller hydropower campaign, and so did the

stopfakegreen.eu campaign. However, this campaign seemed to believe the Commission would not go as far as excluding new hydropower. The submission reads as follows:

> 150 NGOs have asked that the DNSH criteria clearly state that no new hydropower plants should be built in Europe. At the very least, this means reintegrating the TEG recommendation that in Europe "construction of small hydropower (<10MW) should be avoided" (CAMP2).

It is almost as the campaign is suggesting a compromise. If the Commission is not willing to exclude new hydropower, they can meet the almost 45 000 signatories and 150 NGOs halfway by excluding small hydropower. Concerning the language, it can almost seem like the campaign attempts to be a 'connector' between the more emotional, and perhaps radical, feedbacks and the more technical draft of the delegated act. The stopfakegreen.eu campaign refers heavily to the TEG's recommendations, while a 'manifesto' by the 150 NGOs, included in a hyperlink in the campaign's submission, refers to several journal articles. The manifesto puts forward the negligibility of future hydropower projects' impact on European electricity generation and its negative effects (WWF et al., 2020), while the feedback urges the Commission to reinstate some of the TEG's recommendations. The TEG is perceived as a legitimate authority on hydropower, as other respondents also pointed out. The TEG's recommendations are described as "rooted in robust and evidenced work" (ENTH1), and the Commission is urged to "follow the TEG's recommendations or improve them" (ENG3).

Most of the unique feedback within the environmental group asked the Commission to reinstate the TEG's exclusion of small hydropower facilities. As we have seen in the previous public consultation, the benefits of electricity production do not seem to outweigh the environmental costs for respondents in this group. They stressed that small hydropower facilities "cannot make any significant contribution to climate change mitigation" due to its low electricity generation (ENG2), and thus the "massive cumulative impacts on rivers and streams" cannot be accepted (ENG27).

The low emissions group was pleased that the Commission removed the TEG's exclusion of small hydropower. Some of them highlighted that rather than the size of the plant, the site-specificness of hydropower, i.e., the plant design and the water body, affects the impact a hydropower facility may have (e.g., EC22). Thus, they agreed that the taxonomy should not

deem all small hydropower facilities as not sustainable. However, an aspect that many in the low emissions group disagreed with, was the definition of pumped storage hydropower.

5.5.1.2 Facility types

The Commission decided to introduce a new separation of hydropower facilities. While the TEG defined PSH facilities as hydropower in their final report, the Commission decided to split PSH facilities into their two subtypes. Mixed pumped storage now belonged to 'electricity generation from hydropower', while pure pumped storage belonged to the activity 'storage of electricity' (European Commission, 2020a). It seemed like the boundary between the two activities was drawn at "natural stream network" (European Commission, 2021e, p. 160). All hydropower facilities connected to a free-flowing water source was classified as 'electricity generation from hydropower', regardless of their storage abilities. As we remember from the first draft of the TSC, HLEG seemed to have drawn the boundary between hydropower facilities that mostly produce or mostly consume electricity. The Commission's separation between PSH facilities was new within the EU, as existing energy and environmental regulations do not distinguish between mixed and pure pumped storage facilities (Piebalgs et al., 2021).

The separation between pure and mixed PSH facilities was described as "artificial without any contribution to sustainability" by a respondent in the low emissions group (EA1). The consequence of the separation is that most of European PSH facilities will not be defined as storage of electricity (e.g., BA2). In contrast to the hydropower activity, storage of electricity does not have any substantial contribution criteria (European Commission, 2020a). Thus, pure pumped facilities do not have to comply with a GHG emissions threshold. The respondents described hydropower's GHG emissions threshold as unpractical and constraining, as the impacts of PSH facilities will be influenced by the electricity mix in the region (EC3). If mixed PSH facilities cannot meet the substantial contribution criteria, they would not be classified as sustainable and may receive less investments. An energy association explained that this "may lead to a loss of flexible clean electricity needed in keeping the level of security of supply" (EA12).

5.5.1.3 Metrics and thresholds

The substantial contribution criteria for hydropower remained similar to the TEG's recommendations. The Commission decided, however, to change some of the accepted methodologies for calculating GHG emissions. They kept two of the methodologies, the ISO 14067 standard and the G-res tool, and replaced the GHG Protocol and the Hydro Framework with ISO 14064 and Commission recommendation 2013/179/EU (European Commission, 2020a). Furthermore, the Commission removed the declining element of the GHG emissions threshold. However, they kept the TEG's recommendations of a power density at 5 W/m^2 and a GHG emissions threshold at 100 gCO_2eq/kWh.

The stopfakegreen.eu campaign saw it as counterproductive to have multiple methodologies. It would lead to problems with "comparability, consistency and reliability", as these methodologies may lead to different results (CAMP2). The campaign stressed that the taxonomy should "avoid the risk of taxonomy users cherry picking the GHG emissions accounting methodology providing the best results" (CAMP2). They preferred Commission recommendation 2013/179/EU, which measures the life cycle environmental performance of both products and organisations, and they asked the Commission to only include this methodology. A few other respondents called the G-res tool inappropriate, based on its use of time horizon and how it converts other greenhouse gases into CO_2. For example, they pointed out that the G-res tool equates 1 g methane with 25 gCO_2, while the IPCC equates it with 83 gCO_2 (ENG18). One of the creators of the tool, the IHA, considered the G-res tool to be more appropriate than some other methodologies because it allocates emissions in cases of multiple uses of a reservoir, such as when the reservoir both serves power generation and irrigation (EA11).

The stopfakegreen.eu campaign and others within the environmental group asked the Commission to reinstate the declining threshold. Just as with the suggestion to exclude small hydropower, we see that the feedbacks draw upon the TEG's final report and asks the Commission to align with the expert group's recommendations. Neither the campaign nor the unique feedbacks gave any explanation as to why the declining element should be included. In an impact assessment report, the Commission writes that "should the emission performance of activities be necessary to revise, the Commission is entitled to review the delegated act" (European Commission, 2021e, p. 155). Thus, removing the declining element

does not mean that the threshold will remain the same, but rather that it will be adjusted according to when the Commission sees it necessary.

While the environmental group wanted to ensure stricter substantial contribution criteria, the low emissions group was mostly preoccupied with technology neutrality. As in the TEG's drafts, renewable energy technologies like solar and wind power were exempted from demonstrating their substantial contribution to climate change mitigation and thus only have to comply with DNSH criteria. The low emissions group wanted to remove the thresholds for hydropower and used similar arguments as in the previous public consultations. They referred to achieving a level playing field amongst the technologies (e.g., BA7), not causing a "bureaucratic burden and additional costs" for hydropower (EC8), that hydropower's emissions were well below the proposed threshold (e.g., EA2) and that stricter criteria for hydropower than other renewables "may lead to a loss of flexible clean electricity" (EA12). In contrast to the previous public consultations, several feedbacks from the low emissions group now also emphasised that the criteria would violate the taxonomy's principles.

The taxonomy regulation requires the TSC to "identify the most relevant potential contributions to the given environmental objective while respecting the principle of technological neutrality (…)" (Taxonomy Regulation, 2020, art. 19(1)a). The feedbacks stress that the TSC will breach the principle of technology neutrality if similar economic activities, such as all 'generation of electricity' activities, have different types of criteria (e.g., BA2). One submission states that "it can be questioned whether the Commission would exceed its powers if it would adopt the Delegated Regulation in its current form by disregarding essential elements of the Taxonomy Regulation" (POL1).

The Commission seemed to believe that other renewable energy technologies are more likely to always have emissions lower than 100 gCO_2eq/kWh. In their impact assessment report, the Commission writes that technologies such as solar, wind and ocean energy "have widely evidenced low GHG emissions", while for hydropower the Commission refers to the IHA's GHG emissions data and reiterates that "hydropower plants above $5W/m^2$ do not emit more than $100gCO_2e/kWh$" (European Commission, 2021e, p. 155). Thus, facilities complying with the power density metric are treated similarly as other renewable energy technologies, by being exempted from performing an LCA.

Many respondents expressed scepticism towards the power density metric. The stopfakegreen.eu campaign states that the metric would not apply to derivation plants, which divert part of a river to create a greater elevation difference than the river naturally has. This is problematic, they write, as these types of plants are common in Europe "and come with high environmental impacts" (CAMP2). The low emissions group wanted to either remove the metric or to get more guidance on how it should be calculated. As in the previous public consultations, several pointed out that data is difficult to retrieve, especially on pre-impoundment conditions and surface area (e.g., EC7).

5.5.2 DNSH criteria

The Commission did not entirely follow the TEG's recommendations on the DNSH criteria. The water criterion was substantially changed from the TEG's final report. Perhaps because of the changes, or maybe because the criterion is the most difficult to comply with, almost all submissions in the third public consultation commented on the water criterion. The criterion will be explored in detail, but first we will look at changes to the other four DNSH criteria.

5.5.2.1 Adaptation, circular economy and pollution criteria

For the adaptation criterion, the Commission accepted TEG's recommendation to have the same criterion for all activities. They made some changes, such as specifying which data should be used in a risk and vulnerability assessment (European Commission, 2020a, p. 231). Just as in the TEG's final report, the draft delegated act does not include a circular economy criterion for hydropower. However, the draft also considers the pollution criterion as not applicable to hydropower. In an impact assessment report, the Commission explain that renewable energy production "do not, in most cases, pose a risk of significant harm" for pollution, and thus they do not need a DNSH criterion for the objective (European Commission, 2021e, p. 235). Furthermore, the Commission emphasised that removing the pollution criterion "ensures that sectors are treated fairly according to their potential negative pollution impacts." (European Commission, 2021e, p. 235). By 'fairly', they likely mean that the strictness of the criteria is in line with the likelihood of negative impacts caused by the activity.

5.5.2.2 Ecosystems criterion

For the ecosystem criterion, the Commission added several changes suggested by the low emissions group in the second public consultation. In the TEG's final report, all hydropower projects needed to complete an EIA. The Commission proposed to include a screening process, where a competent authority decides if the project need to complete an EIA (European Commission, 2020a). Furthermore, the EIA now had to be in line with only one EU directive, the Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment. Thus, hydropower projects did not need to comply with the Directive on Strategic Environmental Assessment, as the TEG had proposed and some respondents had disagreed with. The mandatory assessment of projects within biodiversity sensitive areas was now only mandatory "where applicable" (European Commission, 2020a, p. 109). The Commission also removed the requirement to have a site-level biodiversity management plan and to monitor biodiversity long-term (European Commission, 2020a). These latter changes must be seen in relation to the changes in the water criterion, as the Commission decided to include considerations of ecosystems and species in the water criterion. It should also be added that the ecosystems criterion was not specific to the hydropower activity, as several activities shared the same criterion in the draft delegated act.

These four DNSH criteria received few comments. An energy association commented that the assessment required by the adaptation criterion would "result in an unjustified administrative burden" and that the data required is not always available (EA1). One feedback suggested to include a circular economy criterion, to ensure that hydropower projects have a plan for decommissioning (ESG3), and some feedbacks commented on the ecosystems criteria. Here, the respondents either wanted to ensure strict compliance with Directive 2011/92/EU on EIAs (e.g., ENG13), or to reduce the administrative burden on hydropower projects by removing additional assessments in biodiversity sensitive areas (e.g., EA3). Compared to the amount of feedback received on the hydropower activity, few respondents were concerned with these DNSH criteria. However, almost all feedbacks seemed to be preoccupied with the water criterion and especially its relation to the Water Framework Directive.

5.5.2.3 Water criterion

The DNSH criterion for water became substantially more comprehensive in the draft delegated act. While TEG's suggestion was around half a page long, the Commission's criterion is more than three pages long. The main difference is that the Commission omitted any reference to the WFD, and instead paraphrased many of the directive's articles. It seems like the Commission have tried to clarify the boundary between the responsibilities of the Member States and the hydropower project owners. As briefly mentioned earlier, the directive applies to Member States. The Member States must appoint a competent authority, who should oversee and report on the compliance with the directive's environmental objectives (Water Framework Directive, 2000). One of the competent authority's responsibilities is to implement a River Basin Management Plan. As we remember, the TEG included the River Basin Management Plan as a requirement for the project owners. This is one of the requirements that have been removed to make the boundary more clear.

Beginning with the requirements for existing hydropower facilities, the criterion have substantially changed from the TEG's final report. In the report, existing hydropower plants were required to implement mitigation measures to "reach good ecological status or potential", particularly "regarding ecological continuity and ecological flow" (TEG, 2020a, p. 226). In the draft delegated act, existing hydropower plants still had to implement mitigation measures. They must comply with "that authorisation or permit issued by the competent authority" and all the mitigation measures included in the permit. The draft lists several "relevant" mitigation measures, such as to "ensure conditions as close as possible to undisturbed continuity in the specific water body" (European Commission, 2020a, p. 106). Depending on what the Commission means by "as close as possible", the requirement may be stricter than the TEG's recommendation. Good ecological status, as the TEG proposed, refers to a slight deviation from undisturbed conditions, while high ecological status refers to "no, or only very minor" deviations from undisturbed conditions (Water Framework Directive, 2000, Annex V, p. 52).

In addition to the permit's mitigation measures, existing hydropower plants must also implement "all technically feasible and ecologically relevant mitigation measures" aimed "to reduce adverse impacts on water as well as on protected habitats and species" (European Commission, 2020a, p. 105). The water criterion thus includes protection of habitats and species, which was previously only required by the ecosystems criterion. The water criterion

further requires monitoring of the mitigation measures' effectiveness "in the context of the authorisation" (European Commission, 2020a, p. 105). Thus, it seems like the competent authority, and not the project owner, should conduct the monitoring. As we remember from the second public consultation, some respondents in the low emissions group suggested that project owners and the competent authorities should share the responsibility for meeting the water criterion requirements. The draft delegated act's requirements for existing hydropower facilities are visualised in figure 4.

Figure 4. Water criterion's requirements for existing hydropower plants and refurbishment.

The requirements for new hydropower facilities are even more detailed. There are different ways of complying with the criteria, but all new facilities must begin with a cumulative impact assessment, as recommended by the TEG. The assessment is more comprehensive in the draft delegated act, as the Commission added a list of aspects that the project owners must assess, such as potential impacts on protected habitats and species and the availability of migration corridors (European Commission, 2020a). The outcome of the assessment decides which other requirements applies. As we see in figure 5, the assessment may lead to three results: the facility "do not entail any deterioration nor compromise the achievement of good status of potential of the specific water body", leads to some deterioration or leads to permanent deterioration of the water status (European Commission, 2020a, p. 106). In the latter case, the facility would not be classified as sustainable.

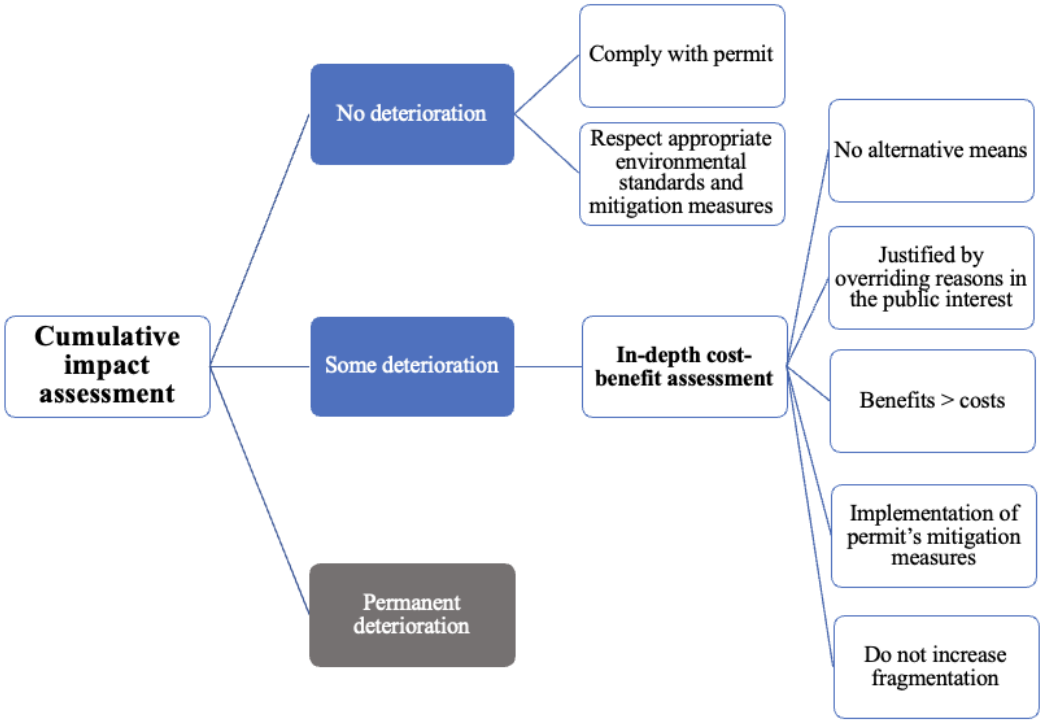

Figure 5. Water criterion's requirements for construction of new hydropower facilities.

If the cumulative impact assessment demonstrates no deterioration of the water status, the facility must still comply with a permit given by a competent authority and respect environmental standards and mitigation measures. The environmental standards relate to "flow management and flood regime", while the mitigation measures include measures such as "controlled releases, state of the art and fully functional fish passages and controlled temperature (European Commission, 2020a, p. 107). Where the assessment demonstrates some deterioration, the project owner must conduct an in-depth cost-benefit assessment.

As we see in figure 5, the cost-benefit assessment must demonstrate compliance with several requirements. First, project owners must demonstrate that, "for reasons of technical feasibility or disproportionate cost", there are no alternative means of achieving electricity generation at lower environmental costs (European Commission, 2020a, p. 107). 'Alternative means' refers to for example using other energy technologies or relocating the facility. Second, construction of the plant must be "justified by overriding reasons in the public interest" (European Commission, 2020a, p. 108). Third, the assessment must prove that benefits outweigh the costs, and should consider aspects such as electricity production, impact on water status, biodiversity and ecosystem services. Fourth, the facility must have a permit which includes "all technically feasible and ecologically relevant mitigation measures" (European Commission, 2020a, p. 108). The list of measures is equal to that of

existing hydropower plants, including the requirement related to 'undisturbed continuity'. The final requirement is to ensure that the plants do not increase fragmentation of water bodies. If the plant would lead to more fragmentation, the project owner must restore continuity "to an extent that compensates the disruption of continuity" (European Commission, 2020a, p. 108).

The water criterion for hydropower was very detailed, and full of indirect references to the WFD. To give one example of its similarity with the directive, we can look at the requirement to not permanently deteriorate good water status/potential. The draft delegated act reads "the plants are conceived (…) so that they do not permanently compromise the achievement of good status/potential in any of the water bodies in the same river basin district", while the WFD reads "a Member State shall ensure that the application does not permanently exclude or compromise the achievement of the objectives of this Directive in other bodies of water within the same river basin district (…)" (European Commission, 2020a, p. 106; Water Framework Directive, 2000, art. 4(8)). Even though the criterion was aligned with the WFD, it did not refere to the directive.

Most submissions commented on the alignment with the WFD and the proposed mitigation measures. The low emissions group were also here concerned with ensuring a level playing field. Like the substantial contribution criteria, the water criterion was seen as setting "a stricter standard for hydropower compared with other renewables" (EC7). One business association pointed out that "hydropower is the only renewable energy technology, where unnecessarily, very detailed points are made on when and how hydropower plants (…) could be sustainable" (BA2). Many feedbacks give examples of why these points are both unnecessary and too detailed.

According to the water criterion, both new and existing hydropower projects must implement "all technically feasible and ecologically relevant mitigation measures" and/or a permit's mitigation measures (European Commission, 2020a, p. 105). The Commission's list of mitigation measures included the abovementioned "conditions as close as possible to undisturbed continuity" which should be achieved by for example ensuring minimum ecological flow and installing "state-of-the-art and fully functional fish passes" (European Commission, 2020a, p. 108). Many respondents commented that 'undisturbed continuity' "is never the case even in nature" (EA17), and this type of requirement could thus "make

investments in hydropower virtually impossible" (EA20). The required measures were seen as "too strict to be practical" (ESG3).

Even though the criterion emphasises several times that these measures should be "technically feasible and ecologically relevant", the list of measures comes across as compulsory for many respondents. Thus, they stressed that several of the requirements "are not warranted or even ecological desirable everywhere", and that applying generic measures could be "counterproductive" as the measures should rather be adapted to the hydropower plant's specific location (EC1). Measures such as to "reduce adverse impacts of eutrophication" were also seen as dependent on other factors than the hydropower facility, and feedbacks thus asked to remove the requirement (European Commission, 2020a, p. 108; e.g., EA14; EA17). The solution proposed by many in the low emissions group, however, was to replace the water criterion with a single reference to existing EU legislation.

Many respondents in the low emissions group suggested to replace the more than three pages long criterion with: "The activity complies with the provisions of Directive 2000/60/EC and in the Directive 2008/56/E" (e.g., EC1; EA1). The latter directive is the Marine Strategy Framework Directive (2008), which is similar to the WFD but applied to marine environments. This would also bring the criterion in line with the other renewable energy technologies, whose water criteria only reference EU legislation (European Commission, 2020a). Several feedbacks highlight that the Commission evaluated the WFD as "largely fit for purpose" in a recent Fitness Check of the directive, and thus did not understand why the Commission added new requirements for hydropower in the taxonomy (e.g., EC5; EC3).

The environmental group also asked for alignment with the WFD. Several of them were concerned with the WFD's exemptions from the no deterioration principle. Through the cost-benefit assessment, these exemptions are partly integrated into the water criterion. Most of the WFD's conditions are included in the assessment, such as to consider alternative means, benefits and costs and overriding public interest (European Commission, 2020a). The assessment does not, however, include a requirement to explain the reason for constructing the hydropower facility (Water Framework Directive, 2000, art. 4(7)). The Commission most likely omitted this condition as it is directed towards Member States, as their competent authorities must write the explanation in their River Basin Management Plan. However, the TEG had incorporated the condition in their final report by writing "ensure that the

conditions outlined in article 4(7) of the WFD are met based on ground evidence" (TEG, 2020a, p. 225). Some respondents suggested to replace the cost-benefit assessment with the WFD's list of conditions and include the TEG's recommendation to meet these conditions 'based on ground evidence' (e.g., ENG13; ENG23).

The environmental group also wanted to align the criterion further with the WFD on mitigation measures. For example, the stopfakegreen.eu campaign states that the criterion "should stress that all necessary mitigation measures should be implemented to reach good ecological status or potential, as required by the Water Framework Directive, without mentioning 'technical feasibility'" (CAMP2). Another respondent explained the consequence of including 'technical feasibility': "the way this is now worded would make it quite easy to challenge the sustainability eligibility of such projects on pure technicalities" (ESG3). Thus, removing the words could reduce uncertainty regarding which mitigation measures should be implemented (ENG28).

For some respondents in the environmental group, alignment with the WFD was not sufficient. An environmental organisation "strongly recommend that it is not sufficient to just meet the criteria through the implementation of the" WFD (ENG11). They give an example of the practice in Norway, stating that facilities "operating within a license, and now also to some extent in accordance with the WFD" have caused "significant damage to ecology and biodiversity of rivers" (ENG11). Another respondent suggested that facilities located in areas that do not meet the WFD's objectives should not be classified as sustainable (ENG28).

The Commission's requirement for no fragmentation was interpreted as weaker than the one proposed in the TEG's final report. Even though both drafts state that new hydropower projects should not lead to fragmentation, the draft delegated act specified that new plants leading to some deterioration of the water status should restore continuity within the river basin district to compensate for the fragmentation (European Commission, 2020a, p. 108). In contrast, the TEG's draft stated that refurbishment of existing facilities should be prioritised. Even though refurbishment also is prioritised in the draft delegated act, through the requirement for no alternative means in the cost-benefit assessment, the TEG's draft was more explicit. Some respondents stated that the Commission's draft "fails to protect already heavily fragmented freshwater ecosystems from further hydropower development" (e.g., ENG13; ENG23). To protect these ecosystems, they proposed to include the following

sentence from the TEG's final report: "construction of new hydropower should not lead to increase fragmentation of rivers, consequently refurbishment of existing hydropower plant and rehabilitation of existing barriers should be prioritised" (TEG, 2020a, pp. 225-226).

In general, several respondents preferred the TEG's recommendations. Both groups asked for more alignment with the WFD, as the TEG's draft had. The environmental group preferred some of the TEG's stricter requirements, such as excluding small hydropower and prioritising refurbishment of existing hydropower facilities. The low emissions group were pleased that the Commission decided to remove the exclusion of small facilities, but they preferred the TEG's general reference to mitigation measures instead of the Commission's list and their generally detailed requirements in the draft delegated act. Some respondents also highlighted that the TEG's recommendations were based on "a fact-based approach" (EA15). The Commission was urged to "follow the TEG's recommendations or improve them", as a weakening of the criteria could undermine the taxonomy's "scientific credibility" (ENG3).

5.5.3 Summary

The public consultation on the Commission's draft delegated act stands out from the two previous consultations. It received far more submissions, and the submissions showed greater variety. While the low emissions group outnumbered the environmental group in the previous consultations, the environmental group was by far the largest in this consultation. This was mainly due to the support of two campaigns – one small campaign dedicated to hydropower and one large commenting on a range of different activities. The two groups have largely kept the same views on sustainable hydropower throughout the public consultations. The environmental group still argues that hydropower either is not sustainable at all, or that only the most efficient and environmentally friendly hydropower facilities should be classified as sustainable. The low emissions group still portrays hydropower as sustainable, and still asks for criteria that are easier to comply with. However, the language changed somewhat in the third public consultation.

Especially noticeable was the emotional appeal in the smaller hydropower campaign. Previously the debate has mostly been structured around the technical aspects of the sustainability definition. In this case, both the smaller hydropower campaign and some other submissions made little reference to technical aspects. This may be due to the open-ended

format of the consultation as the respondents were not directly asked to share their opinions on metrics, thresholds and DNSH criteria. Nevertheless, most submissions still discussed the technical aspects and brought up similar questions and suggestions as in the TEG's public consultations.

The changes introduced by the Commission did not clearly align with either of the groups in the public consultations. They allowed small hydropower facilities to be classified as sustainable, which was received positively by the low emissions group. At the same time they ensured strict DNSH criteria, especially for the water objective, which the environmental group had asked for. However, several of the changes were not well-received by either of the groups. Even though the groups sometimes agree, such as in the case of referencing to the WFD, their views on sustainable hydropower cannot be reconciled. Which group did the Commission attempt to align with in the Climate Delegated Act?

5.6 Climate Delegated Act

The process of defining 'sustainable hydropower' for the climate change mitigation objective ended with the adoption of the Climate Delegated Act. The definition is now settled, at least until the definitions will be reviewed to ensure that they are up to date (Taxonomy Regulation, 2020). It seemed like the Commission had not expected the turnout in the public consultation. The Act was supposed to be adopted in January 2021, a month after closing the public consultation. However, due to the sheer number of submissions, and a disagreement between Member States on another activity's sustainability definition, adoption was delayed (Simon, 2021). The Climate Delegated Act was formally adopted in the beginning of June 2021 (Climate Delegated Act, 2021c). The Commission ended up revising the TSC for hydropower after the public consultation, and in the following I will review the changes from the draft delegated act.

5.6.1 Substantial contribution

The 'substantial contribution' criteria for hydropower mostly remained similar. As we see in Figure 6, the metrics and thresholds in (b) and (c) are the same as in the draft delegated act. However, the criterion (a) is new.

Technical screening criteria for electricity generation from hydropower
Substantial contribution to climate change mitigation
The activity complies with either of the following criteria:

(a) The electricity generation facility is a run-of-river plant and does not have an artificial reservoir;
(b) The power density of the electricity generation facility is above 5 W/m^2;
(c) The life-cycle GHG emissions from the generation of electricity from hydropower, are lower than 100gCO_2e/kWh. The life-cycle GHG emissions are calculated using Recommendation 2013/179/EU or, alternatively, using ISO 14067:2018, ISO 14064-1:2018 or the G-res tool. Quantified life-cycle GHG emissions are verified by an independent third party.

Figure 6. Substantial contribution criteria for hydropower. Reference: Climate Delegated Act (2021c), p. 66.

As we remember from earlier drafts, both HLEG and TEG were mostly concerned with the climate change impact of hydropower facilities with reservoirs. In HLEG's draft, it appeared that only GHG emissions stemming from reservoirs were counted, while the TEG explicitly considered hydropower facilities without reservoirs or built on existing ones as contributing substantially to climate change mitigation. However, without being requested by anyone participating in the public consultation, the TEG decided to remove the automatic eligibility of these facilities in the interim report. Instead, all existing facilities and refurbishment of existing facilities that did not enlarge reservoirs, were considered as contributing substantially to climate change mitigation. Run-of-river and reservoir facilities have since been treated equally. However, the reintroduction of the power density metric ensured that some of these facilities were exempted from performing an LCA.

According to the World Bank, most run-of-river facilities have a power density of more than 100 W/m^2 (World Bank, 2017, p. 26). However, the stopfakegreen.eu campaign stated that power density would not apply to derivation plants, which many run-of-river plants are. Since the TSC does not specify how power density should be calculated, it is not clear why the campaign states that the metric does not apply to these plants. Nevertheless, the new (a) criterion in the TSC makes it easier for run-of-river facilities to be classified as sustainable. These facilities now automatically comply with the substantial contribution criteria.

Most of the feedback was not incorporated into the substantial contribution criteria. The criteria did not exclude neither new nor small hydropower facilities, as the environmental group and the two campaigns had asked for. The large stopfakegreen.eu campaign's recommendations to reintroduce the TEG's declining threshold and to only include one methodology for the LCA was neither accepted by the Commission.

Several respondents within the low emissions group stated that the TSC breached the Taxonomy Regulation's technology neutrality principle. To be treated similarly as other renewable energy technologies, the respondents suggested that hydropower should be considered to contribute substantially to climate change mitigation without having to demonstrate its contribution. The new criterion (a) may be the Commission's response to the complains about technology neutrality. However, it seems like the Commission do not consider reservoir hydropower facilities as similar to other renewable energy technologies in terms of climate change impact, and thus kept the power density and LCA metrics.

In the adopted Climate Delegated Act, 'storage of electricity' now encompasses all pumped hydropower storage facilities. The activity does not have any 'substantial contribution' criteria relevant to pumped storage hydropower (Climate Delegated Act, 2021c). In contrast to hydropower, storage of electricity is not classified as contributing substantially to climate change mitigation by its own performance, but rather as an activity that enables other activities' substantial contribution (Climate Delegated Act, 2021c).

The storage of electricity's DNSH criteria for water divides PSH facilities based on their connection to a river body (Climate Delegated Act, 2021c). PSH facilities not connected to a river, i.e., pure pumped storage facilities, should comply with a generic water criterion listed in one of the appendices of the Climate Delegated Act. Mixed PSH facilities must comply with hydropower's water criterion, which is substantially more comprehensive. The DNSH criteria for adaptation, pollution and ecosystems are similar for the two activities, but storage of electricity has a circular economy criterion that requires implementing a waste management plan (Climate Delegated Act, 2021c, p. 76).

By including PSH facilities in storage of electricity while applying hydropower's water criterion to the mixed PSH facilities, the Commission seems to have made a compromise. The low emissions group stressed that PSH facilities would struggle to comply with the GHG

emissions threshold, as the facilities are net electricity consumers. However, the Commission seemed to define facilities into the hydropower facility based on their connection to a river. By applying different water criteria to the two types of PSH facilities, the Commission could ensure that the facilities did not have a GHG emissions threshold while still applying stricter water criteria to PSH facilities connected to rivers.

5.6.2 DNSH criteria

In the Climate Delegated Act, hydropower only has specific DNSH criteria for one environmental objective. As in the draft delegated act, DNSH criteria for circular economy and pollution are considered not applicable for the activity. Both the adaptation and ecosystems criteria apply to all or many of the activities and are thus placed into appendices in the Climate Delegated Act (2021c). Since there were few comments on any of these DNSH criteria in the public consultation, I will here only focus on the water criterion.

5.6.2.1 Water criterion

Respondents within the low emissions group hoped to see a one-sentence water criterion that only referred to existing EU legislation. Although the Commission did shorten the criterion, it still ended up being more than two pages long. The adopted water criterion is very detailed, but the Commission made some simplifications, including alignment with the WFD as suggested by most of the submissions in the third public consultation.

The requirements for existing plants have been shortened. In the previous draft, these plants would have to implement mitigation measures which should be monitored, and comply with a permit and the permit's mitigation measures. In the Climate Delegated Act, existing plants must still implement "all technically feasible and ecologically relevant mitigation measures", and these should still be monitored in relation to the permit (Climate Delegated Act, 2021c, p. 66). However, the Act does not explicitly ask for compliance with a permit. The list of mitigation measures is also changed. The Commission seems to have listened to the low emissions group, as they removed requirements such as to "ensure conditions as close as possible to undisturbed continuity" and to "reduce adverse impacts of eutrophication", both of which received negative feedback from the group (European Commission, 2020a, p. 106).

Figure 7. Water criterion's requirements for existing facilities.

The Commission made it more evident that the mitigation measures should be adapted to the facility's local conditions. In the draft, the list of mitigation measures was introduced by this sentence: "(…) and sets out all relevant mitigation measures necessary to:" (European Commission, 2020a, p. 106). In the Climate Delegated Act, the sentence was replaced with: "measures include, where relevant and depending on the ecosystems naturally present in the affected water bodies:" (Climate Delegated Act, 2021c, p. 66). Although the draft stated that "ecologically relevant mitigation measures" should be implemented, the formulation of the sentence above made the list of mitigation measures seem compulsory for several respondents (European Commission, 2020a, p. 105). Finally, the requirements for existing hydropower plants refer to the WFD's article 4 on environmental objectives and article 11 on measures (Climate Delegated Act, 2021c, p. 66).

Some of the changes to the requirements for existing facilities also applied to new facilities, such as the updated list of mitigation measures. In the draft, new projects causing no deterioration of the water status had a slightly different list of mitigation measures. In the adopted Act, the mitigation measures and their monitoring were streamlined for all facilities. The requirements to comply with a permit or the permit's mitigation measures were also removed for new facilities. In the previous draft, only new facilities causing some deterioration of water status had to implement measures to counteract any new fragmentation of the water bodies in the river basin district. In the Climate Delegated Act, the requirement was also added for hydropower projects that would not lead to any deterioration of the water status.

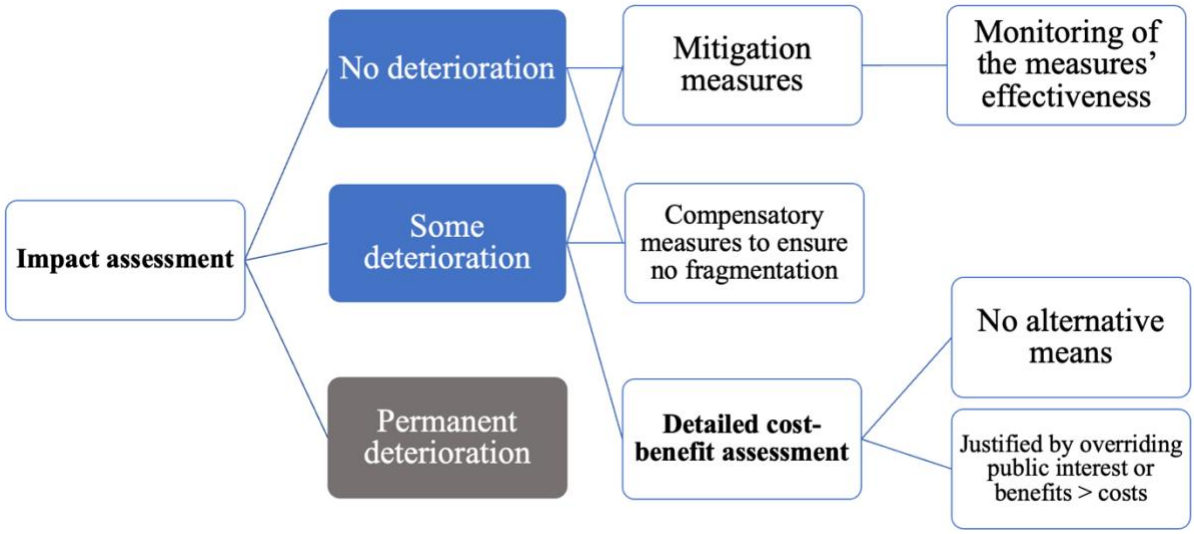

Figure 8. Water criterion's requirements for new facilities.

The final change relates to the impact assessment and cost-benefit assessment. The Commission now specified that the impact assessment should be in accordance with the WFD's exemptions listed in article 4(7) (Climate Delegated Act, 2021c). The text explaining the elements of the cost-benefit assessment for hydropower projects causing some deterioration is now somewhat closer aligned to the conditions in article 4(7) of the WFD. However, the Commission did not add a requirement to provide "ground evidence", as the TEG recommended. Nevertheless, they emphasise that the assessment should be "detailed" (Climate Delegated Act, 2021c, p. 67). The Commission also removed some examples of 'alternative means'. In the draft delegated act, the Commission listed four examples of how one may achieve the benefits provided by hydropower while causing less environmental impacts. In the Climate Delegated Act, they only included the two following examples: "refurbishing of existing hydropower plants or use of technologies not disrupting river continuity" (Climate Delegated Act, 2021c, p. 67). They may have removed the other examples to make the prioritisation of refurbishment more evident.

5.6.3 Summary

Compared to the changes the environmental and low emissions groups asked for, the changes introduced from the draft to the adopted Climate Delegated Act were minor. A visible change was the introduction of a run-of-river criterion, which makes these types of facilities automatically compliant with the 'substantial contribution' criteria. The Commission introduced several changes to the water criterion, of which the alignment to the WFD is likely welcomed by both groups. The most impactful change was likely the removal of some

of the strictest mitigation measures. The Commission also slightly increased the scope of the no fragmentation requirement. However, they did not go as far as the groups asked for. As we remember, the low emissions group wanted hydropower to be considered as substantially contributing to climate change mitigation, and they asked for a single reference to the WFD in the water criterion. The environmental group, on the other hand, asked for exclusion of all, or some types of hydropower facilities. Compared to these suggestions, the changes leading to the adopted definition of ‘sustainable hydropower’ were incremental.

6 Discussion

After deep diving into the documents involved in constructing the EU taxonomy's sustainability definitions, we can conclude that the issue of sustainable hydropower is highly technical. But as with the general concept of sustainability, the definition was contested. This was also the reason for analysing this case. As we saw in the theory chapter, the proliferation of technoscientific controversies has contributed to opening up policy processes to the public, as it has become increasingly evident that science alone could not inform policy (Chilvers & Kearnes, 2016). By studying one such technoscientific controversy, I hoped to find out whether the EU managed to involve the public in the process of defining sustainable hydropower, and if the public had any influence on the policy process.

This research interest led to a focus on both process and outcome. To study how the EU involved the public, I have focused on the 'technologies of elicitation' (Lezaun & Soneryd, 2007), that is, the public consultations. As explained by scholars within STS, they may elicit certain types of responses from the public, and different formats may give different results (Braun & Schultz, 2010). Thus, I have explored how the three public consultations were structured, what types of responses they received, and who participated. Furthermore, I have followed the process of creating 'sustainable hydropower' to assess whether the submissions attempted to modify the framing of the issue, and if they succeeded. This allowed me to explore whether the public could participate in a debate about "the proper public meaning and definition of the issue(s) being contested", or if the discussion was reduced to 'technical decision making' (Wynne, 2003, p. 404).

The discussion will be structured around the questions I posed at the end of chapter 3: was the public free to suggest alternative framings of 'sustainable hydropower'? Did the technologies of elicitation limit the discussion? Did the EU succeed in involving the public, and did they listen to them? This will allow me to answer the research question: *how have the public consultations affected the EU taxonomy's definition of sustainable hydropower?*

6.1 The issue of 'sustainable hydropower'

Throughout the policy process, the issue of 'sustainable hydropower' was largely defined in the same way. Since the TEG's taxonomy pack, the sustainability of hydropower has been assessed through a set of criteria that demonstrates which facilities contribute substantially to

one environmental aspect as well as not significantly harming other environmental objectives. The main focus has been on the activity's ability to mitigate climate change, while some other environmental sustainability aspects were included through the DNSH criteria. Even though most of the changes between the expert groups' and the Commission's drafts were incremental, we did see several attempts to modify the issue and to reframe 'sustainable hydropower'. These attempts will be explored in this section.

Based on their understanding of hydropower's sustainability, the submissions could be broadly categorised into two groups, which I chose to call the 'low emissions' and the 'environmental' groups. Respondents within the low emissions group tried to couple sustainable hydropower with decarbonisation of the power sector. The respondents, who were mostly organisations working within the energy sector, attempted to show the vital role of hydropower in the decarbonisation process. Several of them emphasised that hydropower not only releases low amounts of GHG emissions, but it also enables intermittent renewable energies such as wind and solar power, since it can store energy and release it when needed. These organisations thus related the sustainability of hydropower not only to its own contribution to climate change mitigation, but its ability to enable other sustainable activities.

It seemed like hydropower's substantial contribution to climate change mitigation was a matter of fact for these respondents, and thus the submissions mainly focused on how to ensure future investments into the technology. Their main aims were to make the criteria easy to understand and to apply, and to ensure that hydropower was on a level playing field with other renewable energy technologies. Thus, most of them argued for classifying all hydropower facilities as substantially contributing to climate change mitigation. In case hydropower would still need to demonstrate its contribution to climate change mitigation, they also attempted to make other changes. For example, they redefined PSH facilities as 'storage of electricity' to avoid the stricter criteria for the hydropower activity.

The respondents within the environmental group rather focused on the ambition level of the taxonomy than its applicability. This group was mostly composed of NGOs and citizens. In contrast to the low emissions group, these respondents tried to decouple sustainable hydropower from decarbonisation. They used some of the same evidence as the low emissions group, such as hydropower's low emissions on average. Instead of concluding that hydropower already contributes significantly to climate change mitigation, these respondents

argued that the numbers show that the taxonomy can be more ambitious when it comes to the GHG emissions threshold. Many also stressed that other renewable energy technologies also have low emissions, but they cause less environmental damage. They thus argued that hydropower, and especially small facilities, is not needed to decarbonise the power system, and should be excluded from the taxonomy.

The organisations in the low emissions group mostly tried to make small modifications to the issue of sustainable hydropower. They maintained that hydropower already significantly mitigate climate change and regarding the other environmental objectives they mainly commented that hydropower is strictly regulated within the EU. In most cases, the organisations seemed to believe that hydropower facilities could comply with the criteria, and that the administrative burden was the main obstacle. Thus, they did not try to reframe sustainable hydropower, but rather introduce small modifications to reduce the administrative burden. The respondents from the environmental group arguing for a stricter GHG emissions threshold also tried to introduce smaller modifications. A stricter threshold would mainly exclude outliers, not most hydropower facilities. However, many within the environmental group also attempted to reframe hydropower's sustainability more fundamentally.

The respondents arguing to exclude small or new hydropower had a broader understanding of what 'sustainability' entails. For organisations in the low emissions group and in most of the drafts, sustainability was almost equalled to climate change mitigation since other environmental objectives were only included to account for 'significant harm'. The NGOs and citizens in the environmental group, on the other hand, attempted to bring other aspects of sustainability into the criteria. For example, during the TEG's two consultations several of the respondents asked the TEG to include social impacts. They also attempted to make the DNSH criteria stricter for the other five environmental objectives, and perhaps stricter than 'significant harm' as well.

Regarding other aspects of environmental sustainability, most of the organisations in the low emissions group seemed to maintain that "the significant contribution to decarbonising the power sector outweighs the not significant effect on the environmental goals" (EA4). This is almost the opposite of the respondents in the environmental group, where the significant effect on other sustainability aspects did outweigh hydropower's contribution to decarbonisation. Even though the sustainability definition was supposed to be linked to the

environmental objective of climate change mitigation, these respondents seemed to uphold that sustainability cannot be reduced to one aspect. And by having this broader definition of sustainability, hydropower could not be classified as sustainable.

I want to emphasise that there were differences between the submissions in each group. The degree of modification they tried to introduce were in some cases different, not only between the submissions but also within one submission. This was for example the case in the stopfakegreen.eu campaign and many similar submissions. They asked for an exclusion of new hydropower facilities, but at the very least small facilities should be excluded. The submissions may have been shaped by perceived expectations from the EU (Lövbrand et al., 2011), and thus tried to adjust their responses to what they thought would be possible to get acceptance for. This brings us over to the next question: did the format of the public consultation affect the public's ability to modify the issue, or to suggest new framings of sustainable hydropower?

6.2 Public consultations

This case has allowed us to explore two different technologies of elicitation. In the first two public consultations, feedback was elicited through questionnaires. In the third public consultation, the respondents could freely write feedback into a textbox, and/or upload a PDF.

The TEG's questionnaires were tied to their drafts. The drafts proposed a certain definition of sustainable hydropower, composed of metrics, thresholds and DNSH criteria. The questionnaires posed questions directly related to these technical aspects. In some cases, the questionnaires asked for 'alternatives', however it appeared like they asked for alternative metrics, for example, rather than alternatives to metrics. The questionnaires were thus structured around the way in which the TEG had already defined hydropower, rather than opening up the question of how it should be defined.

It was not only the technologies of elicitation that reduced sustainable hydropower to one definition. The decision to classify hydropower based on a set of 'technical screening criteria' was decided in a separate policy process on the taxonomy framework. Sustainable hydropower was therefore placed into a technical context. For the respondents of the

questionnaires to comment on whether they agreed with the proposed criteria, or whether the criteria should be changed, they would need to understand how these technical aspects affect our understanding of 'sustainable hydropower'. They would thus have to dive into the technical details, as we have. Could the EU expect the public to become engaged in the policy process when the 'knowledge barrier' for entry is high? And could another structure of the public consultations have increased participation?

The European Court of Auditors asked participants in different public consultations on their views on the EU's questionnaires (European Court of Auditors, 2019). They found that almost one third of the over 2 000 citizens consulted thought questionnaires posed "too technical" questions, and some pointed out that the consultation documents had a very technical language. 76% preferred open questions, and one citizen emphasised that technical questions "are not always accessible" (European Court of Auditors, 2019, p. 34). Could the technical language of the taxonomy's drafts and the technical questions in the questionnaires have limited public participation? While it is not possible for me to know whether some citizens considered to submit feedback but withdrew when they saw the length and language of the questionnaire, it is worth pointing out that only 9% of those who responded to the public consultation on the taxonomy pack were registered as individuals. Even though participation by citizens increased to 45% in the second consultation, it decreased for the hydropower activity.

The third public consultation was different in several ways. While most respondents in the TEG's public consultations could be categorised as belonging to the low emissions group, the participation amongst respondents sharing the 'environmental' view significantly increased in the third public consultation. The great majority of the feedback within the environmental group were submitted through campaigns, both the two identified by the EU and smaller campaigns and collaboration within the 'unique' feedback. Participation thus significantly increased when switching to a format that facilitated for such campaigns. The increase in participation may also have been affected by the stage of the policy process and the location. The sustainability definitions were now in the hands of the Commission, and the public consultation was the last chance of commenting on hydropower's sustainability before the definition became adopted. The consultation was also published on the EU's *Have Your Say* portal, along with all other public consultations hosted by the Commission. It may thus have been easier to find this consultation than the two others posted on the EU Survey website.

The content of the submissions was also different from the feedback received through the TEG's questionnaires. While the responses to the TEG's consultations mostly had been structured around the questions, the feedback in the third public consultation showed greater variety. The respondents spent everything from one sentence to several pages on discussing the technical criteria. Some of the submissions did not even mention the content of the draft delegated act, such as several of the submissions that asked to reinstate the TEG's exclusion of small hydropower. There was also a larger variety of rhetoric used, as exemplified by the emotional appeal in the beginning of the smaller hydropower campaign's feedback: "please consider removing the construction of new hydropower plants from the taxonomy!" (CAMP1). Like in the TEG's consultations, respondents used scientific reports, EU documents and regulations, and existing classification systems to support their claims. However, the third consultation also received other types of evidence such as court cases, pictures of dry rivers and personal opinions. The format of the technology of elicitation thus seems to have opened up the policy process to both more participants and to a wider variety of feedback.

6.3 The public and experts

One of the questions I asked was whether the EU listened to the public, or if they mostly relied on experts. If I am to discuss this, I must draw a boundary between these two. I would argue that the boundary should not go between the respondents to the public consultation and the members of the expert groups. The members of the expert groups were not different from many of the participants, and in fact, some of the organisations represented in the expert group also participated in the public consultations. I would rather argue here that experts, in this context, were those familiar with either classification systems for sustainability, climate and environmental issues or with hydropower.

This renders almost all of the participants to the TEG's public consultations experts. In the public consultation on the draft delegated act, citizens were more involved. However, some of these were also experts, in my definition, and even more submitted feedback written by experts. This is especially the case with the stopfakegreen.eu campaign, where the comments on hydropower were written by an environmental organisation that had both been represented in the TEG and submitted feedback to the TEG's consultations. The public's entry into the policy process was thus mediated, either by the technologies of elicitation or the campaigns.

As we saw in the theory chapter, classifications of expertise such as Collins and Evans (2002)'s is meant to help find who possesses relevant expertise to a policy process. But as I argued, the relevant question is not who should be able to participate, but rather how can we ensure to bring different understandings of the issue in question into the policy process. In this case, a classification of expertise can nevertheless help us understand who brought in these different understandings.

If only experts had participated in the policy process, the process would mostly have been reduced to one of 'technical decision making'. The large majority, if not all, of the respondents within the low emissions group can be classified as experts. They mostly asked for changes and clarifications of the criteria. There were also experts within the environmental group, and they did introduce a new understanding of hydropower's sustainability. However, during the TEG's consultations they were few in numbers. They did, apparently, succeed in opening up the sustainability definition, as the TEG both included social impacts and excluded small hydropower in their final report. This is why I emphasise that it would 'mostly' be reduced to technical decision making. It was first in the third public consultation, when citizens became more involved, that we could see that this alternative framing of hydropower was not only shared by a few respondents. The focus also slightly changed, from the technical details to hydropower itself. The main question for many respondents was no longer 'how do we classify hydropower as sustainable?' but rather 'can hydropower be classified as sustainable?'.

Distinguishing between experts and non-experts can thus be useful to understand which role the public can have in policy processes and to acknowledge their contributions. It can also be useful to design technologies of elicitation that can open up the issue.

I would argue that it was not the EU that succeeded in involving the public in this policy process. The TEG's questionnaires received few responses, and even less from citizens. The third public consultation received thousands of submissions. Most of these came from one campaign – stopfakegreen.eu. It was thus the campaigns that succeeded in involving the public, rather than the EU. This has also been the case in other public consultations (Scheer & Höppner, 2010). The format of the technology of elicitation facilitated for such campaigns, but at least for the stopfakegreen.eu campaign the citizens did not even need to enter the EU's

portal as they could participate through the campaign's website. So how could the EU have improved public participation, and opened for a debate on the public meaning of 'sustainable hydropower'?

To facilitate for more participation and an open debate on the public meaning of the issue, the EU should 'fit the consultation to the citizen', to borrow Scheer and Höppner (2010)'s term (p. 273). It may well be that citizens opted out of the consultation or participated through campaigns written by experts because they did not believe they had sufficient knowledge to participate in such a technical policy process. This would corroborate the findings of Scheer and Höppner (2010), where citizens overcame the need for knowledge "by relying on a trusted organization" and prewritten campaign submissions (p. 270). It would perhaps not be enough to "include a set of more general questions for non-specialist" to the questionnaires, as suggested by the European Commission (2021a, p. 15). Rather, the technologies of elicitation may have elicited different types of feedback if they opened for a debate on the issue at hand before 'sustainable hydropower' was reduced to metrics, thresholds and DNSH criteria.

7 Concluding remarks

The concept of sustainability has gained wide traction the past decades. Yet, it has been difficult to define what is sustainable. This had led to concerns of greenwashing, where activities are falsely portrayed as sustainable. To identify which activities are truly sustainable, several classification systems have been created. However, the European Union (EU) feared that discrepancies between different classifications could hinder investments into sustainable activities, which are needed to fund the transition to a more sustainable European economy. Thus, the EU decided to create "a common and unique language on sustainability" with detailed definitions of the sustainability of several economic activities (European Commission, 2018d, p. 6). The classification system for sustainable activities, or the EU taxonomy has received wide attention not least because of the impact it may cause in redirecting private investments.

In this thesis, I have focused on the case of defining hydropower's sustainability in the EU taxonomy. There has been controversy around how one should define 'sustainable hydropower', and whether the activity is sustainable. The taxonomy's definitions of sustainability may affect how we understand what sustainability entails. Thus, it is a public issue, and the public should be able to discuss the meaning of sustainability. The EU invited the public into the process of defining 'sustainable hydropower' through three public consultations. I have approached these consultations as specific technologies that allow the public to enter the policy process – as 'technologies of elicitation' – and analysed what these technologies do to the public's involvement in the issue. By following the documents involved, both the drafts of hydropower's sustainability definition and the responses to the public consultations, I have explored whether the public could modify or reframe the sustainability definition.

The two different technologies of elicitation that were used did influence the submissions received. For the first two public consultations, most of the submissions were structured around the questions posed in the questionnaires. The respondents engaged in a technical debate about how hydropower's sustainability, introducing smaller modifications to the definition. Some submissions did slightly deflect from the questionnaires, and brought up the issue of whether hydropower was sustainable. These submissions attempted to reframe hydropower's sustainability by introducing a broader understanding of what sustainability

entails. The third public consultation was openly structured and received significantly more submissions and a wider variety of feedback. The format of the consultation facilitated for campaigns, and it was largely these campaigns that succeeded in bringing the public into the policy process.

Even though many of the submissions only introduced smaller modifications to the issue of sustainable hydropower, some participants in the public consultations did suggest a new framing of hydropower's sustainability. However, several of those who suggested an alternative framing also added a 'compromise' between their own framing and that of the expert groups and the Commission. This could suggest that they did not believe their feedback would be able to transform the issue.

This thesis has shown that not only experts have meaningful contributions to policy processes on technoscientific issues. However, it has also shown that it can be difficult to engage non-experts in technical debates and that the issue can easily be reduced to one of 'technical decision making'. This begs the question, how can we open up the policy process to achieve meaningful debates on the framing of public issues? This has been an important question within STS, and this thesis demonstrate that technologies of elicitation mediate the public's entry into the policy process. If we are to 'fit the consultation to the citizen', as suggested by Scheer and Höppner (2010), we should further explore what it would take to engage the public, and especially non-experts, in policy processes on technoscientific issues. There are many ways of structuring public consultations, and case studies of different formats could help finding out which types of technologies of elicitation can open up the policy process to a wider variety of public meanings on technoscientific issues.

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Appendix 1. List of analysed documents

Author and year	Title	Context
High-Level Expert Group on Sustainable Finance (HLEG), 2018	Financing a sustainable European economy	The HLEG's recommendations for sustainable finance reforms, including establishing an EU taxonomy
High-Level Expert Group on Sustainable Finance (HLEG), 2018	Informal supplementary document on sustainable taxonomy	The first outline of the taxonomy with technical screening criteria (TSC) for hydropower
European Commission, 2018	Proposal for a Regulation of the European Parliament and of the Council on the establishment of a framework to facilitate sustainable investment. COM(2018) 353 final	The Commission's proposal for a taxonomy framework
Technical Expert Group on Sustainable Finance (TEG), 2018	Taxonomy pack for feedback and workshops invitations	The TEG's first suggestions for TSC for hydropower and questions for the first public consultation
Technical Expert Group on Sustainable Finance (TEG), 2019	Taxonomy Technical Report	The TEG's interim report, with the second suggestions for TSC for hydropower
EU Survey, 2019	Published Results: teg-report-taxonomy	The questionnaire for the TEG's second public consultation on the interim report.
Technical Expert Group on Sustainable Finance (TEG), 2020	Taxonomy: Final report of the Technical Expert Group on Sustainable Finance.	The TEG's final recommendations for the EU taxonomy on the climate change mitigation and adaptation objectives
Technical Expert Group on Sustainable Finance (TEG), 2020	Taxonomy Report: Technical Annex	The TEG's final recommendations for hydropower's TSC
European Parliament and Council of the European Union, 2020	Regulation (EU) 2020/852 of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088	The taxonomy framework

European Commission, 2020	Annex 1 to the Commission Delegated Regulation (EU) .../... supplementing Regulation (EU) 2020/852 of the European Parliament and of the Council by establishing the technical screening criteria for determining the conditions under which an economic activity qualifies as contributing substantially to climate change mitigation or climate change adaptation and for determining whether that economic activity causes no significant harm to any of the other environmental objectives	Annex to the draft Climate Delegated Act with the proposed TSC for climate change mitigation
European Commission, 2021	Commission Delegated Regulation (EU) 2021/2139 of 4 June 2021 supplementing Regulation (EU) 2020/852 of the European Parliament and of the Council by establishing the technical screening criteria for determining the conditions under which an economic activity qualifies as contributing substantially to climate change mitigation or climate change adaptation and for determining whether that economic activity causes no significant harm to any of the other environmental objectives	The Climate Delegated Act, with the adopted TSC for hydropower.

Appendix 2. List of analysed submissions

Description of the table:

Column 'code': The codes used to reference the feedback in the thesis.

Column 'name': Names of the respondents. Individuals have been anonymized.

Columns 'taxonomy pack', 'interim report' and 'draft delegated act': shows whether the respondents submitted feedback to the first, second and third public consultations, respectively. "Yes" means that the respondent submitted feedback, "Not relevant" means that they submitted feedback that did not comment on the hydropower activity. Since some respondents were anonymous, it was not possible to find out whether they submitted feedback to other public consultations. These are marked with "N/A". The third public consultation had codes for each submission, which are written in the last column.

Code	Name	Taxonomy Pack	Interim Report	Draft delegated act
AC1	Commissariat à l'énergie atomique et aux énergies alternatives (CEA)	No	Not relevant	F1331287
AC2	Luleå University of Technology	No	No	F1319762
AC3	SINTEF	No	No	F1346011
AG1	Swedish Landowners´ Organization	No	No	F1346544
ANON1	Anonymous	N/A	N/A	F1308145
ANON2	Anonymous	N/A	N/A	F1350731
ANON3	Anonymous	N/A	N/A	F1308060
ANON4	Anonymous	N/A	N/A	F1307830
ANON5	Anonymous	N/A	N/A	F1306600
ANON6	Anonymous	N/A	N/A	F1306538
ANON7	Anonymous	N/A	N/A	F1352090
ANON8	Anonymous	N/A	N/A	F1346497
ANON9	Anonymous	N/A	N/A	F1322541
ANON10	Anonymous	N/A	N/A	F1344176
ANON11	Anonymous	N/A	N/A	F1352625
ANON12	Anonymous	N/A	N/A	F1308126
ANON13	Anonymous	N/A	N/A	F1346517
ANON14	Anonymous	N/A	N/A	F1351112
BA1	Confederation of Industry of the Czech Republic	No	No	F1346242
BA2	Federation of Austrian Industries / Österreichische Industriellenvereinigung (IV)	No	No	F1346313
BA3	Installatörsföretagen Service AB	No	No	F1307951

BA4	Confederation of Norwegian Enterprise (NHO)	No	Not relevant	F1346250
BA5	The Federation of Norwegian Industries	No	No	F1325178
BA6	Technology Industries of Finland	No	No	F1348676
BA7	Teknikföretagen	No	No	F1347379
BA8	Nelfo (NHO)	No	No	F1346868
BA9	Norwegian Securities Dealers Association	No	No	F1346304
BA10	Confederation of Swedish Enterprise	Not relevant	No	F1346253
BA11	Samfunnsbedriftene	No	No	F1344316
BA12	SGI Europe	No	No	F1349156
BA13	The Swedish IT and Telecom Industries (IT&Telekomföretagen)	No	No	F1344050
BA14	AFEP - French Association of Large Companies	Yes	Not relevant	Not relevant
BA15	The Balance Commission (Balanskommissionen)	No	No	F1346034
BA16	Fellesforbundet	No	No	F1320953
CAMP1	Small hydropower campaign	N/A	N/A	Campaign 3 on *Have Your Say* portal, e.g., F1353162
CAMP2	Large campaign: stopfakegreen.eu	N/A	N/A	Campaign 1 on *Have Your Say* portal, e.g., F1355607
EA1	Eurelectric	Yes	Yes	F1319049
EA2	Energiföretagen Sverige - Swedenergy	Yes	Yes	F1344323
EA3	Association of Austrian Electricity Companies	No	Yes	F1351206
EA4	BDEW German Association of Energy and Water Industries	Yes	Yes	F1345922
EA5	Energy Norway	Yes	No	F1307664
EA6	Finnish Energy	Yes	Yes	F1307659
EA7	FORATOM (European Atomic Forum)	Not relevant	Yes	F1292703
EA8	The Federation of Electric Power Companies	Yes	Yes	No
EA9	Eurogas aisbl	No	Yes	Not relevant
EA10	Polish Electricity Association (PKEE)	No	Yes	Not relevant

EA11	International Hydropower Association	No	No	F1346290
EA12	VGB PowerTech e.V.	No	No	F1345675
EA13	CEDEC	No	Not relevant	F1323914
EA14	France Hydro Electricité	No	No	F1306215
EA15	EASE - European Association for Storage of Energy	No	No	F1345796
EA16	European Federation of Energy Traders (EFET)	No	No	F1346526
EA17	European Renewable Energy Federation	No	No	F1346023
EA18	The Romanian Atomic Forum	Not relevant	No	F1292791
EA19	Norwegian small hydropower association	No	No	F1322078
EA20	Svebio, Swedish Bioenergy Association	Not relevant	Not relevant	F1323197
EA21	Union Française de l'Electricité (UFE)	No	No	F1306429
EA22	World Nuclear Association	Not relevant	Not relevant	F1303757
EA23	Nuclear Industry Association	No	Not relevant	F1347492
EC1	Vattenfall	No	Yes	F1308010
EC2	CEZ Group	Yes	Not relevant	F1320870
EC3	EDF	Yes	Yes	F1308766
EC4	ENGIE SA	Yes	Yes	F1306258
EC5	Iberdrola, S.A.	Yes	Yes	F1346266
EC6	RWE AG	Yes	Yes	F1344890
EC7	Statkraft	Yes	No	F1308154
EC8	Uniper SE	No	Yes	F1327063
EC9	Repsol S.A.	Yes	Yes	Not relevant
EC10	VERBUND AG	No	Yes	In German
EC11	Naturgy	No	Yes	No
EC12	Energias de Portugal, SA	No	Yes	No
EC13	PGE Polska Grupa Energetyczna S.A.	No	Yes	Not relevant
EC14	Arbeitsgemeinschaft Alpine Wasserkraft e.V.	No	No	F1345786
EC15	VB Energi AB	No	No	F1322593
EC16	Acciona	No	No	F1344644
EC17	Andritz Hydro	No	No	F1345391
EC18	BKK AS	No	No	F1303633

EC19	EnBW Energie Baden-Württemberg AG	No	Not relevant	F1353527
EC20	Enel	No	No	F1328213
EC21	Fortum	No	No	F1346021
EC22	Holding Slovenske elektrarne d.o.o.	No	No	F1308006
EC23	MVM Zrt.	No	No	F1306256
EC24	Northvolt	No	No	F1344903
EC25	SN Nuclearelectrica SA	No	No	F1292747
EC26	Slovenské elektrárne	No	No	F1345809
EC27	Pohjolan Voima Oyj (PVO)	No	No	F1322034
EC28	Skagerak Kraft AS	No	No	F1307834
EC29	Mjölby-svartådalen Energi AB (MSE)	No	No	F1346028
EC30	Tekniska verken i Linköping AB	No	No	F1344048
EC31	Lyse Produksjon AS	No	No	F1319474
EC32	Nordion energi	No	No	F1351348
EC33	Härjeåns Kraft AB	No	No	F1306174
ECON1	The Carbon Trust	No	Yes	No
ECON2	EnergyPro Ltd	Yes	No	No
ECON3	Jacobs	No	No	F1337240
ECON4	Energy Community Secretariat	No	No	F1351158
ENG1	BirdLife Europe and Central Asia	No	Yes	F1308092
ENG2	Rivers without Boundaries International Coalition	No	Yes	F1345685
ENG3	WWF European Policy Office	Yes	Yes	F1345650
ENG4	European Environmental Bureau	No	Yes	Not relevant
ENG5	ECOS	Not relevant	Yes	No
ENG6	AGENT GREEN	No	No	F1344175
ENG7	Bat Conservation Ireland	No	No	F1346262
ENG8	WWF Adria (Montenegro)	No	No	F1307627
ENG9	WWF Adria (Albania)	No	No	F1307984
ENG10	Friends of the Earth Norway, The Norwegian Trekking Association, The Norwegian Association of Hunters and Anglers, The Norwegian Outdoor Council, The Norwegian Biodiversity Network, Norwegian Salmon Rivers	No	No	F1346300
ENG11	Naturvernforbundet - Friends of the Earth Norway	No	No	F1354377
ENG12	WWF Austria	No	No	F1344727
ENG13	Riverwatch	No	No	F1308031 & F1325278
ENG14	Balkanka Association	No	No	F1351222

ENG15	Suomen luonnonsuojeluliitto (Finnish Association for Nature Conservation)	No	No	F1347293
ENG16	Italia Centre for River Restoration	No	No	F1307575
ENG17	NABU e.V.	No	No	F1308013
ENG18	CounterCurrent – GegenStroemung	No	No	F1345503
ENG19	EdEn (Equilibre des Energies)	No	No	F1323183
ENG20	EuroNatur	No	No	F1344306 & F1326780
ENG21	Association 2Celsius	No	No	F1354686
ENG22	National Ecological Center of Ukraine	No	No	F1330395
ENG23	Österreichisches Kuratorium für Fischerei und Gewässerschutz	No	No	F1342290
ENG24	European Anglers Alliance (EAA)	No	No	F1351189
ENG25	Free Rivers Italia	No	No	F1344859
ENG26	ass. Bolsena Lago d'Europa	No	No	F1351104
ENG27	River Collective	No	No	F1323713
ENG28	CEE Bankwatch Network	No	Yes	F1346496
ENG29	BiodrivMitt	No	No	F1346055
ENG30	ShareAction	No	No	F1346312
ENG31	Leefmilieu	No	No	F1344881
ENG32	Insitute for Ecology and Action Anthropology (INFOE)	No	No	F1345663
ENTH1	E3G	Not relevant	Not relevant	F1347407
ENTH2	International Institute for Sustainable Development (IISD)	Yes	No	No
ESG1	IPC GmbH	No	No	F1347133
ESG2	GRESB B.V.	Yes	Not relevant	No
ESG3	Climate Bonds Initiative	No	No	F1351599
ESG4	Sustainalytics	Yes	Not relevant	Not relevant
FIN1	Association for Financial Markets in Europe (AFME)	Not relevant	Yes	No
FIN2	European Savings and Retail Banking Group	No	Yes	Not relevant
FIN3	Finance Finland	No	No	F1343123
FIN4	Finance Norway	No	Not relevant	F1346240
FIN5	Nordic Investment Bank	Yes	Not relevant	F1347137
FIN6	NATIXIS	Yes	No	No
FIN7	BANCO BILBAO VIZCAYA ARGENTARIA (BBVA)	Yes	No	No

FIN8	Triodos Bank	Yes	Yes	Not relevant
FIN9	Sycomore Asset Management	No	Yes	No
FIN10	Candriam	No	Yes	No
FIN11	Swedbank AB (publ)	Not relevant	Yes	Not relevant
FIN12	Affirmative Investment Management	No	Yes	No
FIN13	Groupe BPCE	No	No	F1346335
FIN14	Unicredit	No	No	F1347269
FIN15	MSCI	Yes	Not relevant	No
FIN16	European Association of Co-operative Banks (EACB)	Not relevant	Not relevant	F1346537
FIN17	European Association of Public Banks (EAPB)	Not relevant	Not relevant	F1345652
FINGO1	Finance Watch	No	No	F1345802
FOR1	Holmen AB	No	No	F1327566
FOR2	UPM-Kymmene Oyj	Not relevant	No	F1329508
IND1	Individual	No	Yes	No
IND2	Individual	No	No	F1308098
IND3	Individual	No	No	F1307833
IND4	Individual	No	No	F1344444
IND5	Individual	No	No	F1323755
IND6	Individual	No	No	F1346268
IND7	Individual	No	No	F1307582
IND8	Individual	No	No	F1344058
IND9	Individual	No	No	F1307525
IND10	Individual	No	No	F1307849
IND11	Individual	No	No	F1353920
IND12	Individual	No	No	F1351221
IND13	Individual	No	No	F1308143
IND14	Individual	No	No	F1307811
IND15	Individual	No	No	F1307944
IND16	Individual	No	No	F1307991
IND17	Individual	No	No	F1330355
IND18	Individual	Yes	No	No
IND19	Individual	Yes	No	No
MA1	Luossavaara-Kiirunavaara AB (LKAB)	No	No	F1345775
MA1	SveMin	No	Yes	F1347068
MA2	Eurometaux	No	Not relevant	F1351216
MA3	Finnish Steel and Metal Producers	No	No	F1350339

MA4	Orgalim, Europe's Technology Industries	No	No	F1346065
MED1	Corporate Knights	Yes	No	No
POL1	Member of the European Parliament	No	No	F1341876
POL2	Sweden Democrat Group in the Sw. Parliament	No	No	F1344208
POL3	Member of European Parliament (Renew Europe)	No	No	F1331171
PUB1	Federal Environment Agency Austria	Yes	Yes	F1353948
PUB2	German Environment Agency	No	Yes	Not relevant
PUB3	The CPMR North Sea Commission (NSC)	No	No	F1323646
PUB4	Association of Finnish Local and Regional Authorities (AFLRA)	No	No	F1345683
PUB5	Swedish Association of Local Authorities and Regions	No	No	F1344622
PUB6	Council of European Municipalities and Regions (CEMR)	No	No	F1308160
PUB7	Government of the Czech Republic	No	Yes	F1347815
PUB8	Ministry if Finance, Ministry of the Environment (Czech Republic)	Yes	No	No
PUB9	Norwegian Ministry of Finance	No	No	F1326801
PUB10	The Government of Finland/ The Ministry of Finance	No	No	F1348831
PUB11	Ministry of Finance, Ministry of Industries [Iceland]	No	No	F1346014
PUB12	Northern Sparsely Populated Areas (NSPA)	No	No	F1346525
PUB13	AFD French Development Agency group (including PROPARCO)	Yes	No	No
PUB14	Government Offices of Sweden	No	No	F1355488
PUB15	City of Stockholm	No	No	F1344064
REAL1	Swedish Property Federation	Not relevant	No	F1307600
REAL2	Platzer Fastigheter Holding AB (Publ)	No	No	F1348167
REAL3	Rikshem AB	No	No	F1322301
REAL4	Diös Fastigheter AB (Real Estate company)	No	No	F1306269
SOC1	Business & Human Rights Resource Centre	No	Yes	No