Towards ecological governance in EU energy law

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with a focus on biomass regulation and
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by

Renske Anne Giljam

born on 8 January 1980
in Amsterdam

Supervisors
Prof. H.H.B. Vedder
Prof. M.M. Roggenkamp

Assessment Committee
Prof. K.J. de Graaf
Prof. M.G.W.M. Peeters
Prof. M. Lee

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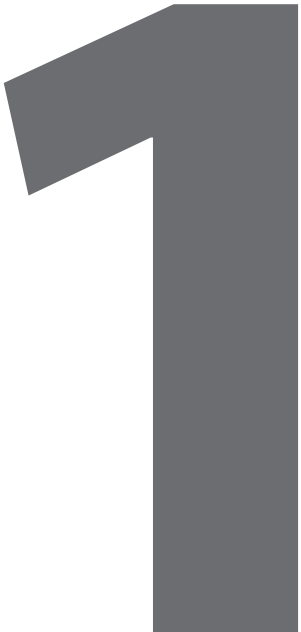
Abbreviations

AB	Appellate Body (of the WTO)
AEEL	Associated Net-Electrical Efficiency Levels (BAT)
AoA	Agreement on Agriculture (agreement part of WTO)
BAT	Best Available Techniques
BATNEEC	Best Available Techniques Not Entailing Excessive Costs
BAU	Best Available Use
BREF	Reference Document on Best Available Techniques
CAP	Common Agricultural Policy
CCS	Carbon Capture and Storage
CDM	Clean Development Mechanism
CEN	Committee for Standardisation
CHP	Combined Generation of Heat and Power
CJEU	Court of Justice of the European Union (formerly ECJ)
CO_2	Carbon Dioxide
COP	Conference of the Parties
CUP	Cambridge University Press
DLUC	Direct Land-use Change
DSO	Distribution System Operator
EC	European Community (predecessor EU)
ECJ	European Court of Justice (now named CJEU)
ECM	Economics and Cross-Media Effects (REF)
Eco-AP	Eco-innovation Action Plan
ECT	Energy Charter Treaty
EEA	European Environment Agency
EEC	European Economic Community (predecessor EC)
EED	Energy Efficiency Directive
EEELR	European Energy and Environmental Law Review
EELF	European Environmental Law Forum
EFS	Emissions From Storage (BREF)
EIA	Environmental Impact Assessment
ELV	Emission Limit Value
ENE	Energy Efficiency (BREF)
EPR	Extended Producer Responsibility
ETAP	Environmental Technologies Action Plan
ETS	Emissions Trading Scheme
EU	European Union
FCCC	Framework Convention on Climate Change

FQD	Fuel Quality Directive
GAEC	Good Agricultural and Environmental Conditions
GATS	General Agreement on Trade in Services (agreement part of WTO)
GATT	General Agreement on Tariffs and Trade (agreement part of WTO)
GC	General Court of the CJEU (formerly Court of First Instance, CFI)
GCEL	Groningen Centre of Energy Law
GESP	Groningen Energy and Sustainability Programme
GHG	Greenhouse Gas
ICT	Information and Communication Technology
IEA	International Energy Agency
IED	Industrial Emissions Directive
ILUC	Indirect Land-Use Change
INECP	Integrated National Energy and Climate Plan
INRA	Institut National de la Recherche Agronomique
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standardization
JEL	Journal of Environmental Law
JERL	Journal of Energy and Natural Resources Law
LCP	Large Combustion Plant(s)
LRN	Legal Research Network
LULUCF	Land Use, Land-Use Change and Forestry
LVOC	Production of Large Volume Organic Chemicals (BREF)
MFN	Most Favoured Nation
MW	Megawatt
NDC	Nationally Determined Contribution
NEEAP	National Energy Efficiency Action Plan
NeVER	Nederlandse Vereniging voor Energierecht
NO_x	Nitrogen Oxides
npr-PPM	'non-product related' PPM
NREAP	National Renewable Energy Action Plan
NT	National Treatment
OECD	Organisation for Economic Co-operation and Development
OJ	Official Journal of the European Union
OUP	Oxford University Press
PBL	Planbureau voor de Leefomgeving
POT	Phase Out Technique
p.p.	percentage point
PPM	Processes and Production Method
pr-PPM	'product related' PPM

RE	Renewable Energy
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals (Directive)
RECIEL	Review of European, Comparative & International Environmental Law
RED	Renewable Energy Sources Directive
REF	Reference Document (type of BREF)
SEA	Strategic Environmental Assessment
SFM	Sustainable Forest Management
SMR	Statutory Management Requirements
SPS	Sanitary and Phytosanitary Measures (agreement part of WTO)
TBT	Technical Barriers to Trade Agreement (agreement part of WTO)
TEU	Treaty on European Union
TFEU	Treaty on the Functioning of the European Union
TPA	Third Party Access
TRIMs	Trade-Related Investment Measures (agreement part of WTO)
TRIPs	Trade-Related Intellectual Property Rights (agreement part of WTO)
TSO	Transmission System Operator
UN	United Nations
UNEP	United Nations Environment Programme
US	United States (of America)
VMR	Vereniging voor Milieurecht
WAT	Worst Available Technique
WFD	Waste Framework Directive
WI	Waste Incineration (BREF)
WMO	World Meteorological Organization
WT	Waste Treatment (BREF)
WTO	World Trade Organization

Chapter One
Introduction



1.1. Environmental degradation, societal change and the role of law

Climate change is a reality we need to address.[1] Despite various solemn pledges and many initiatives,[2] global emissions are still rising and environmental degradation and pollution pertain.[3] The science on the main cause of climate change, human induced greenhouse gas (GHG) emissions, is sufficiently clear and conclusive, and international consensus has been achieved on to the need for humankind to act fast and drastically.[4] However, our responses are in practice slow and insufficient.[5] Various reasons can be given for this.[6] One of them is that it took time to come to understand and, in particular, to accept that climate change and the progressive degradation of ecosystems are indeed largely caused by human activities. By now, scientific acceptance has been achieved, but political acceptance is lagging behind and hardly goes beyond mere window dressing.[7] The challenge appears to be too large to confront and the consequences for our societal structures too far-reaching, since addressing the core of the problem would have profound implications for all policy areas. Our energy systems in particular would be affected, as the energy sector is responsible for around two-thirds of all global anthropogenic emissions.[8] For this reason, the regulation of the energy sector is one of the anchor points of this dissertation, as will be addressed in more detail in paragraph 1.2.6. Adequate responses to climate change are further hindered by the fact that the processes behind climate change as well as the functioning of ecosystems themselves are characterised by interdependency and non-linearity, which makes

1 Climate change is one of the nine tightly coupled planetary boundaries that define the safe operating space for humanity with respect to the Earth system. See J. Rockström *et al*, 'A safe operating space for humanity' (2009) 461 Nature 472–475 doi:10.1038/461472a.

2 In particular the 'Paris Agreement under the United Nations Framework Convention on Climate Change' Decision 1/CP.21 of 12 December 2015 (Paris Climate Treaty).

3 United Nations, 'IPCC: Greenhouse gas emissions accelerate despite reduction efforts–many pathways to substantial emissions reductions are available' April 2014, http://www.un.org/climatechange/blog/2014/04/ipcc-greenhouse-gas-emissions-accelerate-despite-reduction-efforts-many-pathways-to-substantial-emissions-reductions-are-available/; International Energy Agency (IEA), *World Energy Outlook 2015* (IEA 2015a); IEA, *Energy and Climate Change. World Energy Outlook Special Report* (IEA 2015b).

4 See *inter alia* Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (IPPC 2014), e.g. *Summary for Policymakers*, https://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_SPM.pdf, 2; and Paris Climate Treaty (n 2) and subsequent COP meetings.

5 The discrepancy between the level of emissions that we have and the level we should have is called 'the emissions gap'. See United Nations Environment Programme (UNEP), *The Emissions Gap Report 2016: A UNEP Synthesis Report* (UNEP November 2016) http://capacity4dev.ec.europa.eu/unep/document/emissions-gap-report-2016-unep-synthesis-report, at p. xvii.

6 I do not intent or pretend to give a full explanation here.

7 'Acceptance' is used here in the sense that awareness and acknowledgement are coupled with adequate responses to deal with the situation.

8 IEA 2015b (n 3) at p. 20. Therefore, regulation of the energy sector is one of the anchor points of this thesis, as will be addressed in more detail in paragraph.

them complex and therefore difficult to comprehend. As a result, our existing societal and legal structures are inadequate to deal with the problems humankind currently faces.

It is therefore time to rethink these structures to come to an approach that sufficiently acknowledges the complexities at hand. To address the challenges we face, we need to reconsider how we travel, build, eat, manufacture and so on; in short: how we live and how we organise our societies. This overhaul is a massive task that will affect all aspects of society and requires change at all levels. One of these changes will have to be to amend our legal structures in order for them to reflect, and do justice to, the complexities of ecosystems. Throughout this dissertation, I argue that not only should our legal systems acknowledge the interdependent, myriad relationships between the constituent components of ecosystems, they should also expressly acknowledge the fact that humankind is an integrated part of these ecosystems and fully dependent thereon.

Thus, essentially, the basic thought underlying this research is that we need to develop a more life-cycle oriented, or holistic, approach in how we regulate our (damaging) activities.[9] We need to take into consideration all the (cumulative) effects that these activities have on our environment and it is presumed that we are under a duty to minimise the negative effects of such activities, even if these effects are remote, diffuse or complex. Translating these notions into research questions and making them suitable as a dissertation topic, clearly required further demarcation and specification of the terminology used.

1.2. Theoretical foundations and terminology

1.2.1. Sustainable development

I started off from the concept of sustainable development as it is currently deployed to make the transition to a sustainable society. The common definition used is the one from the Brundtland report which describes sustainable development as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'.[10] To achieve this goal, environmental, economic and social interests must be weighed and balanced in decision making. Soon, however, I realised that the concept in its current form cannot bring about the envisaged holistic approach for at least two reasons.

First, the concept provides (some) guidance on which aspects to consider in the decision-making process, but it provides no guidance on the direction of the outcome of this process.[11] Thus, it is

9 These terms are used interchangeably throughout this dissertation, even though they are not fully synonym, as will briefly be mentioned in paragraph .

10 World Commission on Environment and Development, *Our Common Future* (United Nations 1987) at p. 41 (commonly referred to as 'Brundtland report', after its chairman).

11 See also Sander R.W. van Hees, 'Sustainable Development in the EU: Redefining and Operationalising the Concept' (2014) 10 (2) Utrecht Law Review 60, at pp. 75-76 especially.

more a procedural requirement than a material one and a sustainable outcome is not ensured. For this reason, some have argued that sustainable development in its current form has failed.[12] Others call an interpretation of sustainable development that accords equal weight to the three elements 'weak sustainability', whereas 'strong sustainability' would entail an interpretation in which the environmental element is (to an extent) prioritised over the other two.[13] Such strong sustainability could also be achieved by redefining the concept, for instance as 'development that meets the needs of the present while safeguarding the Earth's life-support system, on which the welfare of current and future generations depends.'[14] Others explicitly acknowledge that sustainable development is (or ought to be) 'a systems approach in time and space' rather than a mere balancing act.[15]

Second, in its current form, sustainable development is a rather anthropocentric concept. As such, it does not sufficiently acknowledge, if at all, (i) human dependency on nature, (ii) humans as part of nature, nor (iii) any inherent value (or even right) of non-human lifeforms, ecosystems or elements thereof to exist. The concept now merely focuses on development, which implies growth under the current economic paradigm, and on the human species only. For actual sustainability to be achievable, and to implement a life-cycle oriented approach, it is needed to implement and maintain a more ecocentric focus. Hence, essentially, instead of centring the concept around balancing, sustainable development should come to reflect the factual hierarchical relationship between the economic, social and environmental dimensions. Under such a new notion, it is reflected that the environment sustains humankind, within who's societies the economy is only one element. This can be depicted as shown in Figure 1.

12 E.g. Rebecca M. Bratspies, 'The green economy will not build the rule of law for nature' in Christina Voigt (ed), *Rule of Law for Nature. New Dimensions and Ideas in Environmental Law* (CUP 2013) at p. 300.

13 Platjouw (infra n 21) at p. 128.

14 As proposed by David Griggs, 'Redefining Sustainable Development' (Project Syndicate, 19 March 2013), found at: http://www.project-syndicate.org/commentary/redefining-sustainable-development-by-david-griggs.

15 As stated by the International Institute for Sustainable Development, found at www.iisd.org.

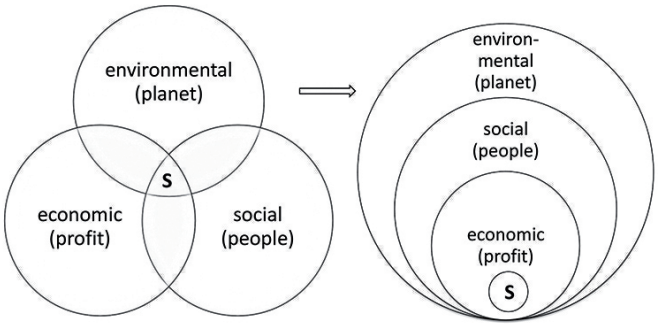


Figure 1.1: The redefined sustainable development concept

When conducting further literature research on the required paradigm (and subsequent legislative) change, I found that among legal scholars aiming at such change, two broad strands of reasoning can be distinguished. One group of scholars puts its faith in developing new legal instruments and concepts to protect our planet. Examples of this are advocating the adoption of 'ecocide' as a crime,[16] or proposing the implementation of rights for nature in various forms.[17] Another stream of thought focuses on what can be summed up as (a wide variety of differently defined) holistic approaches to environmental regulation and protection. The latter approach has served as the starting point for this dissertation, because it entails a life-cycle oriented focus that does justice to the circularity of ecosystems and life in general, as well as taking full account of human impacts thereon.

The terminology used in the existing literature is diffuse: While I often refer to a holistic approach, others refer to an integrated approach, circular approach, ecosystem approach or life-cycle approach.[18] While the legal and institutional details that these authors envisage may differ at several points, I found that essentially they aim at the same thing: Avoiding further environmental degradation by lengthening the 'chain of accountability' and/or the chain of events and effects under consideration in decision making regarding various activities. Examples

16 Polly Higgins, *Eradicating Ecocide: Laws and Governance to Stop the Destruction of the Planet* (Shepheard-Walwyn, 2010).

17 See for instance Susana Borràs,'New Transitions from Human Rights to the Environment to the Rights of Nature' (2016) 5(1) *Transnational Environmental Law* 113; or Christina Voigt (ed), *Rule of Law for Nature. New Dimensions and Ideas in Environmental law* (CUP 2013).

18 See e.g., in respective order: Dirk Scheer & Frieder Rubik (eds), *Governance of Integrated Product Policy: In Search of Sustainable Production and Consumption* (Greenleaf 2006); Chris Backes, *Law for a Circular Economy*, Inaugural Address, University Utrecht, 12 April 2017 (Eleven International 2017); Platjouw (infra n 21); Carl Dalhammar, *An emerging product approach in environmental law. Incorporating the life cycle perspective* (PhD Law 2007).

of such an approach can already be found in several pieces of European Union (EU) legislation, for instance in the concept of extended producer responsibility (EPR) in waste management,[19] or the integrated approach in industrial emissions regulation.[20]

When exploring the theoretical foundations of my research, two authors stood out in particular and their work will be addressed in more detail below. The first is Froukje Platjouw who advocates the 'ecosystem approach';[21] the second is Olivia Woolley who proposes 'ecological governance' as a new paradigm.[22] Both of their books provide solid theoretical foundations and justifications for the normative choices made, and could thus serve as the basis of my research. Furthermore, using their terminology allowed me to build on the existing scholarship, rather than having to reinvent the wheel.

1.2.2. Ecosystem approach

The ecosystem approach as advocated by Platjouw 'requires a governance approach that focuses on the geographical boundaries of the ecosystem, rather than the jurisdictional boundaries. It requires a holistic approach whereby ecosystem structure, functioning and productivity are in focus, rather than individual species, habitats or landscapes.'[23] This holistic dimension is supplemented by an integrative dimension, aimed at coupling the sustainable use of 'ecosystem services'[24] with maintaining the integrity of those ecosystems. Within this dual objective, supremacy is given to maintaining ecosystem integrity as this is vital to safeguard the ability of ecosystems to provide ecosystem services.[25]

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19 E.g. Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE Directive) [2012] OJ L197/38.

20 E.g. Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) [2010] OJ L334/17 (Industrial Emissions Directive, IED), which is aimed at avoiding the shifting of pollution between different environmental media and ensuring the protection of the environment as a whole, see recital 3 & art. 1 IED.

21 Froukje Maria Platjouw, *Environmental Law and the Ecosystem Approach: Maintaining ecological integrity through consistency in law* (Routledge 2016). The ecosystem approach itself is not new and has been discussed in (legal) literature for decades. (See for instance James J Kay & Eric Schneider, 'Embracing complexity: The challenge of the ecosystem approach' (1994) 20(3) Alternatives; Waterloo 32.) While many other authors have also contributed significantly to the development of the concept, in this thesis I will only discuss the work of Platjouw, because it is specifically juridical, as well as comprehensive and recent.

22 Olivia Woolley, *Ecological Governance - Reappraising Law's Role in Protecting Ecosystem Functionality* (CUP 2014).

23 Platjouw (n 21) at p. 13.

24 Defined by Daily as 'the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfil human life.' (From: Platjouw (n 21) at p. 7.)

25 Platjouw (n 21) at pp. 13 & 72. At the same time, ecosystem services might be a good indicator of ecosystem integrity, Platjouw (n 21) at p. 75.

Hence, the work of Platjouw to a large extent revolves around the concept of ecosystem services.[26] The concept is used as a tool to rationalise decisions by monetising them (as much as possible) through the use of cost-benefit analyses. This allows for transparent balancing and integration of diverging interests.[27] While this approach certainly has its merits, it also has its limitations and drawbacks. First and foremost, for balanced decision making under this approach, it is essential that the (estimated) prices are set right. Assigning correct values to ecosystem services is in practice hard and complex, if not impossible, especially in relation to public goods. Secondly, these difficulties are exacerbated by the existence of uncertainties. For correct prizing, sufficient scientific knowledge is required on how certain underlying services contribute to more measureable ones.[28] A third, ethical objection to this methodology is that monetary valuations are anthropogenic in nature.[29] Nevertheless, using ecosystem services as the anchor point in decision making could significantly enhance the integration of the environmental dimension in such decisions and make this process more transparent.[30] As such, it is a rather pragmatic solution, and one that is probably easier to implement and execute than the more abstract approach advocated by Woolley.

1.2.3. Ecological governance

The concept of ecological governance as discussed by Woolley goes beyond the framework sketched by Platjouw, although there are many similarities. Both emphasise the importance of a holistic approach that centres around (the boundaries and the functioning of) ecosystems, rather than jurisdictions. However, Woolley is more principled than pragmatic in her approach, leading to an enhanced emphasis on 'reducing the cumulative stresses on ecosystems' rather than on 'sustainable use of their services'. She thus takes a more ecocentric approach and strictly adheres to the concept of ecological law, by advocating the primacy of respecting ecological limits over economic and technological ones.[31] As a result, in her policy proposals she reserves

26 Like the ecosystem approach, the concept of ecosystem services has also been discussed by many scholars (see e.g. the work of the IUCN, at https://www.iucn.nl/en, or of the Wageningen University, at https://www.wur.nl/en/Dossiers/file/Ecosystem-services.htm). However, as I dismiss the concept as a benchmark in this doctoral thesis, I will not discuss these works any further. Nevertheless, I will touch upon the concept briefly again in my conclusion, in paragraph .

27 Platjouw (n 21) at pp. 78-79.

28 Platjouw (n 21) at pp. 83-91.

29 Platjouw (n 21) at pp. 92-93; Woolley (n 22) at pp. 41, 45.

30 Platjouw (n 21) at p. 94.

31 See also: G Garver, 'The rule of ecological Law: The legal complement to degrowth economics' (2013) 5 S*ustainability* 316-337, at p. 323. Under ecological law, the planetary boundaries mentioned in footnote 1 form the backdrop of reviewing current policies.

a central role for normative precaution (which may require halting growth or development all together)[32] and institutionalised learning coupled with adaptive governance.[33]

1.2.4. Ecosystem resilience

The concept of resilience is discussed in the work of both Platjouw and Woolley. The term is an expression of the capacity of ecosystems to absorb disturbances and maintain (or return to) an equilibrium state throughout or after such disturbances.[34] As ecosystems are complex adaptive systems, their responses to such external shocks (whether natural or human-induced) are characterised by non-linearity and multiple potential stable states.[35] These non-linear responses lead to unpredictability as we cannot determine with certainty what or where the tipping points of the system are. Such tipping points are also closely related to the system's buffering capacity, which in turn is influenced by its level of diversity. In sum, the boundaries of ecosystem resilience are hard (or impossible) to define and resilience as such cannot be quantified, making it unsuitable as a benchmark for decision making.[36]

At the same time, it is clear that reduced resilience increases the vulnerability of an ecosystem,[37] and may ultimately affect its functioning or integrity. Certain attributes of ecosystems can be regarded as indicators of the level of their resilience. Woolley mentions the diversity of species, the 'modularity' of its components, the existence of corridors between biodiverse hotspots (or the overall openness of the system) and more general reserves or capital assets that enhance the system's buffering capacity.[38] Safeguarding the functional complexity of ecosystems is thus essential, as its traits confer upon it flexibility, adaptability and an enhanced ability to withstand shocks.[39]

1.2.5. Demarcations

While Platjouw uses ecosystem services as a practical tool to express ecosystem integrity, Woolley instead centres her research around the concept of 'ecosystem functionality' and advocates an 'ethic of humility' that 'seek[s] to capture a realistic conception of our place in nature'.[40]

32 On the benefits of nonuse and nonuse values, see also Jan Laitos, 'Rules of law for use and nonuse of nature' in Christina Voigt (ed), *Rule of Law for Nature. New Dimensions and Ideas in Environmental law* (CUP 2013) at p. 211.

33 Woolley (n 22) at pp. 8-13. The details of her approach will also be discussed at length in the next chapters. Therefore, at this point I will only give a rudimentary outline thereof.

34 See more elaborately: Woolley (n 22) at pp. 6 & 27-36, or Platjouw (n 21) at p. 66.

35 Woolley (n 22) at p. 21.

36 See also Woolley (n 22) at pp. 6, 32-33 & 160-161.

37 Platjouw (n 21) at p. 67.

38 Woolley (n 22) at pp. 32-33. Platjouw also acknowledges that a high level of biodiversity generally enhances resilience as it provides functional redundancy (Platjouw (n 21) at p. 67).

39 Platjouw (n 21) at p. 73 and Woolley (n 22) at p. 33 respectively.

40 Woolley (n 22) at p. 18.

Thus, while less practical than Platjouw's proposals, Woolley's work provides a more accurate description of the factual position of humankind. Most noteworthy, her research expresses the notion that (i) humans are not above nature, but part of it, and that (ii) we are not omniscient and should therefore not uphold legal structures that require extensive knowledge of causal effects or prediction of events. Woolley does not provide a clear definition of ecological governance as such, but does extensively address what it would entail and what its implementation would require.[41] Therefore, throughout this dissertation, her blueprint for implementation of ecological governance serves as guidance and my research is based (in line with Woolley's proposals) on the premise that 'a fundamental reappraisal is required of how we can use law to prevent our cumulative stresses from undermining ecosystem functionality'.[42] As a result, the focal point of this research is on contributing to ecosystem functioning, rather than on enhancing ecosystem services or advocating sustainable development in its current form.[43] On top, further demarcation is applied by not delving into the question of the democratic legitimation and (the need for) public participation, which are dealt with at great length by Woolley, as well as by a broad array of academic authors.[44] Along a similar vein, this dissertation also does not address how the ideas expressed in it can be implemented in (political) practice, as that would require extensive research into (political) decision making, which would go far beyond the scope of this legal dissertation.[45] Nevertheless, I want to stress that these demarcations were applied for practical reasons and not for lack of importance of these topics.[46]

1.2.6. EU energy law

A further focal point, and hence important demarcation, is that this doctoral thesis is centred around (secondary) EU energy law. However, this dissertation does not address the full body of EU energy (nor environmental law),[47] but merely assesses several aspects of energy law from an environmental perspective. This means that not the broad spectrum of EU energy law is considered and described, but that energy law is rather used as a lens, or focal point, to discuss those elements that particularly impact the environment and/or those elements that may serve as an illustration of holistic or ecological legal approaches. A broader context is provided, if so required for a clear understanding

41 As elaborated on in Chapter Three.

42 Woolley (n 22) at p. 5.

43 The latter demarcation is also the reason that much of the literature on how to balance the three different aspects of 'sustainable development' is not dealt with in great detail.

44 See in particular Woolley (n 22) at pp. 187-214.

45 The latter appraisal would necessarily also entail an assessment of and debate on the (perceived) costs of the new approach, which also fall outside the scope of this dissertation.

46 Hence, I do encourage further societal, political and academic research and debate on these issues.

47 For an extensive description of (EU) energy law, I refer to Martha Roggenkamp *et alia* (eds), *Energy Law in Europe. National, EU and International Regulation* (OUP 2016). For environmental law, see J.H. Jans and H.H.B. Vedder, *European Environmental Law: After Lisbon* (Europa Law Publishing, 2012).

The focus on the energy sector was chosen for three reasons. First and foremost, energy is 'the life blood of society'[48] as it is essential for societal functioning and welfare. Simultaneously, energy production and consumption are a major source of GHG emissions and one the prime causes of climate change.[49] On top, its raw material use, transport and waste production have additional negative impacts on ecosystems all over the world. These notions should make energy the spill of any climate change mitigation strategy and reducing the negative effects from energy production and consumption would thus have a profound positive impact on ecosystems' resilience. Addressing the regulation of the energy sector is therefore largely synonym to addressing the root causes of climate change. The second reason to focus on the energy sector is that its production chains are relatively easy delineable: The types of energy sources as well as their production processes are limited and so is the amount of actors involved throughout the production chains.[50] This makes the sector particularly suitable for a life-cycle oriented legal assessment. Thirdly, the sector has proven to be quite malleable, and hence potentially susceptible to drastic change. Over the last two decades, major structural changes have been accomplished via three consecutive legislative 'energy packages'.[51] These have resulted in the progressive liberalisation and integration of EU members' energy markets. In particular, the so-called 'unbundling requirements' have altered the energy landscape tremendously in terms of its actors and their competences.[52] Additionally, climate change concerns have spurred the development of new (renewable) energy sources,[53] which has also impacted the raw materials' markets.[54]

The rationale for focusing on EU energy law, rather than national energy law, is that for European countries this is the main stage for energy regulation, due to the creation of the internal market

48 European Commission, 'Energy 2020 – A Strategy for Competitive, Sustainable and Secure Energy' (Communication) COM(2010) 639, at p. 2.

49 'Greenhouse-gas emissions from the energy sector represent roughly two-thirds of all anthropogenic greenhouse-gas emissions', according to the IEA. See IEA 2015b (n 3) at p. 20.

50 Although this number has increased significantly with the liberalisation of the energy markets, as discussed below, as well as due to the increasing importance of the forestry and agricultural sectors as suppliers for the energy sector.

51 The first package was adopted in 1996 (for electricity) and 1998 (for gas), the second in 2003, and the third in 2009.

52 'Unbundling' refers to the (legal) separation of production and supply activities from transport (i.e. monopolistic, network-related) activities.

53 Stimulated primarily through Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC [2009] OJ L140/16 (Renewable Energy Sources Directive, RED).

54 Most noteworthy, the agricultural and forestry sectors are now important players in the energy market, as elaborated on in Chapters Two and Three.

in energy, as mentioned above.[55] On top, the EU as a block has much wider geographical (and jurisdictional) boundaries than any single Member State. This makes the European level more suitable to be assessed from an ecological, holistic perspective. Another reason to focus on the EU is that EU law is considered a separate, supranational legal order,[56] which is not the case for the global international arena.[57] Still, EU decision making requires international cooperation and its rules thus reflect international (regional) consensus on a particular topic. The lessons learned within the EU could thus serve as inspiration to achieve similar consensus at the global international level.

In general, EU energy policy is characterised by the trifurcated aim of ensuring affordability, sustainability and security of supply of energy.[58] The latter entails both the safety of the networks, as well as sufficient availability of energy.[59] As a result, a continuous balancing between these aims needs to take place in decision making. Thus, the normative framework that forms the backdrop of EU energy policy and law is confronted with issues and trade-offs similar to those that surround the concept of sustainable development.[60] Analogously, here too a life-cycle oriented approach in regulation could help to identify priorities and thus aid the design of increasingly sustainable energy systems.[61]

1.3. Research questions

From the above, the following main research theme underlying this doctoral thesis can be distilled:

How can we implement a holistic approach in EU energy law?

The assumption underlying this research problem is that such an approach would ensure that climate change and other environmental issues would be effectively dealt with. However, as this is a rather broad, general research theme rather than a workable question, further specifications and demarcations were required. The starting point for this consisted of making an inventory

55 This internal market is further strengthened by the founding of the Energy Union; European Commission, 'A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy' (Communication) COM(2015) 080 final.

56 Case 26-62 *Van Gend & Loos v The Netherlands* [1963] ECR I.

57 The latter being the ideal stage for holistic regulations.

58 COM (2010) 639 final (n 48) at p. 2.

59 The latter also entails transport and supply to consumers. For an elaboration regarding electricity, see Hamilcar P.A. Knops, *A functional legal design for reliable electricity supply: how technology affects law* (Intersentia 2008) at p. 95.

60 The analogy applied here is the following: 'Affordable energy' can be considered the economic component, 'sustainability' represents the environmental element and 'security of supply' would be the social aspect.

61 As has been addressed in paragraph 1.2.1.

of the elements of life-cycle approaches currently present in EU energy law. From this, four sub-studies were conducted which in combination form the main content of this dissertation. Each study was based on the progressive insights stemming from the previous one and each study was published as a separate article. Three out of the four articles were published in double-blind peer-reviewed journals, and one was published in a single-blind peer-reviewed journal.[62] Combined, these articles form the body of this dissertation.

From the initial inventory, it became apparent that the most prominent example of a holistic legislative approach is found in the EU rules on biofuels. For this reason, the first sub-study concerned an analysis of the precise scope and content of these biofuel rules, as well as on the rules on biomass used for energy production in a broader sense. The first sub-questions of this dissertation are hence:

1. *How is the sustainability of biomass for energy regulated under EU law?*
2. *Does this suffice to implement a holistic approach?*

Since this first study *inter alia* concluded that the current legal framework does not bring about a full holistic approach, the next sub-study investigated which means might be used to achieve this. In the conducted analysis, the concept of 'ecological governance' is used as a strategy to implement a holistic approach through the legislative instrument 'best available techniques' (BAT).[63] This led to the following sub-questions:

3. *What does ecological governance entail and require?*
4. *Can the concept of 'BAT' be used or modified to implement ecological governance?*

A reinterpretation of the concept of BAT as sketched in this study would significantly lengthen the chain of events and effects under consideration in decision making. Coupled with an ecological focus, this could lead to trade-restrictive measures, making it necessary to consider the implications thereof under international trade regimes. This led to the questions:

5. *Is an extended application of mandatory BAT compatible with international trade law?*
6. *Is it in particular compatible with the rules of the World Trade Organization (WTO)?*

62 The first three articles (Chapters Two to Four of this dissertation) were published in double-blind reviewed journals, while the fourth article (now Chapter Five) has been published in a single-blind reviewed journal.

63 As currently used in the regulation of industrial emissions under the IED (n 20).

In addition, this dissertation explores the concept of 'technology neutrality' which features prominently in the BAT-concept, as well as in various policy documents on the energy transition. Hence, the fourth sub-study revolved around the questions:

7. *How is technology neutrality used in legislative design?*
8. *Can the concept be used to foster innovations in the energy sector?*

The answers to the sub-questions and the more general findings from the sub-studies were then used to assess the broader, overall research theme in order to provide an answer as to how we might implement a holistic approach in EU energy law.

1.4. Methodology, aims and outline

This legal doctoral research has been conducted via extensive legal documentation and literature studies, resulting in four published articles. Its key sources have been the relevant EU legislation, case law, regulatory decisions, policy documents, several (trade) treaties, and diverse literature. While most literature stemmed from legal science, various sources came from natural sciences and economics. Thus, the legal literature research ranged from works on energy law, environmental law, ecological law and trade law to works on the regulation of ICT and nanotechnologies. The non-legal sources included works on environmental economics, life-cycle analysis, environmental science, and various descriptive reports, projections and policy documents on (the impacts of) energy and/or the environment. This essentially makes this dissertation an interdisciplinary literature desk research. Additionally, on several occasions, the research' ideas, findings and proposals were presented at (international) conferences and meetings to receive feedback.[64] Additional, detailed feedback was received via the peer-review process that took place with every publication. The resulting articles form the body of this dissertation.

The research has essentially consisted of the following steps. It started out with very broad research theme, rather than a workable research question. The initial step was, therefore, to make an inventory of the legislation that was the relevant to this theme. This identification of applicable laws and judicial decisions was primarily conducted by studying legal documentation and legal handbooks. The next step was to lay the theoretical foundations for the normative choices and stances made throughout this dissertation and to formulate more precisely the required design of the legal framework to achieve the set goals. This was done via extensive literature research of both legal and non-legal sources. The insights thus gained were then used

64 E.g. EELF Conferences in Groningen, the Netherlands (2013) and Copenhagen, Denmark (2017); GESP meeting Groningen (2013); INRA meeting in Laon, France (2015); VMR Actualiteitendag in Utrecht (March 2016); LRN Conference in Groningen (2017).

(i) to assess to what extent the current regulatory frameworks already exhibit the desired traits, and (ii) if they do not, to determine what is missing. Additionally, attempts have been made to (determine how to) design legalisation that does have the desired traits. The latter has largely been led by a combination of progressive insights, associative processes and extensive use of teleological interpretation.

Furthermore, this doctoral thesis has a strong law reforming ambition, rather than a descriptive or systematising purpose.[65] As a result, stark normative choices and stances are made throughout the research.[66] These normative foundations underlying the research can be contrasted with the subsequent, objectively performed legal appraisal. What I have aimed to do is to provide a rudimentary blueprint of how we might structure our legal frameworks to be more in line with the factual interconnectedness and complexities of this planet, its life-sustaining ecosystems and our relationship to and position within that. Thus, I have tried to demonstrate that law can be used as powerful steering tool to enhance sustainability, and I have hinted at how we might do that. I have identified hiatuses in the current frameworks and have proposed means to resolve (some of) them. I have explored new approaches to EU energy law and have added new insights to the existing scholarship, by broadening and deepening existing concepts and coupling them with a holistic approach.[67]

The resulting outline of this dissertation is as follows. Chapter Two discusses the EU legal framework on biofuels and biomass used for energy production.[68] Biomass was chosen as an example, because the sustainability criteria for biofuels imposed by the Renewable Energy Sources Directive (RED)[69] represent the most elaborate example of a life-cycle approach to energy regulation. The focal point of this chapter is hence to what extent the current framework

65 Different legal research styles are, for instance, discussed in Paul Chynoweth, 'Legal Research', in A. Knight & L. Ruddock (eds), *Advanced Research Methods in the Built Environment* (Wiley-Blackwell 2008) at pp. 29-31; and Ian Dobinson and Francis Johns, 'Qualitative Legal Research' in M. McConville & W.H. Chui (eds), *Research Methods for Law* (Edinburgh University Press 2007), in particular at pp. 19-22.

66 Hence, some of its contents border on the political. This is, however, not uncommon for legal theses, since '[l]egal rules are normative in character as they dictate how individuals ought to behave [and] make no attempt either to explain, predict, or even to understand human behaviour.' (Paul Chynoweth (n 65) at p. 30.) As a result, one's views of the world colour one's perceptions on how this world should be legally organised. Therefore, whether you view the normative stances in this thesis as a providing a better reflection of the realities at force, or as a tree-hugging hippie's utopia is up to you. However, one's perceptions should not detract from the legal analysis.

67 By focusing on the BAT-concept I have meant to illustrate that, while the 'overhaul' that I advocate may seem drastic, much can already be achieved by using existing and familiar (legal) instruments. This familiarity may reduce the sense of being overwhelmed by the magnitude of the task at hand, thus potentially aiding a more prompt implementation of a new approach.

68 This research was published as: R.A. Giljam, 'Towards a Holistic Approach in EU Biomass Regulation' (2016) 28(1) Journal of Environmental Law (JEL) 95-124.

69 Directive 2009/28/EU (n 53).

facilitates or enables a life-cycle approach. In this chapter, I have analysed the overall framework for biomass used for energy (which is much broader than the rules on biofuels) and have identified several omissions within the framework that may lead reduced sustainability of biomass uses.

Chapter Three then tries to remedy the situation by introducing the concept of 'ecological governance' as the new paradigm for policy making.[70] This chapter explores what the implementation of such an approach would require in legal terms and how it might be brought about. Here, I argue that the concept of 'best available techniques' (BAT)[71] holds great potential in this regard, although significant changes would have to be made in its interpretation and application. These required changes are subsequently described and discussed, with an emphasis on the regulation of biomass.

Next, Chapter Four addresses the potential for extraterritorial effects that such a new interpretation of BAT might have.[72] This is necessary, because the ideas and proposals made in the previous chapter may, if executed, lead to trade-restricting measures. Therefore, chapter 4 explores the legality of such measures, specifically in the light of the EU's obligations as a member of the World Trade Organization (WTO). This discussion is centred around the concepts of 'process measures' and 'likeness' and the difficulties in defining and categorising 'energy'.

In Chapter Five, I then go on to explore the role of 'technology neutrality', which is generally considered a core feature of the BAT concept, as well as a policy objective for EU energy legislation.[73] In this chapter, several EU (energy) directives are assessed in terms of their level of such neutrality. Additionally, it is discussed whether technology neutrality in legislation does indeed enable and/or incentivise the technical innovations that are required for a more sustainable energy system. In this discussion, the existence of uncertainties and externalities features prominently.

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70 This research was published as: R.A. Giljam, 'Better BAT to bolster ecosystem resilience: Operationalising ecological governance through the concept of Best Available Techniques' (2017) 26(1) Review of European, Comparative & International Environmental Law (RECIEL) 5-18.

71 As currently used under the Industrial Emissions Directive (IED) (n 20).

72 This research was published as: R.A. Giljam, 'Extended application of 'Best Available Techniques' as a means to facilitate ecological governance: Assessing the legality of an ecologically oriented interpretation in the European Union (EU) of 'Best Available Techniques' (BAT) under international trade law and in particular in relation to energy production' (2018) 36(2) Journal of Energy and Natural Resources Law (JERL) 181-208.

73 This research was published as: R.A. Giljam, 'Implementing ecological governance in EU energy law: the role of technology neutral legislative design in fostering innovation' (2018) 27(6) European Energy and Environmental Law Review (EEELR) 236-250.

Chapter Six then provides overall conclusions on the basis of the conducted research. It gives direct answers to the research questions as set out above and it assesses the findings of the research in more general terms, especially their meaning for future policy making and the implications for legislative design.

These chapters are followed by six annexes, that contain (i) a policy update, (ii) three posters that depict this dissertation visually, (iii) an English summary, (iv) a Dutch summary (Nederlandse samenvatting), (v) acknowledgements, and (vi) my curriculum vitae. The policy update was added because the articles that form the body of this dissertation were published between 2015 and 2018, and legislative and policy changes have occurred since then or are expected to be adopted in the near future. Please be aware that, since the articles were put into this book exactly as published, they have to be placed within the timeframe of acceptance of that particular manuscript.[74]

74 That is: the latest, pre-copy edited author version of each article was used for in this dissertation. Differences with the published versions are due to changes made in copy-editing and after proof-reading. Also, I have added the full 'late amendments' to the article published in JEL (now Chapter Two), while only part of this list was published in the journal itself. Any inconsistencies in the style of the footnotes throughout this dissertation are caused by differing requirements of the different journals. Permission for re-use of the articles was obtained in writing from all journals.

Chapter Two

Holisticity in the regulation of biomass and biofuels

This dissertation contains the author-produced version[1] *of the article accepted for publication in the* Journal of Environmental Law *following peer review. The version of record is available online at* https://doi.org/10.1093/jel/eqv025 *and* https://academic.oup.com/jel/issue/28/1.

Hence, this chapter has previously been published as:

Renske A. Giljam, 'Towards a Holistic Approach in EU Biomass Regulation' (2016) 28(1) Journal of Environmental Law (JEL) 95-124.

1 This is not a pre-copy editing version, as this was no longer available. Hence, this is the version after copy-editing.

Abstract

The energy transition requires a legal system that promotes the most sustainable forms of energy. This requires a holistic approach that accounts for all effects of energy production throughout the energy chain. This article analyses the presence of holistic elements in the current legal framework of biomass used for energy purposes. It finds that the most advanced example, sustainability criteria for biofuels, applies to only a fraction of all biomass uses, as the applicability is dependent on the production process used and the manner of consumption. Furthermore, the legal framework for biomass accounts for neither all direct effects, nor any indirect effects of production, nor the carbon debt resulting from biomass combustion. All this undermines the assumed sustainability of biomass. As a result, the current legal framework is far from holistic and poorly equipped to promote the most sustainable forms of energy.

Keywords: holistic, biomass, biofuels, energy, sustainability, EU law, renewable energy, European Union, energy transition, environment

2.1. Introduction

Currently, the European Union (EU) faces the challenge of facilitating the transition to a low-carbon economy. This also involves an energy transition, which is, according to the European Commission, required for three reasons.[2] First, and foremost, low-carbon energy production will contribute to mitigating climate change. In addition, increased use of renewable energy will diversify the energy mix, which contributes to the security of energy supply and increases energy self-sufficiency. Thirdly, the development and deployment of innovative technologies provides economic opportunities.

The energy transition requires that the legal system promotes the 'greenest' options in energy generation. However, the current legal framework designed for this energy transition suffers from the only partial internalisation of the environmental effects associated with energy production, which hampers the deployment of renewable energy sources. For instance, fossil fuel energy producers are not confronted with all the costs of damages resulting from combustion induced pollution. At the same time, renewable energy producers are generally confronted with high start-up costs for their relatively new technologies. Ignoring the damages from fossil fuel energy production in the legal framework thus negatively impacts the business case of renewable energy producers *vis-á-vis* their fossil fuel competitors. A similar situation even occurs between different renewable sources, in particular in regard to biofuels. In biofuel production, the indirect effects of the cultivation of energy crops (such as land conversions or the impact on food prices)

2 Commission, 'Renewable Energy Progress Report' COM (2013) 175 final, 2.

are not attributed to the fuels. As a consequence, the legal framework does not necessarily promote the most sustainable fuels, as will be addressed in this article.[3]

I argue that this lack of internalisation of the external effects of energy generation can be overcome through the implementation of a holistic approach in EU energy law which will provide the right incentives to achieve a structural energy transition. The need for this approach is stipulated in several EU energy and environmental legislative and policy documents,[4] and it is even argued that the newly created Energy Union should take a holistic approach.[5] However, none of these documents specify what the concept entails, other than aiming to avoid the shifting of effects throughout a production chain. In this article, a holistic approach in law means a regulatory approach that acknowledges to the full extent the importance of the system as a whole and the interdependence of its parts.[6] Furthermore, it reflects the notion that our society is rooted in our (natural) environment, and that our economy, in turn, is rooted in our society. Hence, these three dimensions are entwined in a hierarchical relationship, rather than a balancing act.[7] To ensure that our environment remains able to facilitate all our (economic) activities, all (direct and indirect) environmental effects of human activities throughout the energy chain must be accounted for.[8] Additionally, the legal design should provide incentives for the progressive

3 There is no consensus on a clear definition of 'sustainable'. Most commonly, sustainable development is understood as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' as defined by the Brundtland Report, ie World Commission on Environment and Development, *Our Common Future* (OUP 1987), 43.

4 Commission, 'A Policy Framework for Climate and Energy in the Period from 2020 to 2030' COM (2014) 15 final, 7; Commission Regulation 592/2014/EU of 3 June 2014 amending Regulation 142/2011/EU as regards the use of animal by-products and derived products as a fuel in combustion plants [2014] OJ L165/33, recital 8; European Parliament and Council Directive 2010/30/EU of 19 May 2010 on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products [2010] OJ L153/1, recital 2; European Parliament and Council Decision 1386/2013/EU of 20 November 2013 on a General Union Environment Action Programme to 2020 'Living well, within the limits of our planet' [2013] OJ L354/171, recital 26; Commission, 'A New EU Forest Strategy: for Forests and the Forest-Based Sector' COM (2013) 659 final, 2 (Forest Strategy), 4.

5 'EU adviser: Energy Union should take 'Holistic Approach'' (EurActiv.com, 27 January 2015) <http://www.euractiv.com/sections/energy/eu-adviser-energy-union-should-take-holistic-approach-311498> accessed 24 August 2015.

6 In essence, this requires a paradigm shift in the perception of sustainable development. See more elaborately: Molly Scott Cato, *Green Economics, An Introduction to Theory, Policy and Practice* (Earthscan 2009), 37 especially. For an elaboration on the ethical foundations underlying this systemic approach and how it affects legal design, see: Olivia Woolley, *Ecological Governance - Reappraising Law's Role in Protecting Ecosystem Functionality* (CUP 2014), ch 2 & 3 especially.

7 David Griggs, 'Redefining Sustainable Development' (*Project Syndicate,* 19 March 2013) <http://www.project-syndicate.org/commentary/redefining-sustainable-development-by-david-griggs> accessed 24 August 2015.

8 See also: WM Adams, 'The Future of Sustainability: Re-thinking Environment and Development in the Twenty-first Century' (Report of the IUCN Renowned Thinkers Meeting, 29–31 January 2006), 3-4.

greening of the energy sector. This article will discuss the current legal framework with this view in mind and will analyse which holistic elements are currently present in it.

The article focuses solely on the regulation of biomass used for energy purposes; other means of energy generation will not be discussed here. Biomass, in its broadest sense, concerns any plant or animal matter that is used for energy production. This focus was chosen, firstly, because biomass is expected to be the largest contributor to the renewable energy targets for 2020.[9] In 2012, almost two-thirds of all primary renewable energy production came from biomass sources.[10] If this continues, the amount of wood used as a primary energy source in the EU in 2020 will be equivalent to today's total wood harvest.[11] To ensure that the use of biomass is sustainable, it is vital to account for all the effects thereof. As the European Commission states: '[d]espite the many benefits associated with biomass use (…), there are a number of sustainability risks that need to be properly managed (…). These risks include unsustainable feedstock production; emissions from land use, land-use change, and forestry; lifecycle greenhouse gas (GHG) emission performance; indirect impacts; inefficient bioenergy generation; and air emissions.'[12] The need to introduce a holistic approach in biomass regulation to internalise these effects is therefore pressing.

The second reason to focus on biomass is that in its regulation the most elaborate example of a holistic approach in EU energy law can be found. This concerns the sustainability criteria that apply to the production of biofuels, which are liquid or gaseous fuels for transport produced from biomass.[13] The sustainability criteria, which will be addressed in detail, illustrates how such a holistic approach in law can be designed.

2.2. Outline of the legal framework

The legal framework applicable to biomass is extensive and complex for several reasons. First of all, the 'product' that is regulated is not uniform. Biomass is a generic term and biomass sources originate from various sectors. In addition, in EU law, biomass is not defined uniformly. The Renewable Energy Sources Directive (RED) defines biomass broadly, ensuring that it covers a

9 These targets can be found in European Parliament and Council Directive 2009/28/EC of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC [2009] OJ L140/16 (RED). In the electricity sector alone, an estimated 42% of all renewables will come from biomass (Forest Strategy (n 4) 2).

10 This includes the use of renewable waste. Eurostat, 'Statistics Explained - Renewable Energy Statistics' (European Union March 2014).

11 Forest Strategy (n 4), 2.

12 Commission, 'State of Play on the Sustainability of Solid and Gaseous Biomass Used for Electricity, Heating and Cooling in the EU' SWD (2014) 259 final (State of Play), 11.

13 Renewable Energy Sources Directive, RED (n 9), arts 2(i) & 17.

wide variety of raw materials.[14] However, the Industrial Emissions Directive (IED) contains a more narrow definition of biomass.[15] Furthermore, what is considered 'biomass' in one directive can be 'waste' in another.[16] Such classifications are crucial, because these partially determine how the raw materials can be handled and processed for energy generation. Further complexity is created by the fact that these varied raw materials are processed differently. These diverging conversion techniques are subjected to (partially) different operating conditions and different environmental standards. On top of this, the final products, which include biofuels, electricity, biogas and biomethane, and energy used for heating and cooling, are covered by different rules on transport and/or consumption thereof. All these variations and variables lead to a situation where different rules apply depending on the origins of the raw material, as well as its categorization in law, its process of conversion and its final use.

Nevertheless, if looked at in consecutive steps, the overall framework of biomass regulation can be depicted as shown in Figure 1. The first step, the 'raw-materials phase', is governed by rules on the cultivation and gathering of these materials, which mostly originate from agriculture, forestry or organic waste. As such, the respective sectoral rules apply. Next, in the 'production phase', the regulatory framework predominantly consists of rules on industrial installations and environmental protection. The 'transport phase' of the generated energy is then dominated by either rules on the networks and access requirements (for electricity and gas), or (in the case of biofuels) by rules on the different means of transportation thereof. The rules on the consumption of the energy, eventually, concern mainly energy efficiency provisions.

14 Ibid, art 2(e).

15 European Parliament and Council Directive 2010/75/EU of 24 November 2010 on industrial emissions (integrated pollution prevention and control [2010] OJ L334/17 (IED), art 3(31).

16 RED (n 9), art 2(e) vs IED (n 15), art 3(31) & European Parliament and Council Directive 2008/98/EC of 19 November 2008 on waste and repealing certain Directives [2008] OJ L 312/3 (WFD), art 2(1)(f).

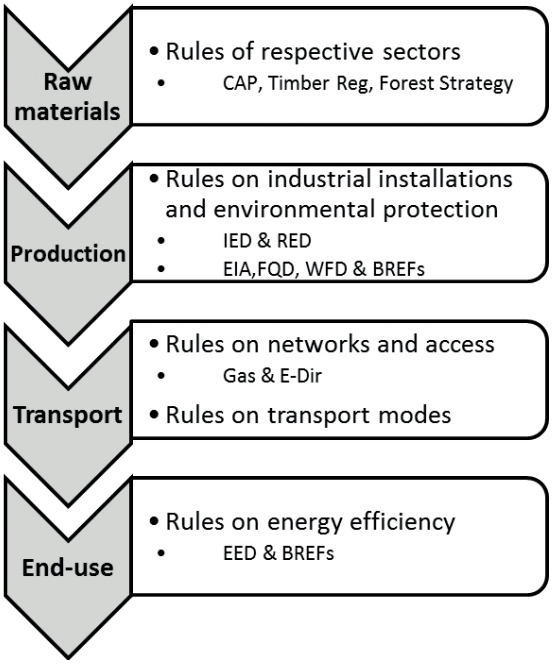

Figure 2.1: Legal framework applicable in consecutive phases of biomass life cycle

Although the energy value chain just described provides a comprehensible overview of the complex legislation, the framework for biomass will not be discussed in this order. Instead, the legislation will be addressed by order of its relevance in biomass regulation, ie by order of its level of impact on how biomass for energy can be handled. The following rules combined form this general legal framework. This will be discussed in detail below, but it is useful to give an overview.

The core of this framework is enshrined in the Renewable Energy Sources Directive (RED) and the Industrial Emissions Directive (IED). The former sets targets for renewable energy and sets sustainability criteria for the production of biofuels. The latter lays down the framework for the operation of industrial installations. These two directives are discussed first, because they set the most influential rules of biomass regulation. Additionally, other directives impose important complementary and/or specific rules. Firstly, there are the Environmental Impact Assessment Directive (EIA Directive) and Strategic Environmental Assessment Directive (SEA Directive).[17] The EIA Directive is relevant for virtually all industrial biomass uses, because for all activities that

17 European Parliament and Council Directive 2011/92/EU of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment [2012] OJ L26/1 (EIA Directive), as amended by Directive 2014/52/EU [2014] OJ L124/1; European Parliament and Council Directive 2001/42/EC of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment [2001] OJ L197/30 (SEA Directive).

fall within the scope of the IED the expected environmental impacts must be assessed prior to consent. The SEA Directive sets similar rules for public plans and programmes.

The next relevant directive is the Energy Efficiency Directive (EED), which is aimed at energy savings throughout the entire energy chain, thus implementing a rudimentary holistic approach.[18] The EIA Directive and the EED both have generic application to biomass used for energy. In addition to these directives, more specific sectoral rules can be found in the Fuel Quality Directive (FQD) for the production and use of (bio-)fuels,[19] and the Waste Framework Directive (WFD) for waste (co)incineration plants.[20] After that, the regulation of solid biomass is important to consider, as this is not fully covered by the other directives. The Common Agricultural Policy (CAP), applicable to agricultural biomass, needs to be touched upon, but primarily the regulation of forest biomass via the Timber Regulation and the EU Forest Strategy are the focus of this analysis.[21] The last relevant directives in the framework are the Gas Directive and the Electricity Directive (E-Directive), which (partially) lay down the framework for the regulation of the energy market.[22] To complement the overview, five 'BAT Reference documents' (BREFs) will be addressed. Formally, these BREFs are 'only' soft law, but in practice they provide the detailed norms used in permitting procedures under the IED.

The legislative overview sketched in this article is not fully comprehensive, as many other regulations are of collateral importance to the legal framework for biomass. These supplementary laws include *inter alia* sector-specific rules; rules on trade in the diverse materials; laws relating to environmental protection, such as legislation on species or habitat protection, avoidance of pollution, and emissions trading; detailed rules on energy efficiency in buildings and energy-using products; and legislation targeting transport, eg provisions on dangerous substances, emission levels for vehicles or deploying alternative fuels infrastructure. However, due to space restraints in this article, these laws are not discussed.

18 European Parliament and Council Directive 2012/27/EU of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC [2012] OJ L315/1 (EED).

19 European Parliament and Council Directive 98/70/EC of 13 October 1998 relating to the quality of petrol and diesel fuels and amending Council Directive 93/12/EEC [1998] OJ L350/58 (FQD), as amended by Directive 2009/30/EC [2009] OJ L140/88 and Directive 2009/28/EC [2009] OJ L140/16.

20 WFD (n 16).

21 European Parliament and Council Regulation 995/2010/EU of 20 October 2010 laying down the obligations of operators who place timber and timber products on the market [2010] OJ L295/23 (Timber Regulation); and Forest Strategy (n 4).

22 European Parliament and Council Directive 2009/72/EC of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC [2009] OJ L211/55 (E-Directive); European Parliament and Council Directive 2009/73/EC of 13 July 2009 concerning common rules for the internal market in natural gas and repealing Directive 2003/55/EC [2009] OJ L211/94 (Gas Directive).

2.3. Core of the framework

2.3.1. Renewable Energy Sources Directive

By far the most important legislative document in biomass regulation is the Renewable Energy Sources Directive (RED), as this is the prime instrument that promotes the use of biomass as an energy source. First, and foremost, the directive requires that, by 2020, at least 20% of the gross final consumption of energy within the EU must come from renewable energy sources.[23] This gross final consumption is the weighted sum of the consumption of the electricity from renewable sources that is used, the energy from renewable sources used for heating and cooling and the energy from renewable sources that is used in transport.[24] To meet the overall EU target, the Member States have each been assigned national targets.[25] Furthermore, the share of energy from renewable sources in all forms of transport in each Member State must be at least 10% in 2020.[26] To achieve these targets, Member States have to adopt and regularly update 'national renewable energy action plans' (NREAPs) containing their intermediate and final goals and the envisaged measures to reach them.[27] Member States are allowed to cooperate in meeting their targets, by using statistical transfers, joint projects and/or joint support schemes, for which the directive sets criteria.[28] Such cooperation may also take place between EU members and third countries, provided that the criteria in the directive are met.[29]

The NREAPs show that the bulk of energy from renewable sources will come from biomass sources, mainly via the co-firing of (solid) biomass in combustion plants and the production of biofuels.[30] To ensure the sustainability of the latter, the RED imposes sustainability criteria for biofuels and bioliquids.[31] Only those fuels and liquids that abide by these criteria can be counted towards the renewables target, and only these are eligible for subsidies. The criteria, basically, contain three essentials elements. First of all, they require that biofuels reduce greenhouse gas (GHG) emissions by at least 35% compared to conventional fuels.[32] Secondly, the cultivation of the raw materials used in biofuels production is not allowed to cause land-use changes (LUC) in specific (ecologically) vulnerable and valuable areas. Three categories of areas are then listed; these are land with high biodiversity value, land with high carbon stock, and peatland. Not only

23 RED (n 9), art 3(1).
24 ibid, art 5(1).
25 ibid, annex I.
26 ibid, art 3(4).
27 ibid, art 4 & annex VI.
28 ibid, arts 6-8 & 11. More detailed criteria can be found in the Commission's Guidelines and Decision concerning state aid: Commission, 'Guidelines on State Aid for Environmental Protection and Energy 2014-2020' [2014] OJ C 200/1.
29 RED (n 9), arts 9-10.
30 Eurostat (n 10).
31 RED (n 9), art 17.
32 This will go up to 50% by 2017 and 60% by 2018.

are conversions of these areas plainly prohibited, if conversions of other areas lead to additional emissions, these are attributed to the cultivation of the biofuel crops.[33] The third important feature of the criteria is that they apply irrespective of whether the raw materials for the fuels were cultivated inside or outside the territory of the EU.

Not all biofuels, however, are made directly from such cultivated agricultural crops. On the basis of the raw materials used for their production, three 'generations' of biofuels are distinguished. First generation biofuels are made directly from food crops; second generation biofuels are created from non-food crops and waste materials; and third generation biofuels are made from especially engineered crops, such as algae.[34] The second and third generation biofuels are also referred to as 'advanced biofuels', and they generally have a smaller environmental impact than first generation biofuels.[35] Therefore, the sustainability criteria apply in full to these biofuels. In addition, agricultural biofuels crops grown within the EU must be cultivated in respect of the principles of good agricultural practise as described in the Common Agricultural Policy (CAP).[36] If, however, biofuels are produced from specific wastes and residues, only the GHG reduction requirement applies and there are no additional requirements on the origins of the raw materials.[37]

By imposing differentiated rules based on the type of raw materials, the sustainability criteria set an excellent example of how holistic rules can be designed. First of all, the length of the chain of effects that is attributed to biofuel production is unprecedented in energy law. Furthermore, it is exceptional in law that the manner in which the raw materials are cultivated is relevant in the production of the final product. Additionally, the criteria touch upon the issue of extraterritoriality as they address agricultural practises outside EU territory, which is often deemed to conflict with national sovereignty and/or trade law.[38]

Despite the merits of the sustainability criteria, they are also criticised for two main reasons. The first is that the criteria apply only to biofuels and bioliquids and not to solid biomass used

33 RED (n 9), annex V.C.7.

34 More elaborately: Thomas Mullan and Alasdair Walker, 'Energy from Waste and Wood' (MSc CEE thesis, University of Edinburgh 2010) <http://energyfromwasteandwood.weebly.com/generations-of-biofuels.html> accessed 26 August 2015.

35 For this reason, the use of crop-based biofuels will be capped, most likely at 7%. 'Parliament rubber stamps EU biofuels reform amid final controversy' (EurActiv.com, 29 April 2015) <http://www.euractiv.com/sections/transport/parliament-rubber-stamps-eu-biofuels-reform-amid-final-controversy-314196> accessed 26 August 2015.

36 RED (n 9), art 17(6). The CAP is also briefly mentioned in paragraph .

37 ibid, art 17(1).

38 For elaborations, see: Erich Vranes, *Trade and the Environment: Fundamental Issues in International Law, WTO Law, and Legal Theory* (OUP 2009); or Laurens Ankersmit, Jessica Lawrence & Gareth Davies, 'Diverging EU and WTO perspectives on Extraterritorial Process Regulation' (2012) 21 Minn J Int'l L 14.

for other (energy) purposes. As a result, solid biomass that is used to produce electricity is not subjected to binding sustainability requirements, while identical material used in biofuel production is subjected to them.[39] In other words, the way in which the raw material is processed determines whether strict rules apply to its cultivation. Thus, the level of sustainability that is required in crop cultivation becomes dependent on the production paths that are subsequently chosen. As electricity from solid biomass provides the largest share of all EU renewables, only a fraction of biomass used for energy is subject to binding sustainability rules.

The second criticism, and the core of the current biofuels debate, is that the sustainability criteria account only for the effects of direct land-use changes (DLUC), while indirect land-use changes (ILUC) are not considered. Emissions from ILUC occur, when land used for food/feedstock production is diverted to energy crops, leading to a shift of food/feedstock production to a new area, which is converted into agricultural land for this reason. This conversion gives rise to additional emissions, known as ILUC emissions. It is very difficult to accurately estimate or calculate these, but their magnitude depends largely on the type of land that is converted. If attributed to biofuel production, these emissions negatively impact the GHG mitigation potential. Several studies show that ILUC emissions may render specific biofuels to be more environmentally damaging than their fossil fuel counterparts.[40] Internalising ILUC effects is therefore crucial in ensuring the sustainability of biofuels. A legislative proposal addressing ILUC issues was submitted in 2012, but to date no formal consensus was reached.[41]

A further holistic element in the RED can be found in the mandatory preferential treatment of electricity made from renewable energy sources.[42] To promote this electricity, Member States must guarantee its transmission and distribution and they must provide for either priority or guaranteed access to the electricity grid. Priority access ensures that producers of electricity from renewable energy sources can sell and transmit their electricity at all times, while guaranteed access ensures that all electricity that is sold obtains access to the grid.[43] In addition, when dispatching electricity generating installations, Member States must ensure that priority is

39 The criteria do apply to bioliquids, so that evasion of the sustainability criteria via combustion of these fuels in the electricity sector is avoided. The regulation of solid biomass is discussed in more detail in para .

40 PBL, *Recente ontwikkelingen in het klimaat- en energiebeleid. Balans van de Leefomgeving 2014 deel 3* (PBL 2014) 13; CE Delft, *Biobrandstoffen benchmarken* (CE Delft, March 2012).

41 Commission, 'Proposal for a Directive of the European Parliament and of the Council Amending Directive 98/70/EC Relating to the Quality of Petrol and Diesel Fuels and Amending Directive 2009/28/EC on the Promotion of the Use of Energy from Renewable Sources' COM (2012) 595 final.

42 RED (n 9), art 16(2).

43 ibid, recital 60.

given to installations using renewable sources.[44] The directive thus explicitly acknowledges that simply promoting the production of renewables is insufficient to ensure its uptake. It is vital that renewables are promoted throughout their full energy chain to ensure that this energy actually reaches consumers. Therefore, the different phases of the production chain must be explicitly connected.

Additionally, in regard to the holistic approach, the detailed calculation rules are crucial. These calculations essentially set the boundaries to the energy chain, as they clarify what is attributed to the chain and what is not. Without going into detail, three different calculations impact how holistic the framework actually is. The first is the calculation of the overall 20% target, which is based on the national targets.[45] The total of renewables consumed is expressed as a percentage of total energy consumption. In the calculation, electricity and heat used in the production of energy and energy losses occurring during the transport of the energy are included, but energy losses in the conversion of primary energy into secondary energy are not accounted for.[46] This means that the attainment of the targets of the RED is not influenced by the level of efficiency of the conversion of primary energy.[47]

The second important calculation concerns the required 10% renewables in transport.[48] In calculating the overall consumption, account is only taken of petrol, diesel, biofuels consumed in road and rail transport, and electricity. However, in calculating the amount of energy from renewable sources all types of energy from renewable sources consumed in all forms of transport are considered. Thus, the required 10% becomes easier to achieve. In addition, to promote specific renewables, the share of electricity from renewables used in road vehicles is counted 2.5 times towards the 10% target, and the share of renewable energy from advanced biofuels is counted twice.[49] In effect, this lowers the 10% target and leads to a smaller volume of biofuels being consumed. However, this double counting applies only for compliance with the 10% target. In the overall EU target of 20%, all biofuels and electricity are counted only once. This means that the heating/cooling and electricity sectors must compensate for the lower contribution from the transport sector. Hence, the calculations reflect the interaction between the three energy branches and allow for some flexibility in the realisation of the targets. Furthermore,

44 Dispatching concerns the task of dividing the (limited) capacity of the network between electricity producers, while ensuring grid stability.

45 RED (n 9), art 5.

46 ibid, art 2(f).

47 Energy efficiency is primarily addressed under the EED (n 18) although the directive focuses on achieving energy savings in the consumption of energy, rather than improving the efficiency of energy conversions.

48 RED (n 9), art 3(4).

49 ibid, arts 3(4)(c) & 21(2).

the calculations are used as a means to improve the environmental performance of the system as a whole.

The third relevant calculation method is that of the GHG savings in biofuel production.[50] For common biofuel production pathways default GHG values are listed in the directive. These are holistic to the extent that they differentiate on the basis of both the raw materials and the production process used. Several of these default values give GHG savings that are lower than the 35% threshold set by the sustainability criteria. In those cases, it is up to the producer to demonstrate that his actual emission savings are higher.[51] However, if treaties regarding sustainability criteria have been concluded with third countries, the Commission may decide that biofuels produced with raw materials from those countries automatically comply with those criteria.[52] This is at odds with the notion that specific production pathways do not meet the required threshold.

Default values can only be used if there are no emissions from DLUC. Otherwise, actual values must be calculated. The directive establishes detailed rules for this, and extensively lists the emissions and emissions savings attributable to a biofuel, hence accounting for the vast majority of effects throughout the production chain. This total of emissions is then compared to the average emissions of the type of fossil fuel it replaces. Recently, it has been argued that this fossil fuel comparator is too low, because the higher carbon footprint of unconventional fossil fuels is not considered in it.[53] A higher comparator would lead to higher relative GHG savings from biofuels, thus rendering more fuels compatible with the sustainability criteria.

These examples illustrate the importance of boundary setting in a holistic approach. Furthermore, despite some omissions, the RED provides the most elaborate example of holistic legislative design in the promotion of renewable energy sources. It achieves this mainly via the rules on the sustainability of biofuels and the preferential treatment of electricity from renewables.

2.3.2 Industrial Emissions Directive

The actual process of the conversion of primary energy sources, including biomass, into secondary energy is regulated primarily under the umbrella of the Industrial Emissions Directive (IED). The IED is of immense importance in energy generation, as it applies irrespective of the

50 ibid, art 19 & annex V.

51 ibid, recital 82.

52 ibid, art 18(4). Also: Almuth Ernsting, *Biomass and Biofuels in the Renewable Energy Directive* (Biofuelwatch, Jan 2009) <http://www.biofuelwatch.org.uk/docs/RenewableEnergyDirective.pdf> accessed 26 August 2015.

53 Arno van den Bos & Carlo Hamelinck, *Greenhouse Gas Impact of Marginal Fossil Fuel Use* (BIENL14773, Ecofys, November 2014).

type of energy that is generated, and it covers virtually all methods of energy production that are used on an industrial scale.

The IED lays down rules on 'the integrated prevention and control of pollution and emissions arising from industrial activities, in order to achieve a high level of protection of the environment taken as a whole'.[54] This is an explicit holistic approach, although it is confined to one specific phase of the energy chain, namely the actual production phase. To achieve this high level of protection, no installation or combustion plant, waste incineration plant or waste co-incineration plant can be operated without a permit.[55] The directive then lays down the framework for the granting of and conditions in the permit.[56] A key feature of the directive is that these permits must contain emission limit values (ELVs) for various polluting substances, and that these values should be based on the Best Available Techniques (BAT).[57] These 'BAT' are those techniques that are the most effective and advanced in achieving a high general level of protection of the environment as a whole, albeit under economically and technically viable conditions.[58] The techniques, and the corresponding emission levels, are not described in the directive itself, but in 'BAT Reference Documents' (BREFs), which are adopted after a procedure of information exchange as formalised by the IED.[59]

In addition to these general provisions, the IED contains several chapters with specific provisions for different types of industrial installations. In regard to biomass regulation, Chapter III concerning large combustion plants and Chapter IV on waste incineration are particularly relevant. For the applicability of these chapters, the categorization of the raw materials (ie the intended fuel of the installation) as either 'biomass' or 'waste' is crucial. In the IED 'biomass' is defined as 'products consisting of any vegetable matter from agriculture or forestry which can be used as a fuel for the purpose of recovering its energy content' and one of five listed types of wastes, ie specific vegetable wastes, paper pulp, cork waste and 'clean' wood waste.[60] All other types of waste are not categorised as 'biomass', but as 'waste' for the application of the IED.

Chapter III applies to combustion plants with a thermal input of 50 MW or more. Almost all power plants fall within this category, including those that are fired or co-fired with biomass.[61] The key provision of this chapter states that the permit must include emission limit values (ELVs) that do

54 IED (n 15), art 1 & annex I.
55 ibid, art 4(1).
56 ibid, arts 12 & 14.
57 ibid, art 14 & annex II.
58 ibid, art 3(10).
59 ibid, art 13 & annex III. These BREFs are discussed in para .
60 ibid, art 3(31).
61 ibid, art 28.

not exceed those listed in the directive.[62] These ELVs are different depending on the thermal input of the installation, the type of installation, the type of fuel used and the state of this fuel –ie solid, liquid, or gaseous.[63] In the case of a multi-fuel firing combustion plant fuel-weighted ELVs have to be set.[64] The ELVs set in this chapter and its annex are Union-wide minimum requirements for large combustion plants, albeit specific exemptions can be made.[65] In practice, the ELVs from the IED are not imposed in the permits, but the significantly more stringent ELVs from the relevant BREFs are. Furthermore, the possibilities for carbon capture and storage (CCS) must be assessed as a potential means to reduce emissions for all modern combustion plants.[66] However, using CCS is not mandatory.

If an installation is fired with waste, instead of biomass, Chapter IV applies.[67] This chapter contains more stringent rules than Chapter III. Firstly, Chapter IV imposes extra requirements on the application of permits and the conditions therein.[68] Furthermore, additional operating conditions are imposed and the rules on breakdowns are more stringent.[69] Lastly, no exceedance of ELVs is allowed for incineration plants,[70] whilst minor and brief exceedances are allowed under the rules for combustion plants.[71] Thus, the choice of a specific primary fuel (ie waste or biomass) impacts how the subsequent production process can be designed. This differentiation on the basis of the fuel type used exemplifies another strong holistic element within the IED.

2.4. Peripheral framework

2.4.1. Environmental Impact Assessment Directive and Strategic Environmental Assessment Directive

The central objective of both the Environmental Impact Assessment Directive (EIA Directive) and the Strategic Environmental Assessment Directive (SEA Directive) is to ensure environmental protection by requiring an assessment of plans, programmes and projects 'likely to have significant effects on the environment' prior to consent.[72] The EIA Directive sets detailed rules for the assessment of individual projects, whereas the SEA Directive concerns itself with public plans and programmes.

62 ibid, art 30(2-3) & annex V.
63 ibid, annex V.
64 ibid, art 40.
65 ibid, arts 33-35 & 73(1).
66 ibid, art 36.
67 ibid, art 42.
68 ibid, arts 44-45.
69 ibid, arts 50 & 47 vs art 37.
70 ibid, art 49 & annex VI, pt 8.
71 ibid, art 39 & annex V, pt 4.
72 EIA and SEA Directives (n 17), arts 1 and 2(1) & 4(1) respectively.

The EIA Directive distinguishes two types of projects: 'Annex I-projects', for which performing an Environmental Impact Assessment (EIA) is mandatory, and 'Annex II-projects' for which this decision is left to the Member States.[73] However, the directive does list the criteria on which the Member States must base the decision whether an EIA must be performed for Annex II projects. These criteria include the characteristics and location of the project and the characteristics of the potential impact.[74] It also lists the information that must be provided at minimum by the project developer to enable the Member State to take a decision in individual cases.[75] The directive, furthermore, sums up the requirements for the actual impact assessment,[76] which must include both the direct and the indirect effects of the project.[77] In order reduce administrative complexity, the requirements of the EIA Directive may be integrated into existing procedures for consent and/or may be coordinated with requirements arising simultaneously from other EU directives.[78] Thus, the information supplied in accordance with the EIA Directive can be used in the description of the project as required by the IED.[79] This information is then examined and used in the granting of the permit under the IED.[80]

The majority of energy related installations fall within the broad scope of the EIA Directive. Basically, an EIA can be mandatory during any phase of the energy life cycle. For instance, an EIA is mandatory for extraction industries, for oil refineries, for nuclear and thermal power stations, for certain storage facilities and for the construction of some pipelines and cables. Furthermore, 'energy industry' has its own heading in Annex II. Regarding the use of biomass for energy purposes, the EIA Directive is applicable to the whole spectrum of possible applications, whether this is in thermal power stations, waste incinerators or for biofuels.[81] In the latter case, the cultivation of crops falls under the EIA Directive only if this cultivation causes specific (direct) land-use changes that are listed in the directive.[82] If such land-use changes do not occur, agricultural rules apply instead of the EIA Directive. In both cases, the construction of an installation that processes these crops requires the performance of an EIA.

Summarised, the EIA Directive contains strong holistic elements, as it requires the environmental effects of projects to be fully assessed prior to commencement and prior to consent on these

73 EIA Directive (n 17), art 4.
74 ibid, annex III.
75 ibid, art 4(4- 5) & annex II, pt A.
76 ibid, arts 5-10 & annex IV.
77 ibid, art 3(1).
78 ibid, art 2(2-3).
79 IED (n 15), art 12.
80 ibid, art 5(3).
81 Most industrial applications fall under EIA Directive (n 17), annex I. Small-scale projects are listed in annex II.
82 ibid, annex II(1).

projects. The boundaries of the assessment are rather broad as both the direct and the indirect effects must be assessed not only on a broad range of factors, but also on the interaction between these factors.[83] Additionally, it is not allowed to split a large project into several smaller projects to evade having to perform an EIA.[84] Furthermore, cumulative effects throughout the energy chain are considered via two routes. Firstly, they are addressed indirectly, through a 'series' of EIAs. EIAs are performed for single projects, but because EIAs are mandatory for basically all large projects, eventually, the effects of all these projects are assessed. Furthermore, since the 2014 amendment of the EIA Directive, it is now mandatory to assess the accumulation of effects with other existing and/or approved projects.[85] The latter assessment is required only in so far as such an analysis is necessary to ensure that the EIA of the project in question covers all the notable impacts.[86] Despite these strong holistic elements in the EIA Directive, a full holistic approach cannot be accorded to it, as the performance of an EIA is essentially a procedural requirement and its outcome is not a ground for refusal of a permit. Permits can be refused on the basis of not performing an EIA properly, but this is a procedural obligation, which can then be repaired. As such, the EIA Directive does not assure sustainable production.

The SEA Directive is more holistic in its approach, which is inherent to its focus on 'all plans and programmes which are prepared for agriculture, forestry, fisheries, energy, industry, transport, (…) or land use and which set the framework for future development consent of projects listed in [the EIA Directive]'.[87] For these plans and programmes an environmental assessment is mandatory, while for other plans and programmes the Member States have a degree of discretion to make their own decisions.[88] Not only must the likely significant effects of a plan or programme be assessed, but also the reasonable alternatives to it.[89] Similar to the EIA Directive, the outcome of an assessment does not challenge the legality of a plan or programme.

2.4.2. Energy Efficiency Directive

The Energy Efficiency Directive (EED) aims to achieve a 20% energy efficiency target by 2020 and further improvements after that.[90] This target corresponds to a quantified maximum EU energy consumption in 2020.[91] Member States are required to use energy more efficiently at all stages of the energy chain, from the conversion of energy to transport and final consumption. As such,

83 ibid, art 3.
84 C-392/96, *Commission vs Ireland* ECLI:EU:C:1999:431 [76, 82].
85 EIA Directive (n 17), annex IV.5.e.
86 C-404/09 Commission vs Spain ECLI:EU:C:2011:768 [80].
87 SEA Directive (n 17), art 3(2). The SEA Directive is relevant to biofuel and/or biomass regulation insofar as it sets rules to the adoption of (governmental) plans and programmes to promote of these fuels.
88 ibid, art 3 & annex II.
89 ibid, art 5(1) and annex I.
90 EED (n 18), art 1.
91 ibid, art 3(1(a)).

the EED takes a holistic approach and affects all parties in the energy market, albeit it is confined to one element relevant in the production chain. To achieve the desired energy reductions, the Member States each had to set an indicative national energy efficiency target which also translates into an absolute level.[92] The targets had to be notified to the Commission as part of the required National Energy Efficiency Action Plans (NEEAPs).[93] These plans comprise the full strategy for achieving the targets, which includes taking specific mandatory measures imposed by the directive.[94] Some of these measures target the end-use of energy while others focus on the efficiency in energy supply.[95] Examples of the former are a mandatory long-term strategy in building renovation, in which public bodies must lead by example, an energy efficiency obligation scheme, energy audits, and metering requirements.[96] The latter category concerns *inter alia* the promotion of efficient heating and cooling and high-efficient co-generation and ensuring energy efficiency in the transformation, transmission and distribution of energy by providing the right incentives.[97]

To promote efficient heating and cooling and high-efficient co-generation, Member States must assess their national potential via a cost-benefit analysis, which must include *inter alia* the external costs and benefits of the different options.[98] This analysis forms the decision base for qualified prioritization of limited resources at society level.[99] When new power plants are planned or old ones refurbished, the cost-effectiveness of using high-efficiency cogeneration, recovering waste heat and connection to a district heating and cooling network has to be assessed and the most efficient option, as revealed by this cost-benefit analysis, must be chosen.[100] In this assessment, account is also taken of the type of fuel used in the installation. The costs and benefits of an installation that is equipped for cogeneration and/or district heating and cooling are compared to an installation that has no such equipment.[101] The environmental benefits of installing the equipment must then outweigh the costs thereof. Because biomass power plants are less polluting than fossil fuel power plants, the environmental benefits of fully equipping such power plants are smaller. As a result, cogeneration might be less feasible in biomass power plants than in fossil fuel plants. This could create conflict between the aims of the RED to promote both cogeneration and electricity from renewable sources.

92 ibid, art 3(1).
93 ibid, art 24(2).
94 ibid, annex XIV, pt 2.
95 ibid, ch II & III.
96 ibid, arts 4-9.
97 ibid, arts 14-15 & annex XI-XII.
98 ibid, art 14(3) & annex IX, pt 1.
99 ibid, annex IX, pt 1, para 1.
100 ibid, art 14(5) & annex IX, pt 2, paras 1 & 8.
101 ibid, annex IX, pt 2, para 1 & 5.

At the same time, the EED positively impacts the share of renewables in overall energy consumption. Since energy savings decrease the use of primary energy sources – which are mainly fossil fuels -, the relative share of renewable energy increases as the overall energy consumption declines. As such, measures taken under the EED contribute to meeting the targets of the RED. This approach is holistic in the sense that it ensures the integration of different elements relevant to greening the energy sector.

2.4.3. Fuel Quality Directive

The Fuel Quality Directive (FQD) applies to biofuels in addition to the RED. The FQD sets both technical and environmental specifications for fuels and a target for the reduction of GHG emissions.[102] The general goal is to decrease GHG emissions from all liquid fuels used in the transport sector by a minimum of 6% and a maximum of 10% by 2020.[103] This reduction target applies to the GHG emissions occurring throughout the full fuel life cycle, which includes all relevant stages from extraction or cultivation, including land-use changes, to transport and distribution, processing and combustion, irrespective of where those emissions occur.[104] Consequently, the FQD takes a holistic approach to fuel production. The reduction target is achieved primarily by blending conventional fuels with biofuels. These biofuels must abide by sustainability criteria identical to those in the RED.[105] The FQDs provisions on the verification of compliance with these criteria and the calculation of GHG emissions are also similar to those in the RED.[106] As the rules are basically identical to those of the RED, they will not be repeated here.

2.4.4. Waste Framework Directive

For waste (co-)incineration plants, the rules of the Waste Framework Directive (WFD) apply in addition to the rules of the IED. In both directives, 'waste' means 'any substance or object which the holder discards or intends or is required to discard.'[107] This is a broad and often disputed definition, and the scope of the directive is narrowed down by excluding several substances, including non-hazardous agricultural or forestry material used for the production of energy, in so far as its processing methods do not harm the environment or endanger human health.[108]

If the WFD applies, so does its 'waste hierarchy'.[109] This is a priority order of waste management that limits how waste can be treated. This order requires that waste must, first of all, be prevented.

102 FQD (n 19), art 1.
103 ibid, art 7a(2).
104 ibid, art 2(6).
105 ibid, art 7b.
106 ibid, arts 7c-7d & annex IV.
107 IED (n 15), art 3(37); WFD (n 16), art 3(1).
108 WFD (n 16), art 2.
109 ibid, art 4.

If that is not possible, it must be prepared for re-use. Only after that, recycling becomes an option. Fourth on the list is 'other recovery', which includes energy recovery. The disposal of waste is the fifth and final option, only to be used when all other options are unattainable. Because the use of waste for energy recovery is only fourth on the list, (bio-)waste that can be prevented, re-used or recycled cannot be incinerated for energy purposes. Furthermore, waste incineration is only regarded as 'recovery', if the waste is used principally as a fuel or other means to generate energy. Incineration facilities for the processing of municipal solid waste fall under this heading only, if their energy efficiency is at least 60% or 65% depending on the date of permitting. Less efficient incineration is considered to be disposal.[110] Moreover, the incineration must be carried out without endangering human health or the environment, and preferably take place in the proximity of where it was generated.[111] Once the waste has been processed, ie converted into heat and/or electricity, it ceases to be waste.[112]

The above shows that the qualification of biomass as 'waste' has a significant impact on how this biomass can be handled. Due to the stricter standards on waste under both the WFD and the IED, using waste for energy generation is generally less favourable for operators than using 'regular' biomass. This effect is mitigated via less stringent requirements on sustainability and by the 'double counting rule' of the RED.[113] This situation reflects the need to simultaneously regulate waste strictly to protect the environment and to 'reward' useful applications of waste. Thus, the combined directives contribute to a holistic approach in the legal framework.

2.4.5. Regulation of solid raw materials

The legislation just discussed does not fully cover the use of solid biomass for energy purposes. In particular, these directives do not address the cultivation of materials from agriculture and forestry used in electricity generation, which constitute the largest share of renewable energy. The sustainability criteria of the RED do not apply to these materials. Instead, agricultural biomass grown in the EU has to meet the standards of the Common Agricultural Policy (CAP). These standards take the form of Statutory Management Requirements (SMR) and Good Agricultural and Environmental Conditions (GAEC). SMR are legal requirements stemming from specific listed EU (environmental) directives, while GEAC are more general requirements on the state of the land after production is ceased.[114]

110 ibid, annex I-II.

111 ibid, arts 13 & 16.

112 ibid, art 6. For detailed guidance, see: Commission, 'Guidelines on the interpretation of key provisions of Directive 2008/98/EC on waste' (DG Environment 2012), para 1.3.

113 As explained in paragraph 2.3.1, around (n 37) of this article.

114 These can be found in European Parliament and Council Regulation 1306/2013/EU of 17 December 2013 on the financing, management and monitoring of the common agricultural policy and repealing Council Regulations 352/78/EEC, 165/94/EC, 2799/98/EC, 814/2000/EC, 1290/2005/EC and 485/2008/EC [2013] OJ L 347/549, arts 91-95 & annex II. The CAP will not be addressed in more detail here.

Forest biomass is regulated mainly through the Timber Regulation and the EU Forest Strategy.[115] The Timber Regulation prohibits the placing on the market of illegally harvested timber or timber products and requires due diligence from operators in this respect.[116] Economic operators must therefore provide information on the origin of their products, when placed on the internal market for the first time.[117] The regulation contains no specific provisions on the sustainability of the products. Sustainability criteria are also lacking in the Forest Strategy, which merely stipulates the need for a 'holistic view of forest management'.[118] To this aim, Sustainable Forest Management (SFM) criteria that encompass all life cycle phases are currently being developed.[119] However, the Forest Strategy does not impose any obligations on Member States nor on operators. Under the recently adopted 'LULUCF Decision', Member States are obliged to monitor and report certain GHG emissions and changes in carbon stock caused by forest related activities.[120] Furthermore, they have to give information on how they will limit emissions from Land Use, Land-Use Change and Forestry (LULUCF).[121] The LULUCF Decision does not impose specific sustainability requirements, so that binding EU rules on solid biomass sustainability are lacking.

There are, however, initiatives at other levels. Belgium, Hungary, Italy and the UK have adopted national rules on sustainable forest management and/or land criteria. At the same time, the Netherlands is contemplating the adoption of a set of sustainability criteria.[122] Furthermore, there are several industry-led sustainable forest management schemes and several 'general' certification schemes for forestry and agricultural products. All of these schemes are voluntary.[123] In addition to these certification schemes, the European Committee for Standardisation (CEN) and the International Organization for Standardization (ISO) develop standards on what they refer to as 'solid biofuels'.

All in all, a patchwork of measures and initiatives regarding woody biomass is in place. There are international, European, national and private initiatives, regarding harvesting, certification,

115 Timber Regulation (n 21) and Forest Strategy (n 4).
116 Timber Regulation (n 21), art 4.
117 ibid, arts 5-6; State of Play (n 12), 12.
118 Forest Strategy (n 4), 4.
119 State of Play (n 12), 13.
120 European Parliament and Council Decision 529/2013/EU of 21 May 2013 on accounting rules on greenhouse gas emissions and removals resulting from activities relating to land use, land-use change and forestry and on information concerning actions relating to those activities [2013] OJ L165/80 (LULUCF Decision), arts 3-4 in particular.
121 ibid, art 10 & annex IV(j).
122 State of Play (n 12), 9.
123 ibid, 12; Forest Strategy (n 4), 12. All recognised EU sustainability schemes can be found on the website of the DG Energy.

standard setting and/or criteria development.[124] None of these initiatives set binding criteria on the sustainability of biomass or mandatory participation of operators in the field. Therefore, at EU level, the sustainability of solid biomass is only assured, if the country of origin has specific national legislation in place. This is currently the case in only four out of the 28 Member States. Furthermore, their criteria are not 'full' sustainability criteria, nor do they have Union wide application. As a consequence, the legal framework for solid biomass is far from holistic and is insufficient to guarantee the sustainability of solid biomass used for energy purposes.[125]

2.4.6. Gas Directive & Electricity Directive

Virtually all energy produced or traded within the EU falls within the scope of the European legal framework covering the liberalisation of the internal energy market.[126] Only two directives of that framework, the Electricity Directive and the Gas Directive, are discussed here. The Electricity Directive establishes common rules for the generation, transmission, distribution and supply of electricity, and lays down consumer protection provisions.[127] The Gas Directive establishes common rules for the transmission, distribution, supply and storage of natural gas, and also applies to biogas and gas from biomass in so far as it can technically and safely be injected into the natural gas system.[128] Biogas has no formal EU definition, but is narrowly described in an annex to the RED.[129] If biogas is purified to natural gas quality, it is referred to as biomethane. In addition, EU legislation distinguishes biogas from landfill gas and sewage treatment gas, which are all recognised as renewable energy sources.[130] Thus, both directives lay down the rules on the organisation and functioning of their respective sectors. The contents of the directives are much the same, so that they will largely be discussed together.

A key feature of both markets is that the networks for the transport of gas and electricity constitute a natural monopoly. Therefore, rules to avoid abuse of dominant positions play a prominent role in the legislative framework. Firstly, the competitive parts of the market are separated from its non-competitive parts. These 'unbundling requirements' mean that generating and supply activities cannot be performed by an undertaking that is involved in the

124 Examples in: Uwe Fritsche and others, 'Extending the EU Renewable Energy Directive sustainability criteria to solid bioenergy from forests' (2014) 38(2) Natural Resources Forum 129, 131.

125 See also: Yelena Gordeeva, 'Wood Biomass Sustainability under the Renewable Energy Directive' in L Squintani & HHB Vedder (eds), *Sustainable Energy United in Diversity – Challenges and Approaches in Energy Transition in the European Union* (European Environmental Law Forum Book Series 2014).

126 For a full description of the (regulation of) the energy market, see: Martha Roggenkamp and others (eds), *Energy Law in Europe: National, EU and International Regulation* (3rd edn, OUP forthcoming 2015).

127 E-Directive (n 22), art 1.

128 Gas Directive (n 22), art 1. This means that raw biogas that is not upgraded to natural gas quality falls outside the scope of the Gas Directive.

129 RED (n 9), annex III.

130 ibid, art 2(a).

operation of the networks.[131] Under both directives two types of networks are distinguished: the transmission network and the distribution network.[132] Simplified, the transmission of electricity concerns the transport along the (extra) high-voltage power grid, whilst the distribution of electricity entails the transport along the lower-voltage power grid. Under the Gas Directive, 'transmission' primarily involves the transport of gas along high-pressure pipelines, whilst distribution occurs along local or regional pipeline networks.

Under each directive, two different entities are responsible for the transport along the two networks. The transmission networks are operated by a transmission system operator (TSO), while the distribution networks are managed by a distribution system operator (DSO).[133] At EU level, all TSOs cooperate to develop Community network codes, which are basically detailed rulebooks for the electricity and gas sector.[134] These network codes also contain the detailed rules on Third Party Access (TPA), which are the second important safeguard against abuse of the dominant position of the TSO flowing from its natural monopoly. The Gas and Electricity Directives demand that access to the network is based on non-discrimination, objectivity and transparency.[135]

When dispatching the electricity installations, the TSO is required to give priority to installations that use renewable energy sources.[136] For installations producing combined heat and power (CHP) this priority is optional.[137] The E-Directive explicitly refers to article 16 of the RED, which requires that the TSO provides preferential access to the network for electricity from renewable sources and guarantees its transmission and distribution.[138] Thus, electricity from renewable sources enjoys 'privileges' throughout the energy chain. However, preferential access to the distribution network is not mandatory, as this decision is left to the Member States.[139] As a result, electricity from renewables that is fed into the lower-voltage network may be accorded fewer 'privileges' than it would in the high-voltage network.

131 Gas & E-Directives (n 22), art 9.

132 ibid, art 2(3 & 5).

133 E-Directive (n 22), ch IV & VI; Gas Directive (n 22), ch III & V respectively. Gas & E-Dir, ch III arts 10-11 Gas Dir, ch V; E-Dir, ch VI.

134 Regulation 714/2009/EC of 13 July 2009 on conditions for access to the network for cross-border exchanges in electricity and repealing Regulation 1228/2003/EC [2009] OJ L211/15 (E-Regulation), arts 4 & 6-8; Regulation 715/2009/EC of 13 July 2009 on conditions for access to the natural gas transmission networks and repealing Regulation 1775/2005/EC [2009] OJ L211/36 (Gas Regulation), arts 4 & 6-8.

135 Gas & E-Directives (n 22), art 32; further reading: Hannah Kruimer, *The Non-Discrimination Obligation of Energy Network Operators. European Rules and Regulatory Practice* (Energy & Law, vol 15, Intersentia 2013).

136 'Dispatching' is explained in (n 44).

137 E-Directive (n 22), art 15(3).

138 RED (n 9), art 16(2).

139 E-Directive (n 22), art 25(4).

By analogy, the requirements from the RED should apply to gas made from renewable sources, but neither the RED nor the Gas Directive mentions a preferential access regime for biogases.[140] Nevertheless, Member States must ensure the integration of large and small scale production of gas from renewable energy sources and remove barriers that could prevent access for such gas.[141]

For the remainder, the two directives are again quite similar. Both directives contain rules on tendering for, and the construction of, new capacity,[142] ensuring security of supply,[143] and guaranteeing the safety of the networks.[144] Furthermore, under both directives the energy efficiency of production, transport and efficient use of energy must be promoted.[145]

Summed up, both directives focus mainly on the smooth functioning of their respective markets. The E-Directive sets such rules for the full electricity production chain, while the scope of the Gas Directive excludes the extraction or production of gas.[146] The construction of such sites is then nevertheless addressed.[147] Within these markets ensuring security of supply is crucial. Security of supply in regards to electricity has recently been defined by the General Court (GC)of the Court of Justice of the European Union as 'the availability of power plants that can produce electricity, regardless of climatological or political circumstances'.[148] Furthermore, the same judgment illustrates the lack of a holistic approach in current energy regulations, as the General Court explicitly ruled that 'environmental protection, which should be integrated into all EU activities according to article 11 TFEU, is strictly speaking not an element of the internal

140 DG Tempelman, 'Groen (als) gas. Een analyse van de groen-gasketen' [2012] 3 *Nederlands Tijdschrift voor Energierecht* (July 2012) 119, 125.

141 Gas Directive (n 22), art 40(d-e). Equal requirements for electricity can be found in E-Directive (n 22), art 36(d-e).

142 E-Directive, arts 7-8; Gas Directive, art 4.

143 E-Directive, art 4; Gas Directive, art 5.

144 E-Directive, art 5; Gas Directive, art 8.

145 E-Directive, arts 12, 25 & 36(d); Gas Directive, arts 13, 25 & 40(f).

146 Gas & E-Directives (n 22), art 1. The extraction of natural gas is (partially) covered under European Parliament and Council Directive 94/22/EC l of 30 May 1994 on the conditions for granting and using authorizations for the prospection, exploration and production of hydrocarbons [1994] OJ L164/3 (Hydrocarbons Directive).

147 Gas Directive (n 22), art 4.

148 Case T-57/11 *Castelnou Energía* v *Commission* ECLI:EU:T:2014:1021 [159]. In this case, the operator of a Combined Heat and Power (CHP) plant objected to the Commission's decision to approve Spain's state aid for indigenous coal for electricity. Spain deemed this aid to be necessary to ensure the security of electricity supply. The Commission decision was upheld by the General Court. Greenpeace intervened in this case and argued that the contested measure should have been tested against the environmental protection requirement of article 11 TFEU. The Court disagreed, because the measure did not have environmental aims. (The quote is a non-authoritative translation from the Dutch version of the case, as no English version is available yet.)

market as defined in article 26(2) TFEU'.[149] This interpretation severely undermines the energy markets potential for sustainable development and comes at the detriment of implementing a holistic approach in energy regulations.

Altogether, the rules for energy market regulation do not ensure that all the effects from energy generation are taken into account. The Gas Directive only imposes a general requirement that 'Member States shall implement appropriate measures to achieve the objectives of social and economic cohesion and environmental protection, which may include means to combat climate change, and security of supply.'[150] In the E-Directive, several holistic elements can be found in the rules on new generating capacity. These are, for instance, the requirement to consider the contribution of a proposed power plant to the 20% renewables target of the RED and its contribution to the reduction of emissions.[151] However, as these elements are not decisive in deciding what type of power plants to build, the approach is only seemingly holistic. Thus, essentially, the only truly holistic element within the E-Directive is the explicit link to the preferential access regime of the RED.[152]

2.4.7. BAT Reference Documents

The last legislative documents to discuss are five 'BAT Reference Documents' (BREFs). These BREFs are lengthy documents that set technical specifications and emission values associated with specific techniques. A BREF is a descriptive document that does not prescribe the use of any technique or specific technology. It merely specifies techniques that are considered to be the Best Available Techniques (BAT). BREFs may either be restricted to issues related to particular industrial activities ('vertical' BREFs) or may deal with cross-sectoral issues ('horizontal' BREFs).[153]

Formally, BREFs are soft law, but with the adoption of the Industrial Emissions Directive (IED) the BREFs' *de facto* status as a secondary source of EU law has been formalised. The procedure for their adoption, as described in article 13 of the IED, is the codification of a long existing practice. The old, more informal BREF-system has often been criticised for lacking transparency and for according too much weight to economic arguments.[154] The codification was meant to address these objections.

149 ibid, [189].
150 Gas Directive (n 22), art 3(7).
151 E-Directive (n 22), art 7(2)(j&k).
152 ibid, arts 15(3) & 25(4).
153 Commission Decision 2012/119/EU concerning guidance on the collection of data and on the drawing up of BAT reference documents and on their quality assurance [2012] OJ L63/1, s 1.1.1 & 1.1.2.
154 See more generally: Bettina Lange, *Implementing EU Pollution Control, Law and Integration* (CUP 2008).

In essence, the adoption of BREFs concerns a lengthy, extensive information exchange procedure between multiple stakeholders. As such, the procedure for adopting BREFs is decisive in how holistic the adopted norms will be. After all, it is during the debate that different views are expressed and that arguments in favour of or against including specific techniques are put forward and discussed. Therefore, the point at which, and the way in which, such arguments are presented largely determines the boundaries of what is eventually adopted and accounted for under a BREF. The determination of the BAT is of vital importance, because the BAT conclusions are the reference point for setting permit conditions under the IED.[155] Hence, the BAT conclusions and their associated emission and consumption levels largely determine the level of environmental protection that is required from industrial installations.

All horizontal BREFs roughly have the same structure and each chapter helps to build up to the final BAT conclusions. Thus, the contents of each chapter have an (indirect) effect on how holistic these conclusions are. In the first chapter, the scope of the BREF is determined and general information on the sector (or cross-sectoral issues) is given. Then the applied techniques of a specific sector are discussed, as are current emission and consumption levels. After that, the techniques considered in the determination of the BAT are described and discussed. In determining the BAT, consideration must be given *inter alia* to the criteria listed in the IED, such as the nature of the raw materials or energy efficiency.[156] The iterative process of BAT determination can be summarised as follows.[157] First, the key environmental issues for the sector are identified. Next, the techniques most relevant to address these key issues are examined. Then the best environmental performance levels are identified, followed by an examination of the conditions under which these environmental performance levels were achieved. On this basis, the BAT are selected together with their associated environmental performance levels. The BREFs do not prescribe a specific environmental performance level, but rather set a range of feasible emission and/or consumption levels. The best available techniques are then described in the BAT conclusions together with a description of any emerging techniques.[158] Normally, consensus is achieved on the BAT conclusions, but split views are also possible and this will be indicated in the BREF.[159]

In the field of energy generation and related biomass uses, five BREFs are particularly relevant.

155 IED (n 15), art 14(3).

156 ibid, annex III.

157 Commission, *Revision of the Standard Texts used in BREFs to Adapt Them to the IED Regime,* 20 July 2012 <http://eippcb.jrc.ec.europa.eu/reference/BREF/Codified_version_of_standard_text29_08_12.pdf> accessed 22 May 2015, [4].

158 Commission Decision 2012/119/EU (n 153), s 2.2.

159 ibid, s 4.6.2.3.2.

Three of these are vertical BREFs applicable to different categories of industrial (biomass) installations. Hence, there are separate 'BAT Reference Documents' for large combustion plants (called the BREF LCP), for waste incineration plants (called the BREF WI), and for other forms of waste treatment (referred to as the BREF WT).[160] All three BREFs provide feasible emission levels for the production processes that are considered BAT in their respective sectors. In case of conflict between any of the norms, the most stringent ones apply.[161] All three BREFs take a holistic approach to one phase of the energy cycle, as they lay down the numerical specifications of the integrated approach required under the IED. Thus, they contain detailed 'instructions' on how to avoid cross-media effects in each segment of the production phase.

The fourth relevant BREF is the reference document on energy efficiency' (called BREF ENE).[162] This is a horizontal BREF, applicable to all installations that fall under the IED-regime. The BREF discusses techniques that are considered BAT to achieve energy efficiency at both the installation level and at system level. However, the BREF does not set energy efficiency values, like the BREF LCP and BREF WI do for the emissions from their respective installations. Instead, the BREF ENE's aim is to ensure that all IED-installations are operated in such a way that energy is overall used efficiently. Out of the five BREFs, the BREF ENE is the most holistic one as it is the only one that considers the full length of the energy chain. At the same time, the chain under consideration is extremely thin, as energy efficiency is one element in the production chain.

The final relevant document, the 'Reference Document on Economics and Cross-Media Effects' (REF ECM), is also a horizontal reference document.[163] Unlike the other BREFs, this document does not determine any BAT. Instead, it describes methodologies that may assist in determining BAT in other BREFs. The REF ECM gives methodologies for assessing and weighing cross-media effects, for balancing costs and benefits of different technologies, and for assessing the economic viability of specific techniques. Furthermore, it provides data and information that can be useful in these assessments. Altogether, the REF ECM takes a holistic approach in avoiding the shifting of effects during the production phase. In addition, the REF ECM considers alternative

160 These are respectively: Commission, *Reference Document on Best Available Techniques for Large Combustion Plants* (July 2006) <http://eippcb.jrc.ec.europa.eu/reference/BREF/lcp_bref_0706.pdf> accessed 9 September 2015 (BREF LCP); Commission, *Reference Document on the Best Available Techniques for Waste Incineration* (August 2006) <http://eippcb.jrc.ec.europa.eu/reference/BREF/wi_bref_0806.pdf> accessed 9 September 2015 (BREF WI); and Commission, *Reference Document on Best Available Techniques for the Waste Treatments Industries* (August 2006) <http://eippcb.jrc.ec.europa.eu/reference/BREF/wt_bref_0806.pdf> accessed 9 September 2015 (BREF WT).

161 BREF WI (n 160), preface, xiv.

162 Commission, *Reference Document on Best Available Techniques for Energy Efficiency* (February 2009) <http://eippcb.jrc.ec.europa.eu/reference/BREF/ENE_Adopted_02-2009.pdf > accessed 9 September 2015 (BREF ENE).

163 Commission, *Reference Document on Economics and Cross-Media Effects* (July 2006). <http://eippcb.jrc.ec.europa.eu/reference/BREF/ecm_bref_0706.pdf> accessed 9 September 2015 (REF ECM).

methodologies for the calculation of external (health and environmental) costs of industrial processes. However, the document only establishes guidelines for Member States, so it does not impose holistic obligations.

Furthermore, in the costing methodologies external costs are not accounted for.[164] This is also the case in calculating costs under the other four documents. As a consequence, the price of the protective measures required from operators is lower than the actual overall societal costs incurred by a specific industrial process. For instance, the average EU health related costs of NOx emissions are estimated to be at least € 4.40 per additional kilo of NOx, while emission reduction measures required from operators are deemed 'reasonable' (ie cost effective) up to a maximum of € 2.50 per kilo of abated NOx.[165] Several health effects are thus ignored, as are any environmental effects. This monetary limitation therefore ultimately limits how holistic the regulatory approach is, as it essentially gives economic considerations preponderance over environmental and/or health concerns.

2.5. Conclusions

2.5.1. Holistic elements and the current framework

The analysis of the legal framework for biomass for energy shows that some strong elements of a holistic approach are present, but mostly this approach remains embryonic. Still, holistic elements can be found at three levels. Firstly, several provisions take a holistic approach to the environmental effects occurring within one phase of the energy (production) chain. The most well-known example are the environmental protection requirements under the IED referred to as the 'integrated prevention and control of pollution' aimed at avoiding the shifting of pollution between water, air and/or soil.[166] At a higher level, holistic provisions link different parts of the energy (production) chain. Awareness on the mutual influence of (actors within) the different phases of the energy chain has led to an increase in this type of rules.[167] The strongest example found in biomass regulations is the preferential treatment of electricity from renewables, as required under the RED.[168] This provision links the raw-materials phase to the transport phase and 'rewards' the more sustainable options. At a third level, there are provisions aimed at a more systemic holistic approach, ie targeting the full energy chain. These rules may focus on either one specific type of energy generation or on the energy system as a whole. The most elaborate example of the former is found in the sustainability criteria of the RED and FQD that explicitly attribute the emissions from cultivation, transport and production to the biofuels.[169]

164 ibid, 41.
165 These estimates are from 2006. See: REF ECM (n 163), 61 vs 121.
166 IED (n 15), art 1.
167 These phases are depicted in Figure 1.
168 RED (n 9), art 16(2).
169 ibid, art 17 & FQD (n 19) art 7b.

Other examples are the 'full life cycle' GHG-savings requirement of the FQD and the assessment requirements of the EIA Directive. Examples of an overall holistic approach are more seldom. The only legislative example here is the systemic assessment required under the SEA Directive, although this does not directly regulate the use of biomass for energy.

Altogether, the current legal framework lacks a coherent vision on how to achieve the often advocated holistic approach. The current framework is characterised by rules that are at times 'clustered' with similar rules, but often function parallel to each other. In this regard, the IED Directive serves as an 'umbrella' to which the EIA Directive and several BREFs are strongly attached. The WFD is connected more loosely, whereas the EED and RED remain parallel and unattached to the IED-cluster. Nevertheless, energy saving requirements can be found throughout the legal framework. Furthermore, the Gas Directive and E-Directive are not related to the IED-umbrella and out of the two only the E-Directive is loosely linked to the RED. The SEA Directive and the FQD do not converge with the other rules, although the FQD echoes the wording of the RED. The resulting fragmentation within the framework partly stems from the fact that the rules were drafted at different times and with different aims in mind. Additionally, the directives each serve multiple interests and EU energy law in general serves the triple aim of ensuring an affordable, secure and sustainable energy supply.[170]

Summarised, the resulting legal framework exhibits a great deal of diversification, as shown in Figure 2. This figure depicts the biomass streams in their consecutive phases and along their different processing methods and it shows the applicable rules along these routes.

170 Commission, 'Energy 2020 - A Strategy for Competitive, Sustainable and Secure Energy' COM (2010) 639 final, 2.

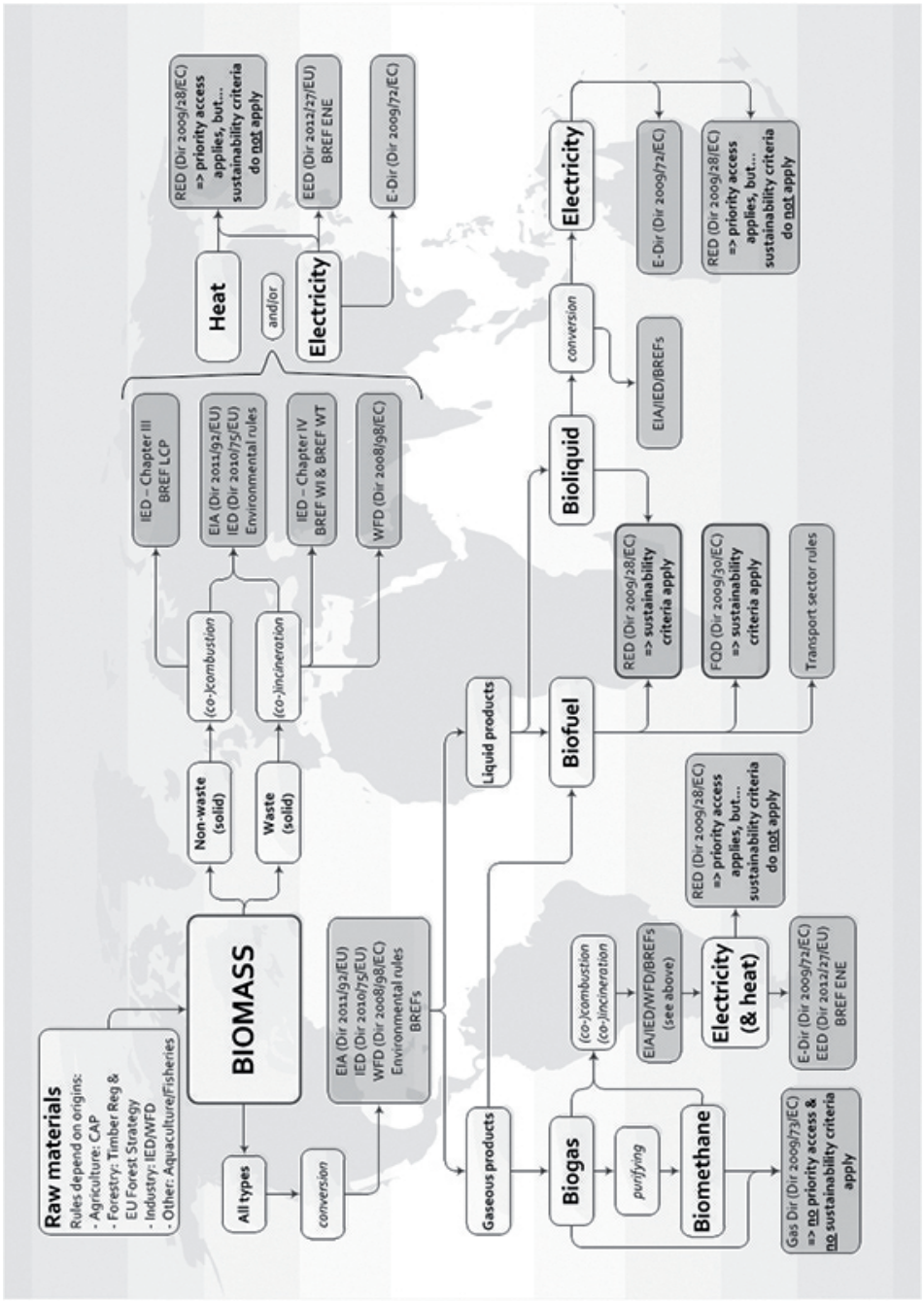

Figure 2.2: Flowchart of rules applicable to different biomass applications

The differentiations visible in this framework are sensible to the extent that they address variations in raw materials and production paths. From a holistic perspective, it is desirable that different rules apply to different production paths, as these have diverging effects on their surroundings. Two examples from the framework can illustrate this. Firstly, the emphasis is different in the regulation of electricity from renewables and biofuels. Electricity is network dependent (ie it has to be transported through cables), so rules on preferential access to the network can provide a stimulus for sustainable production. Sustainable biofuel production cannot be stimulated this way, so here the focus lies on ensuring the sustainability of the raw materials. It is exactly this type of differentiation that is needed in holistic legislative design, as it addresses the products on their specific merits.

The second example is the importance of the classification of biomass as waste. The legal framework reflects the tension between, on the one hand, the desire to regulate waste strictly in order to protect the environment and/or human health, and, on the other hand, the desire to promote waste as a useful resource in order to simultaneously reduce natural resource usage and waste production. To promote the use of biomass in electricity generation, several types of waste are excluded from the waste provisions in the IED; instead the regular combustion rules apply.[171] Similar exclusions exist for the application of the WFD.[172] This approach narrows down the term 'waste', and as a result biomass sources such as residual wood chips can be used more easily in energy generation. At the same time, in the application of the EIA Directive, the term 'disposal' is interpreted to include 'recovery', while under the WFD 'recovery' is regarded as a special type of recycling, and not a form of disposal.[173] This interpretation broadens the scope of the term waste for the application of the EIA to ensure that waste incineration for energy purposes is covered by the EIA.

Despite this need for diversification, differentiation becomes unwanted if it leads to fragmentation, as this decreases the frameworks potential to achieve a holistic approach and may result in the omission of specific effects. A coherent holistic approach is further undermined by a lack of knowledge of the side effects of either the envisaged measures and/or of the production pathways that are regulated. This is particularly true in regard to the application of the sustainability criteria of the RED (and FQD). First of all, these criteria apply to only a fraction of all biomass-for-energy applications, as they cover only roughly 2.5% of overall energy consumption.[174] The practical effectiveness of the most advanced example of holistic legislation

171 IED (n 15), arts 3(31) & 28(j).

172 WFD (n 16), art 2(1)(f).

173 Commission, 'Interpretation of Definitions of Certain Project Categories of Annex I and II of the EIA Directive' (No 2008-022, European Communities 2008), 20.

174 Estimate from Daan Peters and others, *Assessing the EC ILUC Proposal, Dutch National Impact Assessment* (BIENL13265, Ecofys April 2013), 39.

thus remains rather marginal, since no binding sustainability criteria are applicable to any other biomass applications. Furthermore, it is striking that the applicability of the criteria is largely dependent on the form and manner in which the raw materials are eventually consumed. This results in inconsistent application of the criteria, which is most prominent in relation to biogas regulation. Biogas itself is generally not used as a transport fuel; hence, biogas is not covered by the sustainability criteria.[175] However, biomethane, which is purified biogas, can be used as a fuel for vehicles, in which case the sustainability criteria do apply. If biomethane is used in any other way, ie not as a biofuel, the sustainability criteria again do not apply. Consequently, under the current legal regime, the same gas (biomethane), produced in the same manner from the same raw materials, is for one application subjected to stringent sustainability criteria, while for another it is not.[176] In addition, its 'raw version', biogas, is not subjected to sustainability criteria. This inconsistent application of sustainability requirements conflicts with the need to come to a more sustainable overall energy supply.

2.5.2. Carbon neutrality

The sustainable use of biomass for energy is further undermined by the general assumption of carbon neutrality of all types of biomass, while in fact this neutrality depends on the timeframe considered and the biomass source used.[177] Regarding the timeframe, it is problematic that the current legal framework does not acknowledge the carbon debt resulting from the time-lapse between the occurrence of emissions and the reabsorption thereof. Fact is that most biomass applications rely on combustion techniques and that combustion causes carbon emissions. Thus, biomass used for energy production actually increases atmospheric carbon and it takes time to rebuild an equally sized store of carbon.[178] This results in a carbon debt, which can take decades or even centuries to repay. According to the Scientific Committee of the European Environment Agency 'the premise that biomass combustion, regardless of the source of the biomass, would

175 In the exceptional case that biogas is used as a fuel for transport, the criteria do apply.

176 In reality, the situation is more complex, as the trade in biomethane is facilitated via (national) certificate systems. An extensive discussion of such schemes falls outside the scope of this article. Put simply, all biomethane is fed into the natural gas network, so that it becomes indistinct from this natural gas. A gas station, therefore, does not sell biomethane physically, but virtually, through acquiring sufficient certificates. Further information can be found at <http://www.greengas.org.uk> accessed 26 August 2015.

177 BirdLife Europe and others, *EU Joint NGO briefing: Sustainability Issues for Solid Biomass in Electricity, Heating and Cooling* (March 2012) <http://www.birdlife.org/sites/default/files/attachments/EU-Joint-NGO-briefing-biomass-sustainability-energy-March2012.pdf>, accessed 26 August 2015, 3.

178 In addition to the emissions from combustion, there are extra emissions from harvesting, transporting and processing the biomass. These also need to be accounted for.

not result in carbon accumulation in the atmosphere results in a serious accounting error.'[179] This reality, which is currently ignored in law, should be explicitly acknowledged by the legal framework, if there is to be a holistic approach.

A second implication resulting from this time-lapse is that biomass supplies are not endless, as it takes time for supplies to regrow. This means that the increased demand for biomass for energy purposes must be reconciled with all other, potentially competing biomass uses. It is therefore vital to develop a framework that prioritises these uses and establishes a mandatory cascading use, similar to the waste hierarchy advocated by the WFD. For woody biomass, a cascading use approach would require that, the first application of this biomass is for wood-based products. The second preferred option is re-use and third comes recycling. Bioenergy should be only the fourth application, just before disposal. This cascade use ensures that woody biomass is used in the most efficient manner and that competition over biomass sources is avoided, which is particularly important for woody biomass used in electricity generation.[180]

In regard to biofuels, their carbon neutrality is also undermined by the fact that ILUC emissions are not accounted for. From a regulatory perspective, it is problematic that ILUC emissions vary according to the interaction between dynamic (global) economic and physical systems. This leads not only to scientific uncertainty about their size, but also to variations of their size in time. Regulating ILUC emissions is further complicated by the fact that a higher demand for biomass increases the risk of deforestation, hence leading to higher ILUC emissions.[181] To date, no sufficiently accurate models have been developed to calculate ILUC emissions. However, the alternative cannot be to ignore these emissions, as doing so equals setting them to zero in the calculations, which significantly distorts the outcome of the overall environmental performance of biofuels.[182]

Similarly, it is argued that such distortions occur, because the fossil fuel comparator currently used is not accurate. Ecofys, a consultancy agency, argues that this comparator should be adjusted upward to reflect that more unconventional fossil fuels, that typically have higher carbon footprints, will come onto the market.[183] Such an adjustment would improve the relative

179 Scientific Committee of the EEA, *Opinion on Greenhouse Gas Accounting in relation to Bioenergy* (EEA, September 2011) <http://www.eea.europa.eu/about-us/governance/scientific-committee/sc-opinions/opinions-on-scientific-issues/sc-opinion-on-greenhouse-gas/view> accessed 26 August 2015, 1 (Opinion SC EEA).

180 Forest Strategy (n 4), 5-6.

181 Quoted from: PBL, *PBL Note: Sustainability of biomass in a bio-based economy* (PBL, February 2012) <http://www.pbl.nl/sites/default/files/cms/publicaties/PBL-2012-Sustainability-of-biomass-in-a-BBE-500143001_0.pdf> accessed 22 May 2015, 14 (PBL note).

182 Opinion SC EEA (n 179), 7.

183 Van den Bos & Hamelinck (n 53).

environmental performance of biofuels. However, Nusa Urbancic argues that the comparator suggested by Ecofys is too high, because it is based on flawed assumptions regarding the role of unconventional fuels in the future energy mix.[184] This discussion illustrates the importance of the assumptions underlying (GHG) calculations, as such assumptions can significantly impact the relative environmental performance of biofuels or even whole energy systems.

2.5.3. Consequences for legal design

All in all, to ensure the transition to a low-carbon energy system, it is essential to develop a fully holistic approach and to impose sustainability criteria for all types of biomass. The latter could be achieved by a minor amendment to article 17 RED to make the criteria applicable to 'bioenergy' rather than 'energy from biofuels and bioliquids'. Alternatively, criteria similar those applicable to biofuels could be adopted for solid biomass. The starting point t could be the proposal already drawn up by the Commission, which was never submitted due to industry opposition.[185] Additionally, these criteria should account for ILUC emissions and the existing carbon debt.

Without such criteria, an ambitious bio-based economy increases the risk of non-sustainable supply and overexploitation of natural resources.[186] At the same time, the potentially available supply of biomass is strongly influenced by the strictness of any adopted sustainability criteria.[187] The stricter these criteria are, the smaller is the amount of available biomass. Ironically, the available supply of biomass is further affected by climate change itself, because temperature increases, rainfall-pattern-changes and increased frequency of extreme events will influence and interact with the biomass resource potential.[188]

According to the Intergovernmental Panel on Climate Change, 'bioenergy has a significant (…) GHG mitigation potential, provided that the resources are developed sustainably (…). Certain current systems and key future options (…) are able to deliver 80 to 90% emission reductions compared to the fossil energy baseline.' However, the overall impact of bioenergy is positive or negative depending on local conditions and the design and implementation of specific projects.

184 'Scribbling in the Margins – Biodiesel's Efforts to Make itself Look Good' (EurActiv.com, 24 November 2014) <http://www.euractiv.com/sections/energy/scribbling-margins-biodiesels-efforts-make-itself-look-good-310268> accessed 26 August 2015.

185 Commission, 'Proposal for a Directive of the European Parliament and of the Council on Sustainability Criteria for Solid and Gaseous Biomass Used in Electricity and/or Heating and Cooling and Biomethane Injected into the Natural Gas Network' (Draft Proposal, August 2013) <http://www.endseurope.com/docs/130819a.pdf> accessed 26 August 2015.

186 PBL note (n 181), 9.

187 PBL note (n 181), 7.

188 Helena Chum *et al*, '2011: Bioenergy', in O. Edenhofer *et al* (eds), *IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation* (CUP 2011), 214 (IPCC SRREN).

A proper design is all the more crucial, as bioenergy has complex societal and environmental interactions. If improperly designed, climate change feedback, land use conversion and unsustainable forest management can 'in some cases more than neutralize the net positive GHG mitigation impacts'.[189]

As long as the indirect effects of biomass energy are ignored, the perception of biomass as a renewable energy source is overly optimistic and thus its use will be overstimulated. This promotion may come at the expense of other available renewable sources, such as wind or solar energy, or it may hinder the development of new technologies. Furthermore, over the last years, vast investments have been made in developing both first generation biofuel installations and biomass (co)combustion facilities. These investments may increasingly lead to path dependence, as it becomes ever more difficult for policymakers to change their course of action.

Despite the risk of overstimulation, not all biomass energy can or must be instantaneously replaced by wind, solar or other renewable sources. The fact is that each renewable energy source presents its own challenges to the energy system. For instance, with biomass the main issue is its sustainability, while with wind and solar energy the main challenge lies in dealing with intermittent supply. Security of supply is essential, as energy is, in the words of the Commission, 'the life blood of our society'.[190] Thus, striking the right balance in the deployment of the different energy sources is crucial. To find this balance, accurate boundary setting in law is of the utmost importance, as the inclusion or exclusion of specific elements and effects, and the assumptions underlying them, significantly impact the performance of the system as a whole. Currently, the environmental effects of (biomass) energy production are insufficiently accounted under the legal framework. Furthermore, recently emphasis lies on strengthening the market and security of supply through the creation of the Energy Union, rather than on implementing a strong holistic approach to combat climate change and halt the fragmentation of the legal framework.[191] In this light, the recent ruling of the EGC that 'environmental protection is strictly speaking not an element of the internal market' is worrisome, as it leaves leeway for evasion of environmental considerations in market regulations.[192] In addition, this view encourages compartmentalisation of the legal framework, rather than integration. Despite these hurdles, climate change compels us to overcome the methodological challenges arising in the development of the holistic approach in order to intensify the energy transition.

189 All quoted from: IPCC SRREN (n 188), 214-215.

190 Energy 2020 (n 170), 2.

191 Commission, 'Energy Union Package – A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy' (Communication) COM (2015) 80 final.

192 *Castelnou Energía* (n 148), para 189.

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2.6. Late amendments

After this article was accepted for publication, Directive (EU) 2015/1513 of the European Parliament and of the Council of 9 September 2015 amending Directive 98/70/EC relating to the quality of petrol and diesel fuels and amending Directive 2009/28/EC on the promotion of the use of energy from renewable sources [2015] OJ L239/1 was adopted. This affects several elements discussed in this article, especially in regard to the description of the Renewable Energy Sources Directive (RED). The new directive primarily implements measures to address problems arising from indirect land-use change (ILUC) resulting from biofuel production.

The main amendments are:

- A limit of 7% (rather than 10%) to the use of 'first generation' (agricultural) biofuels;
- An (new) indicative minimum target of 0.5% for advanced biofuels;
- Harmonisation of the list of biofuel-feedstock that falls under the 'double counting rule';
- The multiplier for electricity from renewables was amended
- New installations must reduce greenhouse gas (GHG) at least 60%;
- Additional reporting and monitoring requirements regarding ILUC effects.

The corresponding changes in this article should be:

- Reference to the RED (n 8) & Fuel Quality Directive (n 18) should include 'as amended by Directive (EU) 2015/1513 [2015] OJ L239/1'.
- The main text around n. 25 should mention the cap of 7% limit for first generation biofuels (in art 3(4)(d) RED) and the incentive target of 0.5% for advanced biofuels (in art 3(4)(e) RED).
- The main text around n. 31 should refer to the GHG reduction requirement of 60% (instead of 35%). Footnote 31 should read: Installations in operation before 5 October 2015 need to achieve 35% GHG reduction, which will go up to 50% in 2018.
- The text around n. 40 should be amended to show that with the adoption of the new directive consensus has been achieved and ILUC-emissions need to be monitored and reported now (such requirements were added in RED, art 22 & 23). Reporting itself does not lead to actual internalisation of these emissions, but does provide the starting point for it.
- The text around n. 48 should mention that electricity from renewables used in rail transport now counts 2.5 times towards the target, and if used in road vehicles even 5 times. Footnote 48 should refer to RED, article 3(4)(c&f) and annex IX (article 21 has been deleted)
- The text around n. 112 should refer to 'multiplier', rather than 'double counting rule'.
- The paragraph after n 179 should read that ILUC emissions are now monitored, but still not accounted for.

Chapter Three

Ecological governance through the use of 'best available techniques'

This chapter has previously been published as:

Renske A. Giljam, 'Better BAT to Bolster Ecosystem Resilience: Operationalizing Ecological Governance through the Concept of Best Available Techniques' (2017) 26(1) Review of European, Comparative & International Environmental Law (RECIEL) 5-18, available online at: https://doi.org/10.1111/reel.12186

3

Abstract

This article examines to what extent ecological governance can be implemented by extending the concept of Best Available Techniques (BAT) at the European Union level. It therefore firstly analyses what ecological governance would require and what this implies for employing the use of BAT. The article then argues that the use of BAT enables ecological governance to an extent, but that the BAT-concept needs to be modified internally to serve this purpose. Additionally, it needs to be extended to areas outside its original scope to maintain the holistic perspective of ecological governance. Here, biomass used for energy production serves as an illustration of such 'external' BAT application.

Keywords: Best Available Techniques (BAT), ecological governance, biofuels, biomass, energy, sustainability

3.1. Introduction

It is time to acknowledge that the current legal framework is inadequately equipped to avert climate change and to stop environmental degradation.[1] Global fossil fuel emissions are still on the rise[2] and many nations are not on track in meeting their various targets,[3] despite the fact that these are only intermediate goals and in themselves not sufficient to assume adequate mitigation of climate change.[4] In fact, all current national plans combined are insufficient to keep global average temperature rise well below 2 °C.[5] Since 'climate change represents an urgent and potentially irreversible threat to human societies and the planet',[6] societies must be decarbonized as soon as possible. To ensure planetary survival and a livelihood for future generations, we should start to truly respect our (natural) environment and acknowledge 'the importance of ensuring the integrity of all ecosystems, including oceans, and the protection of biodiversity, recognized by some cultures as Mother Earth'.[7] Laws have been put in place to protect the environment, but these rules are often subordinate, either literally or practically, to

1 See also J. Hansen *et al.*, 'Assessing "Dangerous Climate Change": Required Reduction of Carbon Emissions to Protect Young People, Future Generations and Nature', 8:12 *PLoS ONE* (2013), e81648.

2 International Energy Agency, 'CO_2 Emissions from Fuel Combustion' (2015), found at: <http://energyatlas.iea.org/?subject=1378539487>.

3 On renewable energy, see: European Commission, Renewable Energy Progress Report, COM(2015) 293, at 5. However, the EU as a whole is on track, according to European Environment Agency (EEA), *Trends and Projections in Europe 2015*: *Tracking Progress towards Europe's Climate and Energy Targets* (EEA, 2015), at 9. At the same time, violations of air quality targets do still occur; see <http://www.eea.europa.eu/themes/air/intro>.

4 'World only Half Way to Meeting Emissions target with Current Pledges', *Euractiv* (6 November 2015).

5 As stipulated in UNFCCC, Decision 1/CP.21, Adoption of the Paris Agreement (UN Doc. FCCC/CP/2015/10/Add.1, 29 January 2016), at preamble.

6 Ibid.

7 Paris Agreement (Paris, 12 December 2015; in force 4 November 2016), at preamble.

laws that protect private property and/or economic (corporate) interests. This article argues that a radically different approach to climate change must be taken, coupled with a legal framework that goes well beyond the existing ones.

I argue that this altered legal framework must be based on an ecological governance policy approach, as developed by Woolley.[8] Woolley justly argues that current legal approaches to environmental protection are inadequate, because they overly rely on human capability to predict the environmental effects of our actions and ecosystems' responses to them.[9] In reality, our understanding of such causalities is limited and the functioning of ecosystems and their responses to pressures are neither linear nor as easily predictable as current regulations assume. Alternatively, Woolley proposes a policy paradigm that is not so much focused on causalities, but rather on a continuous effort to reduce the cumulative pressures from human activities on ecosystems.[10] Such stress reductions will have an overall positive effect on the functioning of ecosystems and will thus contribute to ecosystem resilience, i.e. the adaptive capacity of ecosystems to withstand (both internal and external) pressures.[11] As Woolley convincingly argues, the current sustainability paradigm is inadequate to protect this ecosystem functionality. The current paradigm is based on a balancing act, whereas the physical reality is that our (human) societies are fully sustained by, and dependent on, our planet and that our economies are only an element servicing these societies. The current paradigm does not acknowledge this factual hierarchy and thus results in severe imbalances.[12] Ecological governance requires (statutory) prioritization of environmental concerns over economic and social interests or, at least, taking away the current imbalances between these three interests in policy making.[13] Additionally, Woolley proposes a normative precautionary approach to all human activities.[14] In practice, this means that the basic goals underlying any policy should be the under-utilization of resources and minimizing our reliance on damaging activities.[15]

8 O. Woolley, *Ecological Governance: Reappraising Law's Role in Protecting Ecosystem Functionality* (Cambridge University Press, 2014), at 6.

9 Ibid., at 25-26; see also 158-162.

10 Ibid., at 31.

11 Ibid., at 55.

12 See also M. Scott Cato, *Green Economics: An Introduction to Theory, Policy and Practice* (Earthscan, 2009), at 37; D. Griggs, 'Redefining Sustainable Development' (Project Syndicate, 19 March 2013), found at: <http://www.project-syndicate.org/commentary/redefining-sustainable-development-by-david-griggs>; and P. Higgins, *Eradicating Ecocide: Laws and Governance to Stop the Destruction of the Planet* (Shepheard-Walwyn, 2010), at 128.

13 See O. Woolley, n. 8 above, at 71 and 155.

14 Ibid., at 59-67.

15 See O. Woolley, n. 8 above, at 50.

In more concrete terms, Woolley distinguishes three leading principles for policy making.[16] The first principle is to reduce consumption and/or to avoid development where the necessity of a proposed activity cannot be demonstrated or where the proposed action can be avoided via a less environmentally consequential means.[17] The second principle is called the substitution principle, and it entails that only those activities that employ the least threat to ecosystems should be deployed.[18] Third, Woolley distinguishes the 'sunsetting' principle, which requires that the most polluting practices be phased out.[19] Implementing these principles demands a thorough assessment of alternative modes of action to identify the best means available. Hence, information is key throughout the process of decision making.[20] In addition, a focus on long-term planning is important to ensure a coherent policy,[21] which would ensure a comprehensive, life-cycle approach over time.

This article examines the role that the concept of best available techniques (BAT) could play in implementing the ecological governance approach described above. As defined in the European Union (EU) Industrial Emissions Directive (IED), BAT are those techniques that are:

the most effective and advanced stage in the development of activities and their methods of operation which indicates the practical suitability of particular techniques for providing the basis for … permit conditions designed to prevent and, where that is not practicable, to reduce emissions and the impact on the environment as a whole:

(a) 'techniques' includes both the technology used and the way in which the installation is designed, built, maintained, operated and decommissioned;
(b) 'available techniques' means those developed on a scale which allows implementation in the relevant industrial sector, under economically and technically viable conditions, taking into consideration the costs and advantages, whether or not the techniques are used or produced inside the Member State in question, as long as they are reasonably accessible to the operator;

16 Ibid., at 67-85
17 Ibid., at 71-74.
18 Ibid., at 74-76.
19 Ibid., at 76-77. A next step could be to extend this principle by criminalizing certain severely damaging practices through the implementation of Higgins' 'ecocide law'. See P. Higgins, n. 12 above.
20 See O. Woolley, n. 8 above, at 77-87 and 215-233. Important factors in the assessment of alternatives should be the manageability of impacts and the (ir)reversibility of effects. Additionally, the acquired knowledge can be used to determine which activities qualify for substitution and sunsetting. Ibid., at 99-101.
21 Ibid., at 85-98.

(c) best' means most effective in achieving a high general level of protection of the environment as a whole;[22]

The BAT concept was chosen as a focus in this article, first, because when it was introduced in 1996, it represented a fundamental change in environmental regulation.[23] The concept has been developed under the legal regime for industrial emissions and its introduction meant a move away from a sectoral approach to more integrated environmental protection. The prior, fragmented approach to environmental regulation largely ignored the complex relations between the various elements of ecosystems and the media with which they interact.[24] The new approach introduced increased systemic regulation. This is rather similar to what an ecological governance approach aims to do, so that the concept can, by analogy, be applied here. A second reason to focus on BAT is that its mandatory use provides a legal driver for the displacement of technologies by less environmentally harmful alternatives, which is also a central feature of the ecological governance approach.[25] Third, since BAT are determined at the EU level, the concept provides a transboundary means to enhance environmental protection.

Under the current legal regime, stresses on the environment are reduced in the following manner. First, the IED imposes a general obligation of achieving 'a high level of protection of the environment as a whole'.[26] This level is then assured via mandatory permits for all large industrial installations.[27] In these permits, emission limit values must be imposed, which have to be based on the use of BAT.[28] Which techniques are considered 'BAT' and which emission levels correspond with these techniques is not described in the IED, but in more flexible documents, called BAT Reference Documents (BREFs). These BREFs describe the state-of-the-art in industrial technologies, emission abatement techniques and corresponding ranges of emission levels.

22 Directive 2010/75/EU of 24 November 2010 on Industrial Emissions (Integrated Pollution Prevention and Control), [2010] OJ L334/17 ('IED'), Article 3.10.

23 Although the idea of an integrated approach dates back to the 1980s. See also: L. Squintani, *Gold-plating of European Environmental Law* (PhD thesis, University of Groningen, 2013), at 75.

24 See also J.H. Jans and H.H.B. Vedder, *European Environmental Law: After Lisbon* (Europa Law Publishing, 2012), at 360.

25 Statistics show that industrial emissions in the EU (apart from carbon dioxide) have overall been going down since the 1990s, largely as a result of technical innovations. On NOx emissions, see: EEA, 'Nitrogen Oxides (NOx) Emissions' (2015), found at: <http://www.eea.europa.eu/data-and-maps/indicators/eea-32-nitrogen-oxides-nox-emissions-1/assessment.2010-08-19.0140149032-3>. However, since it is difficult to establish a causal relationship between the use of BAT and the implementation of these innovations, there is no statistical proof of the effectiveness of the mandatory use of BAT. See M.E. Conti *et al.*, 'The Industrial Emissions Trend and the Problem of the Implementation of the Industrial Emissions Directive (IED)', 8:2 *Air Quality, Atmosphere & Health* (2015), 151, at 153.

26 IED, n. 22 above, Article 1.

27 Ibid., Article 4.

28 Ibid., Articles 14.1 and 15.2.

Additionally, they describe emerging techniques which are the BAT of the future. It is the BAT conclusions in these BREFs that are the reference for setting permit conditions by the local authorities.[29]

This 'layered' norm-setting allows for relatively easy adaptation of the BAT to technological developments, as the BREFs are reviewed outside the scope of (lengthy) legislative procedures. However, to ensure a balanced outcome, the IED does provide criteria that must be considered in determining BAT.[30] Some of these criteria emphasize the 'best' in 'best available technique', while others focus more on the element of availability of these techniques. The idea behind this way of regulating environmental impacts is that the broad definition of BAT combined with the additional criteria allows for a (relatively) flexible BAT concept, which enables a state-of-the-art interpretation of the required 'high protection of the environment as a whole'.[31] This process results in gradual replacement of techniques with environmentally less harmful ones.

This article aims to contribute to the transition of the legal framework by exploring the possibilities of using BAT to implement ecological governance. The focal point of the analysis in the article is the use of BAT in regard to energy production processes, as energy use is 'the lifeblood of society'.[32] As such, sustainable energy use and production lie at the very heart of the transition required to implement ecological governance. Furthermore, the regulation of 'biomass for energy', in particular the European legal framework on biofuels (which are a specific application of biomass), will serve as an example of how lengthy production chains with extraterritorial elements can be regulated to ensure a holistic legal approach to (sustainable) production processes.

The outline of the article is as follows. The next section analyses what changes are required in the interpretation and application of the BAT concept to implement ecological governance. The article then addresses how the new BAT concept can be applied to govern other areas of law. In this, 'biomass for energy' serves as an illustration. Next, it discusses the role of information in the new legal regime. The article's conclusions recapitulate the findings.

3.2. BAT under ecological governance

Implementing ecological governance will have significant implications on how we perceive and interpret what the BAT are. Essentially, the IED's general obligation of 'achiev[ing] a high level

29 Ibid., Article 14.3.

30 Ibid., Annex III.

31 Ibid., Article 1.

32 Communication from the Commission to the European Parliament, The Council, The European Economic and Social Committee and the Committee of the Region, Energy 2020 – A Strategy for Competitive, Sustainable and Secure Energy, COM(2010) 639, at 2.

of protection of the environment taken as a whole'[33] would be replaced with an obligation to 'continuously reduce the cumulative stresses on ecosystems to improve ecosystem functionality and to enhance ecosystem resilience'. Thus, ecological governance goes beyond current requirements by demanding the highest possible level of environmental protection, rather than 'a high level'. This will also lead to a shift in the relative importance of the elements that are balanced within the definition of BAT. Ecological governance departs from the current balancing approach, and endorses a hierarchy in the relation between the environmental, social and economic dimensions.

Nevertheless, there are also quite a few similarities between the current BAT concept and an ecological governance approach. In fact, the three guiding principles underlying ecological governance (i.e., reducing consumption, substitution and sunsetting) are to an extent all already imbedded in the framework of the IED. 'Substitution' essentially even comprises the overall purpose of the BREF system, as both this system and ecological governance entail a continuous effort to replace techniques with less disruptive alternatives. Additionally, the need to reduce consumption is also present in the BREF system as reduction of waste, emissions, impacts and raw material use are elements to consider when determining BAT. However, absolute consumption reductions are not (yet) an element of the BREF system. Lastly, the sunsetting principle is less explicitly present. After all, as time and technological developments advance, old and polluting techniques will be superseded by new and cleaner ones. When new BREFs are drafted, the more damaging technologies will be phased out, because these will no longer be considered BAT. A major and important difference, however, between explicit sunsetting and the current BREF system is that sunsetting requires a more swift and explicit prohibition of the most damaging practices based on ecological grounds only,[34] whereas in the BREF system sunsetting is more of an unintended side effect of substitution, rather than a guiding principle.

A further important similarity between the BREF system and an ecological governance approach is the prominent role of information supply and the expansion of knowledge used to assess and weigh alternatives.[35] As such, the BREF system is already aimed at progressively enhancing the environmental performance of production processes. However, compared to the approach advocated in this article, the current legal framework is quite moderate and rather slow in progressing environmental performances. Due to the length of the information exchange and political debate prior to the adoption of BREFs, they are only reviewed around every 10 years. As a consequence, the supposed state-of-the-art interpretation of the BAT is fundamentally static

33 IED, n. 22 above, Article 1.

34 See O. Woolley, n. 8 above, at 78.

35 A difference between the current rules and Woolley's proposals is that she argues that an external review of decisions should be implemented. This will be addressed further below.

for the next ten years. A rolling review of BAT does not occur.[36] Furthermore, what information is deemed relevant in decision making and how this information is subsequently used, is very different under the two approaches.[37] To start with, the current system ignores many external costs and long-term effects of human activities. Incorporating these costs and effects would set the bar differently in the interpretation of the flexible norms 'economically and technically viable' and 'reasonably accessible' that partially determine what the BAT are.[38] Expanding the range of information that is considered relevant in decision making will therefore raise the level of emission and pollution abatement that can be demanded from operators. A second difference in the use of information is that the current approach does not allow taking decisions on purely ecological grounds, since it is based on the weighing of interests, rather than ecological prevalence.

Besides the 'internal' changes that are needed within the definition and determination of BAT, implementing ecological governance also means that we must consider (and regulate) production processes ever more systemically. The result of taking a life-cycle oriented approach is that the length of the chain of events and related impacts expands drastically. This creates complexities in regulating them, and it means that BAT should be used in (legal) areas outside its current scope. Now, using BAT is mandatory only under the IED-umbrella which regulates industrial installations. This means that the use of BAT is confined to actual production processes, i.e. applied only in the conversion of raw materials to (semi-)final products. However, a systemic approach requires that the use of BAT becomes mandatory in other phases of the life cycle, i.e. the cultivation and extraction of raw materials, transport and consumption. BAT could for instance be applied in the agricultural sector, if this sector supplies the raw materials for the subsequent industrial processes.[39] This 'external' application of the BAT-concept should also incorporate the necessary 'internal' changes to retain its focus on enhancing ecosystem resilience. Both the internal and external dimension will be discussed next.

3.3. Internal changes in the definition of BAT

A fundamental first step in redefining BAT is to apply the best available techniques rather than the 'best available techniques not entailing excessive costs' (BATNEEC) as is commonly the case. As mentioned earlier, ecological governance demands that the 'reasonableness' of preventive measures to be taken by operators should be assessed at least on the basis of the actual societal (e.g., environmental and health-related) costs. Currently, a significant burden is placed

36 See also O. Woolley, n. 8 above, at 99-101.

37 The role of information will be addressed in more detail below.

38 See its definition in IED, n. 22 above, Article 3.10.

39 As is the case for many biofuels. The use of BAT in agriculture will be addressed in more detail below.

on society in bearing the additional costs from pollution from industrial activities.[40] Holding operators to account for such costs would render more preventive measures 'reasonable'.[41] Since more ecologically protective measures will then be required, environmental improvements and benefits will be achieved, which will enhance ecosystem functionality and resilience.[42] Accounting for the external (societal) costs not only creates room for additional preventive measures, it can also have an influence on the choice of techniques that are considered BAT.[43] This manner of extending the range of costs that must be considered under the IED would not require any legislative changes to the definition of BAT.

In addition to wielding a different method for assessing costs, the ecological BAT concept primarily entails a different interpretation of what is 'best' in BAT. Two elements are important in this new interpretation. First, in determining what is 'best' in the individual case, not only the permit application under scrutiny should be relevant, but account should also be taken of the context of this permit application.[44] Under the current IED rules, such a systemic appraisal of permit applications is not possible. A good example of this is the fact that between 2006

40 With regard to energy production, the EU external costs were identified through the ExternE project that ran from the early 1990s to 2005. See <http://www.externe.info>.

41 For instance, in the Netherlands nitrogen oxides (NOx) emission reduction measures are considered reasonable up to €4.60 per kilo of NOx reduction, while the health related costs of each additional kilo of NOx are estimated to be €6.60. For an elaboration (in Dutch) on this discrepancy see: R.A. Giljam, *Schone Lucht of Schone Schijn? Europese Regulering van de Emissies van NOx en Fijn Stof naar Lucht door Moderne Kolencentrales* (LLM thesis, University of Groningen, 2011), found at: <http://api.commissiemer.nl/docs/mer/diversen/schonelucht-schoneschijn.pdf>, at 109. To what extent operators can pass the additional costs on to consumers is a political discussion that is not addressed here.

42 A danger inherent in this 'costing approach' is that it relies (too) heavily on human capabilities to perform accurate and comprehensive calculations, and that it may invite manipulation of data and figures that serve as the input into the assessments.

43 V. Laforest, 'Assessment of Emerging and Innovative Techniques Considering Best Available Technique Performances', 92 *Resources, Conservation and Recycling* (2014), 11, at 13.

44 Also, where Member States (such as the Netherlands) have implemented a multiple permit system, these permits need to be 'fully coordinated'. IED, n. 22 above, Article 5.2. Due to space limitations, the Dutch system will not be discussed comprehensively, nor will any other national approach be dealt with here.

and 2008 permits were issued for four new coal-fired power plants in the Netherlands.[45] The Dutch government argued that they were not in a position to reject these permits as both the technologies and the emission levels applied for fell within the range of the BAT conclusions for large combustion plants.[46] Upon questions posed by the nongovernmental organization Greenpeace, the competent authorities replied that assessing the desirability or the necessity of these installations is not an element of consideration under environmental permit applications. Hence, the competent authorities could only assess whether what had been requested fit within the applicable environmental legislation.[47] The government further argued that it is not up to them to decide what type of installations will be built, as this decision is for 'the market' to make; the government then only sets conditions to the construction and operation of these installations.[48] One of these conditions is that an environmental impact assessment (EIA) must accompany the permit application.[49] This EIA maps the anticipated effects of the proposed project and *inter alia* demands that the developer studies 'reasonable alternatives'.[50] However,

45 The following permits were issued. To Electrabel: Gedeputeerde Staten der Provincie Zuid-Holland, 'Oprichtingsvergunning Verleend aan Electrabel Nederland N.V. voor de Productie van Elektriciteit in een Nieuw te Bouwen Kolen/biomassacentrale (Inclusief Bijbehorende Apparatuur en Activiteiten) met een Netto Elektrisch Vermogen van 750 MW' (11 March 2008), found at: <http://dcmr.gisinternet.nl/downloads/pdf/b800888.pdf> ('Permit Electrabel'); to E.ON: Gedeputeerde Staten der Provincie Zuid-Holland, 'Deelrevisievergunning voor de kolengestookte elektriciteitscentrale van E.ON op de Maasvlakte' (31 March 2006), found at: <http://dcmr.gisinternet.nl/downloads/pdf/b798648.pdf> ('Permit E.ON 2006'); and: Gedeputeerde Staten der Provincie Zuid-Holland, Deelrevisievergunning Verleend aan E.ON voor de Productie van Elektriciteit in een Nieuw te Bouwen Kolengestookte Eenheid (Inclusief Bijbehorende Apparatuur en Activiteiten) met een Bruto Elektrisch Vermogen van 1100 MW' (26 October 2007), found at: <http://dcmr.gisinternet.nl/downloads/pdf/b803658.pdf> ('Permit E.ON 2007'); to RWE: Gedeputeerde Staten der Provincie Groningen, 'Vergunning Wet Milieubeheer Verleend aan RWE Power AG te Essen, Elektriciteitscentrale (2 x 800 MWe) op Poederkool en Biomassa (Locatie: Eemshaven)' (11 December 2007), found at: <http://www.provinciegroningen.nl/fileadmin/user_upload/Documenten/Milieuvergunning/2007rwe.pdf> ('Permit RWE'); to Nuon: Gedeputeerde Staten der Provincie Groningen, 'Oprichtingsvergunning Wet Milieubeheer Verleend aan Nuon Power Projects 1 BV ten Behoeve van de Oprichting en het Bedrijven van een Multi-fuel Elektriciteitscentrale in de Eemshaven' (7 July 2009), found at: <http://www.provinciegroningen.nl/fileadmin/user_upload/Documenten/Milieuvergunning/2009nuonpowerprojectsbvWm.pdf> ('Permit Nuon'). This last one is technically not a coal-fired power plant, because the coal would be gasified prior to its use as a fuel. Also, this installation will no longer be constructed.

46 IED, n. 22 above, Article 5.1 reads: '… the competent authority *shall* grant a permit if the installation complies with the requirements of this Directive' (emphasis added).

47 See Permit Electrabel, n. 45 above, at 31; Permit E.ON 2007, n. 45 above, at 42; Permit RWE, n. 45 above, at 33.

48 'Letter of minister of Housing, Spatial Planning and Environment' (28 June 2006), *Kamerstukken II* 2006/07, 28 240/29 023, no. 77; reiterated in: 'Letter of minister of Economic Affairs' (28 October 2009), *Kamerstukken II* 2009/10, 28 240, no. 104.

49 Directive 2011/92/EU of 13 December 2011 on the Assessment of the Effects of Certain Public and Private projects on the Environment, [2012] OJ L26/1.

50 Ibid, Article 5.1.

an EIA does not assess the necessity of an installation as such.[51] The term 'reasonable alternatives' also features prominently in the rules on nature conservation, which apply in parallel to the IED.[52] In practice, however, nature protection often gives way to social or economic considerations, since halting developments in favour of such conservation is seldom considered in earnest as a reasonable alternative.[53] This is illustrated by the fact that the coal-fired power plants were granted permits, while exceptions to nature protection are only permitted 'in the absence of alternative solutions'.[54]

Thus, permit applications are not fully assessed in the light of long-term policy objectives, such as moving towards a low-carbon society or implementing ecological governance. Furthermore, the permit authorities could not even demand the lowest possible level of emissions associated with the proposed techniques, as this was deemed to be an unreasonable burden on industry.[55] Partially as a result of this lack of systemic assessment, talks on closure of the power plants were already being conducted by the time they came into operation. On top of this, in a landmark court case last year, the district court of The Hague ordered the Dutch government to take more effective climate action to reduce its emissions by a minimum of 25% by 2020 compared to 1990.[56] A recent report argues that closure of two of the three new power plants is necessary if the Netherlands is to cost-effectively meet this emission reduction target.[57] If this goes through, it can be regarded as a rare example of sunsetting. A specific category of energy production is then be regarded as 'outdated', despite the fact that the installations concerned are the most modern of their kind, i.e. they apply BAT and achieve much lower emissions than previous

51 Such an appraisal is also left out in more general strategic assessments of plans and programmes, as required by Directive 2001/42/EC of 27 June 2001 on the Assessment of the Effects of Certain Plans and Programmes on the Environment, [2001] OJ L197/30 ('SEA Directive'), in particular Article 5.2.

52 Directive 2009/147/EC of 30 November 2009 on the Conservation of Wild Birds, [2010] OJ L 20/7; and Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora, [1992] OJ L206/7 ('Habitats Directive'). These form the basis for the Dutch nature protection permit that is required in addition to the environmental permit.

53 See also N. De Sadeleer, 'Assessment and Authorisation of Plans and Projects Having a Significant Impact on Natura 2000 Sites', in: B. Vanheusden and L. Squintani (Eds.), *EU Environmental and Planning Law Aspects of Large-Scale Projects* (Intersentia, 2016), 308; but see also ibid., at 318-319.

54 Additionally, such a derogation is only allowed 'for imperative reasons of overriding public interest' and to the extent that Member States 'shall take all compensatory measures necessary'. Habitats Directive, n. 53 above, Article 6.4.

55 See: Permit E.ON 2007, n. 45 above, at 6 and 40; Permit Electrabel, n. 45 above, at 3 and 36; Permit RWE, n. 45 above, at 11, 22 and 23; Permit Nuon, n. 45 above, at 38 and 52.

56 *Urgenda Foundation and 886 citizens v the State of The Netherlands*, [2015] C/09/456689 / HA ZA 13-1396 ('*Urgenda*'), found at: <http://uitspraken.rechtspraak.nl/inziendocument?id=ECLI:NL:RBDHA:2015:7196>, at paragraphs 4.83, 4.86, 4.93 and 5.1.

57 G. Warringa *et al., Recht Doen aan Klimaatbeleid. Kosteneffectief naar 25% Reductie in 2020* (CE Delft, June 2016), found at: <http://ce.nl/publicatie/recht_doen_aan_klimaatbeleid/1836> (with English summary).

combustion installations. Had the permit authorities in 2006 been able (and willing) to take the context of constructing these power plants into consideration, or had they been given explicit permission to phase out this specific type of energy production, this situation could have been avoided altogether.[58] This example illustrates that, in implementing ecological governance, much can be gained by interpreting what is 'best' beyond the narrow assessment of mere technologies. Instead of such a narrow assessment, the broader aim of reducing stresses on ecosystems should be kept in mind in all decisions, so that each individual decision contributes to implementing the most sustainable means to meet energy demand in general. In this, the lower limit of achievable stress reductions would be formed by genuine concerns regarding security of energy supply. Alternatively, if such systemic appraisals prove to be too burdensome for the permitting authorities, the necessity of using specific types of energy production could be assessed thoroughly at a higher level, for instance as part of general strategic assessments of plans and programmes, which can then serve as guidance for local authorities in permitting procedures.[59]

The second important change in what is 'best' is that this term should be interpreted more dynamically to provide a continuous incentive to reduce stresses on our environment. To achieve this, increased normative flexibility must be implemented in two ways. First, it should be implemented in decision making in individual cases and, second, it should be used to avoid rigidity of the norms resulting from time passing. To start with the former, what is considered BAT is based on an EU-wide, sector average compromise, as the determination of BAT occurs at the EU level and for whole sectors only. However, what is best at the EU level is not necessarily best at the local level, and what is best on average in a sector may not be best for individual installations. The IED offers some leeway to consider local conditions in permit setting, but only to lower the emission standards to avoid 'disproportionate costs'.[60] Member States are allowed to set stricter permit conditions than those achievable by using BAT,[61] but this is only optional and Member States are not allowed to determine stricter (local) BAT. Laforest argues that certain innovative techniques that are discussed as 'emerging techniques' in a BREF could very well be 'local BAT' under specific local conditions.[62] By demanding that 'best' is interpreted on the basis of actual, site-specific (or national) conditions, a higher level of stress reduction is achievable. Similar to the current situation, EU law would set the minimum requirements on BAT. However,

58 Alternatively, if this proves to be too burdensome, the necessity of specific types of energy production could be assessed at a higher level, for instance as part of general strategic assessments of plans and programmes under Article 3.2 of the SEA Directive, n. 51 above, which can then serve as guidance for local authorities in permitting procedures.

59 See also ibid.

60 IED, n. 22 above, Article 15.4.

61 Ibid., Articles 14.4 and 18.

62 See V. Laforest, n. 43 above, at 14.

competent authorities would simultaneously be under an obligation to set stricter standards whenever they can. Imposing a (periodic) 'polluter explains duty' on operators, as discussed below, could aid the authorities in setting such stricter (local) standards.

The second element of change in the dynamic interpretation of 'best' concerns avoiding that the state-of-the-art norms become stifled as time passes and developments continue. The fact is that, once a BREF is drafted, the BAT and the related (emission) norms are static for roughly a decade, as this is generally how often BREFs are reviewed.[63] The IED does require a periodic review of all permit conditions, but only to bring them in line with (new) BAT conclusions or revised environmental quality standards.[64] As long as there is no consensus on new proven techniques, there is no EU incentive for innovation or further emission reductions.

3.3.1. The Polluter Explains Principle

To provide such a perpetual stimulus to reduce stresses on ecosystems, a rolling review of 'what is best' is required. Part of implementing such a rolling review could be imposing a 'polluter explains' obligation on operators. This obligation would require operators to explain, at regular intervals, why their (proposed) installation is necessary for society in the first place and, more particularly, why the technology they (propose to) use is the best in its kind for this particular task and why the associated emissions cannot be any lower.[65] Hence, the 'polluter explains principle' goes beyond the current obligation of assessing, in outline, the main alternatives to the proposed techniques, when applying for a permit.[66] In comparison, the 'polluter explains' obligation is stricter than the current rules in both a material sense and in a temporal sense. Under 'polluter explains', permits will not be granted if the necessity of an installation is not established.[67] As already discussed in the previous section, this is not possible under the current rules. Furthermore, currently, once a permit has been granted, there is no longer a need to justify the existence of an installation or its emission levels, at least as long as no new BREFs are adopted. The polluter explains obligation would introduce a regular check whether the installation itself as well as its environmental impacts are still necessary and acceptable and whether they still represent the state of the art. If any of these questions is answered negatively, this should be ground for closure or adaptation of the installation and/or amendment of its permit conditions. Providing the aforementioned explanation should be made part of the permit conditions, for

63 As can be deducted from the website of the IPPC Bureau: <http://eippcb.jrc.ec.europa.eu/reference/>.

64 IED, n. 22 above, Article 21. After the adoption of new BAT conclusions, Member States have four years to update all permit conditions; see ibid., Article 21.3.

65 This duty would apply to both new and existing installations, and in the latter case encompass both the continued use of a technology, as well as the introduction of new technologies in existing installations.

66 IED, n. 22 above, Article 12.1(k).

67 Since multiple permits require 'full coordination', there are several moments in decision making where the necessity would be assessed.

instance as an addition to the information that already annually needs to be supplied to the competent authorities.[68] An external body, as will be discussed further below, should assess the validity of these explanations.

3.3.2. Substitution and Sunsetting

Parallel to the implementation of the polluter explains principle, sunsetting and substitution should be actively pursued to keep stresses on ecosystems as low as possible. Such stresses will already be reduced if strict BAT conclusions are implemented, but, subsequently, these BAT conclusions can also serve as the basis for the implementation and execution of sunsetting and substitution. This could be done by adding a new chapter to BREFs that contains conclusions on 'phase out techniques' (POT) that must be substituted within a given amount of time, and 'worst available techniques' (WAT) that will be 'sunsetted' as soon as possible. Any technology could be subject to substitution if technologies whose use poses lower environmental impacts become available. Similarly, any technology could be earmarked for sunsetting if its characteristics are judged to be too environmentally damaging for continued reliance on it. Decisions on which technologies to replace would be part of the process of BREF adoption. A percentage of the emission levels associated with the most recent BAT could be used as a threshold here. For instance, if a specific technique emits over 130% of the emissions achievable by using BAT it could be up for substitution, whereas it could be up for sunsetting if it emits over 200% of the state-of-the-art emissions.[69] Another example of a threshold that could be used would be to include in the POT/WAT conclusions at least those technologies that have the potential to amount to or result in 'ecocide'.[70] Thus, the responsibilities of operators to prevent environmental degradation would be expanded and would become a regular element in permit conditions, similar to current provisions regarding accidents.[71] The new BREF chapter (with the POT/WAT conclusions) would essentially be the counterpart of the conclusions on emerging techniques which have already earned a place in the BREF system.[72]

3.4. External application of BAT

To achieve its holistic aims and to ensure coherence in the legal system, the newly defined BAT concept must also be applied outside its original scope. A more systemic approach is currently not possible, because the scope of IED is limited. This does not mean, however, that areas

68 Hence, this would be an addition to the information requirements of the IED, n. 22 above, Article 14.1(d).

69 The percentages chosen here are random, and simply serve to illustrate a point.

70 Defined by P. Higgins, n. 12 above, at 63, as 'the extensive destruction, damage to or loss of ecosystem(s) of a given territory, whether by human agency or by other causes, to such an extent that peaceful enjoyment by the inhabitants of that territory has been severely diminished'.

71 IED, n. 22 above, Articles 7 and 11. An elaboration on this topic goes beyond the scope of this article.

72 For emerging techniques, it might be wise to allow for temporary exceptions from the stricter BAT conclusions for experimental techniques aimed at further alleviating stresses on ecosystems.

outside the scope of the IED have a smaller environmental impact. In fact, estimates show that 'agriculture now accounts for one quarter of the planet's [greenhouse gas] emissions'.[73] Because of this, Möckel questions the adequacy of current agricultural regulations as the emissions from agriculture are no less harmful than those arising from industrial installations.[74] He therefore pleads to extend the use of BAT as the standard to agricultural land use.[75] According to Möckel, the currently deployed standard of 'good practice' is lower than that of mandatory BAT, and extending the use of BAT to agricultural land use would thus heighten the level of environmental protection.[76] As such, it would contribute to ecosystem functionality and assist in implementing ecological governance. Möckel's article thus serves to illustrate that the BAT concept is also suitable to be applied to other sectors than it was originally drafted for.

However, despite the alleviation of stresses on ecosystems that this might bring, implementing the current BAT concept in new regulatory areas is insufficient to bring about ecological governance. For that, the 'internal' changes in the BAT concept that were discussed above would also have to be extrapolated to these newly governed sectors. Additionally, the legal system should stipulate more explicitly the interconnectedness of the various branches involved in a product's life cycle and acknowledge our lack of understanding about how these interact. Under an ecological approach, this ignorance requires us to maintain a high level of ecosystem protection, which can be expressed by demanding at least that our best means are employed during each phase of a product's life cycle. Thus, it is sensible to require the use of the ecological BAT concept throughout each of these phases. Moreover, to fully ensure a holistic focus in regulation, licensing conditions that reiterate the need to consider the manner of production of the raw materials could subsequently be imposed on users of these materials.

3.4.1. Biofuels and biomass

An example of how the interconnected phases of a product's life cycle can be expressed and regulated by a single legal instrument can be found in the Renewable Energy Directive (RED) that contains sustainability criteria for biofuels.[77] Promoting the use of biofuels is part of the EU strategy to achieve overall 20% renewable energy consumption by 2020, and 10% renewable energy in the transport sector specifically.[78] This 10% target will be met primarily by using

73 A. Robert, 'Can We Feed the World and Halt Climate Change?', *Euractiv* (25 January 2016).

74 S. Möckel, 'Best Available Techniques' as a Mandatory Basic Standard for More Sustainable Agricultural Land Use in Europe?', 47 *Land Use Policy* (2015), 342.

75 An additional argument to implement BAT in agriculture is to achieve more equitable burden sharing in emission abatement between agriculture and industry. However, for lack of space, this argument is not addressed further.

76 See S. Möckel, n. 74 above, at 344.

77 Directive 2009/28/EC of 23 April 2009 on the Promotion of the Use of Energy from Renewable Sources, [2009] OJ L140/16 ('RED'), Article 17.

78 Ibid., Article 3.1 and 3.4.

biofuels made from agricultural crops instead of fossil fuels. However, land conversions to grow biofuel crops may lead to significant emissions and may thus cause specific biofuels to be more damaging than their fossil-fuel counterparts.[79] Sustainability criteria were adopted to ensure that the production of biofuels contributes to climate change mitigation, rather than aggravate it.[80] The criteria apply irrespective of whether the raw materials used for the biofuels are cultivated inside or outside EU territory.[81] According to the criteria, biofuels can only be counted towards the renewable energy target if (i) they achieve a greenhouse gas emission reduction of at least 60% compared to the fossil fuels they replace;[82] and if (ii) the raw materials do not stem from one of the three listed types of vulnerable areas. Put briefly, these areas are land with high biodiversity value, land with high carbon stock and peatland.[83] Additionally, the cultivation of agricultural crops within the EU must also comply with the rules of the Common Agricultural Policy.[84]

From an ecological governance perspective, the current rules on biofuels have several strengths. Foremost, the sustainability criteria are an exceptional example of life-cycle oriented legislation, as they explicitly link the raw materials to the final product and thus place fuel producers under an obligation (indirectly) to take account of effects occurring earlier in the production chain. A further strength of the rules in the RED is that they provide an additional incentive to produce the least harmful biofuels by allowing certain biofuels to be counted twice towards the 10% target.[85] In addition, the RED was recently amended to address concerns over indirect land-use change (ILUC). While the criteria already prohibited several types of direct land conversions, indirect conversions were not addressed. To mitigate further emissions from ILUC, a cap of 7% was set for so-called 'first generation' biofuels, while a minimum percentage of 0.5% was set for specific 'advanced' biofuels.[86] Additionally, more stringent monitoring and reporting obligations

79 Directive 2015/1513/EU of 9 September 2015 Amending Directive 98/70/EC Relating to the Quality of Petrol and Diesel Fuels and Amending Directive 2009/28/EC on the Promotion of the Use of Energy from Renewable Sources, [2015] OJ L239/1 ('RED Amendment'), recital 5.

80 A more detailed discussion of the criteria can be found in: A. Schmeichel, *Towards Sustainability of Biomass Importation: An Assessment of the EU Renewable Energy Directive* (Europa Law Publishing, 2014).

81 RED, n. 77 above, Article 17.1.

82 This is for installations in operation after 5 October 2015. Older installations must achieve a greenhouse gas emission reduction of 35%, which will go up to 50% on 1 January 2018.

83 An extensive description can be found in RED, n. 77 above, Article 17.2-17.5.

84 Ibid., Article 17.6. The Common Agricultural Policy imposes legal requirements from a list of EU (environmental) directives as well as more general conditions regarding the state of the land after production is ceased. The use of BAT is not required. For details, see Regulation 1306/2013/EU of 17 December 2013 on the Financing, Management and Monitoring of the Common Agricultural Policy and Repealing Council Regulations (EEC) No 352/78, (EC) No 165/94, (EC) No 2799/98, (EC) No 814/2000, (EC) No 1290/2005 and (EC) No 485/2008, [2013] OJ L347/549.

85 RED, n 77 above, Article 3.4(f) and Annex IX.

86 Ibid., Article 3.4(d) and (e).

regarding ILUC-emissions were imposed.[87] The latter should help to develop a methodology to assess these emissions more accurately.[88]

Despite these amendments, the sustainability criteria in their current form still have several weaknesses. Primarily, they provide no specific incentive to make use of the best biofuels in terms of their greenhouse gas emission performance. Once the threshold for greenhouse gas emission reductions is passed, all fuels are equal in the eye of the law. In addition, indirect effects from crop cultivation and biofuel production are still not reflected in the greenhouse gas emission calculations, largely because no adequate models have yet been developed to estimate or calculate them. Despite the cap and required monitoring, ILUC emissions are in effect still set at zero in these calculations, even though they can be significant.[89] Lastly, an ecological systemic approach is further undermined by the fact that sustainability criteria apply to only a minor fraction (i.e., maximum 2.5%) of the EU's overall energy consumption,[90] and even to only a small fraction of all sources of biomass used for energy.

The sum of biomass used for energy consists of a wide variety of materials that have many applications, some of which can deliver emission reductions of up to 80-90% compared to fossil fuels.[91] These materials originate from various sectors, including agriculture, forestry, waste, fisheries and aquaculture, which all have their own specific regulations.[92] Thus, new sectors have become important players in energy production. To achieve the EU renewables' targets three (energy) products are of particular importance: biofuels, waste and solid (woody) biomass. The first has been discussed already, and the second will be left aside in this article due to space restraints.[93] The latter product, solid biomass, stems mainly from forestry and is used primarily to produce electricity by co-firing it with fossil fuels in 'regular' power plants.

87 Ibid., Articles 22 and 23.

88 RED Amendment, n. 79 above, recitals 12 and 22.

89 See also: Scientific Committee EEA, 'Opinion on Greenhouse Gas Accounting in relation to Bioenergy' (EEA, 15 September 2011), found at: <http://www.eea.europa.eu/about-us/governance/scientific-committee/sc-opinions/opinions-on-scientific-issues/sc-opinion-on-greenhouse-gas/view>, at 7.

90 D. Peters *et al*., *Assessing the EC ILUC Proposal, Dutch National Impact Assessment* (Ecofys, 2013), at 39.

91 The exact reduction is dependent on the actual design and implementation of the projects. See H .Chum *et al.*, 'Bioenergy', in: O. Edenhofer *et al* (Eds.), *IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation* (Cambridge University Press, 2011), 214, at 214-215.

92 RED, n 77 above, Article 2(e). For lack of space, only (the regulation of) agriculture and forestry will be briefly discussed here. A more elaborate discussion can be found in: R.A. Giljam, 'Towards a Holistic Approach in EU Biomass Regulation', 28:1 *Journal of Environmental Law* (2016), 95.

93 Also, waste 'production' is not a deliberate production process and from an environmental perspective sources of waste should be reduced, rather than increased.

In fact, such forest biomass is the source for 42% of all renewable electricity in the EU.[94] Put briefly, the forestry sector is regulated via the Timber Regulation, voluntary certification schemes and the non-obligatory Forest Strategy.[95] None of these documents provide mandatory or systemic rules on sustainability, although monitoring emissions from forestry activities, as well as providing information how such emissions will be limited, is obligatory.[96] To promote the use of renewable electricity in transport, the RED counts this electricity 2.5 times towards the EU targets if it is used in rail transport, and even five times if it is used in electric road vehicles.[97] However, the sustainability criteria of the RED do not apply here, so that there is no uniform standard for the sustainability of the various biomass sources. In fact, since the criteria apply only to biofuels and bioliquids[98], the level of sustainability required in the production of the raw materials hinges upon the final application of the product that is subsequently made from it.[99]

Furthermore, the forestry sector is now a major supplier for the electricity sector and the agricultural sector plays a more prominent role in supplying fuel producers, but neither is fully subjected to the IED regime. The actual production of biofuels is covered by the IED, as well as the combustion of biomass and emissions from storage,[100] but the agricultural and forestry sectors themselves are not required to use BAT. To mitigate the (potential) negative environmental effects of activities in these sectors, other regulatory instruments were chosen, but their level of sustainability varies and the sum of the legislation in place does not amount to a coherent, let alone ecological, policy.

I argue that this can be overcome by requiring the use of BAT outside the scope of the IED and by imposing an overall obligation to retain a focus on enhancing ecosystem resilience. This would require using only those (biomass) sources and those techniques that put the least stresses on ecosystems. Clearly, the 'least stressful technique' is to reduce consumption. Energy is unique in this respect, as much can be gained by increasing the energy efficiency of building and appliances. This way, energy consumption can be significantly reduced without hampering

94 Communication from the European Commission, A New EU Forest Strategy: For Forests and the Forest-based Sector, COM(2013) 659 ('Forest Strategy'), at 2.

95 Regulation 995/2010/EU of 20 October 2010 Laying Down the Obligations of Operators Who Place Timber and Timber Products on the Market, [2010] OJ L295/23 ('Timber Regulation'); see also Forest Strategy, n. 94 above.

96 Decision 529/2013/EU of 21 May 2013 on Accounting Rules on Greenhouse Gas Emissions and Removals Resulting from Activities Relating to Land Use, Land-use Change and Forestry and on Information Concerning Actions Relating to Those Activities [2013] OJ L165/80 (LULUCF Decision).

97 RED, n 77 above, Article 3.4(c).

98 Defined in ibid., Article 2(h).

99 A flowchart on the applicability of the sustainability criteria can be found in R.A. Giljam, n. 92 above, at 119.

100 These are covered under the BREF LVOC (2003), BREF LCP (2006) and BREF EFS (2006) respectively. All BREFs can be found at: <http://eippcb.jrc.ec.europa.eu/reference/>.

human activities. Thus, actually obviating development would not be required. In addition, if we deploy only the BAT, a second wave of alleviating stresses on ecosystems is possible. For the new framework to be effective it is essential that all (indirect) effects are taken into consideration. Hence, implementing mandatory use of the new, holistic BAT concept outside its original scope is sensible. It would expressly acknowledge the interconnectedness of the various sectors and it would ensure that the renewable sources deployed to replace fossil fuels actually contribute to the health of ecosystems. A starting point would be to impose the use of BAT in the relevant parts of agriculture and forestry.

3.4.2. BAT in agricultural land use and forestry

The introduction of BAT in both agricultural land use and forestry can in outline be achieved in an identical manner. To start with, the overall standard of using BAT as the norm would have to be applied across the board in both agriculture and forestry. This is necessary to avoid omissions in the legal framework and to ensure a level playing field between different actors in the respective sectors. The use of BAT should therefore be prescribed in (for instance) the Common Agricultural Policy and the Timber Regulation.[101] Then, different BREFs that describe the material norms in more detail for different branches of each sector would have to be drafted. For agriculture, the BAT described in these BREFs would replace the use of 'statutory management requirements' and strengthen the 'standards for good agricultural and environmental condition'.[102] For forestry, it would mean the instruction of binding norms on sustainable production. In outline, the system would thus be the same as it is for industry under the IED, without having to implement a full permit system.[103] Additionally, the 'polluter explains principle' would have to be incorporated in permit conditions insofar as a permit is required. Thus, in those cases 'operators' will have to explain and justify why they chose a specific production process over any other option. The BREFs can serve as a reference in permitting procedures and can be used as the basis to assess the operators' pleas. As discussed above, the BREFs would also have to contain chapters on POT/WAT conclusions. In agricultural land use, the sustainability criteria for biofuels – despite their shortcomings – could serve as minimum requirements for biofuel-crop cultivation and any biofuel that falls below the thresholds would have to be sunsetted or substituted. Additionally, for both sectors, the listed 'vulnerable areas' of the sustainability criteria could be made off-limits for production, so that more holistic ecosystem protection is accorded.

For both sectors, the BREFs should not only consider what the BAT are, but also what I call the 'best available use' of land. The term BAT concerns the techniques for working on the land, whereas the term 'best available use' focuses on what is grown on the land (i.e., which crops or

101 See Forest Strategy, n. 94 above; Timber Regulation, n. 95 above.

102 Now described in Regulation 1306/2013/EU, n. 84 above, Annex II.

103 This could also contribute to more equitable burden-sharing; see also n. 75 above.

trees) and for what purposes (e.g., for food, industry or energy). The importance of addressing best available use is more prominent in agriculture and forestry than under the IED framework, due to the potentially competing uses of the products within each sector. Increased demand for agricultural and forestry products creates tension between these uses and this will be aggravated further with the expansion of the bio-based economy, as new applications will be found for traditional sources. This competition also results in increased interconnectedness and interdependence of the various sectors that use agricultural or forestry products, either directly or as raw materials. This interdependency requires a holistic approach in regulation, not only to safeguard the functioning of ecosystems, but also to avoid detrimental effects from competition over these commodities.[104] One way of diminishing competition over biomass sources is to establish a hierarchy of uses. Such a hierarchy would lead to a mandatory cascading use, similar to the waste hierarchy.[105] What the exact order of uses should be is a matter of political debate, but imposing some sort of prioritization is vital to decrease the intensified competition over biomass.

Due to the rapid development of new applications for traditional agricultural and forestry products, the new BREFs would also have to have extensive and prominent chapters on emerging techniques both in regard to BAT and best available use. Furthermore, these chapters should expressly acknowledge that emerging techniques in other (industrial) areas may impact what is considered best available use in agriculture or forestry. For instance, breakthroughs in the development of electric vehicles may make the production of biofuels superfluous and may thus lead to the sunsetting of biofuel crop cultivation as BAU. Hence, a rolling review (at short intervals) of both BAT and best available use is essential to facilitate new opportunities in this evolving market while retaining a focus on enhancing ecosystem functionality.

Furthermore, the BREFs on forestry must ensure that the capacity of forests to serve as carbon sinks is upheld and that the sector's potential to result in carbon debt is taken into consideration in decision making. The term 'carbon debt' refers to the time lapse between actual emissions from the combustion of biomass (e.g., in power plants) and the time it takes to regrow an equally sized carbon stock. Since the rotation time of forestry materials is generally much longer than that of agricultural crops, the time lapse between emissions and re-absorption thereof is also much longer. Thus, the extensive use of trees for electricity generation may lead to (temporary) increased atmospheric carbon. Whether this is actually the case, and for what amount of time, depends on what type of woody materials is used and in which manner. Mandatory use of BAT and best available use, combined with a rolling review thereof, could diminish the risk of the bio-economy resulting in carbon debt.

104 An example of the latter is the much debated potential for rising food prices due to biofuel production.
105 Directive 2008/98/EC of 19 November 2008 on Waste [2008] OJ L312/3, Article 4.

3.4.3. Extraterritoriality

This article has so far focused on production activities that occur within the EU. However, it is likely that (parts of) the production chains under scrutiny are outside the territory of the regulating authorities, when regulating matters with a focus on ecosystems' functionality and particularly when regarding their relationship with the Earth system.[106] Hence, this article would not be complete without mentioning the issue of extraterritoriality, although an extensive discussion is outside scope of this article.[107] Extraterritoriality concerns the situation where jurisdiction is in effect extended beyond national borders to regulate impacts, events of behaviour outside one's territory. Due to the sovereignty of nation States, such an extension of one's jurisdiction is in principle not allowed.[108] Regulating extraterritorial elements can thus be problematic from a legal perspective, but such regulation is necessary to implement the proposed holistic, ecological governance approach. The topic is rather controversial, and politics and literature are divided on the matter. Some authors argue that regulators are inherently confronted with a territorial system boundary, while others argue that setting conditions to processes and production methods (PPMs) can be allowed, even if production occurs abroad.[109] Similarly, it is debated whether and when unilateral action is allowed, or even compulsory, to address the transboundary problem of climate change.[110] With regard to the latter, an important concept is that of addressing 'embodied emissions'. Embodied emissions are the sum of emissions that occur during the life cycle of a particular product. By attributing these emissions to the product, a measure can be taken of its 'environmental performance'. Subsequently, similar products can be ranked on the basis of their relative performance, thus allowing an informed choice on the best products or production processes. The current European biofuel rules are the prime example of using embodied emissions as a regulatory technique.

An important legal complication in attempting to regulate embodied emissions is the fact that international trade law is generally believed to prohibit import restrictions based solely on the

106 On this, see O. Woolley, n. 8, at 23.

107 See L. Ankersmit, J. Lawrence, and G. Davies, 'Diverging EU and WTO Perspectives on Extraterritorial Process Regulation', 21 *Minnesota Journal of International Law Online* (2012), 14.

108 An exception to this concerns the realm of diplomatic agencies and ambassadors.

109 An example of regulation of PPMs are the EU's biofuel sustainability criteria; see also E. Ruozzi, 'The EU Directive on Renewable Sources and WTO: Towards a Solution of the PPMs and Extraterritoriality Issues?' (Istituto Universitario di Studi Europei, 2012).

110 Scott distinguishes four situations in which States may depart from the general territorial system boundary as established by the Intergovernmental Panel on Climate Change. See J. Scott, 'The Geographical Scope of the EU's Climate Responsibilities' (2015), found at: <http://discovery.ucl.ac.uk/1469256/7/Scott.1469256_.pdf>, at 13-16.

(external) effects of production processes.[111] In simple terms, under the rules of the General Agreement on Tariffs and Trade, differential treatment of products is allowed only if they are 'unlike'.[112] What constitutes 'likeness' is subject to severe controversy and is in practice assessed via criteria developed in jurisprudence on a case-by-case basis.[113] In regulating the sustainability of biofuels, the EU avoided the potential conflict with trade law by not imposing import restrictions as such, but by merely not counting certain biofuels towards the renewables target and by making them non-eligible for subsidies. As a result, the imposed restrictions are not a straightforward prohibition of specific (damaging) process and production methods outside the EU's jurisdiction. However, in order to implement a legal system aimed at ecosystem functionality it is exactly such prohibitions that are required to reduce stresses on the Earth system and to execute sunsetting and substitution. As Scott points out, there might be room for this, as such prohibitions need not be a problem under trade law 'so long as the EU has clear criteria for assessing the relative responsibilities and capabilities of states, and so long as it applies these criteria in a manner which is consistent and transparent'.[114] Nevertheless, implementing such criteria will not be easy and developing them requires further research.

3.5. The role of information

As is clear from all the above, a key element in both the current use of BAT and the 'better BAT' concept is (access to) information on, *inter alia*, technological possibilities, emissions and impacts. Data and knowledge – and the development thereof – provide input for assessments and evaluations and are hence a precondition for improvements. However, this approach bears an inherent danger of putting too much faith in human capacities to accurately calculate and predict effects and events. In aiming for improved ecosystem functionality and resilience, it is vital to avoid exclusive reliance on accurate prediction of impacts.[115] Additionally, the provision and use of information should not become a purely procedural exercise, i.e. become a matter of simply 'ticking the box'. Rather than relying on procedures or predictions, information should be used to implement an adaptive approach by 'requiring the on-going monitoring and assessment

111 On the basis of Article XI of the General Agreement on Tariffs and Trade 1994 (Marrakesh, 15 April 1994; in force 1 January 1995). Whether this is actually accurate is discussed in detail in: R.A. Giljam, 'Extended Application of 'Best Available Techniques' as a Means to Facilitate Ecological Governance: Assessing the Legality of an Ecologically Oriented Interpretation of 'Best Available Techniques' (BAT) under International Trade Law and in Particular in Relation to Energy Production' (2017, forthcoming).

112 General Agreement on Tariffs and Trade 1994 (Marrakesh, 15 April 1994; in force 1 January 1995, Articles I and III. However, if the conditions of Article XX are met, some import restrictions can be justified.

113 An extensive discussion of this topic is outside the scope of this article. See M.J. Trebilcock, R. Howse and A. Eliason (Eds.), *The Regulation of International Trade*, 4th edn (Routledge, 2013), at 74-76; see also the WTO's interpretive notes on 'like products', found at: <https://www.wto.org/english/res_e/booksp_e/analytic_index_e/gatt1994_e.htm>.

114 See J. Scott, n. 110 above, at 33.

115 See O. Woolley, n. 8 above, at 215.

of the effects of human activities … to develop a deeper understanding of [complex] ecosystem dynamics … and to use [this] knowledge … to modify decisions where … this is necessary'.[116]

3.5.1. Normative precaution

Supplementary to this adaptive approach, a normative precautionary approach must be taken in permitting human activities. The current interpretation of precaution entails that a potentially harmful activity is halted until sufficient knowledge becomes available to make an informed choice. However, the reality is that this moment may never come. Hence, we rather need to 'find a means of deciding how to control our activities with a view to maintaining systemic properties *despite* our ignorance of how they cause ecosystems to decline and fail'.[117] This has two major implications. Primarily, it means that uncertainties and a lack of information, data or knowledge are no reason for inaction. Quite the opposite: normative precaution requires a proactive approach in moving away from (societal) practices that present threats of harm.[118] Thus, the second implication is that the option of obviating development must be considered in all earnest when permits are applied for. Clearly, requiring such normative precaution in human activities bears the risk of fully paralysing such activities. A possible solution presented by Woolley is to allow trial phases aimed at research and gathering data. A final decision regarding the activity is then made once sufficient data is available.[119] I believe this is a good option if the business-as-usual scenario is that no activity is carried out. After all, allowing the activity to proceed would cause a deterioration of the current situation. However, if the proposed activity has the potential of replacing more harmful activities (e.g., replacing fossil fuels with more sustainable sources), conditional approval of the activity should be possible, so that the alleviation of stresses on ecosystems might be sped up.

Put briefly, under the new ecological paradigm, all decisions on development consent should be based 'on assessment of the likely compatibility of activities and uses with ecosystem functionality'.[120] To ensure that the required flow of relevant information is maintained, the gathering of data on the health of ecosystems and on the effects of human activities should be institutionalized.[121] This will hopefully improve baseline knowledge and deepen our understanding of how ecosystems function. This will then increase the capacity to adequately reduce the stresses we put on these ecosystems.

116 Ibid., at 216-217.
117 Ibid., at 54-55.
118 Ibid., at 66.
119 Ibid., at 232-233.
120 Ibid., at 219.
121 Ibid., at 222.

3.5.2. Independent auditor

Much of the information and know-how that is required for the assessments lies with industry. Other valuable contributions come from (natural) science. The systemic nature of the new BAT approach demands that information regarding supply chains is also made available, as is information on the indirect effects of production paths.[122] Due to the prominent role of information in standard setting, an external audit to verify the accuracy of the information supplied is important. In addition, the general direction in which (permit) decisions in effect steer society as a whole would have to be monitored. As such supervision cuts across several layers of government and different levels of decision making, no existing governance institution is well-suited for the task. Therefore, an independent supervisory body should be established whose prime mandate would be to maintain the focus on enhancing ecosystem functionality and on reducing stresses on the environment.[123] This body would ensure that the BAT process is running appropriately within the new ecological framework, while the competent authorities concern themselves with the nitty-gritty technical details of the installations and the conditions for their operation. To fulfil its mandate, the independent body should have statutorily defined tasks, which will help to depoliticize the identification of problems and the setting of priorities for responding to them.[124]

The exact tasks and powers that should be attributed to this body is a matter open for debate, but I believe they should include at least the following. In addition to verifying the information supplied to it, the supervisory body should safeguard the dynamism of the BAT conclusions and steer decision making away from lock-in situations that could lead to stagnation in BAT development. Furthermore, the auditor should be able to assess the validity and adequacy of the 'polluter explains' pleas. To aid operators, the body could be given powers to issue guidelines on the minimum requirements for such pleas and on the dissemination of the requested information. In a nutshell, the independent body would be the guardian of the focus on ecosystem resilience in BAT determinations and subsequent permitting procedures. For this reason, the body should operate independently from the BAT determination process itself, and it should be made up primarily of a broad range of experts from various (natural) sciences.[125] Such a broad delegation from diverse disciplines would ensure that the body is fully equipped

122 For instance, on the effects of land conversions for biofuel production.

123 See O. Woolley, n. 8 above, at 101-103, who elaborates on an advisory committee to review policy decisions.

124 Ibid., at 224.

125 Addressing the more detailed institutional arrangements regarding this body goes beyond the scope of this article. However, it is worth noting that crucial considerations would be how and on which grounds the experts should be appointed or elected, and to what extent the body should be able to issue binding opinions or only advisory ones.

to assess whether all relevant decisions were made with a systemic view in mind and with due regard to normative precaution.

3.6. Conclusions

In sum, this article has analysed to what extent a system of ecological governance as sketched by Woolley can be implemented by expanding the use of the familiar legal concept of BAT. It has found that Woolley's guiding principles of reduced consumption, substitution and sunsetting are already elements that influence the choice of BAT. A further similarity is the central role of information and assessment of alternatives. However, to implement a legal system aimed at perpetually reducing stresses on ecosystems, the concept of BAT should be expanded significantly, both internally and externally. Internal expansion of BAT means that what is considered BAT must be assessed in a broader sense, *inter alia* by including indirect effects and seriously considering reducing development as an option. Additionally, POT/WAT conclusions should be drafted that describe techniques that are up for substitution or sunsetting. In principle, any BAT could qualify for this when new techniques become available, but it might be easier to set a threshold. This could, for instance, take the form of a percentage of the emissions achievable with the latest BAT, or including those technologies that may amount to ecocide. In addition to this more systemic appraisal of BAT, the concept should also be wielded more dynamically in terms of both the time and place it is applied in, as this would improve the adaptability of the legal framework. This dynamism must be aimed at ensuring normative precaution in permitting human activities. Clearly, room must be left for such activities, but the current levels of large-scale destruction are untenable and must progressively be diminished to enhance ecosystem functionality and ecosystem resilience. Partially, this can be achieved by introducing a 'polluter explains' obligation in permit applications, and at regular intervals after that, to provide a check on the necessity of activities and the potential for further stress reductions.

The external expansion of the use of BAT means applying it outside its original scope to ensure coherence in the ecological governance approach. In theoretically applying BAT to agriculture and forestry, it became clear that the concept as such is suitable for implementation in other areas of law than it was originally designed for. Also, it became apparent that how the land is used and for which purpose is at least as important as which techniques are used. For this reason, the term best available use was introduced and it was argued that a description of the best available use should be incorporated in the relevant BREFs. Furthermore, it was concluded that what is considered best available use can be partly dependent on technical developments in seemingly unrelated areas.[126] This notion makes it all the more pressing to maintain a holistic view and to implement an adaptive legal system. Additionally, to safeguard the focus on enhancing

126 Such as the relation between electric vehicles and agricultural crops, as mentioned above.

ecosystem resilience, the BAT determinations and permit conditions should be reviewed by an independent body.

This article has found sufficient leeway to implement (the basics of) ecological governance using an already familiar legal concept. Nevertheless, to actually implement and execute the ideas and visions discussed in this article, bold steps need to be taken by politicians and lawmakers. As also argued by Woolley and Higgins, a lack of sufficient political will to take the required measures is perhaps the most substantial obstacle in the transformation of the contemporary (economic) paradigms.[127] However, momentum may have changed with the recent entry into force of the Paris Agreement, as this treaty expresses near-global consensus on the need to urgently tackle climate change.[128] The Paris Agreement thus paves the way for drastic societal reform and may serve as an impetus to implement a (global) legal framework that promotes enhanced ecosystem health. Law will then prove to be a powerful tool in stimulating innovative powers and in implementing ecological governance, which will steer society in a more sustainable direction.

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127 See O. Woolley, n. 8 above, at 58; and P. Higgins, n. 12 above, at xiv.

128 Nevertheless, it remains to be seen what effects recent geopolitical developments (e.g., the elections in the United States) will have on this momentum and on the execution of the Paris Agreement.

Chapter Four

Trade law compatibility of an expanded application of 'best available techniques'

This chapter has previously been published as:

Renske A. Giljam, 'Extended application of 'Best Available Techniques' as a means to facilitate ecological governance - Assessing the legality of an ecologically oriented interpretation in the European Union (EU) of 'Best Available Techniques' (BAT) under international trade law and in particular in relation to energy production' (2018) 36(2) Journal of Energy and Natural Resources Law (JERL) 181-208, available online at: https://doi.org/10.1080/02646811.2017.1327266, published online 2 June 2017.

4

Abstract

This article examines the possibility of using the concept of 'Best Available Techniques' (BAT) to implement ecological governance in EU energy law. Since extending the mandatory use of BAT in energy production would lead to increased implementation of rules on 'processes and production methods' (or process measures), this article primarily assesses the legality of such measures under international trade law. In this, focus will lie on the implications for energy production. It appears that process measures are not categorically prohibited and that, thus, extension of the BAT-concept is in principle possible. This would allow for a more holistic approach to energy production, rather than maintaining the current rigid, artificial distinction between products and processes. This new, integrated approach would enhance the level of ecological governance, which, in turn, can contribute to mitigating climate change.

Keywords: best available techniques (BAT); ecological governance; energy; sustainability; trade law; extraterritoriality; processes and production methods (PPMs); World Trade Organization (WTO); European Union (EU); Energy Charter Treaty (ECT)

4.1. Introduction

4.1.1. Ecological governance

The international community has acknowledged that current efforts are insufficient to stop climate change.[1] In fact, global emissions continue to rise and trajectories show that full implementation of all current pledges made at the Paris Climate Accords will still lead to a 3 °C temperature rise, rather than the envisioned 1.5 °C.[2] Partially, the ineffectiveness of climate policies is due to the fact that current legal structures are inadequate for addressing the root

1 'Paris Agreement under the United Nations Framework Convention on Climate Change' Decision 1/CP.21 of 12 December 2015 (Paris Climate Treaty). Recent political developments in the United States will not be taken into consideration in this article.

2 United Nations, 'IPCC: Greenhouse gas emissions accelerate despite reduction efforts–many pathways to substantial emissions reductions are available' April 2014, http://www.un.org/climatechange/blog/2014/04/ipcc-greenhouse-gas-emissions-accelerate-despite-reduction-efforts-many-pathways-to-substantial-emissions-reductions-are-available/ (14.09.2016); International Energy Agency (IEA), *World Energy Outlook 2015* (IEA 2015); IEA, *Energy and Climate Change. World Energy Outlook Special Report* (IEA 2015); United Nations Environment Programme (UNEP), *The Emissions Gap Report 2016: A UNEP Synthesis Report* (UNEP November 2016) http://capacity4dev.ec.europa.eu/unep/document/emissions-gap-report-2016-unep-synthesis-report page xvii.

cause of climate change: human induced greenhouse gas (GHG) emissions.[3] The current climate mitigation approach hinges on (i) a balancing of economic, societal and environmental elements and (ii) the belief in the human capacity to accurately predict the impacts and effects of both our actions and climate change itself. The former denies the physical reality of mankind's dependence on the natural world, whereas the latter overestimates human capabilities and comprehension.[4] An alternative approach should therefore be taken and a blueprint for this is offered by Olivia Woolley, who advocates a system of ecological governance.[5] This entails a systemic (legal) approach that acknowledges the complexities of ecosystems and their myriad interactions and interdependencies as well as mankind's dependence on these ecosystems and its incapability to accurately and comprehensively predict the impacts and effects of our activities on these ecosystems.[6]

Essentially, an ecological legal approach should acknowledge and account for the impacts and emissions occurring throughout a product's full life cycle and to subsequently opt for the least harmful practises in order to reduce stresses on ecosystems.[7] Part of reducing the impact of production processes would be to phase out the most polluting practises.[8] This could be done by setting a threshold for activities that amount to 'ecocide' and should therefore be prohibited.[9] Less drastic is opting for the least harmful possibility, which is, in essence, quite similar to the mandatory use of 'Best Available Techniques' (BAT) that is already commonplace in industrial production processes within the European Union (EU).[10] In summary, the EU defines BAT as those

3 Due to the significance of these anthropogenic contributions, this era is sometimes referred to as the 'Anthropocene'. What this notion implies for law and governance structures is explored in Louis J Kotzé, 'Rethinking Global Environmental Law and Governance in the Anthropocene' [2014] 32(2) Journal of Energy & Natural Resources Law, 121-156; and at greater length in Victor Galaz, *Global Environmental Governance, Technology and Politics. The Anthropocene Gap* (Edward Elgar 2014).

4 As also asserted in Jaap C. Hanekamp & Lucas Bergkamp, 'The 'Best Available Science' and the Paris Agreement on Climate Change' (2016) 7 Eur. J. Risk Reg. 42, 43.

5 Olivia Woolley, *Ecological Governance - Reappraising Law's Role in Protecting Ecosystem Functionality* (CUP 2014).

6 Similarly, Kotzé argues that the regulatory response to the challenges posed by the Anthropocene should be holistic, as well as adaptive (Kotzé (n 3), 147 & 149).

7 This is obviously not as easy task in practice, especially since the concept of 'ecosystem approach' itself is elusive and at times contested. Vito De Lucia, 'Competing Narratives and Complex Genealogies: The Ecosystem Approach in International Environmental Law' (2015) 27 (1) Journal of Environmental Law 91-117, 97.

8 More elaborately, see Woolley (n 5) 74-76.

9 As advocated by Polly Higgins, *Eradicating Ecocide - Laws and Governance to Stop the Destruction of the Planet* (Shepheard-Walwyn 2010).

10 As required by Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) [2010] OJ L334/17 (Industrial Emissions Directive, IED). Additionally, the BAT concept is apt to enhance the role of information and institutional learning, which are, according to Woolley, central elements in ecological governance. On this, see also: Maria Lee, *EU Environmental Law, Governance and Decision-making* (Hart 2014), ch 5.

techniques that are 'the most effective and advanced […] for providing the basis for emission limit values and other permit conditions designed to prevent and, where that is not practicable, to reduce emissions and the impact on the environment as a whole […].'[11] However, the use of BAT is only mandatory from gate-to-gate production (i.e. confined to individual industrial facilities), and not throughout the full life cycle of a product. Extending the application of BAT beyond its original scope essentially means regulating 'processes and production methods' (PPMs) at greater length. Extending the use of BAT has two elements: On the one hand it entails expanding the material norm, i.e. implementing a more ecological, holistic interpretation of what is 'best', and, on the other hand, there is the more procedural element of applying BAT-requirements throughout full production chains, regardless of where these take place.[12] This way, the use of BAT provides a legal instrument that can facilitate the far-reaching technological changes required to tackle climate change.[13]

4.1.2. Aims & outline

This article argues that internalising the external effects of production by considering them to be an integral part of the product is in fact essential to implement ecological governance.[14] However, the use of such process measures is controversial. This article will analyse to what extent international (trade) law allows for process measures and whether any elements of the desired life-cycle approach are perhaps already present. Special attention will be paid to energy production for two reasons. Firstly, because EU law makes an explicit process-based distinction between electricity produced from renewable sources and electricity from fossil fuels. Such 'green' electricity is then awarded priority access to the networks.[15] Biofuels are also treated differently on the basis of their production process. At first sight, this seems to contradict the

11 Full definition in: IED (n 10) art 3(10). Which technologies are BAT is not described in the Directive itself, but in separate, lengthy documents, called BAT Reference Documents (BREFs, see also section 4 of this article). For more information and all the existing BREFs, see http://eippcb.jrc.ec.europa.eu/.

12 How ecological governance may thus be implemented is explored in Renske A Giljam, 'Better BAT to Bolster Ecosystem Resilience: Operationalizing Ecological Governance through the Concept of Best Available Techniques' (2017) 26(1) Review of European Community and International Environmental Law (RECIEL) *forthcoming April 2017.* As the current article builds upon this previous one, focus will lie on EU regulations and therefore the (extended) use of BAT in the United States will not be addressed.

13 See also Lea Nicita, 'Shifting the Boundary: the Role of Innovation' in Valentina Bosetti *et al* (eds), *Climate Change Mitigation, Technological Innovation and Adaptation: a New Perspective on Climate Change* (Edward Elgar 2014), 32.

14 In order to implement ecological governance to the full extent, a mix of complementary measures and instruments will be necessary. The use of BAT is only one of these. See also Michael Mehling, 'Implementing Climate Governance: Instrument Choice and Interaction' in Erkki Hollo, Kati Kulovesi & Michael Mehling (eds.), *Climate Change and the Law,* Ius Gentium - Comparative Perspectives on Law and Justice vol. 21 (Springer 2013) 26-27.

15 Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources […] as amended by Directive (EU) 2015/1513 [2015] OJ L239/1 (Renewable Energy Directive, RED) art 16.

legal requirement that identical products must be accorded similar treatment. Analysing the (legal) basis for this differentiation can thus provide guidance on how such differentiation might be applied in a broader sense. Secondly, since energy production and use account for two-thirds of the world's GHG emissions,[16] applying the new BAT concept to energy production can make a major contribution to mitigating climate change. Ultimately, gaining expertise on a more comprehensive use of BAT may contribute to the development of more comprehensive holistic laws that are necessary to implement ecological governance so as to reduce overall stresses on ecosystems.

This article will first sketch the general debate on process measures (section 2) and then address their legality under international trade law (section 3). This legal analysis considers the framework of the World Trade Organization (WTO), the Energy Charter Treaty (ECT) and EU law. In this analysis, focus will lie on the legality of production standards, in the form of BAT, that lead to import restrictions of goods that were produced using particular damaging and/or polluting production methods. Such standards are controversial, because they constitute product requirements 'unrelated to the physical composition of the product'[17] and nevertheless (indirectly) affect production processes outside the territory of the regulating state. In this sense, BAT can be regarded as a specific application of a carbon intensity standard, which may lead to an import ban of a specific product if this standard is not met.[18] The legal analysis in this article is confined (i) to BAT standards that were agreed upon at EU level and (ii) to goods that are consumed within the EU, but produced abroad. This article therefore focuses solely on import prohibitions of products that were produced in a manner inconsistent with EU standards. Primarily, this article revolves around questions on the EU's (im)possibilities to address (environmental) harm from industrial processes occurring abroad. Section 4 will then focus on energy products and assess what the basis is of the differentiation applied to electricity and to biofuels. Also, it will analyse how a broader BAT concept can be implemented in the energy sector and whether and how it might be applied to energy production within the EU, as well as energy imports. In this, focus will lie on the conversion process of primary to secondary energy.

4.2. The debate on process measures

The terminology used in the debate on PPMs is diffuse. While most authors speak of PPMs, others refer to process measures, or make more detailed subdivisions, most commonly between

16 IEA Special Report 2015 (n 2) 11.

17 Laurens J Ankersmit, *Free Trade, Fair Trade, and Green Trade in and with the EU. Process-based Measures within the EU Legal Order* (CUP 2017) *forthcoming* (Ankersmit 2017), 170. This book is based on Laurens J Ankersmit, *Globalization and the Internal Market: Process-based Measures within the EU Legal Order* (PhD Law Thesis VU Amsterdam 2015) (Ankersmit 2015).

18 See also Kateryna Holzer, *Carbon-related Border Adjustment and WTO law* (Edward Elgar 2014), 29.

'product related' (pr) PPMs and 'non-product related' (npr) PPMs.[19] PPMs are often used to correct market failures.[20] In the case of mandatory BAT the objective is to reduce externalities stemming from pollution or emissions. Throughout this article, the terms process measure and PPM are used interchangeably and are understood to mean measures that target how a product is produced, rather than regulating its physical traits or contents. Thus, this article will confine itself primarily to the (il)legality of npr-PPMs in international trade law.

Irrespective of the terminology used, the debate on process measures essentially revolves around two issues. First of all, it relates to the (limits of) sovereignty of nation-states, and, secondly, it revolves around the question what constitutes a product. To start with the former, the main disagreement in the debate is whether process measures infringe upon the principles of non-interference in the internal affairs of another state and sovereignty of nation-states in the international community, as well as on the principles of non-discrimination and elimination of obstacles in international trade. The fact is that process measures may lead to the *de facto* imposition of specific standards regarding production processes on producers that reside outside the territory of the regulating State(s). Thus, process measures can have significant extraterritorial effects.[21] There is a clear tension between, on the one hand, the right of one country (or a trade block such as the EU) to set standards for the products imported or consumed within its territory and, on the other hand, the sovereignty of the producing country to set its own standards. This makes process measures highly controversial.[22]

The second central issue in the debate on process measures can be referred to as the 'traces debate'. This primarily revolves around the question whether or not the use of different production processes causes products to be (fundamentally) different or whether they only differ

19 The former leave traces or residues in the final product, whereas the latter do not. For elaborations, see: Christiane R Conrad, *Processes and production methods (PPMs) in WTO law: interfacing trade and social goals* (Cambridge 2011); Steve Charnovitz, 'The Law of Environmental 'PPMs' in the WTO: Debunking the Myth of Illegality' (2002) 27(1) Yale Journal of International Law 59; Ankersmit 2017 (n 17) 46; Mitsuo Matsushita *et al.*, *The World Trade Organization: Law, Practice, and Policy* (OUP 2015) 443; Erich Vranes, *Trade and the Environment: Fundamental Issues in International Law, WTO Law, and Legal Theory* (OUP 2009) 321-330; Donald H Regan, 'How to think about PPMs (and climate change)' in Thomas Cottier, Olga Nartova & Sadeq Z Bigdeli (eds), *International Trade Regulation and the Mitigation of Climate Change* (CUP 2009) (Regan 2009) 102.

20 Holzer (n 18) 92.

21 Several authors disagree that PPMs must be regarded as extraterritorial. See, for instance, Robert L Howse & Donald H Regan, 'The Product/Process Distinction - An Illusory Basis for Disciplining 'Unilateralism' in Trade Policy' (2000) 11(2) European Journal of International Law 249-289, 274; Regan 2009 (n 19) 112/113; Vranes (n 19) 181. Additionally, for a more extensive discourse on the concept of extraterritoriality and diverging views on it, see Vranes (n 19) 97-170.

22 Lester and Mercurio refer to 'extremely sensitive' measures. See Simon Lester & Bryan Mercurio, *World Trade Law: Text, Materials and Commentary* (Hart 2008, reprinted 2010) 388. On the history of the debate on PPMs, see: Conrad (n 19) para 1.3.

if traces of the production process are residual in the product itself. The answer to this question is essential to subsequently determine whether it is allowed for another state to prohibit the import of this particular product. Many authors argue or assume that production processes as such are not an (essential) element of the final product, even though the environmental impacts of such processes may vary significantly. Hence, there is a general presumption that, at least under world trade law, import prohibitions on this ground are not allowed.

Several arguments can be, and have been, put forward against the use of PPM regulations. Firstly, under international law States are not allowed to infringe upon the territorial sovereignty of other States, nor can they interfere in the domestic affairs of another State. Thus, the imposition of rules with extraterritorial effects can be considered illegitimate on several grounds.[23] On formal grounds, process measures can be said to undermine the rationale of well-established international law. From an economic viewpoint, process measures can be considered unwelcome due to their potential coercive nature, in particular in regard to small and developing countries. It may well be that such countries are highly dependent on export to the imposing State so that in effect they are coerced to adopt a certain standard. Moreover, a pluralist argument against PPMs measures is that diversity and disagreement between States should be respected as no objective, universal truth or 'righteousness' exists. In this light, process measures can be seen as a lack of tolerance for diversity. A further argument against the imposition of process measures is that their use results in unilateralism,[24] rather than resolving transnational problems through multilateral solutions, which is one of the foundations of international (trade) law.[25] On top, as a result of this unilateralism, other states' interests may not be represented sufficiently in the decisions taken, resulting in power without accountability.[26] Thus, these measures might be used for protectionist purposes.[27] Taking it a step further, process measures could even be considered paternalistic, or might be regarded as 'eco-imperialism'.[28] Also, from a practical perspective, the non-regulating state might simply be in a better position to address the issues within their territory. The risk of power without accountability can play a role between states, but also within the regulating state itself. In instances where process measures take a different form than traditional command-and-control regulation, their use may lead to concerns over

23 More details in Ankersmit 2017 (n 17) 54-64, 237-251.

24 In the case of mandatory use of BAT throughout the EU, it can be debated whether these BAT constitute unilateral measures *vis-à-vis* its trading partners, or whether they must be considered as multilateral measures since they were agreed upon at supranational level. For the purpose of this article the latter will be assumed.

25 Ankersmit 2017 (n 17) 64. On the distinction between unilateralism and extraterritoriality, see Vranes (n 19) 173-175.

26 Gareth T Davies, 'International trade, extraterritorial power, and global constitutionalism: a perspective from constitutional pluralism' (2012) 13(11) German Law Journal 1203, 1208.

27 Holzer (n 18) 95.

28 Charnovitz (n 19) 62.

who regulates whom or the adoption can interfere with the division of regulatory competences within that state.

Despite these legitimate concerns over the imposition of process measures, at the same time states (and/or the EU *en bloc*) may have a legitimate interest in exercising such extraterritorial jurisdiction.[29] Such interests range from addressing transboundary harm by which a state is affected; to protecting universal or common interests or even non-material interests, such as morals and ethical values; to ensuring the effectiveness of national policies. Thus, the prime argument in favour of process measures is a practical one: such measures may simply be required due to the lack of global governance necessary to address important issues, including climate change. On top, while one state cannot force another to adopt a certain standard, the opposite is also true. Therefore, in principle, all states should be able to set their own standards for (imported) products, as least to the extent that these are not discriminatory. In this respect, it is important to bear in mind that there is a difference between legislative or prescriptive jurisdiction and enforcement jurisdiction.[30] Clearly, extraterritorial enforcement of one's norms or standards would infringe the sovereignty of another state, but prescribing a certain standard for production would not necessarily. Categorical rejection of such measures would imply that any (environmental) product standard is (too) coercive, while in fact the single observation that a standard impacts foreign production is insufficient to consider the measure to be illegitimate.[31] Instead, important factors in determining the legitimacy of a measure is whether it is applied *erga omnes* and what form it is cast in. In regard to producer-based process measures, no enforcement of production rules occurs abroad, so that in principle there is no violation of jurisdictional competences under international law.[32] Nevertheless, *de facto* enforcement may occur, if the producing country is highly dependent on exports to the regulating country and thus has no choice but to adopt the same standard.[33] However, generally, as long as the standards are applied to all producers, both inside and outside one's territory, this method of setting barriers to market entry can be a very effective way of enhancing and upholding one's standards in a non-coercive, proportionate and non-discriminatory manner. Thus, at first sight, law does not *per se* preclude implementing stricter and more holistic BAT-requirements through process measures. This notion, coupled with the magnitude of the interest at stake,[34] means that such measures, in my opinion, serve a legitimate purpose and are proportionate to their aims. Similarly, several authors consider the protection of the global commons a ground for allowing measures with

29 More elaborately, see Ankersmit 2017 (n 17) 252-280.
30 Ankersmit 2017 (n 17) 56-57.
31 See also Charnovitz (n 19) 73; Howse & Regan (n 21) 274-279.
32 Vranes (n 19) 166-167.
33 Howse & Regan (n 21) 277.
34 This is implementing ecological governance to avert further ecosystem degradation.

extraterritorial effects.[35] Whether this holds true from a legal perspective, is the subject of the analysis of the next section.

4.3. The legality of process measures

4.3.1. World Trade Organization (WTO)

The debate on the legality of process measures is most fiercely fought under the umbrella of the World Trade Organization (WTO) and is hitherto unsettled.[36] Of all the treaties that fall under this umbrella, the General Agreement on Tariffs and Trade (GATT) is the most important one in regard to imposing import restrictions on the basis on an extended BAT concept.[37] Four provisions of this treaty are particularly relevant, and will be discussed here.[38] Firstly, article I ('Most Favoured Nation' (MFN) treatment) prohibits discrimination among trading partners, while article III ('National Treatment' (NT)) prohibits discrimination against foreign products.[39] Additionally, article XI prohibits quantitative restrictions on imports. These three provisions aim to promote trade and eliminate barriers and/or protectionist measures by states. At times, however, states may have a legitimate interest in either differential treatment or in restricting trade in specific products. For these situations, article XX provides general exceptions to the GATT rules. To justify a measure essentially three conditions must be met: (i) the measure must fall under one of the listed exceptions, (ii) it must be applied non-discriminatory and (iii) it must not form a disguised restriction on trade.

35 See Holzer (n 18) 163-164, footnote 583 especially.

36 Holzer (n 18) 91. She argues that it is not clear whether process measures are accepted, but that they have not been declared illegal (ibid 97).

37 Elements of BAT that would fall under other WTO agreements are not discussed here for lack of space. Consequently, the Agreement on Agriculture (AoA), subsidies (SCM), intellectual property rights (TRIPs), investment measures (TRIMs) and services (GATS) are left aside here. However, trade in services will be mentioned briefly in section when discussing the goods-services divide. For a full appraisal of WTO law, see Peter Van den Bossche & Werner Zdouc, *The Law and Policy of the World Trade Organization: Text, Cases and Materials* (CUP 2013). Furthermore, the Agreement on Sanitary and Phytosanitary Measures (SPS) and the Technical Barriers to Trade Agreement (TBT) are also discarded in this article, since they are generally believed not to apply to npr-PPMs (More details in: Arkady Kudryavtsev, 'The TBT Agreement in context' in: Tracey Epps & Michael J. Trebilcock (eds), *Research Handbook on the WTO and Technical Barriers to Trade* (Edward Elgar 2013).) However, this stance is disputed, as several authors argue that (at least certain) npr-PPMs are covered by the TBT agreement. This dissenting opinion can for instance be found in Vranes (n 19) 342; Joost Pauwelyn, 'Carbon leakage measures and border tax adjustments under WTO law' in Geert Van Calster & Marie Denise Prévost (eds), *Research Handbook on Environment, Health and the WTO* (Edward Elgar 2013) 485; Matsushita *et al.* (n 19) 443, footnote 50; and Van den Bossche & Zdouc (n 37) 855.

38 Due to space restraints, a full appraisal of these provisions goes beyond this article. More elaborate discussions can be found in MJ Trebilcock, Robert Howse & Antonia Eliason (eds), *The Regulation of International Trade* (Routledge 2013); Matsushita *et al.* (n 19); Van den Bossche & Zdouc (n 37); and Lester & Mercurio (n 22).

39 Lester & Mercurio (n 22) 278. These provisions are thus an expression of one of the core values of the WTO system: non-discrimination (see Matsushita *et al.* (n 19) 155).

Without going into all the details, article I requires that 'any advantage, favour, privilege or immunity granted by any contracting party to any product originating in or destined for any other country shall be accorded immediately and unconditionally to the like product originating in or destined for the territories of all other contracting parties.'[40] Article III states, *inter alia,* that 'the products of the territory of any contracting party imported into the territory of any other contracting party shall be accorded treatment no less favourable than that accorded to like products of national origin in respect of all laws, regulations and requirements affecting their internal sale, offering for sale, purchase, transportation, distribution or use.'[41]

These phrases demonstrated that, in the application of both article I and III, the definition of 'like products' is a crucial element.[42] If a product is considered to be different on the basis of its production process, differential treatment of these products would not lead to violation of these provisions. However, likeness is not defined in any of the WTO treaties[43] and general consensus is that, *a prima facie*, WTO law considers products alike, despite diverging production processes. According to case law, the likeness of products must be assessed on a case-by-case basis whilst taking account of all the specific circumstances. Traditionally, likeness is determined on basis of four criteria: (i) the properties, nature and quality of the products; (ii) the end-uses of the products; (iii) consumers' perceptions and behaviour in respect to the products; and (iv) the tariff classification of the products.[44] Each of these four criteria must be examined to make an overall determination.[45] Yet, these criteria are neither exclusive nor carved in stone.[46]

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40 Shortened version of article I GATT.

41 Shortened version of article III.4 GATT, which is the paragraph applicable to internal laws and regulations.

42 Further details in assessing the compatibility of measures with articles I and III are not discussed at length here. For the purpose of this article, it is assumed that by applying EU rules to all trading partners alike, there is no violation of article I in terms of discrimination. However, under article I it is important that the contested import ban does not only avoid *de jure* discrimination, but also *de facto* discrimination. Regarding article III, it is for now assumed that prescribing BAT would qualify as a regulation affecting the internal sale of a product, but that this does not accord less favourable treatment to foreign products. For more elaborate discussions of these two provisions, see the more general WTO handbooks referred to in footnotes 19, 22 and 37.

43 Holzer (n 18) 108.

44 WTO, *WTO analytical index: Guide to WTO Law and Practice - GATT 1994* https://www.wto.org/english/res_e/booksp_e/analytic_index_e/gatt1994_e.htm (WTO Interpretive Notes), on art I (no. 42) & art III (no. 241 *et seq.*). See also Thomas Cottier *et al.* (2014)*, Differential Taxation of Electricity: Assessing the Compatibility with WTO Law, EU Law and the Swiss-EEC Free Trade Agreement* (18 April 2014), http://www.wti.org/media/filer_public/fb/81/fb8178a9-89e5-48ed-a313-e3d53702c4d1/es2050_zweite_etappe_differenzierte_stromsteuern.pdf, 31.

45 WTO, *European Communities – Measures Affecting Asbestos and Asbestos Containing Products - Report of the Appellate Body* (5 April 2001) WT/DS135/AB/R *(EC-Asbestos*), para 109. See also WTO Interpretive Notes (n 44) no. 331.

46 WTO Interpretive Notes (n 44) no. 343.

Furthermore, the term 'likeness' is not necessarily identical in all WTO provisions,[47] but rather 'evokes the image of an accordion [. . .that] stretches and squeezes in different places as different provisions of the WTO Agreement are applied.'[48] Moreover, depending on the context, products with different physical characteristics can be like if they are competitive or substitutable.[49] In fact, this substitutability is the essence of likeness under article III.4.[50] At the same time, not all competitive products are necessarily like,[51] which puts the emphasis back on the importance of consumers' perceptions of products.[52] As a result, in the wording of the Appellate Body (AB) of the WTO: 'there can be no one precise and absolute definition of what is "like"'.[53] However, in practice PPMs are hardly ever accepted,[54] and some argue that opening the door to PPMs may pose an 'existential threat' to the WTO system.[55] Simultaneously, the use of PPMs may be required to ensure sustainable development, which is part of the WTO's mandate.[56] As the terms of the treaty must be interpreted 'in the light of contemporary concerns',[57] it seems that all in all the treaty as such, as well as the case law up-to-date, do not *per se* preclude a more holistic approach in the interpretation of likeness, nor do they preclude the inclusion of production processes as an significant element in determining likeness.[58]

Unlike under article I and III GATT, determining a violation of article XI does not depend on the interpretation of 'like products'. Instead, case law on article XI revolves around the meaning of the term 'restriction', which clearly applies to outright import prohibitions based on ecological BAT-requirements.[59] However, such restrictions are only prohibited if they are external measures, i.e.

47 Trebilcock, Howse & Eliason (eds) (n 38) 74-76; Conrad (n 19) ch 4.

48 WTO, *Japan - Taxes on Alcoholic Beverages (AB-1996-2) Report of the Appellate Body* (4 October 1996), WT/DS8/AB/R, WT/DS10/AB/R & WT/DS11/AB/R *(Japan- Alcoholic beverages*) para 114.

49 Matsushita *et al.* (n 19) 165; *EC–Asbestos* (n 45) para 99.

50 Lester & Mercurio (n 22) 308.

51 Ibid.

52 Vranes (n 19) 194 & 324.

53 *Japan - Alcoholic Beverages* (n 48) 21.

54 Npr-PPMs are traditionally not thought to be relevant in determining likeness, see Van den Bossche & Zdouc (n 37) 328.

55 Matsushita *et al.* (n 19) 190-191.

56 See the preamble of the WTO Treaty, and Van den Bossche & Zdouc (n 37) 83. As a result of these ambiguities scholars are divided on the matter. Some say process-based measures do not necessarily violate article III (Regan 2009 (n 19) 119), while others say they do, but that this can be justifiable via article XX. (Daniel C Crosby, 'Tilting at conventional WTO wisdom' in Thomas Cottier, Olga Nartova & Sadeq Z Bigdeli (eds), *International Trade Regulation and the Mitigation of Climate Change* (CUP 2009), 126)

57 WTO Interpretive Notes (n 44) no. 935.

58 In fact, in *EC-Asbestos* (n 45) , the AB allowed non-economic interests and values to be considered in determining likeness, see Van den Bossche & Zdouc (n 37) 391.

59 For this reason, the case law discussing the ambiguities of this provision is not addressed.

enforced at the border and applied solely to imports (or exports).[60] This is hence a vital difference between articles III and XI: the former applies to internal regulations, while the latter concerns border measures.[61] The classification of a measure under article III or XI is crucial, because article III permits internal measures that are non-discriminatory, while article XI prohibits any of the covered border measures.[62] In the case of BAT standards, identical restrictions are imposed on domestic products. According to the WTO website, even if such measures are enforced at the border, they fall under the scope of article III, rather than article XI.[63] In other words, the mere fact that a measure is enforced at the border of the EU, does not transform it from an internal measure into an external measure. After all, 'an export ban is merely one modality of enforcing a general regulatory decision that a product is too risky to be consumed or released in the environment; the general regulatory decision is the real measure, and not being targeted at exports, it should not be considered a violation of article XI.'[64] Thus, article III applies to EU-wide BAT-requirements rather than article XI, which brings the concept of likeness to the central stage once more. On the basis of the likeness-analysis conducted above, upholding such requirements at the borders of the EU does not necessarily violate GATT provisions, as long as the criteria on which they are based are objective and transparent, and applied to domestic and foreign products (and production processes) alike.

Nevertheless, even if a breach of GATT provisions were established, such a violation might be justifiable via article XX GATT.[65] Regarding the use of stringent BAT, two of the ten listed exceptions could serve as a justification. One ground is that a measure can be 'necessary to protect human, animal or plant life or health' (article XX(b)), another option is that it may relate 'to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption' (article XX(g)). On top, for a measure to be justified, the conditions of the introductory clause ('the chapeau') of article XX must also be fulfilled. The chapeau focuses on *how* a measure is applied, rather than what it entails. It demands that measures are 'not applied in a manner which constitute[s] […] arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade […]'.

60 See also Ankersmit 2015 (n 17) 87.

61 Van den Bossche & Zdouc (n 37) 354; Matsushita *et al.* (n 19) 212.

62 Matsushita *et al.* (n 19) 240; Vranes (n 19) 251.

63 WTO Interpretive Notes (n 44) *ad* art III. Normally, either one of the two provisions is applicable. However, the potential for overlap between the two is not excluded by the AB (WTO, *India - Measures Affecting the Automotive Sector* (AB-2002-1) *Report of the Appellate Body* (19 March 2002) WT/DS146/AB/R & WT/DS175/AB/R (*India-Autos)* para 7.224, and/or Van den Bossche & Zdouc (n 37) 354-355).

64 Trebilcock, Howse & Eliason (eds) (n 38) 705.

65 Once more, for a full discussion of this provision, see the more general handbooks, such as the ones mentioned in footnotes 19, 22 and 37.

Under article XX(b), elements to consider in determining the necessity of a measure are, *inter alia,* the contribution that it makes to the policy objective, the importance of the interests at stake, and its impact on trade.[66] While the impact of stringent BAT-requirements on trade is severe, so is the interest at stake.[67] In the '*Korea-Beef*' case, the AB pointed out that the more vital or important the pursued interest is, the easier it is to accept the measures taken as necessary.[68] This necessity is also partially determined by whether any less-trade-restrictive alternatives are 'reasonably available'.[69] In assessing the availability of these alternatives, important factors are the difficulty of implementing alternative measures, the importance of the interest that is sought to protect, and whether the alternative provides the same level of protection. In '*Brazil-Retreaded Tyres'*, for instance, the AB ruled that alternative, remedial measures were not real alternatives to the import ban that had been imposed.[70] Analogously, in regard to global warming and climate change, remedial measures should never be considered an adequate alternative.[71] Furthermore, in the same case, the AB acknowledged that certain complex environmental problems (such as global warming or climate change) may be tackled only with a comprehensive policy comprising a multiplicity of interacting measures. The results of these myriad measures can only be evaluated over time. Hence, the baseline in assessing the necessity of a measure is whether it is 'apt to produce a material contribution to the achievement of its objective'.[72] Additionally, it is not required that the risk that the measure aims to diminish is quantified and, on top, states are free to set their own level of protection.[73] In the case of BAT-requirements, the concept is already tried and tested and generally conceived to be an effective tool in environmental protection. Moreover, air quality and waste reduction have been accepted to fall within the range of article XX(b),[74] so that it would be inconsistent to exclude the more comprehensive approach of BAT from relying on this provision. Combined, these arguments should suffice to demonstrate a

66 WTO, 'WTO rules and environmental policies: GATT exceptions' https://www.wto.org/english/tratop_e/envir_e/envt_rules_exceptions_e.htm.

67 How climate change affects health is briefly summarised in Kati Kulovesi, 'Real or Imagined Controversies? A Climate Law Perspective on the Growing Links between the International Trade and Climate Change Regimes' (2014) 6(1) Trade, Law and Development 55-92, 62-63; and extensively described in several UNFCCC reports.

68 WTO, *Korea — Measures Affecting Imports of Fresh, Chilled and Frozen Beef* (AB-2000-8) *Report of the Appellate Body* (11 December 2000) WT/DS161/AB/R & WT/DS169/AB/R *(Korea-Beef)*, para 162.

69 See also Van den Bossche & Zdouc (n 37) 557.

70 WTO, *Brazil - Measures Affecting Imports of Retreaded Tyres* (AB-2007-4) *Report of the Appellate Body* (3 December 2007) WT/DS332/AB/R *(Brazil-Retreaded Tyres).*

71 Especially when considering that global temperatures have already risen by 1 °C (World Meteorological Organization, *WMO Statement on the State of the Global Climate in 2016* WMO-No. 1189 (WMO 2017) http://library.wmo.int/opac/doc_num.php?explnum_id=3414 , 4), while the international community is aiming to halt this rise at 1.5 °C, or at maximum at 2 °C (Paris Climate Treaty (n 1)).

72 *Brazil-Retreaded Tyres* (n 70) para 151.

73 *EC–Asbestos* (n 45) para 167-168; and Lester & Mercurio (n 22) 392.

74 Van den Bossche & Zdouc (n 37) 554.

'genuine relationship of ends and means', in the words of the AB.[75] Lastly, the AB demands that 'the weighing and balancing is a holistic operation that involves putting all the variables of the equation together and evaluating them in relation to each other after having examined them individually, in order to reach an overall judgement.'[76] This reasoning is similar to the ecological governance approach that is advocated throughout this article.

Under article XX(g), two elements are important. Firstly, the measures must be 'relating to' the conservation of 'exhaustible natural resources'. The phrase 'related to' requires the establishment of a substantial relationship between the measure and the conservation, which is in practice interpreted to mean 'reasonably related'.[77] Additionally, the term 'exhaustible natural resources' is interpreted broadly and is not limited to mineral or non-living resources. Furthermore, this term must be interpreted 'in the light of contemporary concerns of the community of nations about the protection and conservation of the environment.'[78] Given the recent adoption of the Paris Climate Treaty, it can be said with certainty that the earth itself on which we all depend for our lives and livelihoods can be considered an exhaustible natural resource that needs to be preserved.[79] The second central feature of article XX(g) is an even-handedness requirement: the measures must be 'made effective in conjunction with restrictions on domestic production or consumption'. Since BAT are to be considered internal regulations, which apply to European producers as well as foreign ones, this last condition is also fulfilled.

Whether discourse to the exceptions of article XX is impeded by the territorial boundaries of the regulating state is so far undetermined.[80] The answer to that question is influenced by whether this state is itself affected by the activities abroad. In relation to climate change, which is a global and transboundary problem, it can be argued that the state imposing measures is indeed affected and that there is 'sufficient nexus'[81] between the conduct abroad and the effects felt within the regulating state.[82]

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75 *Brazil- Retreaded Tyres* (n 70) para 145.

76 *Brazil- Retreaded Tyres* (n 70) para 182.

77 WTO, *United States — Standards for Reformulated and Conventional Gasoline- Report of the Appellate Body* (20 May 1996) WT/DS2/AB/R, DSR 1996:I, 3 (*US-Gasoline);* WTO, *United States — Import Prohibition of Certain Shrimp and Shrimp Products, Appellate Body Report* (6 November 1998) WT/DS58/AB/R, DSR 1998:VII, 2755 (*US-Shrimp*).

78 WTO Interpretive Notes (n 44) no. 935.

79 See Holzer (n 18) 195.

80 Van den Bossche & Zdouc (n 37) 551.

81 *US-Shrimp* (n 77) para 133.

82 Arguably, reliance on article XX(g) would be easier to construct than reliance on article XX(b), but ultimately both justifications are served by strict production requirements that significantly reduce emissions (see also footnote 67).

Once it is established that one or more of the exceptions applies, it is time to consider whether the measure is applied *in a manner* [emphasis added] that is consistent with the chapeau of article XX. The purpose of the chapeau is to avoid abuse of the exceptions and this should be kept in mind throughout its interpretation.[83] While initially the AB argued that unilateral trade-restricting environmental (process) measures are *per se* inconsistent with the chapeau of article XX and the multilateral trading system as such,[84] it later found that such PPM measures are not *per se* inadmissible.[85] In '*Tuna-Dolphin II*' the AB argued that (trade) measures that force other parties to change the policies within their own jurisdictions are not allowed, because they undermine the multilateral trading system.[86] However, in '*US-Shrimp*' the AB provided more leeway by ruling that only forcing others to adopt *essentially the same policies* [emphasis added] is not allowed.[87] At the same time it is not prohibited to require other states to put measures in place that are 'comparable in effectiveness'.[88] The crux in this assessment is whether the contested measure leaves sufficient flexibility.[89] Thus the chapeau provides a check on whether the measures are applied in good faith. Jurisprudence has highlighted circumstances that help to demonstrate accordance with the chapeau.[90] These include the attempts made by the regulating state to arrive at a solution in cooperation; the design of the measure; its flexibility to take into account differences in countries and/or the existence of objective criteria for any distinctions; as well as the rational for the measures.

In regard to Union-wide BAT-requirements, the latter three circumstances seem to be in order: BAT-requirements are a flexible instrument based on objective, transparent criteria; they are explicitly applied 'without prescribing the use of any technique or specific technology'; and their rationale is 'to achieve a high level of protection of the environment taken as a whole.'[91] Regarding any endeavours to find a multilateral solution, the AB holds that, although a multilateral approach is strongly preferred, attempts to conclude a multilateral agreement are not a prerequisite for

83 *US-Gasoline* (n 77); See also WTO Interpretive Notes (n 44) no. 855; or Van den Bossche & Zdouc (n 37) 572-581.

84 GATT Panel Report, *United States – Restrictions on Imports of Tuna* (3 September 1991, unadopted) DS21/R, BISD 39S/155WTO (*Tuna-Dolphin I*).

85 See also Conrad (n 19) para 1.2.

86 GATT Panel Report, *United States – Restrictions on Imports of Tuna*, (16 June 1994, unadopted) DS29/R (*Tuna-Dolphin II).*

87 *US-Shrimp* (n 77) para 161 *et seq.*

88 Pauwelyn (n 37) 502; Holzer (n 18) 169, footnote 619.

89 *US-Shrimp* (n 77) paragraph 144.

90 See WTO (n 66).

91 IED (n 10) art 15(2) and 1 respectively.

recourse to article XX.[92] Hence, the use of ecological BAT-requirements seems to fall within the range of what is considered good faith. As such, extending their scope of application to imported products cannot be regarded as (arbitrary or unjustifiable) discrimination, nor as a disguised restriction on trade. Since BAT-requirements already apply to production processes that take place on EU territory, applying the BAT concept to a broader geographical area cannot be considered a protectionist measure.[93] Coupled with the urgency and gravity of the interest at stake (averting further climate change) and the realization of the major societal changes this demands, especially in regard to production and consumption patterns, it can be said that less-trade-restrictive alternatives are not available, as these would be unlikely to achieve the level of protection sought. Thus, despite what is commonly held, it appears that nothing in the GATT Treaty precludes the adoption of stringent, ecological BAT-requirements,[94] nor does it preclude the enforcement of such internal regulations at the borders of the EU.[95]

4.3.2. Energy Charter Treaty (ECT)

In addition to the WTO rules, the Energy Charter Treaty (ECT) provides the multilateral framework for energy cooperation.[96] By and large, this treaty is streamlined with the obligations under the WTO. Article 4 of the ECT states that, between parties that are both also members of the WTO, nothing in the ECT shall derogate from the provisions of the WTO. This means that all the rules discussed above automatically apply in full to trade in energy materials and energy products as well as to trade in the listed energy equipment.[97] In the (unlikely) event that one of the parties is

92 Trebilcock, Howse & Eliason (eds) (n 38) 678, as also affirmed by Vranes (n 19) 330. However, Van den Bossche & Zdouc disagree and claim that if no serious effort is made, this can render discrimination to be unjustifiable (See Van den Bossche & Zdouc (n 37) 578). Another discussion (left aside here) would be to what extent the recent Paris Climate Treaty can serve as legitimation to stringent trade-restrictive measures such as the one at hand.

93 After all, these BAT cannot be used as a (disguised) protection of EU industries, since these industries are subjected to identical rules. In fact, not enforcing these BAT at the borders of the EU would lessen their effectiveness as a climate protection strategy (see also Regan 2009 (n 19) 110). However, this does not mean that npr-PPMs can never be used for protectionist reasons, but this is no different than for pr-PPMs, argues Regan (Regan 2009 (n 19) 103). Furthermore, such stringent standards can at times be coercive as they may affect certain countries disproportionately, thus leading to *de facto* discrimination (see also Lester & Mercurio (n 22) 416).

94 In fact, the WTO is obliged to interpret its treaties in light of contemporary concerns, as the terms in it are not static. See *US-Shrimp* (n 77) para 128-130; Van den Bossche & Zdouc (n 37) 566.

95 Admittedly, no final answer to this debate can be given without concrete examples and cases, as observed by Kulovesi (n 67) 73.

96 Energy Charter Treaty (1994), as amended by, *inter alia,* the Amendment to the Trade-related Provisions of the Energy Charter Treaty (1998). Consolidated version (2015) and related documents at: http://www.energycharter.org/.

97 Energy materials and products are, for instance, coal, oil, gas, wood, and electricity, whereas energy-related equipment are the tubes, structures, reservoirs, cables etcetera, that are used to extract or transport energy materials and products. The lists can be found in Annex EM I and EQ I respectively.

not a member of the WTO, the trade in energy products and equipment is governed by article 29 ECT, which essentially declares that the relevant WTO provisions law are also applicable in this case.

Similar to the WTO, the ECT focuses on trade liberalisation, rather than environmental protection. This is apparent in article 19 that deals with the environmental aspects, as it provides a central role for the cost-effectiveness and economic consequences of environmental measures. For instance, this provision acknowledges, *inter alia,* the polluter pays principle, but requires its implementation only to the extent that it can be done 'without distorting investment in the energy cycle or international trade'.[98] Rather than imposing stringent obligations, article 19 demands that members cost-effectively strive to minimise environmental impacts throughout the energy cycle. Special attention is paid to increasing energy efficiency, which is also elaborated on in an additional protocol.[99] On top, article 24 ECT allows for derogations from the treaty obligations if the measures taken are 'necessary to protect human, animal or plant life or health.'[100] Despite these provisions, the ECT is overall predominantly aimed at protecting and promoting energy-related investment, trade and transit, instead of decreasing the negative impacts of energy cycles.[101] As such, it barely provides room for stringent BAT-requirements. However, due to the coupling of the ECT rules with WTO membership, in effect only the leeway found under WTO rules is relevant in assessing the legality of these requirements.[102]

4.3.3. European Union (EU)

Under EU law, different issues come to the foreground when assessing the legality of imposing and enforcing trade restrictive measures. These issues partly pertain to the EU's unique legal structure and *inter alia* concern questions on who has the competence to regulate (the EU, the Member States or both)[103] and to what extent Member States can impose their own

98 ECT (n 96) art 19(1).

99 Energy Charter Protocol on energy efficiency and related environmental aspects (1994).

100 ECT (n 96) art 24(2)(b)(i). This phase is identical to article XX(b) GATT. However, the scope of this provision is rather limited, as is clear from its introductory paragraph.

101 See also Rafael Leal-Arcas, Andrew Filis & Ehab S Abu Gosh, *International energy governance: selected legal issues* (Edward Elgar 2014), 346-350.

102 For a more elaborate analysis of the ECT, see: Craig Bamberger & Thomas Wälde, 'The Energy Charter Treaty' in Martha M Roggenkamp *et al* (eds), *Energy Law in Europe. National, EU and International Regulation* (OUP 2007).

103 On the basis of article 4(2) of the Treaty on the Functioning of the EU (TFEU), regulatory competence in the field of energy as well as environmental policy is shared between the EU and the Member States (see also Leal-Arcas, Filis & Abu Gosh (n 101) 275-295). For an extensive description of the full body of EU energy law, see Martha M Roggenkamp *et al (*eds)*, Energy Law in Europe. National, EU and International Regulation* (OUP 2016). Moreover, EU environmental law in its broadest sense is discussed elaborately in Jan H Jans & Hans HB Vedder, *European Environmental Law. After Lisbon* (Europa Law Publishing 2012).

unilateral (more stringent) measures.[104] Furthermore, it is important that the measures taken are proportionate to their aims. This basically means that they must be both appropriate and necessary.[105] Neither of these issues will be addressed in detail here. The issue of competence does not need to be addressed, because the mandatory use of BAT has been commonplace in industrial (emissions) regulation since the 1990s and there are no controversies over the EU's competence to regulate this area.[106] The same holds true for the proportionality of BAT standards as a legal instrument. Unilateral measures are not addressed, because this article concerns itself primarily with Union-wide agreed BAT standards. The focal point of the analysis in this article is solely on (the legality of) measures that are applied by EU members v*is-a-vis* third countries, aiming to uphold Union wide standards. In the case of 'external' application of BAT-requirements, rather than the general Treaty on the Functioning of the EU (TFEU), a regulation on the common rules for imports applies.[107] This regulation, like the TFEU, prohibits quantitative restrictions on imports from third countries.[108] However, it also explicitly declares that this does 'not preclude the adoption or application by Member States of prohibitions, quantitative restrictions or surveillance measures on grounds of public morality, public policy or public security; the protection of health and life of humans, animals or plants […].'[109] On these grounds, first time imports from third countries can be halted.[110] Despite the fact that the regulation focuses mainly on unilateral actions taken by the Member States, it also applies to external enforcement of EU measures. In regard to such 'enforcement' the Court of Justice of the European Union (CJEU) is more permissive than the WTO dispute panels. In general, it holds the stance that process-measures are not *per se* inadmissible, since they do not regulate directly abroad, but incentivise jurisdiction through market access.[111] On top, this stance is coupled with a broad interpretation of territoriality. In fact, '[t]he territorial 'trigger' that justifies the EU's jurisdiction is employed loosely,

104 Related to the latter is the importance of the (correct) legal basis for legislation and the level of discretion left to the Member States (see also Ankersmit 2017 (n 17) 287-334). This is elaborated on in Lorenzo Squintani, *Gold-plating of European Environmental Law* (PhD Law, Groningen 2013).

105 See also Ankersmit 2017 (n 17) 249-251. On how far 'climate responsibilities' actually go, see: Joanne Scott, 'The Geographical Scope of the EU's Climate Responsibilities' (2015) 17 Cambridge Yearbook of European Legal Studies 92. An earlier draft (15 May 2015) is available at SSRN: http://ssrn.com/abstract=2606681.

106 Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control [1996] L257/26 (IPPC Directive, now incorporated in IED (n 10)).

107 Council Regulation (EC) No 260/2009 of 26 February 2009 on the common rules for imports [2009] OJ L84/1 (Imports Regulation).

108 Ibid, art 1.

109 Ibid, art 24.

110 Ankersmit 2017 (n 17) 166.

111 Ibid, 236 and further.

so there is little doubt that process-based measures enforced within the EU's borders would be found compatible with the rules of customary international law as interpreted by the ECJ.'[112]

It is therefore not surprising that quite a few producer-based process measures with extraterritorial effects are currently in force in the EU. Ankersmit lists and describes these directives and regulations,[113] and these rules serve as guidance in assessing the legality of ecological BAT-based process measures. Firstly, there is the Seal Products Regulation, which essentially bans the marketing of all seal products, with a few exceptions.[114] These exceptions relate to specific traits of the producers, e.g. produce from certain indigenous peoples can be marketed.[115] Thus, this regulation constitutes a producer standard, rather than a 'how produced' standard. This is a significant difference with the BAT-concept. Secondly, the EU has imposed a ban on illegally harvested wood through the adoption of the Timber Regulation.[116] The legality of such timber hinges upon the legislation in place in the country of origin. As such, this EU regulation reinforces the existing rules abroad, whereas BAT-requirements ensure compliance with EU rules. Thirdly, there is the Cosmetics Regulation that bans the import of cosmetics that were produced using animal testing.[117] It is up to producers to show compliance with the Regulation.[118] Thus, this is a 'how produced' standard that shows resemblance with the BAT-concept, as in both cases the legality of marketing a product depends on being able to identify and verify the production methods used abroad. The fourth example concerns the treatment of pigs and calves.[119] Via two directives, EU law requires that imported pigs and calves coming from outside the EU must 'have received treatment [prior to their importation] at least equivalent to that granted to animals of Community origin.'[120] To demonstrate compliance, the animals must be accompanied by a certificate issued by the competent authority of that third country.[121] In

112 Ibid, 144. This stance was upheld by the Court in the aviation case (ECJ Case C-366/10, A*ir Transport Association of America and others v. Secretary of State for Energy and Climate Change* [2011] ECR I-1133, para 124-129) as also briefly explained in Holzer (n 18) 158.

113 Ankersmit 2017 (n 17) 101-141.

114 Regulation (EC) No 1007/2009 of the European Parliament and of the Council of 16 September 2009 on trade in seal products [2009] L 286/36.

115 Ibid, art 3.

116 Regulation (EU) 995/2010 of the European Parliament and of the Council of 20 October 2010 laying down the obligations of operators who place timber and timber products on the market [2010] OJ L 295/23; and related documents. For a critical appraisal of these rules, see Renske A Giljam, 'Towards a Holistic Approach in EU Biomass Regulation' [2016] 28 (1) Journal of Environmental Law 95.

117 Regulation (EC) 1223/2009 of the European Parliament and of the Council of 30 November 2009 on cosmetic products [2009] OJ L 342/59.

118 Ibid, art 4.

119 Council Directive 2008/119/EC of 18 December 2008 laying down minimum standards for the protection of calves [2009] OJ L 10/7; and Council Directive 2008/120/EC of 18 December 2008 laying down minimum standards for the protection of pigs [2009] OJ 47/5.

120 Calves Directive (n 119), art 8; Pigs Directive (n 119), art 9.

121 Ibid.

effect, the protection of these animals is thus extended beyond EU borders. A similar example of extraterritorial application of EU rules can be found in the Regulation on slaughter processes, which declares that imports of meat must (similar to live pigs and calves) 'be supplemented by an attestation certifying that requirements at least equivalent' to those of the regulation have been abided by.[122] An 'extension' of EU rules also occurs upon export of live animals. EU law on animal transport requires a certain minimum level of animal welfare during transport.[123] For this reason, a journey log has to be submitted and authorised prior to transport.[124] Recently, the European Court affirmed that this journey log should comprise the entire journey, even if the final destination of the animals is a third country.[125] Thus, in effect, the conditions for transport of animals within the EU are made applicable outside the EU, as long as the journey commences within EU borders.

The above does not mean, however, that these European process-measures are uncontroversial, nor that they are without complexities. For instance, the ban on seal products has been challenged before the EU courts, as well as before the WTO dispute panels. Before the EU courts this challenge was unsuccessful[126] Yet, the AB of the WTO did conclude that the EU's seal regime is inconsistent with the GATT Treaty.[127] On top of such controversies over process measures, the complexities relating to their implementation may also hinder their application. For instance, to avoid carbon leakage under the Emissions Trading Scheme (ETS) the European Commission could have opted to include imported products in the EU ETS system through process-based measures.[128] Instead the Commission chose to maintain the current policy of free allocation of allowances, as it is 'mostly concerned with maintaining an open trading system and the good relations with potentially affected countries' as well as 'the host of practical issues well known to process based measures.'[129] These practical issues include increased administrative burdens on economic operators, problems relating to monitoring and verification, and the difficulties in calculating the carbon or GHG content of products. In other instances, however, these difficulties

122 Council Regulation 1099/2009 of 24 September 2009 on the protection of animals at the time of killing [2009] OJ L 303/1, art 12.

123 Council Regulation (EC) No 1/2005 of 22 December 2004 on the protection of animals during transport and related operations and amending Directives 64/432/EEC and 93/119/EC and Regulation (EC) No 1255/97 [2005] L3/1.

124 Ibid, art 5(4) & annex II.

125 Case C-424/13, *Zuchtvieh-Export -Stadt Kempten* [2015] 23.5.2015 (not yet published), para 20, 37 & 56.

126 Case C-398/13P, *Inuit Tapiriit Kanatami and Others v Commissions* [2015] 3.9.2015 (not yet published).

127 WTO, *European Communities – Measures Prohibiting the Importation and Marketing of Seal Products – Report by the Appellate Body* (22 May 2014) WT/DS400/AB/R and WT/DS/401/AB/R.

128 For a full appraisal of the ETS, see Edwin Woerdman, Martha Roggenkamp & Marijn Holwerda (eds) *Essential EU Climate Law* (Edward Elgar 2015), ch 3.

129 Ankersmit 2017 (n 17) 138. See also: Kati Kulovesi, 'Climate Change in EU external relations; please follow my lead (or I might force you)' in Elisa Morgera (ed), *The External Environmental Policy of the European Union. EU and International Law Perspectives* (CUP 2012) 145.

did not prevent the adoption of a life-cycle approach to emission abatement. The most well-known example in EU law is the use of calculated life-cycle GHG emissions of biofuels as a threshold for their contribution to the EU's renewable energy targets.[130]

These rules illustrate that it is not uncommon for the EU to declare its internal rules applicable to imports, hence 'exporting' its ethical values to third countries.[131] As such the EU legal framework is rather permissive towards process measures. While the rules on seal products and timber show only a minor resemblance with the use of BAT as a legal instrument, a comparison between BAT and the rules on cosmetics, and on imports, exports and slaughter of animals is more easily made. These latter regulations all demand a specific level of protection (whether this is for animal, human or environmental health reasons) and rule out the import of products that were manufactured by using production processes that fall below the line. By applying the same principle analogously to the use of BAT, it seems there are no legal objections to the introduction of an import ban on products that do not abide by stringent, holistic EU BAT standards.

4.4. BAT and energy production

Summed up, neither the WTO, nor the ECT, nor EU law categorically prohibit the imposition of process measures, nor is the use of BAT as a legal instrument controversial in its own right. Thus, in relation to energy production and use, there appears to be sufficient leeway to implement more stringent BAT-requirements and apply them to a broader range of activities.[132] In exploring the potential of BAT for energy production, it is first important to distinguish which elements constitute the energy life cycle. The cycle starts with obtaining primary energy sources. The traditional materials (such as oil, gas or coal) generally need to be extracted, while the newer (renewable) sources must be cultivated (in the case of crops and wood) or 'captured' (e.g. sun and wind). These primary sources then need to be converted into usable secondary energy, predominantly refined fuels and electricity. This involves diverging energy technologies, equipment and complex processes. All this energy in its different forms is then transported

130 RED (n 15) articles 17-19. More elaborately, see Giljam (n 116).

131 The EU is known to use unilateral action to force the direction of international climate change policies, say Leal-Arcas, Filis & Abu Gosh (n 101) 517.

132 However, verifying compliance with the BAT will not always be easy. In many cases, conformity can be assessed on the basis of the conditions of the permits of the industrial installations where the products were produced, but this might not be possible in all situations. Detailed information on supply chains and/or related carbon footprints can be difficult or virtually impossible to obtain or verify, as also stipulated by Howse & Eliason (Robert Howse & Antonia L Eliason, 'Domestic and international strategies to address climate change: an overview of the WTO legal issues' in Thomas Cottier, Olga Nartova & Sadeq Z Bigdeli (eds), *International Trade Regulation and the Mitigation of Climate Change* (CUP 2009), 60-68) and by Kulovesi (see Kulovesi (n 67) 77).

via different means, including cables, pipes, roads and waterways in order to finally arrive at its consumers.[133]

The use of BAT is only mandatory at a minority of moments throughout this energy life cycle, as is depicted in Figure 1. Essentially, BAT-requirements apply only to the conversion process of primary to secondary energy, e.g. from coal to electricity, and to refineries and fuel production.[134] An authorisation must be obtained for the exploration and exploitation of hydrocarbons, but no use is made of mandatory BAT in the permit conditions.[135] Additionally, mining waste from coal processing and oil shale is covered by a Reference Document on BAT (BREF), while gas and lignite production are not.[136] Furthermore, a BREF regarding unconventional hydrocarbons is currently under development, but it is not directly linked to the implementation of any directive and its conclusions will have no legally binding effect on Member States.[137] On top, the use of BAT is not enforced in regard to imported goods.

133 Due to these peculiarities of the energy sector, it has been argued that the WTO rules in their current form do not effectively nor sufficiently deal with energy trade and that it would be wise to conclude a separate WTO agreement on energy (Thomas Cottier *et al, Energy in WTO law and policy,* NCCR Trade Working Paper No 2009/25 (May 2009) https://www.wto.org/english/res_e/publications_e/wtr10_forum_e/wtr10_7may10_e.pdf (Cottier *et al* (2009), 8).

134 The use of BAT is only mandatory for the activities listed in the IED (see arts 2(1), 10 & annex I IED), while the BAT themselves are described in separate documents (see n 11).

135 Directive 94/22/EC of the European Parliament and of the Council of 30 May 1994 on the conditions for granting and using authorizations for the prospection, exploration and production of hydrocarbons [1994] OJ L164/3, arts 3 & 5.

136 BREF: Management of Tailings and Waste-Rock in Mining Activities (January 2009, currently under review, see http://eippcb.jrc.ec.europa.eu/reference/BREF/mmr_adopted_0109.pdf).

137 Communication from the Commission on the exploration and production of hydrocarbons (such as shale gas) using high volume hydraulic fracturing in the EU, COM/2014/023 final/2. http://ec.europa.eu/environment/integration/energy/hc_bref_en.htm.

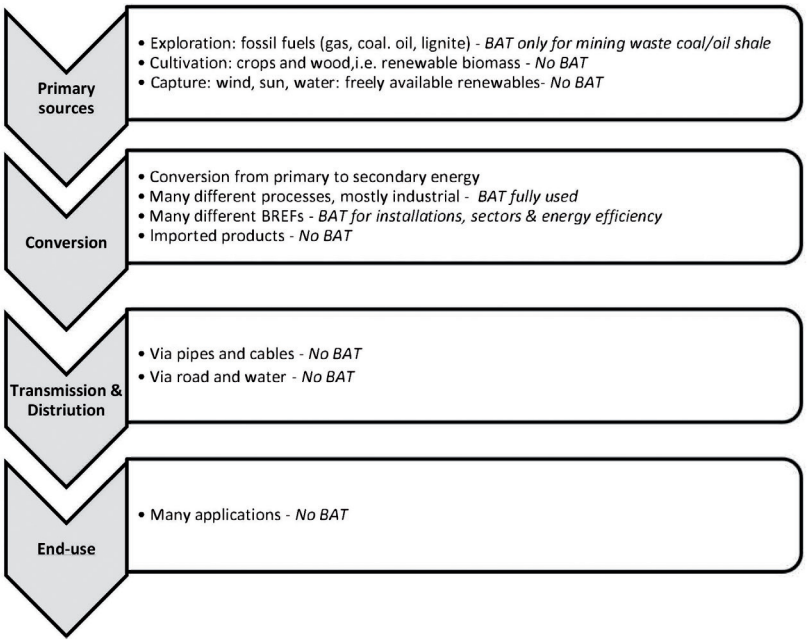

Figure 4.1: Mandatory use of BAT

Not only is the use of BAT not mandatory throughout the full product cycle, the concept itself is also interpreted rather narrowly. For instance, different ways of producing coal-based electricity are compared in determining the BAT for coal-fired combustion, but coal-fired combustion itself is not compared to gas or biomass combustion to determine 'overall' BAT for electricity generation. Thus, the primary sources play no role in determining what the BAT are. Comparing the different options for primary sources in determining whether a production process is considered BAT could provide a significant push in the implementation of ecological governance. Such a comparison is (legally) possible, when looking at the criteria for determining BAT as enshrined in the Industrial Emissions Directive (IED). According to this directive, in determining the BAT, 'special consideration' must *inter alia* be given to the nature, effects and volume of the emissions concerned, the need to prevent or reduce the overall impact on the environment, the consumption and nature of raw materials used in the process and energy efficiency, and technological advances and changes in scientific knowledge and understanding.[138] This leaves plenty of room for a broader interpretation of what is BAT. In fact, it can even be argued that, based on the current understanding of (the effects of) climate change coupled with modern-day available technologies, gas has superseded coal and/or lignite as a BAT-worthy energy source. Due to its environmental impacts, any installation using coal or lignite would thus no longer be

138 IED (n 10) art 3(11) & annex III.

considered to be using BAT and would accordingly have to be phased out. Similarly, in the near future, gas itself would likely be surpassed by wind and/or solar energy.

It has been argued that this kind of interpretation of what is BAT is not possible, because it is not up to the authorities to decide which raw materials will be used for energy production, but that this is a choice to be made by 'the market', i.e. by the investors of a new installation.[139] Yet, the IED does not at all preclude a new interpretation of what is considered BAT. This latter view is strengthened by the explicit reference in the Electricity Directive (E-Directive) that the nature of the primary sources and the installation's potential for emission reductions are factors to consider in the authorisation of new electricity capacity.[140] Despite this possibility, not many countries have imposed criteria or conditions on the choice of fuels for energy production,[141] nor for fuels used in manufacturing. However, energy efficiency requirements are usually imposed to reduce energy consumption. Nevertheless, current rules are not so stringent that they lead to the refusal of a permit to pollute, as long 'reasonable' safeguard measures are installed. Yet, such reasonableness does not consider external effects or climate change effects, so that the resulting environmental damage can still be extensive. A broader BAT interpretation would improve this situation by providing authorities with a tool for declining a permit request if an alternative production method with a lower impact is reasonably available.

4.4.1. Defining energy

Achieving this is, however, easier said than done, because energy is a unique 'product' with specific traits that make its regulation particular precarious. First of all, energy products are of major economic importance, since they form the largest share of world trade.[142] This makes it all the more peculiar that the WTO does not deal explicitly with trade in energy,[143] although the WTO treaties do apply.[144] Additionally, energy is of immense strategic and political value, and the energy sector is important in national and global development.[145] This makes the regulation of energy a highly sensitive topic for states, especially if such regulations may affect their security

139 As discussed (in Dutch) in Renske A Giljam, *Schone lucht of schone schijn? Europese regulering van de emissies van NOx en fijn stof naar lucht door moderne kolencentrales* (LL.M. Thesis, University of Groningen 2011) http://api.commissiemer.nl/docs/mer/diversen/schonelucht-schoneschijn.pdf (15.09.2016), 11.

140 Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC [2009] OJ L211/55, art 7(1&2).

141 As also noted by A.J. Bradbrook, 'Energy law as an academic discipline' (1996) vol. 14(2) Journal of Energy & Natural Resources Law 193, 216.

142 Leal-Arcas, Filis & Abu Gosh (n 101) 101.

143 To fill this void, Cottier and others argue for a separate WTO agreement on energy, in Cottier *et al* (2009) (n 133).

144 As concluded by Matsushita *et al.* (n 19) 734-739.

145 Leal-Arcas, Filis & Abu Gosh (n 101) 102-103.

of supply. This security of supply is also impacted by the finiteness of traditional sources and the subsequent need to switch to renewable sources.[146] On top, the transport of several types of energy (e.g. electricity and gas) significantly differs from other products.[147] Last but not least, energy is not a uniform product, but consists of a wide range of primary sources with different physical characteristics and diverging environmental effects. These physical traits also impact how (and whether) this energy can be stored, transported and distributed.[148] In addition to this trade in goods, trade in energy further covers trade in energy-related equipment, energy services and energy technology.[149]

As a result of all this, determining BAT for energy is a complex task. Clearly, an energy production cycle may make use of very different raw materials and a broad range of diverging techniques to which (partially) different legal regimes apply.[150] Most primary energy sources are tradeable goods, to which the general rules on trade apply.[151] Nevertheless, the rules governing their respective sectors of origin are different.[152] Also, under WTO law, these materials can be sub-divided into agricultural, industrial or even environmental goods and this classification affects what rules are applicable in respect to tariffs or subsidies.[153] What these goods do have in common is that they are all tangible, identifiable products. In addition to primary energy sources, energy equipment and energy technologies are crucial.[154] Not only are these the centrepiece of the BAT concept, there are also indispensable for the production of usable, secondary energy. These technologies, as well as the materials that they are made of, are also tradeable, mostly tangible, goods themselves. The status of electricity –the most noteworthy secondary energy source- is, however, more ambiguous, as it can be considered either a good, or a service, as will be discussed in the next section.[155]

146 Ibid, 104-105.
147 Ibid, 107.
148 Ibid, 104.
149 Matsushita *et al.* (n 19) 734.
150 Largely from Gabrielle Marceau, The WTO in the emerging energy governance debate, WTO Online Forum (WTO 2010) https://www.wto.org/english/res_e/publications_e/wtr10_forum_e/wtr10_marceau_e.htm.
151 However, some renewable sources (e.g. sun and wind) are not goods, but rather 'commons'.
152 These are primarily the agricultural, forestry and mining sector.
153 See Trebilcock, Howse & Eliason (eds) (n 38) 694.
154 The latter two entail the actual tools and machinery for energy conversions, as well as the technological processes behind them that may be subject to intellectual property rights.
155 Marceau (n 150). This distinction is important because the two are subject to different rules. Under the WTO, goods are governed by the GATT and TBT Agreement (Trebilcock, Howse & Eliason (eds) (n 38) 695), while services are subject to the General Agreement on Trade in Services (GATS) Treaty. The primary consequence is that under the GATS, as opposed to the GATT, members are not obliged to accept foreign services and suppliers in their market.

Under EU law, energy is also covered by a diffuse set of rules. These range from specific rules on industrial emissions, agricultural practises or timber regulation to more generic rules on the functioning of the market, energy taxes, required shares of renewable energy and standards for energy efficiency.[156] Furthermore, in the EU legal system, the legal basis chosen for the adoption of such laws is also of great significance due to the division of competences between the various institutions and the Member States. For instance, Member States are hardly allowed to unilaterally impose more stringent environmental measures in relation to rules regarding the internal market, whereas they are allowed to do see in the case of environmental legislation.[157] For each policy area, a separate legal basis exists, each with different conditions attached to them.[158] On top of this already diffuse situation, most EU laws regulate only one element or a delineated part of the energy chain. Due to the lack of a comprehensive, overarching strategy this can lead to fragmentation and, at times, to inconsistent application of specific rules. This is for instance the case with the use of biomass for energy, where identical materials are for certain uses subject to sustainability criteria, but not for others.[159] Thus, the method of conversion and the final use of these materials in retrospect determine the level of sustainability that is required in the cultivation of this biomass. This kind of fragmentation can be avoided by implementing an integrated approach, such as the ecological governance approach advocated throughout this article.

4.4.2. Categorisation and differentiation

The complexities and characteristics sketched above, and the ambiguous status of electricity in particular, show that it can be a thin line between what considered is a product and what a (production) process. Moreover, Bradbrook even argues that energy conservation, which surely is not a product and arguably not a process,[160] could be considered an (indirect) energy source, since saving energy is as effective in in satisfying society's energy demand as generating energy is.[161] Combined, these examples and arguments illustrate that the current black-and-white divide between products and processes is too rigid in its approach and does not always do justice to

156 For a full appraisal see Roggenkamp (n 103).

157 Arts. 114(4-6) & 193 TFEU; N. de Sadeleer, *EU Environmental Law and the Internal Market* (OUP 2014), ch 7.

158 In addition to provisions on adopting rules regarding the internal market (art. 114 TFEU) and the environment (art. 192 TFEU), there are for instance separate competences for developing commercial policy (art. 207 TFEU) and regulating agriculture (art. 43(2) TFEU).

159 This is the case in particular for crops and wood used for biofuels. For an elaboration, see Giljam (n 116). A legislative proposal was recently adopted to remedy this situation, but it remains to be seen whether this will eventually be adopted or not (see European Commission, *Commission proposes new rules for consumer centred clean energy transition* (November 2016) http://ec.europa.eu/energy/en/news/commission-proposes-new-rules-consumer-centred-clean-energy-transition).

160 Energy efficiency measures can be regarded as processes, but the energy thus saved is neither a product nor a process.

161 Bradbrook (n 141) 194-195.

reality. However, under the WTO terminology, one would expect that electricity from renewables and carbon-based electricity constitute like products as they cannot physically be distinguished from one another[162] and because they are substitutable. Hence, the same rules would in principle apply to both.[163] At the same time, many authors signal that the current classification of energy as either a product or a process is unsatisfactory, and may even complicate the trade in energy.[164] For instance, Holzer argues that the 'doctrine is too stringent'[165], Leal-Arcas, Filis and Abu Gosh speak of an 'artificial determination'[166] and Vranes states that there is no 'uniform product-process doctrine', but that instead it consists of several shades.[167] On top, he argues that it is difficult to sustain that the process-product distinction is required.[168] Trebilcock, Howse & Eliason argue that energy *is* a process, and that its physical nature 'is such that any distinction between 'process' and 'product' would be scientifically meaningless.'[169] Others are less bold, but still acknowledge that in specific cases a production method can define a product[170] and that, at least, the assertion that a production method is 'non-product related' (npr) is too strong.[171]

Furthermore, regarding electricity, Cottier and others argue that '[t]he fundamental divide between goods and services does not offer an appropriate basis for addressing and regulating energy.'[172] Again yet others argue that, although the grey and green electricity are physically indistinguishable and therefore like, decarbonisation of society requires full recognition of npr-PPMs in order to incentivise change in (energy) production processes.[173] The perception that the process (partially) defines the product cannot only be found in literature, but is also reflected in consumers' preferences. The public perception that grey and green electricity are two different

162 Thomas Cottier (2015), *Renewable Energy and Process and Production Methods,* E15Initiative (ICTDS & World Economic Forum 2015) http://e15initiative.org/publications/renewable-energy-and-process-and-production-methods/, 1.

163 Cottier *et al* (2009) (n 133) 11.

164 The latter is argued by Cottier *et al* (2009) (n 133) 10.

165 Holzer (n 18) 94.

166 Leal-Arcas, Filis & Abu Gosh (n 101), 111.

167 Vranes (n 19) 321-322.

168 Vranes (n 19) 350.

169 Howse & Eliason (2009) (n 132) 80, reaffirmed in: Trebilcock, Howse & Eliason (eds) (n 38) 691.

170 Leal-Arcas, Filis & Abu Gosh (n 101) 419; Robert Howse & Alexey Vikhlyaev, *World Trade Law and Renewable Energy: The Case of Non-Tariff Barriers* United Nations Conference on Trade and Development UNCTAD/DITC/TED/2008/5 (United Nations 2009) http://unctad.org/en/Docs/ditcted20085_en.pdf, 3.

171 Charnovitz (n 19) 66.

172 Cottier *et al* (2009) (n 133) 7. These authors further state that the current rigid division between industrial and agricultural products can make matters more complicated (ibid, 7) and that the definition of electricity should be reviewed (ibid, 9).

173 Cottier (2015) (n 162) 5.

products is an element in determining likeness under the GATT Treaty,[174] and thus provides an indication that these products are perhaps not like.[175] Similar considerations have been expressed by the AB in the '*Canada-Renewable Energy'* case, where it considered the two types of energy to be rather distinct.[176] Thus, it can be concluded that the current divides are mere artificial legal constructs, and it is at times impossible to discern between a process and a product or a good and a service, especially when considering energy. Re-assessing the classification and categorisation of energy will also have a profound impact on the definition of likeness[177] and the related 'traces debate' fought so fiercely under the umbrella of the WTO, since these would also have to be reconsidered to ensure consistent and coherent application of the legal framework.

An additional argument to abandon the current rigid classifications is to bring the legal terminology more in line with the factual situation. No matter one's view on the (un)likeness of different electricity types, it is a fact that EU law imposes differentiated treatment of electricity purely on the basis of raw materials used in production, as a preferential access regime applies to green electricity.[178] Similarly, differential treatment is accorded to biofuels, based on both the origin of the raw materials and the CO2 emissions reduction that is achieved overall.[179] In fact, the sustainability criteria on biofuels also could have been formulated as import restrictions, rather than mere thresholds for calculations and subsidies. In their current form, the criteria stay 'well below the ceiling set by WTO law.'[180] Some argue that differential treatment in terms of taxation is unlikely to be incompatible with WTO law as long as it concerns fossil fuels used for energy production *vis-a-vis* renewable sources, since the two are physically very different. On top, differentiated tariff rates for renewables also seem acceptable if the applied rate is the same for all members.[181]

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174 The importance of consumer preferences is also stipulated by Holzer (n 18) 110-111. At the same time, she argues that it is good to be aware that perceptions are subjective and hence hard to measure and interpret (ibid, 113).

175 See also Kati Kulovesi, 'Climate Change and Trade: At the Intersection of Two International Legal Regimes' in Erkki Hollo, Kati Kulovesi & Michael Mehling (eds.), *Climate Change and the Law,* Ius Gentium - Comparative Perspectives on Law and Justice vol. 21 (Springer 2013) 432. Here it needs to be reiterated that the fact that the two types of electricity are also competitive 'products' is an indication that perhaps they are like (Lester & Mercurio (n 22) 308; *EC-Asbestos* (n 45*)* para 99.

176 WTO, *Canada — Certain Measures Affecting the Renewable Energy Generation Sector; Canada – Measures relating to the Feed-In Tariff Program* (AB-2013-1) *Reports of the Appellate Body* (6 May 2013) WT/DS412/AB/R & WT/DS426/AB/R (*Canada- Renewable Energy)*, paragraph 5.174, and reiterated in Leal-Arcas, Filis & Abu Gosh (n 101) 419.

177 Leal-Arcas, Filis & Abu Gosh (n 101) 135.

178 RED (n 15) art 16.

179 RED (n 15) art 17.

180 A. Schmeichel, *Towards Sustainability of Biomass Importation – An Assessment of the EU Renewable Energy Directive* (Europa Law 2014), 264. A dissenting opinion is held by Mitchell & Tran, see Leal-Arcas, Filis & Abu Gosh (n 101) 472-473.

181 Trebilcock, Howse & Eliason (eds) (n 38) 692-693.

Essentially, the EU provisions on electricity as well as on biofuels are outright npr-PPM measures, which shows that process measures are not as controversial as is often assumed. However, they are used only sparsely rather than categorically. This is odd, since it is rather inconsistent to allow differentiation for one or two types of energy, but not for others. Even though green electricity is given differential legal treatment from grey electricity, this does not occur with any other type of energy. For instance, conventional and unconventional hydrocarbons are treated as if they are like products, despite their diverging production processes and environmental impacts. An indication that the two might be unlike can be found in the fact that currently a Hydrocarbons BREF is being prepared, which was not deemed necessary when only conventional hydrocarbons were (technically) available. Moreover, this BREF is non-binding and completely unattached from the IED framework, which is rather unusual and indicates that unconventional fuels are indeed perceived to be different from regular hydrocarbons. In addition to a lack of general application of differential treatment, there are also no further subdivisions regarding electricity, such as differential treatment between electricity from gas and electricity from lignite. In fact, some authors claim that any further subdivisions (e.g. coal versus oil) would be problematic under WTO law.[182] In my opinion this is not the case. First of all, the broad category 'fossil fuels' is not a uniform group of products. In fact, coal and oil have very different physical characteristics. On top, the conversion processes used also differ greatly, as do the environmental impacts stemming from this production. Treating these situations as if they were identical would therefore amount to 'reverse discrimination', i.e. treating different situations alike.[183] Such an application seems inconsistent compared to how renewable sources and production processes are regarded and dealt with. All in all, the categorisations and differentiations currently used are thus rather haphazard and inconsistent. This ambiguity cannot be resolved by merely saying that for certain electricity types 'the process is the product', while denying this definition for other types of electricity. It is not tenable to maintain that differentiation is only relevant for electricity and not for other forms of energy, nor that such differentiation would only be justified to the extent that it concerns renewable versus fossil-based electricity. Taken a step further, it is even hard to argue that that a ground for differentiation would only exist for energy products and not for a broader spectrum of goods.

Such a broader new approach would not have to conflict with trade law. Trade law principally aims to promote trade and ban protectionist measures and discriminatory practices, but it does not necessarily prohibit genuine, justifiable trade restrictive policy measures. The legality of such measures depends largely on the details of the legal design, as well as the circumstances surrounding of their adoption. If a country has a legitimate interest in addressing a specific

182 Trebilcock, Howse & Eliason (eds) (n 38) 692.

183 This argument is derived from analogously applying WTO jurisprudence on the need to take account of diverging conditions in different countries (see also Van den Bossche & Zdouc (n 37) 575).

(transboundary) practice and can demonstrate its commitment via a history of attempts to achieve change through less restrictive means,[184] and if it imposes identical restrictions on domestic goods, the measures under scrutiny have a good chance of passing the test under WTO law. Furthermore, a crucial design element in strict, holistic BAT-production criteria imposed on energy products is that this type of legislation does not 'force a member to adopt essentially the same policies',[185] but leaves multiple production techniques open as an option. Also, other countries are still free to use non-BAT production processes, only they will not be able to export those products to WTO members that enforce strict BAT. Thus, such measures are either no violation of WTO law, or they can be justified via the general exceptions. Carbon emission reductions are crucial in averting climate change, so that without strict measures human (as well as animal and plant) life and health are threatened, the protection of which is 'among the most pressing or fundamental interests protected under article XX'.[186] Moreover, WTO law is ultimately limited in its scope and its members maintain a 'right to regulate', in order to pursue legitimate goals as long as they do so in an 'even-handed, non-discriminatory manner, avoiding where possible harmful effects on trade.'[187]

4.5. Conclusions

In brief, this article has shown that,

> 'process-based measures […] are not contrary to the principle of territoriality in international law […] However […] there are a number of other grounds on which one may object to process-based measures […] These range from perceived economic coercion, objections against paternalistic use of trade measures, to a call for tolerance and diversity among Member States. Nonetheless, […] there are also many good reasons for Member States to enact process-based measures based on a strong nexus between the interest protected and the territory or the people on the territory of the regulating Member State [and…] much depends on how justifications and derogations are framed.'[188]

Thus, essentially the acceptability and legality of process measures hinges upon their detailed institutional design as well as on their effective manner of application.[189] Preferably, such measures should be framed as 'how-produced' standards that directly target the undesirable

184 More elaborately, Robert Howse & Joanna Langille, 'Permitting Pluralism: The Seal Products Dispute and Why the WTO Should Accept Trade Restrictions Justified by Non-instrumental Moral Values' (2012) 37 Yale Journal of International Law 367, 373 & 384 in particular.

185 *US-Shrimp* (n 77) para 161 *et seq*.

186 Howse & Langille (n 184) 420.

187 Howse & Langille (n 184) 428.

188 Ankersmit 2015 (n 17) 150-151.

189 See also Kulovesi (n 67) 81.

production practice. In doing so, the standard should be as flexible as possible and target performance rather than design of products.[190] The concept of BAT allows for such flexibility and is already common place in EU law, so that it potentially provides a suitable means to implement comprehensive climate change policies. The legal analysis in this article has also shown that strict BAT-requirements would in principle not violate WTO law or EU law.[191]

Nonetheless, implementing such a BAT-based regime will in practice not be easy. At least three important hurdles must be overcome to arrive at a comprehensive framework. The first is to generate sufficient political will and consensus to implement significant changes at several levels of governance.[192] Secondly, complications may arise from difficulties in verifying compliance with the BAT-requirements.[193] Lastly, in designing the system, the risk of *de facto* discrimination must be addressed, which could be caused by disparate effects on developing countries that wish to export their products to the EU. For them, strict BAT might lead to disproportionately increased costs for production or significantly reduced income from exports, as a result of which the incentive to improve production processes can in fact 'come very close to *de facto* enforcement of production rules abroad.'[194] Hence, a balance must be struck between the protection of 'foreigners' and regulatory autonomy.[195] Simultaneously, if the envisaged strict BAT would be deemed illegal, the EU would *de facto* be forced to accept a larger degree of environmental degradation, corresponding emissions and subsequent climate impacts. Thus, '[a] territorial limitation could therefore potentially indicate an inherent bias of market liberalization over social and environmental interests.'[196]

Perhaps a compromise can be found to mitigate the BAT's potential for excessive coercive effects. Several authors have put forward solutions to the bifurcated approach to trade and climate policies. For instance, multiple authors suggest that disproportionately affected countries could be granted a form of aid, either financially or in terms of technological transfer in order to bring their production processes in line with the tightened import-requirements.[197] Additionally, a 'phase-in period' could be observed to allow developing countries to adjust their production

190 Charnovitz (n 19) 107.
191 The former is affirmed in Howse and Eliason (2009) (n 132) 92.
192 As also stipulated by Woolley (n 5) 58; and Higgins (n 9) xiv.
193 See also Holzer (n 18) 224-225.
194 Ankersmit 2015 (n 17) 152.
195 Matsushita *et al.* (n 19) 185-186.
196 Ankersmit 2017 (n 17) 236.
197 Charnovitz (n 19) 109. The need for proliferation of (clean) energy technologies is also stipulated in *inter alia* Lea Nicita (n 13) 37-38; Thomas Cottier & Nashina Shariff, 'International trade and climate change' in Geert Van Calster & Marie Denise Prévost (eds), *Research Handbook on Environment, Health and the WTO* (Edward Elgar 2013) 433.

processes.[198] Others recommend creating stronger links between the WTO and United Nations mechanisms and obligations, such as the Clean Development Mechanism (CDM).[199] Further recommendations are amendment or reinterpretation of the WTO Treaties to facilitate climate change policies[200] or to waive specific WTO obligations in the pursuit of climate change objectives.[201] On top, environmental law and policies can be considered more thoroughly in the interpretation of WTO provisions and within WTO dispute settlement.[202] These are just some (non-exclusive) examples to show that several options are available to resolve the current tension between climate change policies and the trade framework.[203] However, an extensive appraisal of (the feasibility of) these options is outside the remit of this article. No matter which route is chosen, and no matter how hard it will be to achieve it politically, it is vital that a means is found to reconcile the two, as it is becoming increasingly evident that business as usual is not an option.[204]

Therefore, in my opinion, implementing process measures on a large scale is a necessity for a society that wants to move to a more sustainable future. It is a practical solution to resolve the fallacious, black-and-white legal distinction between products and processes. Such categorisation is in principle a useful legal tool to compartmentalise, and thus to structure society in order to provide clarity and predictability. However, if such categorisation hinders the transition to a low-carbon economy and obstructs moving towards ecological governance, it forfeits its purpose. Energy regulation requires an integrated approach[205] and through the adoption of holistic, ecological BAT-requirements much of the current divide could be resolved. As it is, the current examples of differential treatment of energy products have a legal basis in

198 Holzer suggests that such a transition period should be at least 10 years, albeit her argument concerns the introduction of a carbon tax (Holzer (n 18) 238). Also, it could be sensible to implement stricter BAT in two phases. A first transition period could then apply to the current BAT being enforced at EU borders, while a second one would relate to more stringent BAT being adopted and subsequently being 'externally' enforced (On the latter, see also Giljam (n 12)).

199 See for instance Cottier (2015) (n 162) 5.

200 Holzer (n 18) 250-255.

201 Isabel Feichtner, *The Law and Politics of WTO Waivers - Stability and Flexibility in Public International Law* (Cambridge 2014).

202 See also Trebilcock, Howse & Eliason (eds) (n 38) 675.

203 Several other paths for reconciling the two are explored in: Amelia Porges & Thomas L. Brewer, *Climate Change and a Renewable Energy Scale-up: Responding to Challenges Posed to the WTO*, E15Initiative (ICTDS & World Economic Forum 2014) http://e15initiative.org/wp-content/uploads/2014/12/E15_CleanEnergy_Porges-and-Brewer_FINAL.pdf (21.4.2016).

204 The world is in fact 'heading towards unchartered territory at 'frightening speed'', according to The Independent (Steve Connor, 'Global warming: World already halfway towards threshold that could result in dangerous climate change, say scientists' *The Independent* (9 November 2015) http://www.independent.co.uk/environment/climate-change/climate-change-global-average-temperatures-break-through-1c-increase-on-pre-industrial-levels-for-a6727361.html), as affirmed by the WMO (n 71) and the United Nations (n 2).

205 Cottier *et al* (2009) (n 133) 8.

law,[206] but the rules lack a coherent framework underlying the distinctions made. Legal certainty would benefit from a clear, coherent, comprehensive legal framework containing objective criteria for differentiations. The extensive use of BAT could provide just that: clarity coupled with flexibility. The EU provides an ideal platform to (further) develop this mechanism, as it would present flexible solutions based on mutual agreement in an international setting. Furthermore, the EU is already acquainted with the concept and its Courts are unlikely to take a principled stance against process-based measures. In fact, such opposition would be 'contrary to the EU's own interests and ambitions which are not solely aimed at trade liberalization.'[207] By additionally upholding BAT-requirements at its external borders, the EU could alleviate the risk of 'exporting ecological impacts',[208] i.e. avoid that production shifts to countries with lower standards. In principle, there seem to be no significant legal objections to wielding a broader application of a more holistic BAT concept, as long as it is applied consistently and in a non-discriminatory manner, to domestic and foreign products alike, while allowing a transitional/phase-out period for those techniques and installations that will no longer be considered BAT.[209]

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206 RED (n 15) arts 16 & 17.

207 Ankersmit 2017 (n 17) 334.

208 From: Annalisa Savaresi, 'EU external action on forests: FLEGT and the development of international law' in Elisa Morgera (ed), *The External Environmental Policy of the European Union. EU and International Law Perspectives* (CUP 2012), 154.

209 The length of this transitional phase should be impacted *inter alia* by security of supply considerations.

Chapter Five

The role of technology neutrality in incentivising energy-related innovations

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5

Abstract

This article discusses the concept of technology neutral legislation and its use in EU energy law. For this reason, the applicable EU Directives are assessed in the light of their level of such neutrality. Additionally, the overall desirability and feasibility of technology neutral legislative design is examined and weighed against other legislative goals, in particular the need to foster technological innovations in the energy sector. This assessment is carried out from the perspective that, in order to mitigate climate change, it is essential to come to a legislative system for ecological governance. On the basis of this premise, it is concluded that technology neutrality should not be the prime concern of legislators, but that adaptability and comprehensiveness of the legal framework are more important factors to come to a sustainable energy system.

Keywords: technology neutrality, energy law, ecological governance, innovation, best available techniques (BAT), EU law, sustainability.

5.1. Introduction

The many environmental problems that humanity currently faces compel and motivate us to change our way of life and to amend our production and consumption patterns in order to bring them (more) in line with the planetary boundaries that we see ourselves confronted with.[1] Achieving this is particularly important in regard to energy, which is 'the life blood of society'[2] while its production and consumption are simultaneously one of the prime causes of greenhouse gas (GHG) emissions and thus of climate change and environmental degradation.[3]

One way of bringing our consumption patterns in line with the planetary boundaries would be to implement a system of ecological governance which centres around a continuous strive to reduce the cumulative stresses that our activities put on ecosystems.[4] Such an approach would require an adaptive legal framework aimed at progressive reductions of impacts, via reduced consumption, substitution of damaging activities by less disruptive alternatives and the 'sunsetting' (i.e. timely prohibition) of the most polluting and/or damaging activities.[5] These guiding principles show great similarity with the concept of 'best available techniques' (BAT) as

1 J. Rockström *et alia*, 'A safe operating space for humanity' (2009) 461 *Nature,* pp. 472–5.

2 European Commission, 'Energy 2020 – A Strategy for Competitive, Sustainable and Secure Energy' (Communication) COM(2010) 639, at p. 2.

3 'Greenhouse-gas emissions from the energy sector represent roughly two-thirds of all anthropogenic greenhouse-gas emissions', according to the International Energy Agency (IEA). International Energy Agency, *Energy and Climate Change. World Energy Outlook Special Report* 2015, at p. 20.

4 O. Woolley, *Ecological Governance - Reappraising Law's Role in Protecting Ecosystem Functionality* (CUP 2014), at p. 54.

5 Ibid, at pp. 71-7.

currently deployed in European Union (EU) industrial emissions abatement.[6] Hence, ecological governance could largely be operationalized by reinterpreting the concept of BAT and expanding its scope of application.[7] One implication thereof is that the regulations prescribing the use of BAT must largely be 'technology neutral'.[8] On top, technology neutrality as a legislative principle features prominently in energy law in a broader sense.[9] For these reasons, this article assesses to what extent technology neutral legislation has been implemented EU energy law and whether the use of the concept does indeed lead to innovations and whether its use aids the transition to more sustainable energy production and consumption patterns.

Technology neutrality can be defined as 'that different technologies offering essentially similar services should be regulated in similar manners'.[10] The term was first used primarily in the field of ICT regulation, but its use has gained much momentum since then.[11] In fact, '[t]he desirability of technology neutral regulation has become part of the general wisdom, and is rarely questioned.'[12]

6 The BAT concept is defined in article 3(10) of Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) [2010] OJ L334/17 (Industrial Emissions Directive, IED) and elaborately explained in S. Bell *et alia*, *Environmental Law* (OUP 2017), at pp. 518-21.

7 As discussed at greater length in: R.A. Giljam, 'Better BAT to bolster ecosystem resilience: Operationalising ecological governance through the concept of Best Available Techniques' (2017) 26(1) *Review of European, Comparative & International Environmental Law (RECIEL)* 5-18; and: R.A. Giljam, 'Extended application of 'Best Available Techniques' as a means to facilitate ecological governance: Assessing the legality of an ecologically oriented interpretation in the European Union (EU) of 'Best Available Techniques' (BAT) under international trade law and in particular in relation to energy production' (2018) 36(2) *Journal of Energy and Natural Resources Law (JERL)* 181-208.

8 As explicitly acknowledged in IED, n. 6 above, art. 15(2): '… emission limit values […] shall be based on the best available techniques, without prescribing the use of any technique or specific technology.'

9 See, e.g. European Commission, 'Energy roadmap 2050' (Communication) COM(2011) 885 final, at p. 3.; European Commission, 'State aid: Commission authorises UK Capacity Market electricity generation scheme' (Press release) Brussels, 23 July 2014, available at: http://europa.eu/rapid/press-release_IP-14-865_en.htm; or more implicitly: European Commission, 'Guidelines on State aid for environmental protection and energy 2014-2020' (Communication) [2014] OJ C 200/1, e.g. guideline 226.

10 Definition from ICT Regulation Toolkit, available at: http://itlaw.wikia.com/wiki/Technology_neutrality#cite_note-0.

11 The term was first used in an EU legislative proposal in 1998, according to Reed, n. 12 below, at p. 264. Now the principle can *inter alia* be found in: European Commission, 'Principles for regulating Audiovisual Media Services at European level', available at: https://ec.europa.eu/digital-single-market/en/general-principles; Directive 2002/21 on a common regulatory framework for electronic communications networks and services [2002] OJ L108/33, recital 18.; Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC [2006] OJ L396/1, which covers chemicals, including nanomaterials.

12 C. Reed, 'Taking Sides on Technology Neutrality' (2007) 4(3) *SCRIPT-ed,* pp. 263-84, at 265. Even though his work concerns ICT regulations, it is applied by analogy here.

Put briefly, the desire to design technology neutral regulations stems from one of the three following reasons.[13] First, laws tend to aim to regulate functions and effects, rather than means. Thus, 'behavio[u]r as such is not the point of regulation, it is rather the effect of behavio[u]r on society or on other people that is the focus of regulation.'[14] Second, laws overall aim to avoid any negative consequences or unintended side effects of regulations, i.e. they mean to avoid discrimination and hindrance in the development of technologies. Third, technology neutrality can be seen as a principle of law making: a law must sustain the test of time, be proportionate and subsidiary and be transparent. Whether technology neutral legislative design can actually live up to these expectations is a matter open for debate. After all, '[r]ules are devised in a particular technological context, with explicit and implicit assumptions as to what is possible' and '[t]he link between a rule and its goals is [also] based on assumptions about the world.'[15] Reed in fact argues that the desirability of technology neutral rules can only be determined after examining (i) whether the implicit aims are achievable; (ii) whether technology neutral drafting is in this particular case possible at all; and (iii) whether there are potential undesirable consequences.[16]

One such potential negative consequence could be a risk of reduced legal certainty. After all, '[b]y definition, technology neutral regulation cannot be very specific about the subject matter which it regulates. This can produce the undesirable consequence that the law, or its application in practice, is insufficiently clear.'[17] Therefore, in the design of technology neutral legislation a delicate balance must be struck between the flexibility that the rules offer and the legal certainty that they provide.[18] On top, the vagueness resulting from the enhanced flexibility of the legal framework might affect the legislation's 'power to steer'. The latter is important in order to come to more sustainable production and consumption patterns. In energy especially, radical innovations in production processes are a crucial aspect for replacing damaging practices with less disruptive ones. Stimulating the development of such new technologies, may well require additional efforts other than implementing a neutral overall framework. As such, in order for new technologies to be developed and placed on the market, it can be necessary to implement (temporary) technology specific policies to stimulate these innovations. Hence, in the design of

13 B.J. Koops, 'Should ICT Regulation be Technology-Neutral' in B.J. Koops, M. Lips, C. Prins & M. Schellekens, *Starting Points for ICT Regulation: deconstructing prevalent policy one-liners* (The Hague: TMC Asser Press 2006), pp. 77-108, at 83-90.

14 Koops, n. 13 above, at p. 83.

15 L. Bennett Moses, 'Recurring Dilemmas: The Law's Race to Keep Up With Technological Change' (2007) 2 *University of Illinois Journal of Law, Technology & Policy,* pp. 239-85, at 265-6.

16 Reed, n. 12 above, at p. 275. The implicit aims he discerns are a desire to 'futureproof' legislation, a wish to ensure equivalent treatment of technologies, and a hope to encourage the development and uptake of technologies.

17 Reed, n. 12 above, at p. 280.

18 Thus, regulations can only be 'as much technology-neutral as is compatible with sufficient legal certainty'. Koops, n. 13 above, at p. 90. As also affirmed by J. Ebbesson, 'The rule of law in governance of complex socio-ecological changes' (2010) 20(3*) Global Environmental Change,* pp. 414-22, at p. 417.

EU energy policy, a clear tension can be identified between the need to steer production in a specific ('green') direction – which at first sight seems to require technology specific rules - and the need for laws to be comprehensive and time-resilient which would likely require technology neutral legislation. Matters are complicated even further by the notion that currently EU energy policy is not aimed solely at making energy production and consumption sustainable, but that the policy simultaneously pursues affordable energy for all, as well security of energy supply.[19]

Nevertheless, incentivising innovation is essential, because environmental protection requires a swift, radical energy transition. To facilitate this transition, major technological changes are required, as new production methods are crucial to make the energy sector sustainable.[20] On top, technical innovations are also needed to diversify energy supplies to ensure security of supply thereof.[21] Hence, in addition to 'future proofing' legislation via technology neutral formulations, the regulatory framework should simultaneously stimulate innovative solutions.

The resulting outline of this article is the following. First, the characteristics and regulation of the EU energy sector are described and discussed in the light of the level of technology neutrality of these rules. After that, the potential for technological neutral legislative design to stimulate innovations is discussed in more detail, and this contrasted with the role of technology specific legislation in incentivising (radical) innovations. This will lead to a discussion on what is needed for the legal system to enhance ecological governance in the energy sector. In this, particular attention will be paid to the need to deal with uncertainties and externalities. Finally, overall conclusions are drawn. Throughout this article, the focal point is on EU energy law, and in particular on an expanded use of BAT as a means to reduce impacts and emissions from energy production.[22]

19 This is also referred to as the 'energy trilemma', as reiterated in para. , n. 27 below. See N. Gunningham, 'Confronting the Challenge of Energy Governance' (2012) 1(1) *Transnational Environmental Law,* pp. 119-35, at pp. 120 & 123-26.

20 As also acknowledged in European Commission, 'Energy Technologies and Innovation' (Communication) COM(2013) 253 final, at p. 2.

21 At the same time, the need to ensure the safety and functioning of the networks sets boundaries to the type and level of the changes that can be implemented.

22 For this reason, as well as for a lack of space, a choice was made not to discuss the EU emissions trading system (ETS) despite its relevance to technology neutral legislative design. For a discussion of the ETS, see E. Woerdman, M. Roggenkamp and M. Holwerda (eds), *Essential EU Climate Law* (Edward Elgar 2015), pp. 43-75.

5.2. Regulation of the EU energy sector

5.2.1. Characteristics of the sector

It is important to be aware that 'energy' entails a broad range of very different products and processes, which are not (and cannot be) all regulated in the same manner.[23] Furthermore, the separate branches of the sector differ in their relative shares of (environmental) impacts and levels of consumption. The largest part of the energy sector is the heating and cooling sector, followed by the transport sector. This leaves the electricity sector as the smallest section of the three.[24] Also, each of these sectors has a different energy mix.[25] These differences in the energy sources used partially impact how the respective sectors can be (effectively) regulated. As mentioned above, in energy regulation it is furthermore crucial to do justice to the 'energy triangle', or triple aim of energy policies: Energy must be sustainable (i.e. 'green') as well as affordable, while energy supplies must simultaneously be secure.[26] This multi-facetted policy leads to a constant need to strike a balance between the different, and at times conflicting, aims.[27]

In such balancing, the timeframe under consideration has an additional impact on where the equilibrium is expected to be found, as a short term perspective leads to different conclusions than a long-term view. The length of the timeframe considered is also crucial in regard to the

23 A full description of EU energy market complexities and regulation falls outside the scope of this article. For that, I refer to: M. Roggenkamp *et alia* (eds), *Energy Law in Europe. National, EU and International Regulation* (OUP 2016). For an overview of energy infrastructures as complex adaptive socio-technical systems, see D. Scholten & R. Künneke, 'Towards the Comprehensive Design of Energy Infrastructures'(2016) 8(12) *Sustainability,* 1291, at p. 3 of 24.

24 Heating and cooling consumes around half of overall European energy demand. Around a third of all energy is then used by the transport sector, which means 15-20% of all energy is used in the electricity sector. See: European Commission, 'Impact Assessment Accompanying the Proposal for a Directive of the European Parliament and of the Council on the promotion of the use of energy from renewable sources' SWD(2016) 418 final – part 1 of 4, at pp. 12 & 14.

25 Ibid. For instance, the transport sector is almost entirely dependent on oil, while the heating and cooling sector accounts for almost 70% of the EU's gas imports. The majority of renewables is consumed as electricity, even though this sector as a whole is still dominated by more conventional fuels.

26 This security of supply has two aspects. Energy supply must be adequate, in the sense that the system should be capable of meeting demand at all times, while it must also be secure, meaning that is must be able to withstand disturbances. Therefore, it is also important to secure sufficient investment in generation capacity . See H.P.A. Knops, *A functional legal design for reliable electricity supply: how technology affects law* (Intersentia 2008), at pp. 93-5 & 277.

27 Called the 'energy trilemma' by Gunningham, n. 19 above. It is debatable whether it is at all possible to achieve these three aims at the same time, or whether some form of hierarchy is required. See: K.S. Friesenbichler, 'Policy interaction and the integration of volatile renewable energy' (2016) 18(2) *Environmental Economics and Policy Studies*, pp. 193-211, at 209.

required investments in the energy system which are characterized by a long-term range.[28] Due to this, the energy sector is generally characterized by high path dependency and a high potential for technological lock-in. Not only are the investments in infrastructures itself high cost and long-term, but so are the subsequent investments in household appliances that are adapted to these infrastructures.[29] As a result of this, as well as due to the fact that the sector is heavily regulated, existing technological patterns are strongly embedded in society.[30]

This situation is exacerbated by the notion that several energy sources are highly network dependent; in particular electricity and to a lesser extent gas.[31] Related to this network dependency are two complications stemming from the increase in renewable energy sources. Firstly, renewable sources tend to generate a more intermittent supply of energy than traditional (fossil) sources, which (if not managed well) may affect the safe and secure functioning of the networks.[32] On top, current infrastructures are primarily set up for centralized supply, while energy is increasingly generated in a decentralized manner.[33] Both of these characteristics of renewable energy create technical challenges for system operators, which are increasingly addressed by legislators.[34]

28 While accurate figures are hard to find, estimates show that the average lifespan of power installations is typically 20-30 years for renewable sources and 30-45 years for more conventional power plants. (See, e.g.: World Bank, *Transition to a Low Carbon Economy in Poland,* Low Carbon Growth Country Studies Program, Briefing Note 009/11 (2011), at p. 22.) For the various components that make up the network the lifespan ranges between 40 to 60 years. (As estimated in: R. Itten, R. Frischknecht & M. Stucki, *Life Cycle Inventories of Electricity Mixes and Grid,* Version 1.3 (Treeze 2014), at p. 182.) On top, the development and maturing of new technologies also takes time, as affirmed in COM(2013) 253 final, n. 20 above, at p. 8.

29 For instance, in the Netherlands all new buildings have a mandatory connection to the gas network and, as a result, Dutch households are highly dependent on gas for heating as well as cooking. To switch to more sustainable modes of heating and cooking, the mandatory connection requirement was recently scrapped, but to effectuate any innovations all the equipment must be replaced. (Rijksoverheid, 'Verplichte gasaansluiting voor nieuwbouwwoning vervalt' News report (27 June 2017), available at: https://www.rijksoverheid.nl/actueel/nieuws/2017/06/27/verplichte-gasaansluiting-voor-nieuwbouwwoning-vervalt)

30 E. Gawel *et alia*, The Rationales for Technology-Specific Renewable Energy Support: Conceptual Arguments and their Relevance for Germany, UFZ Discussion Paper 4/2016 (Helmholtz Centre for Environmental Research, April 2016), at p. 7.

31 These sources need to be transmitted and distributed through cables and pipelines. Therefore, many rules in the energy sector are centred around the privileged position of the network operators.

32 *Ergo*, volatile renewable energy may create imbalances in the networks and thus impact the security of energy supply, both in terms of safety as well as the availability.

33 This may also lead to 'two-way' traffic, when individuals wish to put their home-produced excess of energy into the network, rather than buying it from the traditional top-down one-way network.

34 E.g. via implementing capacity mechanisms, such as priority access for renewables and enhanced cross-border cooperation and balancing.

Since the 1990s the energy sector has been characterized by increasing Europeanization, due to the creation of an EU internal energy market.[35] This has led to major transformations in the division of competences, in the amount of actors involved in the field, as well as in consumer protection and freedom of choice. As a result of this Europeanization, the EU energy market is now regulated at three levels of (partially overlapping) governance: the EU level, the national level and the local level. This article focuses solely on the European regulatory level. The EU founding treaties mention energy on several occasions and the competence to regulate in this field is shared between the EU and its Members.[36] In a nutshell, the EU can adopt energy market legislation, while the Member States maintain a sovereign right 'to determine the conditions for exploiting its energy resources, its choice between different energy sources and the general structure of its energy supply'.[37]

Within each governance level, different institutions with differing competences play a role in decision-making, and in the execution and enforcement of the rules.[38] When it comes to the regulation and, especially, enforcement at the national level, national governments decide upon the national policies and fill in the blanks left by EU law, while lower level branches of government are usually the competent authority in permit issuing. Thus, while the latter may have no say in setting the rules, they do influence the level of environmental protection accorded or the adequacy of energy supply, as the local level is eventually where the rules are interpreted, executed and enforced.[39]

35 Up to date, three 'energy packages' have been issued, each leading to further strengthening of the EU market dimension. For a full description of these developments, I refer to Roggenkamp *et alia,* n. 23 above.

36 The basis in EU law is that as long as a specific competence is not conferred upon the EU institutions, it rests with the Member States. Thus, in certain policy areas the EU has exclusive competence, while in others, it shares its competence with the Member States. On top, in the use of its conferred competences, the EU must adhere to the principles of subsidiarity and proportionality. See Articles 4 & 5 of the Consolidated version of the Treaty on European Union [2012] OJ C326/13 (TEU) and Articles 3 and 4 of the Consolidated version of the Treaty on the Functioning of the European Union [2012] OJ C326/13 (TFEU).

37 TFEU, n. 36 above, art. 194(2). At the same time, this sovereignty can be ceded by the Council acting unanimously, provided certain conditions are met (ibid, art. 192(2).) Additional powers are, under conditions, conferred to the Council in order to take 'measures appropriate to the economic situation, in particular if severe difficulties arise in the supply of certain products, notably in the area of energy' (ibid, art. 122) Lastly, the EU has to contribute to the development of trans-European networks in energy (ibid, art. 170-172).

38 On the division of competences, see more elaborately R. Leal-Arcas, A. Filis & E.S. Abu Gosh, *International energy governance: selected legal issues* (Edward Elgar 2014), at pp. 278-92.

39 On how and whether Member States use their discretionary power, see L. Squintani, *Gold-plating of European Environmental Law* (PhD Law, Groningen 2013).

5.2.2. Material norms

Many of the regulatory changes since the 1990s stem from so-called 'unbundling requirements' which led to the separation of the production and supply of energy from the transmission thereof.[40] Besides the creation of an internal market, additional rules aimed at sustainability and environmental protection were implemented, for instance in the form of minimum requirements for energy from renewable sources and energy efficiency.[41] Furthermore, the opportunities offered by smart grids and appliances have also increasingly received regulatory attention.[42] Lastly, in so far that production activities amount to 'large industrial installations', they are also covered by the rules on industrial emissions.[43] Without going into detail on all the material norms, the most important EU rules are discussed below in the light of assessing to what extent they are (or are not) technology neutral.[44]

Hydrocarbons Directive

The Hydrocarbons Directive provides an outline of the procedure and the requirements that authorizations for the prospection, exploration and production of hydrocarbons must adhere to.[45] In granting such authorizations, Member States have to consider, *inter alia,* the financial and technical capabilities of the applying entities, as well as their proposed methods for prospecting, exploration, and/or production.[46] In this respect, Member States have to ensure that the size of the affected area and the duration of the activities as well as the corresponding rights do not exceed beyond what is necessary.[47] Since the Directive is quite general in its wording and applies to all types of hydrocarbons, it can be considered technology neutral.

40 'Unbundling' means that a producer or a supplier cannot be involved in the transmission of energy, whereas previously this was the norm. Such unbundling was required to create competition and to avoid abuse of power by network operators which hold a natural monopoly caused by the network dependency of electricity and gas. For this reason, rules on connection and access to the network also received a prominent place.

41 The latter measures are part of the EU's '20-20-20 policy', the aim of which is to achieve 20% renewable energy, 20% efficiency increase and 20% reduction in GHG emissions by 2020.

42 See also I. Lammers & L. Diestelmeier, 'Experimenting with Law and Governance for Decentralized Electricity Systems: Adjusting Regulation to Reality?' (2017) 9(2) *Sustainability*, 212.

43 As addressed further on in this paragraph, under 'Industrial Emissions Directive'.

44 For the purpose of this article, I hold that the general (legal) distinction between renewable energy and fossil fuels is in itself technology neutral.

45 Directive 94/22/EC of the European Parliament and of the Council of 30 May 1994 on the conditions for granting and using authorizations for the prospection, exploration and production of hydrocarbons [1994] OJ L164/3 (Hydrocarbons Directive).

46 Ibid, art. 5.

47 Ibid, art. 4.

Gas Directive and Electricity Directive

The Gas Directive and the Electricity Directive basically provide common rules for the internal markets in gas and electricity respectively.[48] These directives are largely similar and the rules are characterized by the network dependency of these energy sources. In both markets, the unbundling of production and supply activities from transmission and distribution activities is required,[49] as is non-discriminatory access to the networks (and in the case of gas: storage facilities) provided certain conditions are met.[50] Member States are responsible for monitoring the security of supply,[51] and for adopting authorization procedures. Authorization is mandatory for the construction of all new electricity generating facilities, and the directive lists the criteria that must at least be considered in granting such authorizations.[52] The rules on the construction of natural gas facilities are more lenient.[53] Furthermore, Member States are responsible for the design of technical safety criteria.[54] Both directives also list the general objectives for, and duties and powers of, the national regulatory authorities. Essentially, the former require Member States to promote the development of the internal market in various ways, while the latter entail monitoring requirements and ensuring compliance with the directives.[55] All these provisions apply to all sources of electricity and gas, regardless of the technology used to extract the primary sources and/or the technology used for their conversion into secondary energy. Hence, these directives are fully technology neutral in this respect. Additionally, the risk of path-dependence is lessened by the requirement for the transmission system operator (TSO) to yearly submit a ten-year network development plan.[56] This requirement is technology neutral as investments are only steered to the extent that the sum of measures must 'guarantee the adequacy of the system and the security of supply'.[57]

However, both directives also contain elements that are (potentially) less neutral. In the Electricity Directive, two provisions accord explicit differential treatment to electricity from renewables and

48 European Parliament and Council Directive 2009/73/EC of 13 July 2009 concerning common rules for the internal market in natural gas and repealing Directive 2003/55/EC [2009] OJ L211/94 (Gas Directive); European Parliament and Council Directive 2009/72/EC of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC [2009] OJ L211/55 (E-Directive).

49 Gas Directive & E-Directive, n. 48 above, art. 9 for TSO; art. 26 for DSO.

50 For details, see art. 32 *et seq.* in both directives, n. 48 above.

51 E-Directive, n. 48 above, art. 4; Gas Directive, n. 48 above, art. 5.

52 E-Directive, n. 48 above, art. 7.

53 Gas Directive, n. 48 above, art. 4.

54 E-Directive, n. 48 above, art. 5; Gas Directive, n. 48 above, art. 8.

55 E-Directive, n. 48 above, arts. 36 & 37; Gas Directive, n. 48 above, arts. 40 & 41.

56 Gas Directive & E-Directive, n. 48 above, art. 22. Since these plans are adjusted on a yearly basis, they have, at least in theory, a strong potential for reducing path-dependence. However, as they are also coupled with more long-term focused investment decisions in practice path-dependence may still pertain.

57 Gas Directive & E-Directive, n. 48 above, art. 22(1).

electricity from traditional sources. As a result, in dispatching the installations,[58] the transmission system operator must give priority or guaranteed access to the grid of electricity made from renewables.[59] Additionally, Member States may opt to also provide such priority to electricity from combined heat and power plants.[60] For the network operators in the distribution grid providing priority for electricity from renewables is not mandatory, but only optional.[61] Despite the fact that these provisions are formulated in a technology neutral manner (i.e. they apply to all renewables vis-à-vis all traditional sources), they do seem to be at odds with the notion that electricity from renewables is often generated in a more decentralized manner. Thus, in effect, these provisions may put certain renewables at a disadvantage, because giving priority is only mandatory for those renewables that are produced at the 'traditional' level of electricity generation.

Under the Gas Directive, the situation is different. The directive applies to natural gas as well as biogas and other gases from renewable sources, 'in so far as such gases can be injected safely into, and transported through, the natural gas system.'[62] However, unlike in the Electricity Directive, no priority access to the network is granted for such gases, nor does the directive provide any other stimulus to promote biogases.[63] At the same time, the competent regulatory authorities are required to integrate large and small scale production of gases from renewable sources and to facilitate their access to the network.[64] The directive does not specify how they should do this.[65]

Consequently, both directives can be considered technology neutral, at least in their wording. Yet, in effect, under both directives renewable sources might be at a (slight) disadvantage,

58 'Dispatching' is turning on and off of installations and determining who will get access to the network in case of overcapacity.

59 However, it is proposed in a recast of the RED that this preferential treatment is scrapped after 2020. See
European Commission, 'Proposal for a Directive of the European Parliament and of the Council on the promotion of the use of energy from renewable sources (recast)' COM(2016) 767 final/2, at p. 86.

60 E-Directive, n. 48 above, art. 15(3). For reasons of security of supply, Member States may also provide priority for indigenous primary energy fuel sources, up to a maximum percentage (ibid, art. 15(4)).

61 E-Directive, n. 48 above, art. 25(4). Transmission concerns the transport of electricity through the high voltage network, while distribution occurs at a lower voltage.

62 Gas Directive, n. 48 above, art. 1(2).

63 On several occasions, the directive does refer to the need to integrate 'new sources of gas supply' (e.g. in art. 36(2)). However, this is a broader category than gases from renewable sources, as it may also include shale gas.

64 Gas Directive, n. 48 above, art. 40(d&e).

65 For an extensive appraisal on how these tasks are regulated in the Netherlands, see (in Dutch) D.G. Tempelman, *Alternatieve gassen en aansprakelijkheid. De Nederlandse gasketen in een geliberaliseerde markt: contractuele en buitencontractuele aansprakelijkheid van groen-gasinvoeding en waterstofbijmenging* (WLP 2016).

precisely because of this neutral wording. As a result of the fact that new energy sources are treated identically to traditional ones, the playing field may become uneven. The Electricity Directive attempts to remedy the situation by stimulation renewable sources though providing priority access, but the Gas Directive does not.

Renewable Energy Directive

The Renewable Energy Directive (RED)[66] creates a more even playing field for renewables to enter the market through positive discrimination. This directive specifically aims to promote energy form renewable sources, so its wording is much less technology neutral than in the Gas and Electricity Directives.[67] While the primary distinction between renewables and fossil energy is considered technology neutral, many of the steering instruments used in the RED are not. The directive starts out neutral, as it sets overall targets for the share of renewables that must be achieved by 2020, without prescribing which sources should be used.[68] The directive distinguishes three branches of energy consumption, namely electricity, heating and cooling, and transport.[69] As these sectors differ significantly, each requires a different approach and a different combination of measures.[70] To achieve their targets, Member States may take various national support measures[71] or achieve their targets in cooperation.[72] For the electricity and heating and cooling sectors, it is mostly left to the Member States to choose which renewable sources to promote and how to do so. However, it is mandatory for the Member States to provide preferential access to the networks for electricity made from renewable sources.[73]

The 'greening' of the transport sector is regulated in more detail under the RED. First of all, an additional minimum requirement of at least 10% energy from renewable is imposed

66 Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources […] as amended by Directive (EU) 2015/1513 [2015] OJ L239/1 (Renewable Energy Directive, RED).

67 As such, it is an elaboration of the general strive for sustainability, while the aims of security of supply and affordability of energy are less prominent.

68 This target is set at 20% for the EU as a whole, with individual targets for each Member State (RED, n 66 above, art. 3(1) & annex I). On top, in the transport sector at least 10% renewable energy must be consumed (ibid, art. 3(4)).

69 RED, n. 66 above, art. 5(1).

70 An overview of the various measures taken can be found in European Commission, 'Renewable Energy: Progressing towards the 2020 target' (Communication) COM(2011)31, at p. 10.

71 These have to be described in a national action plan; see RED, n. 66 above, art. 4.

72 Ibid, arts. 6-11.

73 This is mandatory at transmission level, and optional at distribution level; ibid, art. 16. However, as said before, this preferential treatment may be scrapped after 2020. See COM(2016) 767 final/2, n. 59 above, at p. 86.

on this sector.[74] As this target will primarily be achieved by using biofuels, the RED imposes sustainability criteria for such fuels.[75] These criteria set thresholds for the minimum level of GHG reductions that must be achieved by using these fuels, and they prohibit the production of biofuels in specified vulnerable areas.[76] As a result of this, certain production paths, and hence technologies, are explicitly ruled out.[77] On top, through the methodology used to calculate the share of renewables, the directive provides further technology-specific incentives to enhance the consumption of renewable energy in transport. Firstly, a list of specified biofuels is counted twice towards the target.[78] Secondly, to stimulate the use of renewable electricity in transport, several usages thereof are also multiplied in the calculations. If renewable electricity is used for rail transport it counts 2.5 times towards the targets; if used in road vehicles it counts five times.[79] These latter requirements are technology-specific in the sense that they promote a specific application of energy (i.e. electric transport), while remaining neutral about how this energy was produced (i.e. through any of the renewable options). Such neutrality is particularly important in regard to the choice for energy sources, which is a competence explicitly left with the member States.[80]

Industrial Emissions Directive

The Industrial Emissions Directive (IED), to which many energy installations are subject, merges and recasts seven directives that were all aimed at reducing pollution from various substances by industrial activities.[81] The directive aims at an overall 'high level of protection of the environment taken as a whole.'[82] It advocates an integrated approach to pollution, to avoid the shifting of

74 Simultaneously, so-called 'first generation' biofuels are capped at 7%, while 'advanced' biofuels must reach a minimum share of 0.5%. See RED, n. 66 above, art. 3(4). The proposed recast of the RED deletes this 10% share all together. See COM(2016) 767 final/2, n. 59 above, at p. 65.

75 RED, n. 66 above, art. 17.

76 However, they do not ban production as such, but merely rule out 'below-standards fuels' to be eligible for subsidies or to be counted towards the renewables target, see ibid, art. 17(1).

77 While the criteria predominantly focus on the (cultivation of the) raw materials used for the fuels, the GHG reduction that is achieved is also partially dependent on the technology used for production; to illustrate, see RED, n. 66 above, annex V, part A.

78 Ibid, art. 3(4)(f) & annex IX.

79 Ibid, art. 3(4)(c).

80 TFEU, n. 36 above, art. 194. In fact, it is striking that the RED was adopted via the ordinary legislative procedure using 'qualified majority voting' (QMV), since article 192 TFEU demands that 'measures significantly affecting a Member State's choice between different energy sources and the general structure of its energy supply' must be adopted with unanimity. (See art. 192(2)(c), in combination with arts. 289 and 294 TFEU, n. 36 above).

81 European Parliament and Council Directive 2010/75/EU of 24 November 2010 on industrial emissions (integrated pollution prevention and control [2010] OJ L334/17 (Industrial Emissions Directive, IED). The incorporated directives are listed in recital 1. Not all of these norms are discussed here.

82 Ibid, art. 1.

pollution from one medium to another.[83] For this reason, all large industrial installations must have an operating permit in which limits are set for their emissions to water, air and soil.[84] These emission limit values 'shall be based on the best available techniques, without prescribing the use of any technique or specific technology.'[85] Additionally, environmental quality standards may require stricter conditions than those achievable by BAT.[86] What the BAT are is not static and the techniques are not described in the directive itself;[87] in fact, prescribing a specific technique in the permit conditions is not allowed.[88] Instead, what the BAT and the corresponding emission levels are is explained in BAT reference documents (BREFs) that are drawn up in a more informal, institutionalized, extensive information exchange.[89] Thus, the prescription of BAT in its current form constitutes a multi-level approach in which the overall norms have been set at EU level, while the more detailed technical descriptions have been addressed in a more soft law form with a higher degree of flexibility. An additional layer of governance is formed by the implementation of the EU rules at Member State level and subsequent application at local level.

The overall design of the directive is technology neutral, as it uses emission limit values (i.e. performance standards) and environmental quality standards as the benchmark for permit authorizations. However, in the fine-tuning of these standards the system is much more technology specific, since the amount of technologies listed as BAT is limited. On top, in its current form, the definition of BAT places much emphasis on the economic viability and availability of techniques,[90] resulting in maintaining the status quo in techniques.[91] This situation is exacerbated by the codification of BREFs as '*the* [emphasis added] reference for setting permit conditions'[92], rather than using these emission levels as the lower threshold. Furthermore, only part of the energy market is regulated via the IED and the use of BAT is therefore only mandatory for those elements of the production chain that are covered by the IED.[93] As a result, in practice the directive does not provide strong incentives for stark emission reductions in the energy sector,

83 Ibid, recital 3.
84 Ibid, arts. 4(1) & 14(1).
85 Ibid, art. 15(2).
86 Ibid, art. 18.
87 The directive does contain several emission limits for certain categories of installations in its annexes, but most of these have been surpassed by new BAT with lower emissions.
88 IED, n. 81 above, art. 15(2).
89 Ibid, art. 13.
90 Ibid, art. 3(10)(b).
91 C. Backes, *Law for a Circular Economy*, Inaugural Address, University Utrecht, 12 April 2017 (Eleven International 2017), at p. 33.
92 IED, n. 81 above, art. 14(3).
93 These activities are listed in IED, n. 81 above, annex I.

and *de facto* only leads to incremental change. These notions severely impede the strength of BAT as a tool to achieve 'a high level of protection of the environment'.[94]

5.3. Technology neutrality and stimulating innovation

Parallel to the rules discussed above, EU has adopted an action plan to stimulate innovation and to advance 'environmental technologies'.[95] According to this plan, '[e]co-innovation potential should be at the centre of the revision of existing infrastructure standards, including transport, energy, buildings, and ICT, while simultaneously leading to enhanced climate resilience'.[96] Despite this broad mandate, the subsequently adopted Ecodesign Directive[97] focuses mainly on enhancing energy efficiency, so that it reduces the demand for electricity,[98] but does not alter electricity production itself.[99] The directive addresses the design stage of 'energy-related products', i.e. 'any good that has an impact on energy consumption', including the parts intended to be incorporated in it.[100] The directive sets parameters for (generic) ecodesign requirements that entail all life-cycle phases, and lists the elements that must be assessed in each phase.[101] Specific ecodesign requirements then aim to improve selected environmental aspects of a product.[102] The former requirements do not set limit values, whereas the latter do. On the basis of a technical, environmental and economic analysis concrete measures must then be taken to minimize the environmental impact.[103] Prior to the marketing of a product, an EC declaration of conformity must be issued and the CE mark[104] must be affixed to the product.[105] As such,

94 At least in its current form. However, reinterpreting the concept of BAT and expanding its scope of application could, in my opinion, give a significant push to enhanced ecological governance, as further discussed in para. .

95 European Commission, 'Innovation for a sustainable Future - The Eco-innovation Action Plan (Eco-AP)' (Communication) COM(2011) 899 final. This plan was preceded by the 2004 'Environmental Technologies Action Plan' (ETAP), available at: http://ec.europa.eu/environment/ecoap/sites/ecoap_staycon-nected/files/pdfs/etap_action_plan.pdf.

96 COM(2011) 899, n. 95 above, at p. 8.

97 Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products (recast) [2009] OJ L285/10 (Ecodesign Directive).

98 Ibid, recital 6.

99 However, the wording of the directive does leave room for more comprehensive, life-cycle improvements. See also Backes, n. 91 above, at p. 40.

100 Ecodesign Directive, n. 97 above, art. 2(1).

101 Ibid, annex I.

102 Ibid, annex II.

103 Ibid, annex II.

104 This marking signifies that the product complies with EU rules on health and safety and environmental protection. The CE mark is mandatory for many, but not all, products placed on the European market. An overview of all CE Marking Directives is available at: https://cemarking.net/eu-ce-marking-directives/.

105 Ecodesign Directive, n. 97 above, arts. 3 & 5, further details in annexes IV-VI.

the Ecodesign Directive is a rather technical regulation and does not specifically facilitate the energy transition.

In sum, the directives discussed in paragraph 5.2.2 reflect the need to strike a balance between, on the one hand, steering production and providing guidance through technology specific rules and, on the other hand, the desire to have a durable and open legal framework through technology neutral wording. Essentially, for each directive the level of neutrality varies with its general primary aim. The Gas and Electricity Directives, aimed primarily at market integration and liberalization, are thus rather neutral in their wording. In contrast, the RED, aimed at enhanced sustainability, provides stronger non-neutral steering mechanisms. Lastly, the IED, aimed at environmental protection through progressive innovation, is also quite neutral in its wording.[106] In regard to such innovations, it is important to distinguish between rules that enable change and those that incentivize change.[107] The former simply aim to avoid obstacles to incorporating technological changes in the existing legal framework, whereas the latter explicitly aim to promote innovations. From this perspective, the Gas Directive, the Electricity Directive and IED are aimed more at enabling innovations, while the RED means to incentivize them.

This observation illustrates the notion that technology neutrality is never a goal in itself but rather a means to achieve non-discrimination between different technologies with similar functions. It is meant to ensure that legislation does not force or favour the use of any particular technology over another, regardless of whether these are present or future technologies.[108] This way path dependence is believed to be avoided, a level playing field appears to have been created via neutral wording and it is assumed that this way legislation will be future proof.[109] Nevertheless, the pre-regulation of future technologies may cause unintended side effects or may even hinder the deployment of new technologies.[110] Also, an 'important factor in determining whether technology neutral drafting is possible is the extent to which the legislator understands the technology.'[111] On top, even a comprehensive understanding of the technologies provides no guarantee there will be 'no consequences from unanticipated changes to that technology.'[112]

106 This is, the BAT concept in the directive itself is quite neutral, but its subsequent effectuation in BREFs is less so, as also mentioned in para. 5.2.2, under 'Industrial Emissions Directive'.

107 This is illustrated by the fact that the overall EU energy policy (aimed at facilitating change through technology neutrality) is supplemented by more specific innovation-stimulating policies. In fact, an 'EU energy technology and innovation strategy is an integral part of […] EU energy policy.' (COM(2013) 253 final, at p. 12).

108 Bennett Moses, n. 15 above, at p. 273.

109 Reed, n. 12 above, at p. 275.

110 D.J. Gervais, 'Towards A New Core International Copyright Norm: The Reverse Three-Step Test' (2005) 9(1) *Marquette Intellectual Property Law Review*, pp. 1-35, at n. 128.

111 Reed, n. 12 above, at p. 279.

112 Ibid, at p. 280.

Thus, in practise, the sought-after non-discrimination may very well require the opposite: the implementation of (temporary) technology specific policies to stimulate the development of new technologies and facilitate their access to the market.[113] Without such positive discrimination the development and market penetration of new technologies may be difficult, because it can be virtually impossible for these new techniques to gain access to the market. Partly, this is due to the fact that large technical systems such as the energy sector tend to favour incremental change over radical change.[114] In general, 'operators do not have any interest in abandoning existing technologies before they can recoup long-term investments.'[115] At the same time, avoiding path dependence is particularly important in the energy sector, which is characterized by long-term investments. Once (significant) investments have been made, it is difficult to alter the course of action, leading to a high risk of technological lock-in and, consequently, a high degree of path dependency.[116]

A reluctance to drastic changes to the energy system seems additionally motivated by fear of societal repercussions in terms of energy prices and security of supply considerations.[117]

113 Three phases in developing new technologies require particular regulatory attention. These are the actual development of a technology, or the R&D phase; the transition from the lab to large scale deployment thereof; and determination on how to deal with this technology when implemented in society. Each phase requires different treatment, also in regard to the desirable level of technological neutrality of the rules. See also A.B. Jaffe, R.G. Newell & R.N. Stavins, 'Technology Policy for Energy and the Environment' in A.B. Jaffe, J. Lerner & S. Stern (eds) *Innovation Policy and the Economy* (MIT 2004), pp. 35-68 ('Jaffe, Newell & Stavins 2004'), who refer to Josef Schumpeter's trichotomy at p. 63, n. 1.

114 Radical change refers to the adoption of new technologies, whereas incremental change means adapting or improving existing technologies. To be effective, innovations must always be coupled with market penetration (M. Jänicke & S. Lindemann, 'Governing environmental innovations' (2010) 19(1) *Environmental Politics* 127-41, at 129-30). Other authors use a different terminology and refer to a need for 'disruptive regulation' versus 'moving target regulation' or 'innovation' versus 'improvement'. (Respectively: J. Verschuuren & K. Bink, *Naar slimme milieuregelgeving die innovatie stimuleert* (University of Tilburg, 2015), at p. 9; Scholten & Künneke, n. 23 above, at p. 5). In this article the term 'innovation' refers to radical change.

115 G. Bellantuono, 'Law and Innovation in the Energy Sector', in B. Delvaux, M. Hunt & K. Talus, *EU Law and Policy Issues* ELRF Collection (Euroconfidentiel 2009), pp. 263-96, at p. 9 of the SSRN version, available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1480071.

116 As elaborated on in para. 5.2.1.

117 In this sense, safety requirements can be considered a threshold for the level or amount of change that can be implemented at once. Thus, (technical) safety requirements form the bottom line of 'what can be absorbed', i.e. of the maximum achievable level of technology neutrality in the legal design. At the same time, this should not be used as an excuse for non-implementation of innovations. Furthermore, it must also be avoided that innovations are hampered by parties with vested (fossil) interests in maintaining the status quo. In a similar vein, the argument that climate issues must be 're-balanced' against competitiveness has been identified as one of arguments used by trade associations for energy-intensive sectors and the fossil fuel industry to exert influence over EU climate policy. (B. Fagan-Watson, B. Elliott & T. Watson, Lobbying by Trade Associations on EU Climate Policy. (Policy Studies Institute, 2015), at p. 8.)

It must therefore be borne in mind that energy production and use are not 'an end in itself but is used to achieve commercial and social ends, and it is these that may be changed by technology development in a way which outdates the regulation'.[118] Thus, energy essentially provides a means through which to accomplish the tasks and activities that drive society. For this reason, taking account of this (societal) context of the regulation is also of importance.[119] On top, energy infrastructures are increasingly perceived as complex adaptive socio-technical systems, which means that energy infrastructures are not exclusively defined by a technical topology, but additionally the interaction of the integrated physical and social/organizational networks is considered a crucial element in determining system performance. In this light, energy infrastructure performance is also about how (embedded) institutions, technologies and legislation mutually influence, incentivize and re-enforce each other.[120] The existence of these interacting forces at work implies that segregated technical and economic regulatory designs do not suffice to address the complexities of energy infrastructures, but that instead the two types of design need to be interwoven into a more comprehensive energy infrastructure design.[121]

Furthermore, from literature the picture emerges that rules that foster innovations are crucial to achieve the required transition, and that they must be coupled with far-reaching goals.[122] Innovation can be stimulated or forced by ambitious environmental targets that cannot be achieved by existing technologies.[123] However, innovation is a complex process influenced by different variables, which makes it hard to (empirically) identify what factors or what measures are decisive for achieving breakthroughs.[124] Innovation in the energy sector is particularly difficult due to (i) the network structure of energy systems; (ii) the distinctive features of energy-related technologies; and (iii) the uncertainty about the impact of regulatory interventions on the rate

118 Reed, n. 12 above, at p. 282. This statement was made in the context of ICT regulation, but also holds true for energy regulation.

119 According to Koops the context of regulation concerns how much 'technological turbulence' there is, what the side effects of regulating are on the technology, what its scope for interpretation is and how the regulation is enforced. He argues that this context, in combination with the purpose of the regulation and its means, determine whether technology neutrality is desirable. (Koops, n. 13 above, at pp. 98-103).

120 Scholten & Künneke, n. 23 above, at p. 3.

121 Ibid, at p. 13.

122 This approach (also known as the 'Porter hypothesis', first formulated in: M.E. Porter, 'America's Green Strategy' (1991) 264(4) Scientific American 168) is advocated by various authors, including: Jänicke & Lindemann, n. 114 above, at p. 133; Backes, n. 91 above, at p. 44; Verschuuren & Bink, n. 114 above, at p. 9.

123 Verschuuren & Bink, n. 114 above, at p. 53. Higgins goes even further and argues that in the absence of ambitious targets no fundamental change will occur at all (P. Higgins, *Eradicating Ecocide: Laws and Governance to Stop the Destruction of the Planet* (Shepheard-Walwyn, 2010), at pp. 10-2).

124 Verschuuren & Bink, n. 114 above, at p. 12; Bellantuono, n. 115 above, at p. 11.

and direction of innovation.[125] On top, the diffusion of innovations is hindered by both practical and legal barriers even though there is an urgent need for technology transfer.[126]

5.4. Implementing ecological governance

As explained in the introduction, technology neutrality in this article is assessed primarily in terms of its contribution to enabling and incentivising innovations with a view to implementing ecological governance. The latter, in turn, largely revolves around the concept of ecosystem resilience. In resilience literature, several criteria have been identified as highly relevant to the ability to govern socio-ecological systems and to deal with uncertain and complex changes.[127] To start with, social systems and institutions need to be flexible in their attitude to change, and open for broad participation. Additionally, multilevel governance appears to be the most effective governance structure. On top, social structures must promote learning and adaptability without limiting the options for future development. Evidently, these are only broad outlines that provide little guidance on how this might be achieved and executed in practice. What is clear is that the more precise and detailed laws try to be, the more likely they are to become disconnected from the rapidly changing technologies that are its regulatory targets.[128] In other words, the higher the degree of technology specificity, the shorter the lifetime of the regulation.[129] As such, legal durability is a concern that impacts the choice of legal instruments as well as the level of regulation and its intensity.[130] This explains the tendency to put our faith in technology neutral legislation, which may not always be justified since the life-span of legislation should not be our prime concern.

In fact, the guiding principles for ecological governance as developed by Woolley (i.e. reduced consumption, and substitution and sunsetting of polluting practices)[131] compel us to put the emphasis on other goals. In sum, we need a three-tier approach to the regulation of human activities and energy production in particular. *Ex ante* the (potential) effects and impacts of the proposed activity need to be identified as much as possible and compared to all available alternatives. If the proposed activity is in principle approved, strict norms for its execution should then be imposed, followed by monitoring of the impacts and effects and enforcement of the set

125 Bellantuono, n. 115 above, at p. 9.

126 Explored in more depth in Z. Chen, 'Climate change: legal impediments to technology transfer' in P. Martin *et alia* (eds), *Environmental Governance and Sustainability (*Edward Elgar 2012), pp. 266-87.

127 Ebbesson, n. 18 above, at p. 414.

128 R. Brownsword & H. Somsen, 'Before We Fast Forward – A Forum for Debate' (2009) 1 *Law, Innovation and Technology,* pp. 1-3, at 3.

129 A. Butenko & P. Larouche, 'Regulation for innovativeness or regulation of innovation?' (2015) 7(1) *Law, Innovation and Technology*, pp. 52-82, at 75.

130 In EU law, the latter two are enshrined the principles of proportionality and subsidiarity (TEU, n. 36 above, art. 5).

131 See Woolley, n. 4 above, at pp. 71-77.

conditions. *Ex post* evaluation of the chosen route should take place and, if needed, operating conditions as well as underlying policies should be amended.

Thus, ecological governance demands that we take fundamental ethical decisions and prioritize our aims, rather than maintaining the currently deployed balancing approaches. From this perspective, technology neutral legislative design is of subordinate importance compared to maintaining a legislative focus on reducing the stresses our activities put on ecosystems. Furthermore, implementing ecological governance requires a holistic approach to regulation to do justice to the complex interactions between and within ecosystems and our impacts upon them. On top, this legal approach should be adaptive to be able to accommodate new insights regarding these interactions and to amend the regulation of our actions and activities accordingly.[132] At the same time, we need to acknowledge the limitations of our ability to fully comprehend the world around us and the effects our activities have on it, as well as the limitations of law as a tool for sustainability.

5.4.1. Uncertainties

Essentially, we need to adapt our legal structures to endemic uncertainty. This goes beyond mere technology neutral formulation of laws. In designing ecological governance structures, aimed at enhancing ecosystem resilience, we will always be unsure about (i) the consequences of our activities; (ii) the casual pathways of interactions between activities and ecosystem effects; (iii) what properties are important for ecosystem resilience; (iv) which elements will become important if changes occur; and (v) when resilience is sufficient. Precisely because of these uncertainties we need a 'proactive precautionary approach'.[133] This means that we should not just halt an activity until sufficient information on its impacts is available, but we need to accept that there will (perhaps) never be sufficient information and we need to develop policies and laws in spite of this realization.

132 The kind of comprehensive, adaptive, multi-level approach advocated here thus has many similarities with the programmatic approach used in environmental law. However, for lack of space the programmatic approach is not discussed in detail here. For that, I refer to F. Groothuijse & R. Uylenburg, 'Everything according to Plan? Achieving environmental Quality Standards by a Programmatic Approach' in M. Peeters, R. Uylenburg (eds), EU Environmental Legislation: Legal Perspectives on Regulatory Strategies (Edward Elgar 2014), pp. 116-145; M.N. Boeve & G.M. v.d. Broek, 'The Programmatic Approach; a Flexible and Complex Tool to Achieve Environmental Quality Standards' (2012) 8(3) *Utrecht Law Review*, pp. 74-85; L. Squintani & H. van Rijswick, 'Improving Legal Certainty and Adaptability in the Programmatic Approach' (2016) 28(3) *Journal of Environmental Law,* pp. 443-70.

133 Woolley, n. 4 above, at p. 67.

Addressing climate change is particularly troublesome as this phenomenon is 'characterised by a cascade of uncertainties that cover every aspect of the problem'.[134] Uncertainties surround climate change science, as well as its impacts and its solutions. Furthermore, three characteristics of such major social-ecological change pose particular challenges for governance. Firstly, the time lapse between the policy measures (or inactivity in this regard) and the effects thereof extend beyond one human generation. Secondly, these challenges are part of complex systems that we can (so far) only partly comprehend. Thirdly, they concern global collective goods and are linked to a wide range of human activities.[135] Each of these characteristics presents a major hurdle in itself, but on top they also coincide and interact, so that designing appropriate governance structures becomes even more challenging.[136]

On top, the technological changes needed as part of climate change solutions are themselves an uncertain phenomenon.[137] Moreover, technological change does not exist in a vacuum. The rate and direction of technological developments interact with policy decisions. Policy interventions create incentives that affect the investment decisions made by technology developers and thus these interventions influence which new technologies are developed and how rapidly they will diffuse.[138] Making such interventions technology neutral may to an extent reduce obstacles to such development and diffusion, by allowing them to be absorbed in the existing legal framework. Nevertheless, a degree of legal uncertainty is almost inevitable in regard to innovations, because there are no precedents.[139] Finally, the fact that the process of technological change is itself characterized by market failures further complicates the design of adequate governance structures.

5.4.2. Externalities

One such market failure is the existence of externalities. Without going into details on all the economics and the exact role and size of externalities, it is important to emphasize here that many externalities exist and that they impact the effectiveness of ecological governance strategies. These external costs and/or benefits vary with each energy source and each technology. Regarding electricity production, there are, for instance, externalities relating to

134 M. Tavoni, 'Coping with Uncertainty' in Valentina Bosetti *et alia*, *Climate Change Mitigation, Technological Innovation and Adaptation. A New Perspective on Climate Policy* (Edward Elgar 2014), pp. 97-114, at p. 97.

135 A. Underdal, 'Complexity and challenges of long-term environmental governance' (2010) 20(3) *Global Environmental Change,* pp. 386-93, at 386. The third characteristic is not so much an uncertainty problem, but rather a regulatory challenge related to free-rider problems and the 'tragedy of the commons'.

136 Ibid, at p. 389.

137 Tavoni, n. 134 above, at p. 108.

138 A.B. Jaffe, R.G. Newell & R.N. Stavins, 'A tale of two market failures: Technology and environmental policy' (2005) 54(2-3) *Ecological Economics,* 164-74 ('Jaffe, Newell & Stavins 2005'), at 165-6.

139 Verschuuren & Bink, n. 114 above, at p. 51.

the environmental impacts of production, but also those relating to the need for electricity system integration of renewables and effects stemming from the impacts on the security of energy supply.[140] Technology development has its own external effects, such as knowledge externalities and adoption externalities. Externalities may work in one of two directions. In the case of externalities from pollution, the polluter incurs costs on society, but lacks an incentive to reduce these costs as he does not pay for them himself. As a result, too much pollution is caused. In the case of technology, the problem is reversed. Investors in new technologies bear all the costs for developing them, while others may reap (part of) the benefits. Hence, the incentive to invest in new technologies is reduced, so that too few of them are developed.[141] Additional market failure *inter alia* stems from incomplete information, i.e. uncertainties.[142] The existence of externalities and other market failures impacts the case for technology neutral regulation. As long as externalities exist, some form of steering is required to correct these market imperfections. Essentially, the greater the positive externalities and societal value expected from an innovation or from a reduction of environmental damage, the stronger the case for policy interventions and support mechanisms.[143]

5.4.3. Adaptability

Under the suggested three-tier ecological approach, a central role is reserved for information and data and the gathering and development of knowledge. Producing data, gathering information and expanding knowledge lay the foundation of informed decision making. However, equally important is how and to what extent this knowledge subsequently needs to be taken into account in these decisions. For instance, performing an environmental impact assessment (EIA) is already mandatory prior to consent for large (industrial) projects,[144] but this is primarily a procedural (albeit extensive) requirement. EIAs are used as an informative tool to reduce uncertainties; yet, their conclusions do not necessarily have a decisive impact on the decision taken.[145] To reduce stresses on ecosystems we need to add an ecological value judgment. In other words, we need to provide a preference for ecosystem protection.[146] If not, the ecological interest can be (and

140 Gawel *et alia*, n. 30 above, at pp. 9 *et seq*.

141 See more elaborately: Jaffe, Newell & Stavins 2005, n. 138 above, at p. 166.

142 Jaffe, Newell & Stavins 2004, n. 113 above, at pp. 38-40.

143 Butenko & Larouche, n. 129 above, at p. 62.

144 Directive 2011/92/EU of 13 December 2011 on the Assessment of the Effects of Certain Public and Private projects on the Environment, [2012] OJ L26/1 (EIA Directive); similar obligations exist for plans and programmes, under Directive 2001/42/EC of 27 June 2001 on the Assessment of the Effects of Certain Plans and Programmes on the Environment, [2001] OJ L197/30 (SEA Directive).

145 By this, I mean that the EIA's conclusions may impact the details of a decision, but not the decision itself at a more fundamental level. See also Woolley, n. 4 above, at p. 184.

146 Ibid.

usually is) outweighed by economic incentives.[147] Still, in more strengthened form EIAs can be a valuable tool in ecological governance, to identify key issues and to assess alternatives, both *ex ante* and *ex post*.[148] At the same time, we have to accept that we may very well never have all the information needed to make fully informed decisions regarding our actions. Hence, we have to adapt our policies and the legal system accordingly.

Furthermore, the degree to which a legal system promotes ecosystem resilience and the extent to which it can adapt to changes and/or new insights depends on quality of the assessment, as well as on the possibility to review and/or withdraw the consent for activities. Thus, the grounds on which a permit, once granted, can be challenged, reviewed or withdrawn are important factors in the flexibility and adaptability of the legal system. Such review procedures are particularly critical when (i) the adverse effects of an activity turn out to be worse than expected; (ii) when the ecosystem has declined or is at risk of declining significantly; and (iii) when better technology has been or could be developed.[149]

5.4.4. The BAT concept

The review procedure described above could provide a strong incentive to progressively reduce the stresses on ecosystems. When it comes to developing new technologies, I argue that an enhanced interpretation and application of the concept of BAT provides a suitable means, not in the least because of its technology neutral nature. By providing leeway to 'absorb' new technologies, it enhances the adaptability of the legal framework. The BAT concept is thus flexible in the sense that the obligations that rest on operators become stricter as technical developments progress.[150] However, in its current application, the use of BAT focuses more on the economic viability of technologies and installations, than on their effects on health, the environment and natural resources. Arguably, therefore, the BAT concept in its current form does not foster innovations, because it focuses primarily on (improving) existing techniques.[151] For this reason, the mandatory use of BAT can now only help to diffuse a (innovative) technology,

147 After all, 'considering' something is not the same as 'accounting for' it, and a requirement to weigh different interests or options does give direction to its outcome. See also C. Voigt, 'The principle of sustainable development: integration and ecological integrity' in C. Voigt (ed), *Rule of Law for Nature. New Dimensions and Ideas in Environmental law* (CUP 2013), pp. 146-157, at p. 150.

148 On the important role of (institutionalized) information gathering, see Woolley, n. 4 above, at pp. 215-33; and Ebbesson, n. 18 above, at p. 418.

149 Ebbesson, n. 18 above, at p. 418. To provide legal certainty for the operator, the conditions under which the permit or consent may be reviewed or withdrawn can be set out either in the statutes on which this consent is based or in the permit itself. Alternatively, or in parallel, the consent could be granted for a limited time, after which new circumstances or insights can then be taken into account (ibid).

150 Ibid, at p. 419.

151 Backes, n. 91 above, at p. 33; Verschuuren & Bink, n. 114 above, at pp. 7 & 53.

but it cannot stimulate inventions or contribute to their marketing in the first place.[152] For the latter, it is needed that 'performance standards of this kind must be supplemented or combined with normative frameworks that take due account of the impact of the activity on health, the environment and long-term utilization of natural resources.'[153] This normative framework could, for instance, take the form of introducing a priority for ecological considerations or mandatory 'eco-proportionality' in decision making,[154] coupled with requiring the use of BAT in (geographical and legal) areas where it was previously not.[155]

The use of BAT as a legal concept holds great potential for technological change, if indeed it is reinterpreted and wielded differently. Literature distinguishes two models for responding to complex long-term ecological governance -the collective action model and the adaptive governance model-[156] which are essentially combined in BAT as a legislative instrument.[157] Through the definition of BAT a collective, technology neutral (EU) norm is set, expressing international consensus, a form of leadership or guidance and a contraction of power, while simultaneously the BREFs and national implementations provide for (technological) specificity, diversity and a variety of locally executed activities. Such decentralization provides each unit with the freedom to act quickly and adequately in regard to the local situation.[158] However, this flexibility is (and needs to be) limited and normatively guided to avoid non-ecological and arbitrary decisions.[159]

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152 Jänicke & Lindemann, n 114 above, at p. 132. Thus, the current BAT concept only stimulates one of the three phases of technological change while all three stages of the innovation cycle need to be supported for an innovation-oriented policy (as mentioned in footnote 113).

153 Ebbesson, n. 18 above, at p. 419.

154 G. Winter, 'Ecological Proportionality' in C. Voigt (ed), *Rule of Law for Nature. New Dimensions and Ideas in Environmental law* (CUP 2013), pp. 111-29, at pp. 115-7 & 128.

155 Ibid, at p. 125. Therefore, the concept must be expanded in a material sense, as well as in its scope of application.

156 Underdal, n. 135 above, at p. 390.

157 Underdal indeed affirms that '[…] a system of governance must provide a carefully differentiated framework that combines elements of the adaptive governance model – to enhance flexibility, diversity, and learning capacity – with components of the collective action model—to ensure focus, energy, and sustained commitment. It would be a system of multi-level governance —sufficiently decentralized to provide scope and incentives for local initiatives but also capable of building arenas and networks to facilitate the diffusion of best practices and international regimes and organisations to enhance the capacity for collective action.' (ibid, at p. 392.)

158 Ibid, at p. 391.

159 Such arbitrariness can be induced by the use of decisional discretion, which may render the balancing in individual cases to become political. (See F.M. Platjouw, 'A Coherent Legal System for the Ecosystem Approach' in C. Voigt (ed), *Rule of Law for Nature. New Dimensions and Ideas in Environmental law* (CUP 2013), pp. 158-74, at p. 167; and H.C. Bugge, 'Twelve Fundamental Challenges in Environmental Law' in C. Voigt (ed), *Rule of Law for Nature. New Dimensions and Ideas in Environmental law* (CUP 2013), pp. 3-27, at p. 23.)

In the practical interpretation and application of BAT this would entail the following. First of all, in determining what the BAT are the balance between its three elements (best, viable, and accessible) has to be struck differently, so that the targets and subsequent emission levels are more ambitious.[160] On top, the emission levels achievable with current techniques should be used as the absolute lower threshold, rather than being the accepted reference for permit setting for the next decade.[161] Instead emission levels corresponding with the most promising emerging techniques could be used as the reference for permit setting,[162] in order to keep pressure on operators to achieve lower emissions as soon as possible. Additionally, the interval between reviews of achievable emissions should be shorter and cross-examination between technologies using different energy sources should also take place.[163] The latter could then lead to phasing-out the most polluting production techniques, such as those using lignite or coal, which are at the moment still described as BAT. This novel approach could ensure that the use of BAT leads to 'technology forcing' which has been identified as a potential strong tool for innovation.[164] Furthermore, as technology neutral regulation is not the same as 'technologically blind' regulation, and because this neutrality is not the sole regulatory purpose,[165] the concept of BAT could bring these elements together.

5.5. Conclusions

To recapitulate, this article has identified the following. Technology neutrality as a regulatory principle is primarily aimed at future proofing legislation, and leaving industry sufficient room to develop new technologies. However, it appears that the sought-after effectiveness of this regulatory tool is based on the assumptions that (i) markets function under perfect (efficient) competition and (ii) there are no externalities, i.e. that there are no market failures at force.[166] Yet, in reality matters are much more complex and market failures are persistent, which undermines

160 To achieve this, it might also be necessary to reduce the influence of industry in determining which techniques are 'reasonably available' (as required by IED, n. 6 above, art. 3(10)), as too much input from industry entails the risk of increased focus on economic aspects, which could lower the level of ecosystem protection (as also mentioned in n. 117 above). On top, such influence may politicize the determination of BAT, as also acknowledged in Bell, n. 6 above, at pp. 524-5). However, others argue that the success of R&D programmes seems to (partially) hinge on industry participation, so that the input from and participation of industry is crucial. (Jaffe, Newell & Stavins 2005, n. 138 above, at p. 171.)

161 As this is roughly how often BREFs are reviewed.

162 Such new technologies are currently already described, and thus to an extent embedded, in the BREFs.

163 Currently, for instance, different ways of producing coal-based electricity are compared, but these are not compared to using gas or biomass instead.

164 See para. 5.3 of this article or Jänicke & Lindemann, n. 114 above, at p. 132.

165 U. Kamecke & T. Körber, 'Technological Neutrality in the EC Regulatory Framework for Electronic Communications: A Good Principle Widely Misunderstood' (2008) 5 *European Competition Law Review,* pp. 330-7, at 335.

166 Gawel *et alia,* n. 30 above, at pp. 2-3.

the case for technology neutral legislation.[167] On the basis of the preconditions for the desirability of technology neutrality as sketched by Reed,[168] we may conclude that the aim of future proofing legislation seems to overstretch our capabilities in practice, while the desire to be able to absorb new technologies in existing legislation comes at the detriment of the ability to steer production and consumption in a more sustainable direction.

Moreover, large technical systems consisting of strongly interdependent elements, such as the energy industry at large, tend to favour slow and smooth changes over abrupt, drastic innovations.[169] This preference is currently maintained through the existing legal framework and perpetuated by existing institutional structures.[170] The prevailing legal approach of setting higher standards step-by-step leads only to incremental change rather than radical innovation (and implementation) of energy technologies.[171] As such, technology neutrality alone will unlikely bring about the required innovations, both at a technical and a legal level. While technology neutrality may reduce the risk of new developments falling outside the scope of existing laws, much more is needed to actually incentivize innovations.

On top, ecological governance requires a legal system that prioritizes a focus on enhancing ecosystem resilience and includes 'adequate policies for the consideration of risks and uncertainties'.[172] Particularly important is then how new insights and changed circumstances are subsequently incorporated in decision making as well as in the legal system at large. Adaptability is furthermore important to facilitate breakthrough technologies and to avoid a regulatory framework that creates lock-ins into insufficiently ambitious or outdated standards or technologies.[173] Thus, this new approach must be based on institutionalised learning, enhance multi-level governance, set ambitious targets and have the power to steer, and be flexible and adaptive, in order to deal with endemic uncertainties and progressive insights.

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167 As also affirmed by P. Lehmann & P. Söderholm, 'Technology-neutral or Technology-specific? Designing Support Schemes for Renewable Energies Cost-effectively', IAEE Energy Forum, Antalya Special Issue 2015, pp. 13-5, at 14.

168 See the introduction of this article (around n. 16 above).

169 Bellantuono, n. 115 above, at p. 9. This tardiness is exacerbated by the fact that the sector is largely network dependent and characterised by long-term investments, leading to high path dependency, as touched upon in para. 5.2.1.

170 To foster innovation, not only technical change is needed, but also radical institutional change. (ibid, at p. 1; affirmed (analogously) by P. Martin, J. Williams & A. Kennedy, 'Creating Next Generation Rural Landscape Governance: The Challenge for Environmental Law Scholarship' in P. Martin *et alia* (eds), *Environmental Governance and Sustainability* (Edward Elgar 2012), pp. 46-79, at 57 *et seq*.)

171 Verschuuren & Bink, n. 114 above, at pp. 9 & 11. This situation is aggravated by the embeddedness of the current technologies and infrastructures.

172 Ebbesson, n. 18 above, at p. 419.

173 COM(2011) 899, n. 95 above, at p. 7. Such lock-ins would create barriers to eco-innovation.

These notions have major implications for the design of our legal frameworks. First of all, devising a legal system aimed at adaptability has implications for its degree of legal certainty. There is fundamental tension between the dual desires for stability and flexibility that lies at the heart of the debate on how governance systems can cope with complexity.[174] Legal certainty will essentially have to be transformed from a 'right' to maintain a certain situation or expectation, to a 'right' to be able to know what kind of changes to expect and when to expect them. Similarly, safeguards should be installed to avoid arbitrariness in making value judgments in decisions in individual cases.[175]

Literature points out that there is no 'one size fits all' solution, but that rather a mix of legal instruments is needed and that these must be coupled with monitoring and enforcement.[176] As a consequence, most authors advocate a combination of technology neutral and technology specific policies. Thus, 'the optimal set of […] policies likely also includes instruments designed explicitly to foster innovation and possibly technology diffusion, as distinct from environmental policies that stimulate new technology as a side effect of internalizing environmental externalities.'[177] Others argue that to foster innovation functional or performance norms must be adopted, instead of prescribing specific techniques.[178] Such performance and technology standards can be explicitly used to force (and forge?) new technologies, by 'mandating

174 A. Duit *et alia*, 'Governance, complexity, and resilience' (2010) 20(3) *Global Environmental Change,* pp. 363-68, at p. 366.

175 Specifying and objectifying the required ecological basis for such judgments could limit the chance of decisions becoming arbitrary or political. (On the challenges that value judgments pose, see more elaborately: Platjouw, n. 159 above, at pp. 167-72.)

176 See, for instance, M.J. Faure, 'Instruments for Environmental Governance: What Works?' in P. Martin *et alia* (eds), *Environmental Governance and Sustainability (*Edward Elgar 2012), pp. 3-23, at p. 12. Many authors and institutions advocate market-based instruments as more powerful incentives for innovation, but empirical evidence that they are more effective than 'old-fashioned' command-and-control measures is not conclusive. (Bellantuono, n. 115 above, at p. 12; However, Jaffe, Newell & Stavins disagree. (Jaffe, Newell & Stavins 2004, n. 113 above, at p. 55.) Some say that '[i]nnovation-oriented environmental policy is most likely to succeed if regulatory 'fine-tuning' through command and control measures (a 'regulatory core') is complemented with market-based 'trend-steering' through economic instruments' especially if 'flanked with supporting instruments'. (Jänicke & Lindemann, n 114 above, at p. 135.)

177 Jaffe, Newell & Stavins 2005, n. 138 above, at p. 169. At the same time, these authors acknowledge that too specific regulation may actually stifle innovation (ibid, at p. 171). Other authors also acknowledge this paradox with legislation that steers toward innovation; *inter alia* J. Spaans, 'Circulaire economie: Meer dan minder afval alleen' in Vereniging voor Milieurecht, *Met recht naar een circulaire economie* VMR 2017-1 (Boom 2017), pp. 151-65, at p. 158.

178 E.g. B. Worthington, 'Why Europe must back a technology-neutral energy policy' (2015) Europe's World (17 March 2015), available at: http://europesworld.org/2015/03/17/europe-must-back-technology-neutral-energy-policy/#.V_IIC037WUk. On top, by using performance or technology standards as awarding criteria in tendering, public procurement can also foster innovation, argues Backes. (See n. 91 above, at p. 56.)

performance levels that are not currently viewed as technologically feasible or mandating technologies that are not fully developed.'[179] This indeed calls for a combination of technology specific and technology neutral rules, which could be effectuated via the layered norm setting as implemented via the (enhanced and expanded) BAT concept.

Structural adaptability to changing circumstances allows us to facilitate new technologies, (potential) changes in energy system functionalities and/or consumer behaviour. It is argued that 'only those countries with the capacity to adapt their regulatory frameworks to the needs of an accelerated technological development will rise to the challenge posed by climate change.'[180] On top, institutionalized integration of progressive insights would allow us to amend our activities in line with an enhanced understanding of these actions on, and within, our environment and the ecosystems we are part of. Societies aimed at strengthening the ability to deal with uncertainties and surprises are better equipped to sustain and absorb stress, external interference and complex changes, than societies aimed controlling nature, maintaining a given social or ecological situation, or countering changes.[181]

179 Jaffe, Newell & Stavins 2004, n. 113 above, at p. 50.
180 Bellantuono, n. 115 above, at p. 15.
181 Ebbesson, n. 18 above, at p. 414.

Chapter Six
Conclusion

6.1. Implementing a holistic approach in EU energy law

From the onset, this dissertation has taken a broad view as to how we might construct a more sustainable society. Obviously, being a legal scholar, emphasis lay on how law might contribute to that goal. In this, I have used EU energy law as the concrete focal point, because of the central role that energy plays in achieving sustainability for society as a whole. I have not addressed the full body of EU energy law, but merely used it as lens and as an illustration of regulatory potential. However, the further I progressed in my research, the more evidence I encountered that law as a tool for sustainability is powerful, but limited. The vision of ecological governance that I have used as guidance throughout my research entails much more fundamental changes to societal structures than those that can be achieved through legislative amendments.

Thus, I have found that not only do the current rules generally fall short in implementing a holistic approach, even if these rules were perfectly holistic, the transition to ecological governance would not be complete. For that to be achieved, more profound changes are needed which greatly exceed the legal sphere and will permeate all aspects of society, including the economy. Most noteworthy, I have found that ecological governance cannot be fully implemented without reconsidering the assumptions that underlie the policies and the economic structures upon which the legal frameworks are subsequently based. On the basis of my findings, I therefore come to conclusion that the transition to a sustainable society can only be successful if it adheres to three principles: (i) we must be humble in how we go about our business; (ii) we have to think circular, rather than linear, in the design of our policies; and (iii) we have to accept limits to (economic) growth, or at the very minimum, accept increased restraints on human activities.

I am aware that these principles are bold statements conveying a controversial view, thus requiring more in-depth explanation and (perhaps) justification. I will use this conclusion to do just that. I will start by providing answers to the research questions, as sketched in the introduction. The legal analysis conducted for this dissertation has consisted of essentially four sub-themes that each answered two research questions, which are listed below. After discussing these eight questions, I will address the broader implications of my findings. Then, I move on to connecting the dots and will come back to the overall research theme of how we might implement a holistic approach in EU energy law and what this means for the design of EU energy law. Lastly, all this will serve as the basis for taking a helicopter view and this will bring me back to principles just mentioned and the paradigm changes that are needed to execute them.

6.1.1. Answering the research questions

1. How is the sustainability of biomass for energy regulated under EU law?

Biomass is not a uniform product and, as a result, its use for energy purposes is regulated via a broad array of rules. The core of the regulatory framework consists primarily of the Renewable

Energy Directive (RED) and the Industrial Emissions Directive (IED).[1] Most noteworthy, the former contains (*inter alia)* specific rules on the sustainability of biofuels and bioliquids used for transport, while the latter is mainly important in the regulation of (the emissions from) the use of biomass in power plants. This regulatory division between the two main sources of biomass is largely upheld throughout the overall legal framework. In a broader sense, biomass is also covered (depending on its final form) by the general market rules stemming from the Gas and Electricity Directives, as well as the general requirements set by the Energy Efficiency Directive (EED).

Additionally, depending on the type of biomass used as well as its manner of application, various other EU directives apply in parallel. Firstly, for the construction of various facilities for the processing and conversion of biomass, the Environmental Impact Assessment (IEA) Directive has to be abided by. If waste materials will be used in such installations, the Waste Framework Directive (WFD) applies in addition to the IED. On top, for biofuels, the rules from the RED are supplemented by the Fuel Quality Directive (FQD). The latter also reiterates the sustainability criteria that apply to these fuels. The rules on the (sustainable) cultivation of solid biomass are significantly different and largely dependent on its sector of origin. Agricultural biomass is covered by the EU's Common Agricultural Policy (CAP), whereas forestry biomass is regulated at EU level through the Timber Regulation, the Forest Strategy, and the LULUCF Decision. On top, these solid biomass types may also be subject to national rules and voluntary certification schemes.

The above shows that biomass for energy is regulated via a fragmented set of different legal means and diverse instruments. Most noteworthy, the current legal framework makes a clear distinction between biomass used in the form of biofuels and bioliquids in the transport sector, and other forms of biomass used for energy production, most noteworthy solid biomass co-fired in 'traditional' power plants. For such solids, none of the regulatory instruments used contain sustainability criteria that are as comprehensive or as stringent as the criteria from the RED. Thus, the schism has led to the situation that under EU law biofuels and bioliquids are subject to more stringent sustainability criteria than solid biomass or biomass used for other purposes than transport. Most likely, this situation will be remedied under the post-2020 RED, in which it is proposed to expand the scope of application of the sustainability criteria.

1 The latter is largely effectuated though Reference documents on the best available techniques (BREFs). For reasons of simplicity, these are, for the purpose of this conclusion, considered to be an integral part the IED and hence not discussed further.

2. Does this suffice to implement a holistic approach?

If this question were to be answered by a simple yes or no, it would be no. However, the overall picture is more nuanced, as various legislative documents contain (more or less) holistic elements. The IED, for instance, expressly acknowledges the need for an integrated approach to environmental protection due to the interconnectedness of different environmental media. At the same time, the concept of BAT is interpreted and applied rather narrowly. The EIA Directive, which is largely streamlined with the IED, also contains strong holistic elements, as it demands that all environmental effects of, basically, large projects are fully assessed prior to consent. In effect, however, the directive largely has a procedural function, as poor performance of an EIA is a ground for refusal of a permit, but an 'unsustainable' outcome as such is not. The latter provides an indication that implementing a holistic approach requires more than the adoption of life-cycle oriented legislation. From a holistic perspective, the EIA is a near-perfectly designed instrument: it considers the full life cycle of a project, both in terms of direct and indirect effects, is based on the best available knowledge, and assesses any reasonable alternatives. Yet, the power of the IEA to steer decision making in a sustainable direction is much weaker than thusly expected. While all effects are assessed, their magnitude or severity is not necessarily a ground to halt or prohibit specific activities. This is an indication that the difficulty in achieving sustainable practices lies not so much in law itself, but at a more fundamental level.

A holistic instrument with more power to steer can be found in the sustainability criteria of the RED and FQD. Since these criteria consider the full life cycle of biofuels, from cultivation to final usage, irrespective of the geographical location of these raw materials, to a considerable extent they do provide a holistic framework. On top, unsustainable production processes are discouraged by the prohibition to count them towards the RED's targets and by not granting such processes any subsidies. Simultaneously, however, two crucial limitations are in place. Firstly, the effects of indirect land use change (ILUC) are not covered by the criteria, so that these are essentially left aside as externalities. Secondly, the life-cycle approach of the criteria concerns only their material contents. In their scope of application, the criteria are much more limited, as they only apply within the respective frames of the RED and the FQD. This means that they apply only (i) to such fuels used for transport; (ii) in terms of counting these fuels towards the RED's or FQD's targets; and (iii) for showing their eligibility for subsidies under the RED. Thus, biomass applications other than biofuels and bioliquids used in transport are not covered by the criteria, leaving the majority of biomass used for energy outside the scope of these criteria.

These two important omissions have, fortunately, not gone unnoticed and legislative attempts are made to remedy the situation. This has, firstly, led to a significant amendment of the RED, adopted in 2015, to address ILUC-concerns. This amendment has put a cap on the use of so-called 'first generation' biofuels, while providing a minimum target for 'advanced biofuels'. It also imposes stricter GHG reduction targets and amended some of the calculations used. On

top, it introduced additional reporting and monitoring requirements regarding ILUC. A second important legislative change is enshrined in the proposal for the new (post-2020) RED. This new directive is yet to be adopted, but most likely it will extent the applicability of the sustainability criteria to other forms of biomass, i.e. solids agricultural and forestry materials, as well as biogases, all used outside the transport sector. On top, the rules regarding reporting and monitoring of ILUC-issues are further strengthened. These developments show increasing awareness of the need for a coherent and comprehensive legal framework based on a holistic vision of the processes and/or products under scrutiny. However, such an approach is far from implemented in practice.

3. What does ecological governance entail and require?[2]

Ecological governance entails a policy paradigm centred around a continuous strive to reduce the cumulative stress that human activities put on ecosystems. Such stress-reductions have a positive effect on ecosystem resilience, which is required to ensure their 'healthy' functioning. Clearly, such a policy paradigm is far away from current realities, where environmental protection policies are (at best) centred around 'balancing' without acknowledging the factual hierarchy of the Earth as the necessary support-system for human societies as well as for our economies. Bringing policy paradigms in line with this factual hierarchy is an overwhelming task, as it requires nothing short of an overhaul of our economic, societal as well as legal structures.

On the basis of the conducted research, I come to the conclusion that the task at hand can be eased by following the three guiding principles for ecological governance as discerned by Woolley. In essence, these require us to go about our business more humbly, because (i) humankind is an integrated part of nature and not its master; and (ii) we cannot fully oversee and comprehend the effects our activities have on and within ecosystems. In practice, these guiding principles require that we, first and foremost, need to halt developments and reduce consumption in cases where the necessity of an activity cannot be demonstrated or where less disruptive alternatives are available, rather than maintaining our bias towards continuous growth. On top, when acting, we need to deploy only those activities that impact ecosystems the least and continuously strive to substitute activities with less damaging ones. Third, the most polluting practices should be 'sunsetted', i.e. phased out near-immediately. To be able to do his, information is key and, thus, the development of knowledge gets a prominent role under the new paradigm.[3] Coupled with long-term planning this should lead to a coherent ecological policy.

2 In this section only a brief answer to the sub-question is provided, based solely on the findings of Chapter Three of this dissertation (i.e. the article published in RECIEL 2017 26(1)). However, the topic is addressed more broadly and more extensively further on in this chapter.

3 As further addressed under paragraph 6.4.3.

4. Can the concept of 'BAT' be used or modified to implement ecological governance?
The short answer to this question would be: yes, to a large extent it can. The symmetry between Woolley's guiding principles and the BAT concept are striking. The concept of BAT as a legislative instrument is all about reducing consumption (of raw materials and energy) and impacts (e.g. reducing waste) throughout production processes. This runs parallel to the first principle of ecological governance. On top, through the mandatory use of BAT, polluting processes are gradually substituted by less disruptive ones as technological developments progress. Here, the similarity with the second principle is clear. Third, with each revision of a BREF, some of the most polluting practices will be 'sunsetted', as they will no longer considered to be 'the state-of-the-art in technologies' and are subsequently removed from the BAT-conclusions and are thus phased out. Moreover, both concepts reserve a prominent place for assessing alternatives; a process that must be based on the state-of-the-art knowledge and understanding.

Despite these parallels, the BAT-concept as it is currently deployed cannot bring about ecological governance. For that, it would have to be re-interpreted and modified along the following lines. The current use of BAT has its roots in the balancing approach, whereas ecological governance requires prioritisation of environmental concerns. Such a new approach would have several implications for how and when the BAT-concept is used. One implication is that halting developments should be considered as a serious option. Another consequence would be that 'best' in BAT would have to express ecological prevalence and that cost-considerations should play a less prominent role.[4] Furthermore, substitution and 'sunsetting' of the most polluting techniques would have to become explicit aims, rather than unintended side effects of technological progress. For this purpose, a new chapter describing the technologies that are to be phased out could be added to each BREF. All these changes are what I call 'internal modifications' of the concept.

In addition, an 'external modification' of the concept should occur by extending its scope of application, for instance to agriculture. Such external application becomes ever more important, when considering the changing roles and actors involved in the energy sector. These changes are essentially caused by the energy transition, as new technologies emerge and new sectors (most noteworthy the forestry and agricultural sectors) become suppliers to the energy sector. To ensure a consistent application of, for instance, the sustainability criteria for biofuels, it is hence vital to incorporate these new technologies and actors in a coherent legal framework. An expanded scope of application of BAT could accomplish just that. However, this would require greater transparency in production chains and enhanced insights as to the links and interactions between (parts of) these chains. This brings me, once more, to the central role of information

4 At the very minimum, cost-considerations should have a long-term focus, which would already shift the balance significantly in determining what is 'best'.

gathering and the need to further institutionalise progressive learning and subsequent legal adaptivity. The sum of the modifications sketched here, coupled with a long-term focus on enhancing ecosystem resilience, could significantly strengthen (the potential of) the use of BAT as a tool for ecological governance.

5. Is an extended application of mandatory BAT compatible with international trade law?
Before answering this research question, I have to make a critical note about the question itself. The question is based on the notion that current policies, and subsequent legal structures, lean on a tripartite balancing act and hence identify the economic, social and environmental elements as separate entities. However, these three are not necessarily separate domains that can be contrasted, nor do they need balancing as the three aspects are in a hierarchical relationship to each other, so that in the end they are essentially aligned.[5] This perspective triggers doubts on whether assessing the compatibility of trade and the environment is indeed the right approach, or whether instead the whole notion of contrasting the two in the first place should be questioned. Nevertheless, this normative connotation aside, it is currently a reality that trade and the environment are usually contrasted and/or balanced in law. Hence, the question on their compatibility remains valid for now.

Extending the scope of application of BAT as discussed above may affect trade in (energy) commodities as, essentially, this approach boils down to regulating 'processes and production methods' (PPMs). If such rules are subsequently upheld at the EU's borders, they may lead to import restrictions, which in turn may violate trade rules. The controversy lies particularly in the fact that strict EU standards can affect production processes abroad, thus potentially leading to illicit meddling in the internal affairs of another state. Such interference is all the more contested, if the imposed rules target non-physical aspects of a commodity, such as the amount of pollution caused throughout its production process.

The compatibility of said measures with trade rules hence hinges upon the answers to two questions. The first one is to what extent countries can impose rules with extraterritorial effects. The bottom line here is that each country is free to set and uphold its own standards. Clearly, it is a thin line between the right of one state to refuse certain products on their territory, and the right of another to produce their products as they see fit. The second question that must be answered is what constitutes a product. Here, it is of particular importance to determine whether or not the manner of production (e.g. environmental friendly or not) of a commodity can be considered an integrated part or specific trait thereof.

5 I briefly come back to this at the end of paragraph 6.4.

In a nutshell, current rules and case law indicate that EU law is rather permissive towards regulating PPMs. In the case of enforcing BAT-requirements at the EU's borders, the EU's common rules on imports apply, which prohibit quantitative import restrictions. Simultaneously, the rules do not preclude the imposition of such restrictions for reasons of *(inter alia)* protecting the health and life of humans, animals or plants. On top, the Court of Justice of the EU in general holds that process measures upheld at the border are not *per se* inadmissible, as they do not amount to exercising jurisdiction abroad, but rather incentivise jurisdiction through market access. Thus, there seem to be no legal objections to the imposition of import bans that have their basis in EU-wide accepted and applied BAT-standards.

6. Is it in particular compatible with the rules of the World Trade Organization (WTO)?
To be brief: Yes, upholding BAT-requirements at the border of the EU may very well be allowed, as long the same standards are applied internally and to all trading partners alike. However, this view is controversial and requires an elaboration.

Under WTO law, four provisions of the GATT Treaty are of particular relevance to our hypothetical BAT-case.[6] To start with, article I prohibits discrimination between different trading partners, while article III prohibits discrimination against foreign products. Such differential treatment of products is only a violation of WTO rules if the products are considered 'like products'. WTO case law has developed criteria for assessing this likeness, but also asserts that there is no precise definition and that 'likeness' may vary case-by-case. Since ensuring sustainable development is part of the WTO's mandate, and because its treaties must be interpreted in the light of contemporary concerns, I see sufficient leeway to take manufacturing processes into consideration when determining the likeness of products. In this regard, it should also be noted that with energy, and with electricity especially, the currently upheld distinction between a product and a process is rather artificial and may not form a suitable basis for assessment. Thus, particularly when considering energy products, their manner of production may cause products to be 'unlike', which leaves room for differential treatment, so that no violation of articles I and III GATT occurs.

In addition to these two provisions, article XI GATT states that trade restrictions are prohibited if they amount to 'external measures', i.e. applying to imports only. In the case of EU wide BAT standards this is not the case, since they are also applied and upheld internally. Thus, this provision is also not violated. Lastly, even if upholding BAT-requirements at EU-borders were deemed a violation of one of the three provisions mentioned, this might be justifiable under article XX GATT. Under that provision, trade restrictions can be allowed (*inter alia)* for the

6 The provisions from the Energy Charter Treaty are streamlined with the rules of the WTO, and are therefore not discussed separately here.

protection of human, animal or plant life or health, or for the conservation of exhaustible natural resources. The measures taken have to be necessary, non-discriminatory and proportionate. In my analysis, I have found that these conditions are all satisfied.

While the PPM-debate under the WTO umbrella is still ongoing and unsettled, it is clear that its outcome largely depends on the details of the contested measures, and in particular on how they are applied. Forcing another WTO-member to adopt essentially the same policy is not allowed, but setting one's own standards high is. BAT-requirements leave multiple production processes open, thus creating sufficient flexibility and autonomy for other members to choose from, if they wish to import their product onto EU territory. Thus, the envisaged approach of extended use of BAT is non-coercive, proportionate and applied non-discriminatory and, hence, not in violation of trade laws.

7. How is technology neutrality used in legislative design?

The concept of technology neutrality entails the idea that legislation should be designed in a way that ensures that different technologies that offer similar services and/or have similar effects must be regulated in similar manners. First used in ICT regulations, the use of the concept concerned itself primarily with ideas such as online and offline equivalence (e.g. electronic and 'analogue' signatures), but its use has subsequently become more frequent and its application has been broadened significantly.

Behind the use of technology neutral wording in legislative design lie (at least) three aims. First, it is meant to ensure that laws formulate and regulate goals, and not the means through which these are achieved. Laws should therefore not be focusing on specific behaviour or activities, but on the effects of such behaviour or activities. Second, neutral wording is used to avoid unequal treatment of activities or technologies with similar effects and to avoid any hindrance of new (technological) developments that may result from narrow interpretations and formulations of the law. Last, but certainly not least, technology neutrality is aimed at extending the durability of legislation. The use of (broad) neutral wording facilitates the 'absorption' of new technologies under the existing framework without amendments. The flexibility achieved by not 'picking winners' or being too specific is thus essentially aimed at 'future proofing' the existing regulatory framework. In a nutshell, technology neutrality is never an aim in itself, but rather a means to avoid discrimination and to maintain an open, durable legal framework. As such, this legislative instrument can be visualised as a funnel that captures a much broader range of technologies than we can currently envisage and 'pours' them into the existing legislation. Thus, it is a holistic approach to the extent that it enhances the comprehensiveness of the overall legal system.

8. Can the concept be used to foster innovations in the energy sector?

It is difficult to provide a conclusive answer to this question, as it hinges on the following specific variables and distinctions. First, a preliminary distinction must be made between the types of technological change that are considered. On one end of the spectrum, there are incremental changes in technologies; on the other, there are drastic technological changes, i.e. those changes that I consider to be actual innovations. Obviously, the more a technological development deviates from existing technologies, the harder it will generally be to fit it into the existing framework. Thus, the potential for technology neutrality to facilitate incremental changes is higher than it is for facilitating innovations. A second, crucial distinction is between the concept's potential for accommodating changes under the existing legal framework, and its ability to incentivise such technological changes in the first place. Literature research reveals that technology neutral wording does appear to aid the accommodation of new developments, but much more is needed to actually foster changes in technologies. Thus, schematically, the following mixed picture emerges (figure 6.1).[7]

Technology neutrality can…	Accommodate	Incentivise
Incremental change	+	+/-
Innovation	+/-	-

Figure 6.1: The potential of technology neutrality

On top, technology neutral wording in legislation has two main drawbacks that provide contra-indications for using it. To start with, neutral wording may lead to vague formulations, thus negatively impacting legal certainty. In addition, this vagueness can reduce the 'power to steer' production processes in a specific direction. In the field of energy, the latter aspect is particularly worrisome, as changing current production processes is key to reducing emissions and environmental impacts. Hence, in the energy sector specifically, policies aimed at incentivising innovations are crucial. Literature indicates that such innovations can be driven by the imposition of ambitious environmental targets that cannot be met by existing technologies. Additionally, (temporary) positive discrimination can aid the creation of a level playing field for new market entrants and new technologies. Such innovation-oriented policies often require a form of technology specific rules to assist the development and adoption of technological changes.

So, in sum, while technology neutrality certainly has is merits for accommodating incremental changes, the required energy transition demands that we have other priorities than mere non-discrimination between technologies or future proofing current rules. Taken a step further, implementing ecological governance requires even less neutral policies, as it is based on a

7 Due diligence compels me to explicitly reiterate that this figure is based on a literature review, and not on empirical evidence.

normative framework with a focus on enhancing ecosystem functioning and reducing the cumulative stresses thereon. As sketched above under question 3, such an approach demands an adaptive legal framework equipped to deal with endemic uncertainty. Under such a frame, technology neutrality is of subordinate concern.

6.1.2. Applying the findings to (the regulation of) the energy sector

When applying the findings discussed above to the energy sector and its regulation specifically, the following stands out. The regulation of biofuels provides a prominent example of life-cycle oriented regulation. However, such an approach is only taken for a minor fraction of the energy sector and hardly applies to any other energy source or any other (part of a) energy production process. Nevertheless, over the last decades, significant attempts have been made to reduce the impacts of and emissions from energy production and consumption via other means; for instance, by promoting the use of renewable energy under the RED, enhancing energy efficiency through the EED, and by imposing ever-stricter emission limits on industry via the IED. Despite this, the progress made does not keep pace with what we by now know we should be doing, and no holistic, coherent vision seems to underlie the overall policy.[8]

The reluctance to change is not surprising, considering that energy policy is highly political, since abundant energy is an essential precondition for the proper functioning of our economies and our societies. On top, energy is also largely network dependent and characterised by long-term investments, resulting in high path-dependency and a high potential for technological lock-in. Such large technical systems tend to favour incremental change over drastic or sudden innovations. This preference for slow and smooth transitions is even stronger when (as is the case here) 'shockwaves' of technological or regulatory change can have repercussions on energy prices, or its availability or safety, which in turn may affect societal functioning in its broadest sense.[9]

This notion is also reflected in the trifurcated aim of EU energy policy, which leads to the observation that 'greening' energy is not the only concern, nor is it the core of energy policy. Instead, this core is formed by the concept of 'balancing', similar to how the definition of sustainable development is currently interpreted. A risk of such a balancing approach lies in the

8 In this regard, I want to stress that while 'holistic' and 'ecological' approaches are not linguistic synonyms, for the purpose of this dissertation the two terms are closely related. A holistic approach entails considering all relevant elements and impacts in decision making, while maintaining a long-term focus. On such a basis, coupled with the acknowledgement of mankind's factual dependency on nature, the only sensible conclusion is that we need to strive for an ecological vision in decision making. Thus, 'holistic' and 'ecological' largely coincide and thus become almost synonym.

9 On top, any (drastic) policy change will be met by opposition of vested interests, which may temper the political willingness to act in the first place. However, as mentioned in paragraph 1.2.5, analyses of political decision making and democratic legitimation do not form part of this dissertation.

fact that it implies equal footing for each element (whether or not this is accorded in practice is a wholly different matter). This implication obscures the necessity for drastic change that stems from the factual situation that the planet sustains both human societies as well as its economies. Therefore, while I do acknowledge the sensitivities surrounding energy policies and its (sectoral) regulation, as well as the need to take various interests into consideration, I strongly argue that a balancing of diverging aims is an inadequate approach to the challenges we face. Instead, a new, more hierarchical approach is needed that keeps energy production and consumption within planetary and ecological boundaries. In order to assess what that means for energy policy, and in particular to provide an answer to the overall research theme 'how can we implement a holistic approach in energy law', it is necessary to first discuss the broader implications of the findings of the research.

6.2. Broader implications of the findings

6.2.1. Hiatuses in the current approach

The research conducted for this dissertation has identified several hiatuses in the current legislative framework. First and foremost, the current framework is rather fragmented which leads to the implicit neglect of ecological linkages, possibly resulting in inaction or in conflicting action.[10]

On top, administrative discretion may lead to diverging interpretations and applications of the rules.[11] Consistent and coherent application of the rules is important, since 'discretion in law allows decisive weight to be given to other concerns, [so that] ecosystem degradation can lawfully occur.'[12] Furthermore, as illustrated by the rules on biomass, even when the legal framework is designed in a way that considers a product's full life cycle and/or remote effects, a sustainable outcome is not fully assured, as the scope of application of these rules is severely limited.

It has been pointed out that the legal frameworks applicable to ecosystems may, on top, be pragmatically inconsistent as they contain rules that regulate the exploitation of natural resources, while they are simultaneously aimed at the conservation of the same ecosystem.[13] This situation is exacerbated by the notion that both the definition of 'sustainable development' and energy policy in a broader sense are also characterised by weighing and balancing and hence

10 F.M. Platjouw, *Environmental Law and the Ecosystem Approach: Maintaining ecological integrity through consistency in law* (Routledge 2016), at p. 114 & 116.

11 As discussed at length, in: ibid, at pp. 121-140.

12 Ibid, at p. 178.

13 Ibid, at p. 199.

by potentially conflicting goals.[14] As a result, the actual level of environmental protection is to a great extent dependent on how exactly the weighing and balancing assessments are carried out. Thus the 'maintenance of ecosystem integrity [may] become […] subject to political priorities rather than being the result of specific legal rules.'[15] As the legal framework is furthermore based on an economic system that advocates continuous growth, the economic aspect is generally given more weight than the environmental aspect. Essentially, this leads to 'legally protected consumption, rooted in strong notions of property rights and personal freedom.'[16] As such, the current legal framework is ill-equipped to address the environmental issues at hand. Law thus falls short, both in terms of its contents, i.e. its material norms, as well as its context, i.e. its institutionalised 'balancing' that essentially contrasts the environment with the economy and treats them as separate domains, allowing for unsustainable outcomes.

6.2.2. Required levels of change

The above shows that to implement ecological governance, major changes are needed. I have identified (at least) three levels of such required change. Starting at the most 'shallow' level, progress towards ecological governance can already be made by addressing and reducing the current fragmentation of the legal framework. This fragmentation has a vertical as well as a horizontal dimension.[17] Vertical fragmentation is caused by the existence of several layers of governance, leading to (partially) different laws being applicable at the international, European, national and/or local level. It also means that different actors are involved in the application and interpretation of the existing rules, enhancing the risk for divergence. Fragmentation also cripples our ability to integrate information and coordinate effective responses.[18] Resolving this segmentation requires enhanced coordination between the various layers of governance. It is crucial to do so, because fragmented governance structures are in part debit to horizontal fragmentation.[19] The latter refers to the compartmentalisation of (environmental) laws. While 'integrated approaches' are increasingly advocated and implemented to overcome the traditional sectoral approach to environmental regulation, so far this has not lead to a coherent, comprehensive strategy. Thus, different laws still exist for the protection of different

14 In the short term these goals can be conflicting, but in the long term they coincide, as will be addressed in paragraph .

15 Platjouw (n 10) at p. 179. I have come to a similar conclusion in R.A. Giljam, 'Schone lucht of schone schijn? Europese regulering van de emissies van NOx en fijn stof naar lucht door moderne kolencentrales' (2013) 1 *Nederlands Tijdschrift voor Energierecht* pp. 4-15, at p. 12.

16 G. Garver, 'The rule of ecological Law: The legal complement to degrowth economics' (2013) 5 S*ustainability* 316-337, at p. 325.

17 Platjouw (n 10) at pp. 99-100.

18 C. Folke *et alia,* 'Reconnecting to the Biosphere', (2011) 40 *AMBIO* pp. 719-738, available at https://doi.org/10.1007/s13280-011-0184-y, at p. 730. How we might improve our ability to valuate information is addressed in more detail in paragraph .

19 Platjouw (n 10) at p. 108.

environmental media (e.g. water, soil and air) as well as for different parts of a product cycle (e.g. manufacturing or waste production). The resulting 'fragmented structures of environmental law do not fit well with the nature of ecosystems as complex adaptive systems.'[20]

A second, 'deeper' level of change would be to amend the material norms of the existing legal framework in order to gear them towards ecological governance. An example of change at this level is the amended BAT concept as discussed in this dissertation. I have gone at great length to show that much can be gained by using this tried-and-tested concept, but at the same time it is important to point out its limitations. In particular, I want to stress here that, for change to be effectively implemented, it is crucial that (policy) interventions occur at high leverage points, so that a relatively minor change will have effects throughout the entire system and may thus affect its general direction. In this respect, legal amendments can be regarded as important, but cannot be considered the highest point of leverage.[21]

This brings me to the third, and most fundamental, level of change: the need to challenge the assumptions underlying the legal framework and/or the paradigms that prevail in the economic and governance structures behind it. Without addressing the wrongs at this deepest level, any attempt at reducing fragmentation or inconsistent application of the norms is essentially a palliative measure. Likewise, even drastic amendment of the material norms themselves would amount to no more than cosmetic measures.[22] It is by now quite clear that current means and levels of environmental protection are insufficient to maintain ecosystem integrity. It is therefore time to acknowledge that current (legal) structures are grossly inadequate to address the issues at hand. Remedying the situation requires more than 'mere' amendment of the rules -or as one author puts it: we cannot simply regulate our way out.[23] In fact, it requires vigorous revision of the rules of the game. Thus, essentially, we need to reinvent (our attitudes towards) our economic and legal structures and the assumptions underlying them. If we do not, we will continue to overshoot the planetary boundaries we find ourselves confronted with.

20 Ibid, at p. 25.

21 D.H. Meadows, *Leverage Points: Places to Intervene in a System* (The Sustainability Institute 1999), available at http://donellameadows.org., at p. 6.

22 Just to be clear: implementing change at these levels ís important, but can only lead to ecological governance if such measures are executed in conjunction with altering the underlying paradigms. Hence, I consider these changes to be of secondary importance.

23 Thomas Friedman, *Hot, flat and crowded: why we need a green revolution--and how it can renew America* (Farrar, Straus & Giroux 2008), at p. 243.

6.3. Connecting the dots: the overall research theme

6.3.1. General

As mentioned before, this dissertation has used EU energy law as a lens, rather than discussing the full body of it. I have found, throughout the research conducted for this dissertation, that various elements of a holistic approach can be found in EU energy law. However, I also found that a coherent vision or systematic ecological (or even 'sustainable') approach behind them is currently lacking.[24] As such, this dissertation has identified hiatuses in the current framework, highlighted areas of attention, and hinted at directions of change. First and foremost, in general, it appears that the growth paradigm and the fear of potential repercussions on trade and/or the economy have an overall damping effect on the willingness to take full-scale holistic, ecological measures. This has led us to develop policies aimed more at countering the symptoms of the problem than at fighting its actual causes.

The current EU biofuels policy is illustrative in this respect. On the one hand, the rules show that we can actually introduce circular approaches in law, but at same time they illustrate that the fear of trade repercussions is real and impacts legislative design.[25] As a result, biofuels have to be sustainable only to the extent that they do not conflict with trade law. By this, I mean that unsustainable production and trade remain unhindered, but are simply not eligible for subsidies and cannot be counted towards renewable energy targets. On top, similar sustainability rules do not (yet) apply to solid biomass, which makes up a much more significant share of renewable energy.[26] These observations signify the importance of coherency in our legislative design, and, unfortunately, the lack thereof, even in the most elaborate example of circular design that I have been able to find. It also illustrates the prevalence of economic arguments over ensuring sustainability and our tendency to address the issues at hand with interventions that have below-optimal leverage in transitioning to a new energy system.

In addition to these general fears just discussed, for the regulation of the energy sector specifically these concerns are heightened by the potential impact of 'drastic' sustainability measures on the

24 The European Commission would disagree with me, as they have explicitly stated that 'the EU's climate and energy policy has followed a holistic design.' See European Commission, 'Accelerating Clean Energy Innovation' (Communication) COM(2016) 763 final, at p. 3.

25 According to Schmeichel, the sustainability criteria 'appear to have been drafted with the requirements of international trade law in mind' and it seems this has reduced their stringency. See A. Schmeichel, *Towards Sustainability of Biomass Importation – An Assessment of the EU Renewable Energy Directive* (Europa Law 2014), at p. 264.

26 By the looks of it, this situation will be remedied under the post-2020 RED; see the Annex I of this dissertation.

security of energy supply as well as on energy prices.[27] These are indeed important factors to consider, as energy is the 'life blood of society'. Thus, disruptions in supply could severely impact the deployment and execution of economic and societal activities. On top, the affordability of energy could further hamper human activities and may even lead to (deteriorated) 'energy poverty' for specific vulnerable groups.[28] While these are grave concerns, it must nevertheless be borne in mind that these are mainly short-term factors. In the longer run, the three seemingly diverging aims are much more aligned. In the end, the switch to renewable energy sources serves long-term security of supply as we are running out of fossil fuels. According to general economic theory, such scarcity will also drive up energy prices, so that the potential for energy poverty may not be very different from when we make the switch now. Furthermore, research has shown that fast-forwarding the transition now will save significant costs in the future,[29] not to mention the positive effects that a swift transition would have on people's well-being and overall quality of life by keeping the planet liveable.

To ensure such a smooth and swift transition, I believe it is vital that it is backed by a coherent, comprehensive vision. Thus, to implement a holistic approach throughout the energy sector it is imperative to develop some sort of a 'master plan'. I have found that ecological governance is a suitable candidate for this task.

6.3.2. BAT

This ecological governance would require us to (i) reduce overall consumption, or for that reason even halt specific developments all together, (ii) progressively replace activities and technologies with less disruptive ones, and (iii) swiftly phase out the most damaging practises. Due to the parallels that these principles show with the existing concept of BAT, much of this dissertation has been devoted to assessing the potential of BAT for implementing ecological governance in the energy sector. In a nutshell, I have concluded that major progress could be made by expanding this existing concept. The European Commission has also stressed the importance of BAT as well

27 Security of supply entails the availability of energy as well as the adequacy of the required infrastructure. This adequacy entails both the sufficiency of the physical networks (i.e. enough cables and pipelines) as well as the need to balance them. The latter is usually more complicated with volatile renewable sources than with (more steady) fossil ones, but innovative (technological) solutions are increasingly found and implemented (e.g. via smart technologies or new storage options).

28 In the EU, 50 million people are already affected by energy poverty, estimates the European Commission (in: Commission, 'Third Report on the State of the Energy Union' (Communication) COM (2017) 688 final, at p. 7). More information can be found at the website of the EU Energy Poverty Observatory, which was launched 29 January 2018; see: https://www.energypoverty.eu/.

29 Many studies have been conducted on the costs of climate change measures, and while the detailed calculations and estimates may differ, there is a general consensus that acting now is significantly cheaper than acting later. The most influential report is probably N. Stern, *Stern Review: The Economics of Climate Change* (2006).

as innovative processes in enhancing the circularity of the production side of the economy.[30] However, to be geared towards an ecological approach significant amendments would have to be made. Partly, these would be textual changes to expand its scope of application and to prioritise a focus on reducing the cumulative stresses on ecosystems. Partly, however, much can already be achieved without legislative amendments, merely by reinterpreting how the concept is applied.

Admittedly, the current manner of applying the concept does not provide a significant push to technological innovations, as it primarily facilitates incremental change. On its own, the use of BAT does currently not incentivise the development or marketing of innovative technologies. However, a strict ecological focus and subsequent progressive standard-tightening could provide just such a stimulus. A prerequisite would then be to abstain from diverging (national or local) interpretations and applications that could result from broad or vague formulations, while maintaining the ability for case-by-case assessment and adaptive management.

Then, there is a second remark to be made about the potential of BAT in aiding the energy transition. While innovations are crucial for it, over-confidence in technological progress also bears an inherent threat to this same transition. This paradoxical situation stems from the fact that innovations do not address the growth-paradigm that underlies them. Thus, growth in consumption can still outpace the reduction of the impacts on ecosystems that was achieved through these innovations.[31] As a result, nothing is essentially done to break the cycle. This way technological innovations may only reinforce the untenable growth-paradigm and keep us locked-in in unsustainable practices. Thus, one has to conclude that, while innovations are essential to achieve sustainability, on their own they are not enough.[32]

In addition to this limitation inherent in innovations, it must also be stressed that the role and capability of legislation itself to implement the required changes is also restricted. While rules are powerful tools in shaping behaviour, they are not the highest point of leverage in the quest for ecological governance.[33] Thus, a broader array of measures and changes is needed to fully implement an ecological approach to energy production and consumption.

30 COM (2015) 614 final (below, n 89) at p. 5.

31 If, for instance, a new car engine emits less CO2 per mile, but its mileage is subsequently increased ('because it is greener') the net-effect can be zero, or overall emissions may even increase.

32 J.D. Sterman, 'Sustaining Sustainability: Creating a Systems Science in a Fragmented Academy and Polarized World' in M.P. Weinstein and R.E. Turner (eds.), *Sustainability Science: The Emerging Paradigm and the Urban Environment* (Springer Science 2012), pp. 21-58, at p. 52.

33 Meadows (n 21) at p. 14.

6.3.3. Paradigm change

In fact, implementing full ecological governance in EU energy law would require a much more fundamental overhaul of economic and legal structures, as well as broad 'psychological' or societal changes, such as mentality and behavioural changes and a political course with a renewed focus. I therefore reiterate that a paradigm change is much needed: We need to limit growth and devise a new economic model that accords with known (and unknown) planetary boundaries. This would have profound implications for our current tendency to centre our policies around 'balancing'. This balancing occurs in defining sustainable development, in defining the aims of energy policy, as well as in defining the BAT.[34] As a consequence of a paradigm change, all these definitions would have to be recalibrated. A secondary step would then be to amend our legal structures accordingly.

6.4. Working towards ecological energy law

Thus, energy law should come to entail holistic management, based on best available knowledge, and aimed at satisfying human needs, without (further) compromising the integrity of ecosystems.[35]

On the basis of the core features of ecological law as identified in literature,[36] in practice an ecological focus would entail the following amendments in EU energy law. First and foremost, energy law should acknowledge that humans are part of earth's life systems, and that ecological limits must have primacy over social and economic regimes. For this reason, and to ensure the fair sharing of resources among present and future generations of humans and other life, energy law must also exercise precaution about crossing global ecological boundaries. These notions should permeate all applications of energy law. Furthermore, the rules should focus on radically reducing material and energy throughput. On top, adaptability as well as research and monitoring should form an institutionalised, integrated part of energy law. To an extent, such monitoring already takes place, most noteworthy under the requirements of the EIA and SEA Directives, as well as under the extended ILUC monitoring requirements. Nevertheless, this monitoring and reporting should be done more consistently and consequentially, and should especially be coupled with subsequent adaptability of policies and/or legal frameworks, if so

34 Additionally, Platjouw (n 10) extensively points out that balancing also occurs in administrative decision making, when use is made of discretionary powers.

35 These are the three core elements of the ecosystem approach in international law, as identified by Trouwborst. See: A. Trouwborst, 'The Precautionary Principle and the Ecosystem Approach in International Law: Differences, Similarities and Linkages' (2009) 18(1) Review of European, Comparative & International Environmental Law (RECIEL) pp. 26-37, at p. 28.

36 Garver identifies ten of such features. I will not go into all of them here, as Garver's discussion focuses on a global rule of ecological law, which is much broader than the geographically and thematically limited scope of EU energy law. For a full discussion of all features, see Garver (n 16), pp. 325-330; they are also conveniently listed on p. 316 of said article.

required to maintain an ecological focus. These notions could be effectuated via institutionalised scrutiny of policies and/or legislation by an independent auditor or an 'ecological committee' with a specific mandate to keep the focus on enhancing ecosystem functionality and reducing the overall stresses that our actions put on our environment, similar to what has been suggested earlier in this dissertation.[37]

6.4.1. Ecological BAT approach

This brings me, once more, to the concept of BAT, which has significant parallels with the latter three criteria, i.e. reducing material and energy use, adaptivity, and rolling review. Resilience literature furthermore indicates that legal structures should display the following five traits, in order to effectively govern complex, dynamic systems. The developed framework must be flexible towards change, open for broad participation, make use of multilevel governance, promote learning, and (I cannot reiterate this enough) be adaptive.[38] All these traits are currently already present in the BAT concept. Coupled with Woolley's guiding principles for ecological governance, an ecologically focused BAT concept could, in concrete terms, entail the following.

First and foremost, the ecological application of BAT would form a ground for halting (i.e. refusing permits for) specific damaging developments on EU territory. On top, similar to what is now applied to biofuels, these BAT-standards could be applied, irrespective of where production takes place. However, ecological BAT-standards would take matters a step further and implement accountability for the full life cycle; hence, limiting the imports of energy sources and energy materials that fall below the line. Such limitations would apply regardless of whether it concerns primary energy sources, secondary energy sources, such as electricity, or the technologies and materials used to produce energy. An additional amendment would be that a holistic, ecological interpretation of BAT would allow for a comparison of different categories of technologies, which is now not possible. This way, several damaging technologies (e.g. coal-fired combustion) would no longer be considered BAT, because less disruptive alternatives exist (e.g. gas or biomass combustion, or, even better, non-combustion technologies, such as wind or solar installations). Such comparisons could be used (i) as a ground for refusal of individual permit applications, and/or (ii) to identify whole categories of technologies that need to be phased out or are immediately ceased from being considered 'best'.[39]

37 See paragraph 3.5.2. Addressing the institutional details of such an auditor or the potential hurdles in its formation go beyond the scope of this dissertation and are hence not discussed here.

38 Jonas Ebbesson, 'The rule of law in governance of complex socio-ecological changes' (2010) 20(3) Global Environmental Change 414, at p. 414.

39 I have suggested in Chapter Three to include the latter group of technologies in the BREFs in what I have called 'POT/WAT conclusions', see paragraph 3.3.2 of this dissertation.

6.4.2. Ecologically responsible use of biomass

Maintaining - or rather introducing - a similar ecological approach to the use of biomass for energy purposes would have profound implications for the policies taken in this regard. Biomass and biofuels have great potential in reducing carbon emissions, but this potential hinges on a large array of very specific factors, e.g. the source of biomass that is used, how it is grown and transported, as well as the production process used to manufacture the final product. As a result, whether or not the use of biomass is sustainable, depends on the details of the product's full life cycle.[40] Furthermore, the heterogeneity of 'biomass' and the complexity of their respective production chains make it very hard, if not impossible, to draw general conclusions on the desirability of the use of biomass as an energy source.[41] Further complexity is caused by the 'biofuels policy trilemma',[42] due to which environmental, energy and agricultural policies interact. If these interactions are not closely monitored, they may lead to detrimental (environmental) effects, rather than that they alleviate them.

In addition to these general effects, the cultivation of biomass materials and subsequent use thereof also has a broad array of more direct effects on soil, water and air, as well as on biodiversity.[43] Here, the precise details of the full production chain largely determine that specific source's 'emission balance', i.e. whether that specific source is overall 'good' for the climate or not.[44] As most biomass sources furthermore require a lot of space (land) for their cultivation, additional negative effects may occur from increased pressure on (arable) land: the so-called ILUC effects.[45] As a result, biomass sources, and more specifically biofuels, differ greatly in terms of their ecological impacts.[46] The use of (certain) tropical oils is especially worrisome, as their carbon

40 See also A. Cowie *et alia*, 'Environmental Risks and Opportunities of Biofuels' in Y. Le Bouthillier *et alia* (eds), *The Law and Policy of Biofuels* (Edward Elgar 2016) at p. 11.

41 See also P. Martin & E. Le Gal, 'Unpacking the Complexities of Biofuels Policy' in Y. Le Bouthillier *et alia* (eds), *The Law and Policy of Biofuels* (Edward Elgar 2016), at p. 323.

42 J. de Beer, 'Network Governance of Biofuels' in Y. Le Bouthillier *et alia* (eds), *The Law and Policy of Biofuels* (Edward Elgar 2016), at p. 380.

43 Described at greater length in Cowie *et alia* (n 40), at pp. 20-28.

44 Ibid, at p. 29.

45 Seven ways to minimise ILUC effects are described in Cowie *et alia* (n 40), at pp. 13-16.

46 E.g. biogas from manure or organic waste has very different properties than woody biomass that is (co-)fired in a (conventional) power plant to generate electricity, which in turn has very different traits from any kind of biofuel.

footprint is generally much higher than that of the fossil fuel it is meant to replace.[47] Similarly, the use of woody biomass can be overall detrimental if it does not adhere to a (mandatory) cascading use and strict sustainable forest management requirements.

Many of the effects described above can be reduced by close monitoring and threshold-setting, so that in essence risk management becomes a large(r) element in (the design of) biomass-policies. It is also required to 'manage' a complex (and growing) array of actors and industries involved.[48] For this reason Martin and Le Gal argue that a 'governance cocktail' is needed, i.e. a combination of public and private regulations, and different instruments, that makes maximum use of the knowledge that industries hold.[49] While to an extent I agree with this, simultaneously we have to be careful not to create a situation in which the fox is guarding the hen house. For an ecological approach to biomass and biofuels it is essential that detrimental biomass sources and biofuels are banned.

Furthermore, the increased use of (unsustainable) biomass sources invokes more principled questions regarding this usage. Firstly, it has been argued in literature that this usage is not so much fuelled by sustainability concerns, but also by security of supply considerations, as the use of biomass sources reduces the dependency on fossil fuel imports.[50] This notion ties in with what I perceive to be one of the greatest, more fundamental risks of the increased use of biomass: a prolonged dependency on combustion technologies. The most commonly used applications of biomass (i.e. co-firing solid biomass and use of biofuels in vehicles) both rely on combustion and thus lead to vast emissions, resulting in the build-up of a 'carbon debt'. The money, time and effort spent on biomass for energy can thus slow down the transition to a sustainable energy system, as this diverts such money, time, and efforts from being spent on finding more structural solutions. As a result, inadequate legal and economic structures are upheld and path dependency is affirmed, rather than reduced. Therefore, questioning current

47 Concerns are raised especially over Argentinian soy-based oils and even more over Malaysian and Indonesian palm oil, which are both much cheaper than European rapeseed, corn, wheat or sugar beet sources, but current cultivation practices (can) have devastating ecological effects. For this reason, many people and organisations call for a phase out of first generation fuels, and/or an explicit (legal) differentiation between sustainable and unsustainable biofuels; see, e.g. 'EU unable to contain explosion in unsustainable biodiesel imports' (Euractiv.com, 2 May 2018) https://www.euractiv.com/section/agriculture-food/opinion/eu-unable-to-contain-explosion-in-unsustainable-biodiesel-imports/ or 'NGOs tell Commission to listen to science and differentiate biofuels' (Euractiv.com, 8 May 2018) https://www.euractiv.com/section/agriculture-food/news/ngos-tell-commission-to-listen-to-science-and-differentiate-biofuels/.

48 Martin & Le Gal (n 41) at p. 320-321.

49 Ibid, at p. 329.

50 Whether this is effective, since many biomass sources are also imported, is a discussion left aside here. See also Anneleen Kenis & Matthias Lievens, *De mythe van de groene economie* (Epo 2016), at p. 163.

structures is, once more, essential to ensure a sustainable outcome.[51] If the growth paradigm is not challenged, a 'rebound effect' may occur, making it dubious whether the biomass or biofuel used actually replaces fossil fuels, or merely supplements them, thus potentially annihilating any ecological progress made.[52]

In sum, if biomass and biofuels are to be (increasingly) used for energy purposes, this must be done sparingly and with great caution and their sustainability must be closely monitored. Since the overall sustainability of these sources depends on the precise (life-cycle) 'inputs' throughout the full product chain, information and transparency are key. An institutionalised, lifelong learning approach as discussed below will aid the transparency of the production chains and assist in the (rolling) identification of the best technologies and materials to use. Partly, such an approach is being implemented for biofuels via the amendment of the RED in 2015 to address ILUC concerns, and the new RED, which is expected to bring profound changes in the biomass' legal regime by *inter alia* expanding the scope of the sustainability criteria to solid biomass and biogas. However, neither of these documents provide a full scale ecological approach, and the RED will still allow for accounting tricks that in effect lower the 'renewable ambitions' set for the transport sector.[53] Therefore, biomass and biofuels should, at best, provide an intermediate solution that must be accompanied by more structural changes to reduce emissions for transport. The latter could entail allowing the use of these bio-based sources only in those situations where (cumulatively) their sustainability is fully assured, and it is extremely difficult to replace fossil fuels, while in other situations more structural changes to the transport system must be found. Practically, this could for instance mean that biofuels are used for long distance transport, while for shorter distances a combination of (e-)bikes and improved (sustainably run) public transport could be used.[54]

The ecological prioritisation that is stressed and advocated throughout this dissertation is, however, not entirely limitless. While respecting planetary boundaries is absolutely essential for human survival, so is the availability of sufficient and safe energy for all for conducting our activities. Thus, ecological governance in energy law, if it were to be depicted, would come close to resembling the 'doughnut' as sketched by Kate Raworth in her influential book on economics.[55] However, as I still adhere to the necessity of prioritising 'the environment', the final picture would be a combination of the 'hierarchical pie' as shown in the introduction and the

51 Analogous to Einstein's famous quote: we cannot solve our problems with the same thinking we used when we created them.

52 Cowie *et alia* (n 40), at p. 19.

53 Since the double and quintuple counting rules will likely be maintained.

54 Clearly, this is just one example; many other solutions can be thought of.

55 K. Raworth, *Doughnut Economics. Seven Ways to Think Like a 21st-Century Economist* (Random House 2017) at p. 11 for a simple picture, and p. 44 for a more detailed version.

doughnut sketched by Raworth. Visually, this would resemble something like this (Figure 6.2). Thus, an important nuance compared to the picture used in the introduction (Figure 1.1) is the explicit recognition that, while the outer boundary is still formed by ecological limits that must be respected, an inner boundary also exists, which consists of the need to safeguard the security of energy supply as well as a need to avoid energy poverty. Furthermore, a crucial difference with the way sustainable development is currently viewed (aka, three separate circles that partially overlap and where sustainability is found at the intersection of the three) is that under the new paradigm the three elements are not separate domains to be contrasted with one another, but instead all three are (in the long term) served by a vigorous respect for ecological boundaries.

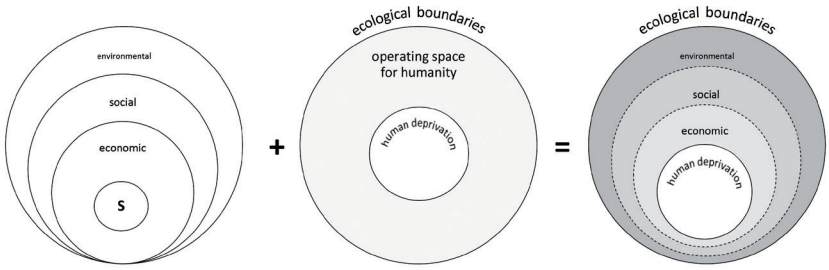

Figure 6.2: Ecological EU energy law

6.4.3. Lifelong learning

In practice, all this means we have a lot to learn on how we can achieve these new goals. To stay with the cooking-terminology of pies and doughnuts used above, we need to get into the kitchen and come up with novel and creative recipes to fulfil our appetite without plundering the fridge. Coming up with such new recipes, and ensuring that they lead to a sustainable 'diet', is, as said before, not an easy task. Partly, this is because the need to regulate complex, adaptive systems challenges existing governance approaches by virtue of ecosystems' adaptivity and self-organisation that lead to unpredictability and uncertainty.[56] Considering the interconnectedness of the various components and their mutual interactions, and increasing our understanding thereof, are hence crucial. The latter demands an approach of lifelong learning. Via institutionalising learning, we can promote knowledge building which will lead to enhanced understanding.[57] I consider this to have at least the following advantages. First, it will reduce uncertainty and unpredictability. This would allow us to better identify and assess potential

56 Platjouw (n 10) at p. 63.

57 An elaborate discussion of how this might be done can be found in Olivia Woolley, *Ecological Governance - Reappraising Law's Role in Protecting Ecosystem Functionality* (CUP 2014), pp. 215-233.

alternatives for the activities we deploy. On top, the acquired knowledge may serve as a basis for a rolling review of our policies, thus positively affecting the effectiveness of legislation in achieving its goals. Progressive insights can also be used to adapt the legal framework to ensure its compatibility with its subject.[58] Last, lifelong learning and the know-how stemming from that can lead to mentality and/or behavioural changes which could progress our societies on the path to ecological governance. If people increasingly become aware of what is required, this lifelong learning can also aid (the perception of) the legitimacy of the policy choices made.[59]

On a more critical note, it is simultaneously important to be aware that enhanced insight is not beatific. While gathering more data and developing enhanced knowledge are always beneficial in strengthening the ecological approach, the same is not necessarily true for how we subsequently valuate and use this information and knowledge. Similar to the scientific approach to conducting life-cycle analyses, two phases must thus be distinguished: the first consists of the largely factual and objective gathering of data; the second comprises the assessment of this data, with explicit room for normative and political weights.[60] Both are complex tasks surrounded by uncertainties and confronted with boundary problems. Determining which impacts to include and what timeframes to consider is extremely difficult. For the energy sector, some guidance can be found in the work of Sørensen who extensively lists which (types of) impacts must at least be considered in the performance of a life-cycle assessment of (parts of) the energy system.[61] He also stresses the importance of not ignoring or excluding impacts that cannot be quantified or monetised and he points out that the monetising methods developed so far are deficient as they can only capture values from an anthropocentric perspective and not from an ecocentric viewpoint.[62] This critique is similar to what I have said about the concept of ecosystem services.[63] While I dismiss that concept as a tool for (normative) decision making, it certainly has its merits for knowledge building. Its use can provide valuable data and insights on what ecosystems are 'worth' at minimum to humankind. At the same time we have to be wary of its use, as it may keep us locked into the idea of nature being in servitude to humankind.

In sum, a broad array of tools is at our disposal for information gathering, ranging from simple observations to full life-cycle analyses to complex modelling and forecasting. All these

58 Once more, I want to point out the parallels that these uses of information show with the use of information in determining BAT.

59 All the more so, if public participation in decision making is simultaneously promoted. See also Woolley (n 57) at pp. 187-214.

60 Bent Sørensen, *Life-Cycle Analysis of Energy Systems: From Methodology to Applications* (RSC Publishing 2011), at p. 6.

61 Ibid, at pp. 35-40.

62 Ibid, e.g. at p. 69. The different methodologies for valuing nature are discussed in more detail in Tom Tietenberg & Lynne Lewis, *Environmental & Natural Resource Management* (Pearson 2012) at pp. 74-101.

63 See Chapter One, paragraph 1.2.2.

tools and the insights stemming from them can be used in a supplementary (and preferably institutionalised) manner in order to further develop our knowledge and understanding of our planet and the role that we play on and in it. This will allow a better, comprehensive comparison of potential policy options and their consequences and possible directions for (technological) solutions.[64]

However, valuing the collected data and information and determining what they mean in terms of policy directions is even more complicated than gathering this data in the first place. It is crucial that in our valuations we are aware of and explicit about the subjectivity involved in such policy decisions. On the one hand, this subjectivity it is caused by the uncertainties and unpredictabilities that surround knowledge building from the onset.[65] This is exacerbated by the fact that these uncertainties and unpredictabilities tend to increase with the length of the time horizon involved. Essentially, this means that many of the scenarios that we sketch and the projections that we subsequently base our policy courses on are no more than educated guesses. As a result, different models generate greatly differing outcomes, with no way to objectively verify which one is accurate.[66] Consequentially, policies are often based on estimations that entail subjective assumptions underlying the model used, rather than on hardcore, objective data. A second subjective element then seeps into decision making when considering the assumptions that policy makers themselves have. The normative choices that must be made in policy formation and subsequent legislative design are by default rather subjective. To give an energy-related example, establishing that there is an inner boundary to ecological governance in terms of ensuring human welfare (as depicted in figure 6.2) is one thing, pinpointing where exactly this boundary lies is another. A crucial subjective element here is how one perceives human 'needs' in contrast to human 'wants'. Most likely, all will agree that energy poverty must be avoided, but what constitutes 'poverty' is much more subjective and coloured by *inter alia* social, cultural and personal norms.[67] Such perceptions are thus of influence on where one sets the lower threshold for ecological governance. While such subjective elements cannot, and need not, be avoided, being explicit about them is essential as they (subconsciously) steer our policies. In fact, ecological governance as discussed throughout this dissertation would compel

64 This coincides with the traditional aim of life-cycle assessments, as mentioned by Sørensen (n 60) at p. 309.

65 In fact, the perception of risks is in itself a subjective element; see Martin & Le Gal (n 41) at p. 333.

66 Illustrative in this respect is, for instance, that one calculator estimates the emissions of a return-flight between the EU and Tokyo at 1.7 tonnes, while another sets it at 15.7, according to Alex Kirby *et alia*, *CCCC Kick the Habit - A UN Guide to Climate Neutrality* (UNEP 2008) at p. 64.

67 The concept of energy poverty and its complexities are not discussed at full length here. The term is merely used to illustrate that interpreting data is not a fully objective task, but that it involves subjective (normative) choices (e.g. on the 'appropriate' level of energy availability) that impact the final policy decisions.

us to implement an explicit normative presumption 'in favour' of ecosystems relative to human activities.

Thus, precaution in all our activities remains in order, especially since we can never know what we do not know. The current precautionary approach requires us to postpone specific activities until sufficient (scientific) information becomes available to assess its impacts, its effects, and its pros and cons. However, in reality complete (scientific) understanding of ecosystems (and the effects of our actions on them) is unfeasible, due to their complexity and variability.[68] As a result, policy decisions must be made, and ecosystem management carried out, even in the absence of (sufficient) knowledge.[69] This brings me to the somewhat paradoxical conclusion that while information gathering and the development of knowledge are key in ecological governance, the data thus found and the insights gained will never provide conclusive answers. Partly, this situation can be overcome by guaranteeing the adaptivity of the management structures in place, so that these are fit to incorporate the latest insights. In addition, it is important to acknowledge this limitation and be humble, once more, in how we go about our business and how we treat our environment.

Along a similar vein, I myself must be humble about the findings and results of this dissertation. The ideas expressed in it have come about gradually; they have evolved as I went along and progressive insights will continue to arise after I have finished this book. Thus, this dissertation does not provide a sure-fire recipe to solve all the problems discussed, as there is no one-size-fits-all solution to them. One can think of other ways to implement ecological governance, and certainly there are various legislative instruments that could be used or devised for this purpose. Diverse authors have suggested such novel approaches, ranging from demanding mandatory proactive precaution to retroactive liability and litigation and anything in between.[70] What all these initiatives, including mine, have in common is the idea that we have to gear our legal systems towards upholding the integrity of ecosystems and their functioning upon which our lives and livelihoods depend. As eloquently put by Garver, we must come to accept that '[a] legal regime that accords with ecological economics, degrowth and global ecological boundaries will undoubtedly impose on human activities limitations that do not exist under the current legal

68 Trouwborst (n 35) at p. 35.

69 Ibid; and Woolley (n 57) at p. 54-55.

70 In the introduction I have already mentioned the works of Polly Higgins, *Eradicating Ecocide: Laws and Governance to Stop the Destruction of the Planet* (Shepheard-Walwyn, 2010); Susana Borràs, 'New Transitions from Human Rights to the Environment to the Rights of Nature' (2016) 5(1) *Transnational Environmental Law* 113; and Christina Voigt (ed), *Rule of Law for Nature. New Dimensions and Ideas in Environmental law* (CUP 2013). Here, I want to also add Roger H.J. Cox, *Revolutie met Recht* (Stichting Planet Prosperity Foundation 2011). Clearly, these are just some examples, as many more works exist and, hence, this list is non-comprehensive.

regimes in most, if not all of the developed world.'[71] While that might seem intrusive to human well-being under the current paradigms, these interests are not as conflicting as one might expect: '[t]he economy, society and environment are not separate domains to be traded off against one another. The economy is embedded in a social and political context, which in turn is embedded in ecosystems upon which all life depends. The interests of business, society and the environment are therefore fundamentally aligned.'[72] If we can manage such a paradigm shift, we will 'have hit a leverage point that totally transforms systems.'[73] Then it will show 'just how quickly the unfeasibly radical can become the feasibly practical.'[74] However, what such a paradigm shift means *in concreto* in terms of legal arrangements and institutional details in the energy sector goes beyond the scope of this dissertation, and requires further research.[75] This dissertation merely points out that ecological governance requires more than legislative adaptations.

6.5. Taking a helicopter view

This dissertation has shown that indeed some of the issues sketched and identified in it can be resolved via legislative amendments. However, the research conducted has also indicated that the core of the problem in keeping (energy) production and consumption patterns in line with the planetary boundaries lies not so much in law itself, but rather in the assumptions underlying the economic structures upon which the legal framework is subsequently based. Therefore, to resolve the current unsustainable situation, the solution needs to be much broader than addressing only the legal system or its fragmentation. Thus, the legal redesign must be coupled with more fundamental re-considerations. On the basis of my findings, I argue that three key aspects of this broader solution stand out particularly and that these should serve as general guiding principles in designing ecological (EU energy) law.

6.5.1. Be humble

First and perhaps foremost, implementing ecological governance compels us to accept and be clear about our limitations and, hence, to exercise humility in how we go about our business. This humility is essentially two-pronged.

71 Garver (n 16) at p. 325.

72 Sterman (n 32) at p. 26.

73 Meadows (n 21) at p. 18.

74 Raworth (n 55) at p. 276.

75 Important questions that remain are thus, e.g.: how could this overhaul be effectuated; can it be done in the same manner for all energy sources and all actors alike, or are the differences too great (i.e. can network-dependent and 'independent' energy sources be regulated similarly or not); and also: what do the answers to all this imply for implementing ecological governance outside the energy sector?

…due to dependency

First of all, we need to explicitly acknowledge our dependency on nature and its ecosystems. Many of our current rules are based on the (implicit) assumption of the supremacy of humankind over nature, rather than as being one of its constituent parts. Hence, one of the challenges lies in seeing ourselves as part of a larger system,[76] and subsequently devising our economic, legal and societal structures accordingly. Essentially, we need to move from an anthropocentric to an ecocentric approach to environmental protection, as many environmental problems stem from the institutionalised, artificial schism between humans and nature. To address the roots of these problems, we need to question not only our supposed supremacy, but also the notions of nature as property, unlimited growth and the flagrant disrespect of planetary (ecological) limits that it causes. This is not an easy task, as these paradigmatic assumptions are expressions of our culture and are thus deeply rooted in our (western, 'civilised') societies.[77] They form our deepest set of beliefs that shape our views on and perceptions of the world,[78] both consciously and subconsciously. As a result, these beliefs largely determine the organisational structure of our societies in which our economies are embedded.

Illustrative in this regard is also the 'ecosystem services' concept that is often hailed as a solution to the environment being treated as an externality. The concept certainly provides a pragmatic solution for bringing ecosystems into consideration in decision making. It is a useful tool to 'clarify the significance of natural capital and ecosystem services for human wellbeing'.[79] At the same time, it is a fallacious concept that reinforces the assumption of nature being in servitude to humankind, and worth protection only to the extent that it benefits our species. Thus, the services-concept 'marks the abandonment of the intrinsic value' of nature.[80] As a result, it shifts ecosystems from being an 'externality' to being 'an asset on [mankind's] balance sheet'.[81] This, for me, is the prime reason to reject the ecosystem services concept as a legislative or policy tool for implementing an ecological approach. My second objection stems from the fact that the concept fully hinges on economic valuations of nature and that its use requires extensive modelling, estimations and projections. This brings me to the second motivation for a more humble approach: the fact that, as a species, we are rather ignorant.

76 Sterman (n 32) at p. 28.
77 Meadows (n 21) at p. 18.
78 Ibid, at p. 17.
79 Folke *et alia* (n 18) at p. 720.
80 A. Michelot & A. Aseeva, 'From Ecosystem Services to Ecological Solidarity' in Laura Westra, Janice Gray & Franz-Theo Gottwald (eds), *The Role of Integrity in the Governance of the Commons. Governance, Ecology, Law, Ethics* (Springer 2017) pp. 37-5, available at https://link.springer.com/book/10.1007/978-3-319-54392-5 at p. 42.
81 Raworth (n 55) at p. 116.

…due to ignorance

Many of our current protective and precautionary measures are, like the ecosystem services concept, based on an accumulation and assessment of data, modelling and the assumption that we (will eventually) have sufficient knowledge to allow us to take decisions on a solid scientific basis. In reality, however, ecosystems are complex adaptive systems characterized by myriad interactions, feedback loops and delayed and diffuse effects and we can therefore not accurately estimate nor predict the impacts of our actions on them.[82] Precisely because of this, Woolley argues that we need to let go of the expectation that we will ever have sufficient knowledge for informed decision making. Thus, we need our legal structures to reflect caution regarding the activities that we allow to take place and humility when it comes to our abilities to model, predict or forecast events, effects and impacts.[83]

Our limited abilities also come to the fore, when considering the idea of externalities. In fact, the very notion of 'external' effects itself is an illustration that our worldview is too narrow and reductionist. In the words of Sterman, 'there are no side effects – just *effects*.'[84] Thus, our limited mental models create a mismatch with the characteristics of complex systems.[85] This is problematic, since '[t]he effectiveness of a governance system in relation to the maintenance of the integrity of a particular ecosystem depends on whether its characteristics match those of the ecosystem it addresses.'[86]

6.5.2. Think circular

To implement ecological governance, it is hence crucial to bring our legal instruments in line with the characteristics of the ecosystems we aim to protect. Most noteworthy we therefore need to implement instruments that are equipped to address non-linear processes. While all processes in life and life itself are circular, the legal and economic structures that are supposed to regulate these are usually not. Moreover, not only are the processes we aim to regulate non-linear, they are usually also characterised by interconnectedness and interdependence, which are reinforced by intricate feedback loops. While negative feedback loops are self-correcting and thus move a system towards an equilibrium, positive feedback loops are self-reinforcing and amplify what is happening within the system.[87] These loops and the system as a whole are then also impacted by delayed and diffuse effects, with unknown time horizons. On top, complex systems are adaptive

82 Our brains are geared toward local and short-term consequences and we tend to ignore interconnections and delayed and distal impacts, argues Sterman (n 32) at p. 26.

83 See also paragraph 6.4.

84 Sterman (n 32) at p. 24.

85 Ibid.

86 Platjouw (n 10) at p. 6.

87 Explained at greater length in, e.g., Sterman (n 32) pp. 26-32. An important example of a positive feedback loop is climate change itself, see, e.g. 'UN Arctic chief: 'Climate change is not linear – it is accelerating'' (Euractiv.com, 19 March 2018) https://www.euractiv.com/section/climate-environment/interview/un-arctic-chief-climate-change-is-not-linear-it-is-accelerating/.

and are hence constantly changing and evolving. As a result, the linear approaches that our brains (and legal systems) are naturally geared towards, do not match the characteristics of our regulatory topic.[88] In recent years, awareness on the importance of implementing circular approaches in law and economics has grown significantly and also received increasing attention of policymakers and regulators.[89] Despite this, such life-cycle oriented approaches are barely executed in practise, as has been shown in this dissertation. Moreover, the increased awareness has not lead policy makers to venture into questioning the paradigms that underlie the current approaches, which brings me to the third aspect of the broader solution that we need.

6.5.3. Limit growth

Much has been said about (the validity of) the growth-paradigm for decades, but it still remains the predominant paradigm in scholarly circles, as well as in practice.[90] While we have by now established that 'we don't know' and 'we are part of it all', we are still a long way from the proactive, normative precautionary approach that these notions should trigger. As a consequence of the need for humility and circularity in our approaches, we need to accept limitations on the activities we deploy and come to terms with the fact that the current growth paradigm is untenable if we are to remain within ecological boundaries.[91] While this is increasingly advocated by scholars and environmentalists, this realization has not yet seeped through to the legislative level, nor to the core of market economic theory. Nevertheless, various authors stipulate that 'the standard economic model offers an inadequate framework to analyse environmental issues characterized by irreversibilities, pure uncertainty and very long time horizons.'[92] Furthermore, as

88 Sterman lists a total of ten traits of systems that impact the effectiveness of policies. These will not all be addressed in detail here, but are nonetheless worth mentioning. In sum, complex systems are constantly changing, tightly coupled, governed by feedback, nonlinear, history dependent, self-organizing, adaptive and evolving, characterized by trade-offs, counterintuitive, and policy resistant. (Sterman (n 32) at p. 25.)

89 As evidenced by the 'integrated approach' of the IED, the rules on biofuels, or, more recently, the Circular Economy Action Plan. (European Commission, 'Closing the loop - An EU action plan for the Circular Economy' (Communication) COM (2015) 614 final.)

90 The starting point of the debate is essentially marked by the influential report of the Club of Rome (D.H. Meadows *et alia, Limits to Growth* (Universe Books 1972)) and has since been advocated and elaborated by many scholars. A quick scan of available literature shows that scholars from various disciplines are involved, and among the list are *inter alia*: T. Jackson, *Prosperity without Growth. Economics for a Finite Planet* (Earthscan 2009); R. Patel, *The Value of Nothing* (Granta Books 2009); various authors that contributed to C. Voigt (ed) (n 70), as well as many others, whose works were partially discussed in this dissertation.

91 Dissenting opinions can be found in Cameron Hepburn & Alex Bowen, 'Prosperity with Growth: Economic Growth, Climate Change and Environmental Limits' in Roger Fouquet (ed), *Handbook on Energy and Climate Change* (Edward Elgar 2013), pp. 617-638, explicitly at pp. 617 & 633.

92 E.g. Platjouw (n 10) p. 92.

infinite economic growth on a finite planet is simply impossible, '[t]he question is not if growth will cease, but when and how.'[93]

Some have argued, and I concur, that the reason that it has been possible to uphold this fallacious assumption for so long, it that its 'success' is largely measured through unrealistic and narrow (mental) models. This is particularly illustrated by the idea that the environment is 'external' to the economy, and can be contrasted or balanced with it. Thus, also, the concept of externalities is usually not considered a flaw of the model used, but rather serves as an explanation for failed (regulatory) interventions.[94] As a result, growth as such is not challenged and reins free to drive (legally protected) environmental degradation and to put ever-increasing pressures on planetary boundaries. What we need is a reversal of thinking (and acting) where we do not use natural capital and labour to create financial means, but where we use financial means to create natural capital.[95]

Not everyone agrees that we need to challenge the growth paradigm. In particular, the 'green economy' is often advocated as a means to address environmental and climatological issues.[96] The idea behind it is that technological advances will sufficiently reduce material throughputs and increase (energy) efficiencies to the extent that sustained growth can be coupled with reduced ecological impacts. Thus, green economists have a high fidelity in technologies and markets to solve the crisis, and therefore come up with solutions that are centred around creating new markets or using market instruments to promote green growth. Once more, growth is thus

93 Sterman (n 32) at p. 31.

94 Ibid, at p. 24.

95 As argued by H.H.F. Wijffels at a meeting of the *Vereniging voor Milieurecht* (VMR, the Dutch Association for Environmental Law) on 10 October 2017.

96 For instance, the EU, the OECD and the UN are advocates of such green growth. See, e.g. the website of the 'Green Growth Knowledge Platform' (http://www.greengrowthknowledge.org/) which is founded by the Global Green Growth Institute, the Organisation for Economic Co-operation and Development, the United Nations Environment Programme, and the World Bank. See also the specific EU website dedicated to green growth, http://ec.europa.eu/environment/green-growth/index_en.htm and its Europe 2020 Strategy.

portrait as (part of the) the solution, while I argue that the current ecological crisis challenges this mantra.[97] In fact, this crisis merely illustrates the failure of the (faith in) markets.[98]

It is exactly because of the continued growth paradigm, that I argue that the green economy cannot deliver the anticipated results. While significant relative impact-reductions might be achieved, this provides no guarantee that this also leads to absolute impact-reductions. Increased efficiency on its own does not necessarily lead to lower consumption levels, precisely because it is coupled with an aim for growth. Practice illustrates that the possibility that the progress made is outpaced by increased consumption is real. This has, for instance, been the case with low-emissions mobility, where '[m]any advances in the past have been offset by growing […] demand.'[99] Similarly, the OECD has acknowledged that 'increasing pressures on the environment from population and economic growth have out-paced the benefits of any efficiency gains.'[100]

Thus, while technological advances are crucial in the transition to ecological governance, green growth, I argue, is not the answer, due to its tendency to offset its own achievements, hence merely postponing 'having to pay the bill'. Simultaneously, I have to acknowledge that I am not an economist and I do not have concrete answers as to how we might design and implement the required new economic structures. This calls for a much broader debate and further research, that go way beyond this dissertation. It begs for answers on, *inter alia,* what is needed at minimum

97 The centrality of growth is based on the idea that growth generates income, which enhances purchasing power, so that people can afford more of whatever they need, whether this is food, sustainable energy, environmentally sound products. Thus, growth becomes a precondition for resolving the current 'shortage' of ecologically friendly practices; as explained by Kenis & Lievens, (n 50) at p. 103. While Kenis and Lievens argue that this reasoning is flawed, Friedman, on the hand, concludes that growth is imperative for human development, as well as for the energy transition. See Friedman (n 23) at p. 186 & 194.

98 According to Nicholas Stern, in Kenis & Lievens (n 50) at p. 127. Friedman diametrically opposes this view and argues that we cannot blame it all on growth. He states that we simply cannot know whether growth must cease or not, as so far we have not given the energy transition, nor the drastic innovations that must accompany it, our best efforts. See Friedman (n 23) at p. 243.

99 European Commission, 'A European Strategy for Low-Emission Mobility' (Communication) COM(2016) 501 final, at p. 3.

100 OECD, *OECD Environmental Outlook to 2030* (OECD 2008), executive summary, p. 6. At the same time, the OECD maintains that 'protecting the environment can go hand-in-hand with continued economic growth' (ibid, at p. 7). More recently, however, the OECD expressed the view that '[t]he current growth model and the mismanagement of natural assets could ultimately undermine human development.' (See OECD, *OECD Environmental Outlook to 2050 - The Consequences of Inaction* (OECD 2012), Summary in English, front page) Nevertheless, it still considers safeguarding long-term economic growth a policy objective (in: OECD, *OECD Environmental Outlook to 2050 - The Consequences of Inaction* (OECD 2012), executive summary, at p. 27).

for human welfare, and triggers questions on (intergenerational) justice and distribution.[101] I do maintain, however, that in order to return to and remain within planetary boundaries, we have to accept limitations on human activities and that such limitations will affect the economy. Climate change is not an environmental crisis as such, it is a societal crisis that has its roots in how societies function, i.e. how they are structured and organised.[102] Therefore, the broader solution that I envisage to resolve the issues I investigated in this dissertation entails addressing the root causes that are embedded in the fallacious assumptions underlying (the regulation of) our economies and our activities. This starts, first of all, by delinking ecosystem protection and the human interest. Our planet deserves protection beyond its function to mankind, to reflect its status as the source of all life and humankind's dependency on it. This compels us to accept limits to economic growth and to come to reflect (in our societal and economic structures) awareness of our subordinate position in relation to nature. These notions then need to be explicitly acknowledged and implemented in (energy) policies and legislation alike, in a manner that accords with the adaptive, circular nature of ecosystems, so that we can progress towards ecological governance in EU energy law.

101 Increased material wealth enhances human welfare to a certain point, in particular if it affects the availability of and access to food, shelter and education. However, a human's ability to flourish depends on many more factors than material wealth alone, especially after a material baseline has been reached. Thus, material growth is not necessarily a prerequisite for prosperity. Admittedly, determining the boundaries is to an extent a subjective activity and I do not know how or where to draw the line. For elaborations, see Jackson (n 90).

102 See also Kenis & Lievens (n 50) at p. 32.

Annex I

Policy update

Policy update

This Annex discusses (the status of) the relevant legislative and policy updates as adopted up to 1 July 2018.[1]

I.1. General amendments and headline targets for 2030

Since the commencement of the work on this dissertation in 2012, various legislative amendments have been implemented. For the purpose if this PhD thesis, the most noteworthy one is Directive (EU) 2015/1513, which significantly amends the RED in order to enhance the sustainability of the biofuels regime. Primarily, this directive puts a cap on so-called 'first generation' biofuels and imposes extra monitoring requirements on Member States regarding ILUC emissions.[2]

The enhanced insights and experiences gained since then, have led to a further strengthening of the biofuels regime under the (proposed) post-2020 framework. This so-called 'clean energy for all Europeans package', or 'fourth energy package', is currently being drafted and debated, on the basis of a comprehensive set of legislative proposals made by the European Commission in 2016.[3] The package consists of eight legislative pieces that combined form the core of the renewed EU energy policy up to 2030 and beyond. The legislative proposals relate to the energy performance in buildings, electricity market design, rules for the regulator ACER, energy efficiency, renewable energy, and governance. At the time of writing (July 2018), political agreement had just been

1 However, for reasons of completeness, I want to point out that on 11 December 2018 amended versions of the drafts discussed in this update have been adopted and signed. (See Commission, 'Commission welcomes political agreement on conclusion of the Clean Energy for All Europeans package' (Press release) 18 December 2018, at http://europa.eu/rapid/press-release_IP-18-6870_en.htm.) A quick scan of the most relevant adopted documents revealed that significant length was (once more) added to the texts. This lengthening was largely due to restructuring and renumbering and partly the result of various new recitals and definitions being inserted. Hence, when reading this chapter, please keep in mind that the references made to specific provision numbers may ultimately not correspond with the numbering of the rules that were eventually adopted. Nevertheless, as no significant amendments appear to have been made in terms of their contents, these latest amendments are not discussed further here, and the focus remains on the changes made prior to 1 July 2018, i.e. this analysis is based on the documents mentioned in footnotes 5 & 6 below.

2 These changes have been summed up in more detail in paragraph 2.6 of this dissertation, and will therefore not be reiterated here.

3 European Commission, 'Commission proposes new rules for consumer centred clean energy transition' (News) 30 Nov. 2016, at: https://ec.europa.eu/energy/en/news/commission-proposes-new-rules-consumer-centred-clean-energy-transition

reached on the (compromise) text of four out of the eight proposals.[4] Not all four are discussed here, but two pieces of legislation deserve an elaboration, as they touch upon the core of this dissertation and address several of the critiques that I have uttered in it. These are the new Renewable Energy Sources Directive ('RED II')[5] and the 'Regulation on the Governance of the Energy Union' ('Governance Regulation'),[6] which will be addressed in more detail in the next sections. On top, it must be mentioned that in May 2018 the 'LULUCF Regulation' was adopted.[7] This Regulation essentially strengthens and updates the 'LULUCF Decision', as discussed in paragraph 2.4.5 of this dissertation. In short, the new regulation demands that Member States have to ensure that GHG emissions from LULUCF are offset by at least an equivalent removal in the period from 2021 to 2030.[8]

4 Agreement was reached on the rules regarding (i) energy efficiency, (ii) the energy performance of buildings, (iii) renewable energy, and (iv) governance. (European Commission, 'The Energy Union gets simplified, robust and transparent governance: Commission welcomes ambitious agreement' (Press release) 20 June 2018, at: http://europa.eu/rapid/press-release_IP-18-4229_en.htm) The new Energy Efficiency Directive ('EED II') - as agreed so far - is: Council, 'Proposal for a Directive of the European Parliament and of the Council amending Directive 2012/27/EU on energy efficiency - Analysis of the final compromise text with a view to agreement' (Note, document 10309/18) 26 June 2018 (interinstitutional file 2016/0376 (COD)). Full information on (the progress in) the legislative process can be found at: https://eur-lex.europa.eu/procedure/EN/2016_376. The new Directive on the energy performance of buildings ('EPBD') is: Directive (EU) 2018/844 of the European Parliament and of the Council of 30 May 2018 amending Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency (EPBD) [2018] OJ L156/75. For further information, see https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/clean-energy-all-europeans.

5 Council, 'Proposal for a Directive of the European Parliament and of the Council on the promotion of the use of energy from renewable sources - Analysis of the final compromise text with a view to agreement' (Note, document 10308/18) 21 June 2018 (interinstitutional file 2016/382 (COD)) ('RED II'). Full information on (the progress in) the legislative process can be found at: https://eur-lex.europa.eu/procedure/EN/2016_382?qid=1531999730641&rid=1.

6 Council, 'Proposal for a Regulation of the European Parliament and of the Council on the Governance of the Energy Union, amending Directive 94/22/EC, Directive 98/70/EC, Directive 2009/31/EC, Regulation (EC) No 663/2009, Regulation (EC) No 715/2009, Directive 2009/73/EC, Council Directive 2009/119/EC, Directive 2010/31/EU, Directive 2012/27/EU, Directive 2013/30/EU and Council Directive (EU) 2015/652 and repealing Regulation (EU) No 525/2013 - Analysis of the final compromise text with a view to agreement' (Note, document 10307/18) 26 June 2018 (interinstitutional file 2016/0375 (COD)) ('Governance Directive'). Full information on (the progress in) the legislative process can be found at: https://eur-lex.europa.eu/procedure/EN/2016_375?qid=1531986474198&rid=1.

7 Regulation (EU) 2018/841 - Inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework, and amending Regulation (EU) No 525/2013 and Decision No 529/2013/EU [2018] OJ L156/1 ('LULUCF Regulation').

8 Ibid, art. 4. Such removals are tradeable between Member States under the Effort Sharing Regulation, which was simultaneously adopted. (This is Regulation (EU) 2018/842 - Binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013 [2018] OJ L156/26.)

The headline targets that have been adopted for 2030 are more ambitious than what was originally envisaged by the Commission in 2014 or what has been proclaimed in the 'Third Report on the State of the Energy Union' of 2017.[9] Agreement was reached to aim (for 2030) for a GHG reduction of 40%, an increase in renewable energy to 32% and a non-binding indicative target of 32.5% for energy efficiency. The latter two targets will, furthermore, be reviewed by 2023 in order to see if they can and/or must be increased further. On top, the new rules implement an explicit, strong connection with the commitments made under the Paris Climate Treaty. The headline targets for 2050 remain unaltered (aiming for 55% renewable energy and a GHG reduction of 80 to 95%),[10] but under the new rules Member States are now required to adopt long-term strategies in order to start progressing towards their 'Paris-obligations'.[11] While the RED and the Governance Regulation still have to go through various steps in the legislative process, and are thus not yet officially adopted, it is worthwhile to discuss the texts agreed upon so far.[12]

I.2. New Renewable Energy Sources Directive

In brief, the new RED ('RED II') entails a drastic overhaul compared to its predecessor.[13] Its general structure has been changed, its contents have been amended significantly and most of the procedural elements and monitoring and reporting requirements have been removed from the RED and were instead incorporated in the new Governance Regulation.[14] Additionally, the emphasis of the new directive has shifted from electricity to heating and cooling and the transport sector, and the preferential treatment of electricity from renewables has been removed entirely. Furthermore, a lot of attention was paid to improving the design and stability of renewables' support schemes and the possibility of opening up national schemes to other members, which may even become mandatory.[15] More elaborate rules were also adopted in

9 These targets were: at least 40% reduction of GHG emissions, at least 27% renewable energy, 25-30% energy efficiency, and 15% interconnection by 2030. See: Commission, 'A policy framework for climate and energy in the period from 2020 to 2030' (Communication) COM(2014) 15 final, at pp. 4, 6 & 8; and Commission, 'Third Report on the State of the Energy Union' (Communication) COM(2017) 688 final, at p. 2.

10 These can be found in: European Commission, 'Energy Roadmap 2050' (Communication) COM (2011) 885 final.

11 Governance Directive (n 6) art. 14 & annex IIa, as addressed in more detail below.

12 As already mentioned in footnote 1, in December 2018 both of these legislative documents have been formally signed. The full text thereof can be found at https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CONSIL:PE_48_2018_REV_1&from=EN (for the new RED) and https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CONSIL:PE_55_2018_REV_1&from=EN (for the Governance Regulation). These documents will not be discussed further here.

13 For a full reference to RED II, see footnote 5.

14 Not all details of the new RED will be addressed here. The Governance Regulation is discussed in paragraph I.3.

15 RED II (n 5) art. 5(5). See also ibid, arts. 4-6.

regard to streamlining and reducing administrative procedures.[16] On top, a prominent place was given to rules on self-consumers and energy communities.[17]

In terms of targets, a new approach is taken, compared to the 'old' RED. While the new directive sets a mandatory target of 32% renewable energy in 2030 for the EU as a whole, it sets no such national targets.[18] It is left to the Member States to set these collectively,[19] but the Commission retains a right to intervene if their contributions are insufficient.[20] Additionally, a sector-specific, indicative target of 1.3 percentage point (p.p.) is introduced for heating and cooling.[21] For the transport sector, an overall target of at least 14% renewables has been set for 2030.[22]

I.2.1. Transport sector rules

While this transport target itself is straightforward, the remainder of the new provision on mainstreaming renewable energy in transport is lengthy and highly complex. This is largely the result of a vigorous (and much needed) revision of the biofuels regime, the outlines of which I will sketch here. To start with, many new definitions were added to the directive, which now refers not only to biomass, biofuels, bioliquids, 'renewable liquid and gaseous transport fuels of non-biological origin' and 'low ILUC-risk fuels' (like the 'old' directive), but also to advanced biofuels, recycled carbon fuels, biowaste, biogas and biomass fuels.[23] These new definitions make it possible to better address the peculiarities of each fuel and their differences in terms of their life-cycle GHG emissions, but it does not aid the clarity of the new rules.

The new provision on renewable energy in transport (article 25) goes at great length to specify in detail how the target of 14% is to be met, and, in particular, which sources may contribute to it to which extent.[24] Similar to the overall EU renewable energy target, no national sub-targets have been set for the transport sector, but Member States themselves are to set indicative trajectories and calculate their respective contributions according to the methodology set out in the directive. Also, the transport-target is subjected to an upward revision clause for 2023. The

16 Ibid, arts. 15-17.
17 Ibid, arts. 21 & 22.
18 Ibid, art. 3(1). However, the Governance Regulation (as discussed in paragraph I.3.) does impose a mandatory trajectory for Member States (Governance Regulation (n 6), art. 4).
19 Following the procedure described in Governance Regulation (n 6) art. 5.
20 RED II (n 5) art. 3(2&3).
21 Ibid, art. 23. On top, Member States are required, on the basis of art. 24, to enable and promote district heating and cooling.
22 Ibid, art. 25(1).
23 Ibid, art. 2. Both the old and the new RED also contain a (nearly identical) list of definitions of various (raw) materials used for the production of biofuels.
24 As a result, the first paragraph of art. 25 of the new RED is now, on its own, almost five pages long.

provision then goes on to specify how, and to what extent, various fuel-types can be counted. This list contains the following.

First of all, 'advanced fuels'[25] must contribute at least 0.2% to the overall target in 2022, 1% in 2025, and 3.5% by 2030. In calculating their shares, these fuels can be counted twice.[26] On top, electricity from renewables that is used in road vehicles counts four times; if it is used in rail transport, it counts 1.5 times. Furthermore, in order to count towards the target, the minimum GHG savings from the use of 'renewable liquid and gaseous transport fuels of non-biological origin' must be at least 70% from 1 January 2021. For recycled carbon fuels, the GHG threshold is to be set by the Commission, before 1 January 2021.[27] The GHG requirements of other (bio) fuel types are addressed in subsequent provisions and annexes of the directive.[28] Additionally, in regard to food- & feed-based bio(mass) fuels, a slow-down-clause has been adopted, demanding that their contribution to the 2030 target can be no more than 1% higher than their contribution was in 2020. Simultaneously, the overall cap of 7% - which was incorporated in the RED in 2015 - has been upheld for these fuels. Member States are free to lower this cap further and may also, for reasons of sustainability, distinguish between different food- and feed-based fuels, taking into account the best available evidence on ILUC impacts.

An interesting feature of the new RED is, furthermore, that if Member States make use of this derogation and indeed lower the cap, they are also allowed to lower the overall transport-target of 14%. It may do so by a maximum of seven p.p., so that the overall target can in effect be lowered to 7%. If, under this scenario, only (double counting) 'advanced' biofuels were to be used, the overall target could effectively become as low as 3,5%.

In addition to the more stringent rules on these 'first generation' bio(mass) fuels, a standstill requirement was also incorporated for certain 'high ILUC-risk' fuels. The contribution of such fuels to the 2030-target may not exceed the level of their consumption as it will be in 2019, unless these fuels (will) have been certified on the basis of criteria that are to be developed by the Commission before 1 February 2019.[29] After 2023, the contribution of such fuels will gradually decrease to 0.0% by 2030.

25 i.e. second generation biofuels from non-food crops, as listed in RED II (n 5) annex IX.A.

26 Under the new RED, the list of double counting fuels (found in annex IX) has been shortened by three feedstocks.

27 The calculation of GHG emissions and savings is subsequently addressed in RED II (n 5) art. 28.

28 More precisely, in (ibid) arts. 26, 28 and annexes V, VI and VIII.

29 These criteria must furthermore be reviewed by 1 September 2023 (ibid, art. 25(1)).

The next paragraphs of article 25(1) address the calculation of the shares of the various fuels, and of the denominator and numerator.[30] Two new elements stands out here: Contributions of biofuels and biogas from used cooking fat and certain animal fats are limited to 1.7%, while they are counted twice; and fuels supplied to the aviation and maritime sectors are counted 1.2 times.[31] Article 25(3) then describes specifically how the share of electricity from renewables must be calculated. The remainder of the provision concerns itself mainly with enhancing cooperation between Member States, ensuring the availability of recharging and refuelling infrastructure, and the development of a database to enable the tracing of fuels and their emissions.[32] Lastly, the Commission is empowered to adopt various delegated acts.[33]

I.2.2. The sustainability of biomass and biofuels

The sustainability regime, which the fuels described above must adhere to, has also been vigorously revised and significantly lengthened.[34] Largely, this is due to its (much-needed) broadened scope, as a result of which solid and non-transport fuels are now also covered. Like the 'old' provision, the new one proclaims that biofuels, bioliquids and biomass fuels (the latter being newly added) can only count towards the targets if they fulfil the various criteria, irrespectively of the geographical origin of the biomass.[35] In terms of contents, the requirements that the raw materials cannot come from land (i) with high biodiversity value; (ii) with high carbon stock, or (iii) land that was peatland in 2008, have not been amended significantly.[36] However, they do now apply to a broader array of biomass-based fuels.[37] On top, several new paragraphs were added to address the peculiarities of forest and agricultural biomass, as well as of electricity produced from biomass sources.

In order for bio(mass) fuels from agricultural land to count towards the targets, it is now mandatory for Member States to have management or monitoring plans in place regarding soil quality and soil carbon.[38] For forest-based biomass, even more elaborate and stringent criteria have been put in place. Hence, forest biomass can now only be counted towards the targets, if the country where the materials were harvested has national laws and/or local management systems

30 These are currently largely found in art. 3(4) of the 'old' RED.
31 RED II (n 5) art. 25(1), at the end & annex IX.B.
32 These are RED II (n 5) arts. 25(3bis), 25(4a) & 25(4&5) respectively.
33 Ibid, art. 25(6-7).
34 Ibid, art. 26.
35 Ibid, art. 26(1). The exception that waste-materials only have to fulfil the GHG-savings-criterion has remained intact.
36 See ibid, art. 26(2-4).
37 For instance, 'biomass fuels produced from agricultural biomass' are now explicitly covered, and paragraph 26(2)(aa) was added to the directive to include biodiverse forests and woodlands.
38 Ibid, art. 26(1).

in place to ensure a certain minimum level of sustainable forestry.[39] On top, explicit LULUCF-requirements have been incorporated in the new RED,[40] demanding that the region or country of origin must either be party to the Paris Climate Treaty and must have addressed LULUCF-emissions in its nationally determined contribution (NDC) or its national laws; or evidence must be provided that 'management systems are in place at forest sourcing area level to ensure that carbon stocks and sinks levels in the forest are maintained, or strengthened over the long term.'[41] The effectiveness of these new criteria will be assessed by the Commission by the end of 2026.[42]

In addition, under the new directive, the required levels of GHG savings have been adjusted upward, and the list now consists of five categories.[43] Three of these apply to 'biofuels, biogas consumed in transport and bioliquids'; and two relate to 'electricity, heating and cooling production from biomass fuels'. The first group of fuels must achieve a GHG reduction of (i) at least 50%, if the installation became operational on or before 5 October 2015; or (ii) at least 60% after this date. On top, for these fuels the threshold is 65%, if they are produced in an installation that will be operational after 1 January 2021. For the second group ('electricity, heating and cooling production from biomass fuels') more stringent thresholds are imposed: a (life-cycle) GHG reduction of at least 70% must be achieved for energy/fuels used in installations that become operational after 1 January 2021 and 80 % for installations starting operation after 1 January 2026.

Furthermore, the next paragraph dictates that electricity from biomass fuels can only be taken into account for the targets, if they are produced (i) in a rather small-scale installation (below 50 MW); or (ii) in a larger one (above 50 MW) that uses high efficient cogeneration or biomass carbon capture and storage (CCS). Energy from electricity-only-installations can only be counted if that installation does not use fossil fuels as its main fuel (for installations below 50 MW). Larger installations must additionally (i) meet the Best Available Technology associated net-electrical efficiency levels (BAT-AEELs), or use biomass CCS, if they are between 50-100 MW; or (ii) if they are over 100 MW, they must achieve a net-electrical efficiency of 36%, or use biomass CCS.[44]

The last paragraphs of this provision on sustainability address that Member States (i) cannot refuse to take into account biofuels and bioliquids that abide by the sketched criteria;[45] but (ii)

39 Ibid, art. 26(5).
40 For completeness, I reiterate here that a 'LULUCF Regulation' (n 7) has also been adopted, demanding that emissions from LULUCF are offset (see also para 7.1).
41 RED II (n 5) art. 26(6). Operational guidance in this will be provided by the Commission by 31 January 2021.
42 Ibid, art. 26(6). This assessment concerns the criteria of art. 26(5) as well as those of art. 26(6).
43 Ibid, art. 26(7).
44 Ibid, art 26(8).
45 Ibid, art. 26(9).

can derogate from the criteria for a limited period of time and for outermost regions only;[46] or (iii) may impose additional sustainability criteria for biomass fuels.[47]

I.2.3. Compliance and calculations

In line with the changes made in the sustainability criteria, the scope of the provisions dealing with compliance and the calculation of GHG emissions were also broadened to include 'biomass fuels and/or other fuels that are eligible for counting towards the numerator'.[48] In the provision on compliance, the characteristics of the required mass balance system that operators have to use are described in a longer and more specified manner.[49] In more detail than previously, it is then discussed how to deal with mixed consignments of biomass and how to calculate the relative shares of GHG emissions if consignments are processed further.[50] The reliability of information and auditing has also received increased regulatory attention, and now entails not only a broader list of specified fuels, but also an explicit prohibition of fraud, especially in regard to the intentional discarding of biomass to classify it as 'waste'.[51] The possibility of using voluntary schemes approved by the Commission as a means to verify compliance has been updated. The conditions thereof are now more elaborately described, and the Commission's powers of decision in this area have been strengthened.[52] Lastly, new elements were added to the paragraph that empowers the Commission to examine, upon the request of a Member State, whether the sustainability criteria have been met by a specific operator.[53]

The amendments that were adopted in relation to the GHG-calculation-methodology are not found so much in the directive's provisions, but rather in its annexes.[54] Most of the changes made in the provision on calculations are minor, and relate primarily to the expansion of its scope to include biomass fuels.[55] However, the annexes that entail the actual methodology and GHG-values have increased significantly in scope as well as in length. Where the original Annex V (on biofuels and bioliquids) counted only nine pages, it is now 44 pages long. In a nutshell, it got so much longer for three reasons. First, the list of biofuel production paths that are described in each table of default values is more extensive (each biomass type having various production

46 Ibid, art. 26(9bis).
47 Ibid, art. 26(10). The Commission will assess the need to harmonise these criteria by 31 December 2026.
48 Ibid, art. 27(1). See also art. 28(1).
49 Ibid, art. 27(1).
50 The latter can be found in (ibid) art. 27(2).
51 Ibid, art. 27(3). This classification is important, because waste-materials are subjected to less stringent sustainability criteria than 'regular' biomass (see also n. 35).
52 See ibid, art. 27(4-7).
53 Ibid, art. 27(7bis).
54 On the calculations, see also what has been said at the end of paragraph 2.3.1 of this dissertation.
55 See RED II (n 5) art. 28. On top, a couple of changes entail enhanced powers of decision for the Commission (see ibid, paras. 4-6).

processes), adding to its length.[56] Second, a new division was applied in the methodology for calculating GHG emissions from biofuels and bioliquids. Under the 'old' RED, one methodology applies to both, whereas under the new RED, GHG emissions from biofuels and bioliquids are calculated according to different formulae.[57] Third, and adding most to the length, the tables containing 'disaggregated default values' have increased exponentially in number.[58] In terms of contents, it stands out that the number of possible production paths has increased significantly since the adoption of the 'old' RED. On top, their level of GHG savings has been recalculated and amended.[59] Furthermore, various emissions that must be taken into account in the calculations have been described in more detail; in particular those relating to intermediate processes and those dealing with the allocation of emissions to different outputs.[60] Last, but certainly not least, the fossil fuel comparator that is used for the calculations has been drastically adjusted upward.[61] This has important implications for the level of GHG savings that biofuel and/or bioliquid production paths can achieve. The higher this comparator is set, the easier it is for a biofuel-producer to achieve a certain percentage of GHG savings, so that his product is more likely to be compatible with the sustainability criteria.[62]

In addition to a longer Annex V, a fully new Annex VI was also added to the directive to cover biomass fuels. The main production pathways that are sketched in it are based on woody materials (especially chips, briquettes and pellets), agricultural residues in various forms, and biogases of different origins (in particular from manure and biowaste). This annex is another 54 pages long, and essentially follows the same outline and methodology as Annex V, so that I will not reiterate it here.

One element worth mentioning, however, it that, for these solid materials, the distance over which it was transported (prior to processing) is an important determinative factor in the level of GHG savings that can be achieved. From a holistic perspective, it is comforting to see that this factor is taken into account in all earnest in each table of estimates.[63] For the remainder, the old and the new RED are much the same.

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56 Ibid, annex V(A&B).

57 Ibid, annex V.C. In particular the need to allocate shares when using co-generation has made the calculation longer and more complex (see ibid, annex V.C, paras. 16-18).

58 Ibid, annex V(D&E).

59 Most of these can be found in (ibid) annex V.A.

60 Ibid, annex V.C.

61 Ibid, annex V.C, para. 19.

62 A (fictive) example can clarify this. Let's say a certain biofuel emits 50 gr CO_2/MJ. If its comparator is estimated at emitting 100 gr CO_2/MJ, the biofuel achieves a 50% reduction in CO_2. However, if the comparator were set at 150 gr CO_2/MJ, the biofuel would reduce such emissions by 66%. Under this scenario, for a new installation, the level at which the comparator is set, would hence be decisive in whether that biofuel does or does not abide by the sustainability criteria.

63 See especially RED II (n 5), annex VI(A&D).

I.3. Regulation on the Governance of the Energy Union

In conjunction with the new RED, a compromise text for a new Regulation was (almost simultaneously) agreed upon to address the more procedural aspects and to lay down the details of all the planning, reporting, and monitoring requirements that are enshrined in the RED.[64] Such requirements are now described in the RED itself, but under the new framework they have been removed, and placed in the separate 'Regulation on the Governance of the Energy Union' ('Governance Regulation').[65] It is interesting to see that, while the Energy Union at its establishment seemed to have a rather strong emphasis on the diversification of gas supply, the governance of the Energy Union is now centered around renewable energy.[66] The new Regulation applies to all five dimensions of the Energy Union (energy security, internal energy market, energy efficiency, decarbonisation, and research, innovation and competitiveness), and is structured along these pillars.[67] The basis for governance are long-term strategies, 'integrated national energy and climate plans' (INECPs) and related reporting and monitoring arrangements. Furthermore, the Regulation has strongly integrated the procedural rules with the commitments made under the Paris Climate Treaty.

In outline, these (procedural) rules entail the following. By the end of 2019, and every ten years thereafter, each Member State has to submit an 'integrated national energy and climate plan' (INECP), containing *inter alia* that state's targets, measures and means for the ten years to come. This INECP must cover all five dimensions of the Energy Union, while bearing in mind the longer-term perspective.[68] One element in these plans are the national contributions regarding renewable energy. While neither the new RED, nor the Governance Regulation sets national targets for this, the Governance Regulation does impose a mandatory trajectory for achieving the target-to-be.[69] It furthermore prescribes the process of how the Member States must determine their national renewable energy contributions, and it creates a collective responsibility to meet the EU target of 32%.[70] The next provisions then describe how and when exactly these plans must be drafted and what they have to entail.[71] By the end of 2018, a draft INECP must be submitted, which will be assessed by the Commission.[72] The Commission can then provide

64 Similar obligations arising from other energy-related directives (such as the ones mentioned in footnote 4) are also covered by the Governance Directive.

65 For a full reference, see footnote 6.

66 The Energy Union was established with the adoption of: European Commission, 'A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy' (Communication) COM (2015) 080 final.

67 Governance Regulation (n 6), art. 1(2).

68 Ibid, art. 3(1).

69 Ibid, art. 4(2).

70 Ibid, art. 5 & annex Ia. A similar process-description for energy efficiency can be found in (ibid) art. 6 & annex II.

71 See ibid, arts. 3-13 & annex I.

72 Ibid, art. 9(1).

recommendations, which must be taken seriously by the Member States.[73] The definitive plans are then also assessed by the Commission, in particular in regard to their sufficiency (when totalled) in meeting the Union-targets.[74] These plans must furthermore be updated by 2023, and every ten years thereafter.[75] Alongside these obligations, Member States also have to submit long-term strategies, with a perspective of at least 30 years.[76] In short, these strategies entail sketches of various scenarios and their respective implications.[77] These strategies too, must be reported to the Commission every ten years and be updated every five years.[78]

The next section of the Governance Regulation is mostly concerned with reporting requirements. Member States have to submit biennial progress reports on the implementation of their INECPs.[79] The contents thereof are dictated in separate provisions for each pillar of the Energy Union.[80] Further biennial reports must be submitted on GHG policies, measures and projections,[81] as well as on national climate change adaptation planning and policies.[82] On top, annual reporting duties are imposed regarding *inter alia* oil and gas operations and stocks, GHG inventories, and the 2020-targets.[83]

The following chapter of the Governance Regulation is then dedicated to aggregate assessments and monitoring done by the Commission.[84] On the basis of (primarily) the Member States' reports, the Commission biennially assesses the following: the progress towards the EU objectives; the progress made by each Member State towards its own targets; the overall impact of aviation on the global climate; the overall impact of the national policies and measures on the Union policy measures, as well as on the operation of the EU ETS.[85] If the Commission finds that there are inconsistencies or insufficient ambitions or progress, it can issue recommendations to remedy the situation.[86] The powers bestowed upon the Commission under the 'renewable energy'-pillar are stronger than under the other four pillars. If ambitions are too low in the

73 Ibid, art. 9(2&3). These recommendations relate in particular to the level of ambition, the contents of the (envisaged) measures, and potentially needed additional measures, and interactions with existing and/or planned policies and other dimensions of the Energy Union (ibid, art 9(2)).
74 Ibid, art. 12.
75 Ibid, art. 13.
76 Ibid, arts. 14-14bis & annex IIa.
77 Ibid, art. 14(1); more details in annex IIa.
78 Ibid, art. 14(1).
79 Ibid, art. 15.
80 Ibid, arts. 18-22, including an additional provision (art. 21a) on energy poverty.
81 See ibid, art. 16 & annexes III-V.
82 Regulated in (ibid) art. 17 & annexes VI & VII.
83 See (ibid) arts. 23 & 23bis & annex III.
84 Ibid, arts. 25-33.
85 Ibid, art. 25.
86 Ibid, arts. 24, 26 & 27.

area of renewable energy, the Commission has to issue recommendations – under the other pillars this is not mandatory.[87] The Member State then has to fix the gap, and explain how it will prevent reoccurrence in the future. In the next update of its INECP, the Member State must subsequently address how it has dealt with the recommendations and provide a reasoning if it has not addressed or has deviated from one of them.[88] The Commission has to keep the Council and the European Parliament informed of all developments via the yearly 'State of the Energy Union report'.[89]

Furthermore, in order to gather accurate and sufficient data for all this reporting and monitoring, and to be able to access those reports, a further section of the Governance Regulation is dedicated to monitoring systems, i.e. to (the continuous development of) inventory systems for GHG estimates and registries for various reports.[90] The last elements that this Regulation addresses are cooperation between Member States (and the Union),[91] the roles and powers of the various actors involved,[92] and amendments and transitional aspects.[93]

I.4. General appraisal of the new framework

In general, the new legal framework under construction provides a much more holistic, integrated approach to biomass regulation, as well as to renewable energy in a broader sense and in context with other policies.

Under the new RED, the scope of sustainability scheme is significantly broadened, and its contents strengthened, although this has had a negative effect on the directive's clarity. Nevertheless, it is great to see that several of the concerns I have expressed throughout my dissertation have been addressed and dealt with under the new rules. My three main critiques of the 'old' RED, and the biofuels-regime in particular, were that (i) its scope was too narrow as a result of which solid and non-transport fuels were not covered by the sustainability criteria; (ii) that ILUC issues were not (sufficiently) addressed; and (iii) that 'accounting tricks' in the calculations could in effect lower the targets.[94] Under the new RED, two out of these three concerns have largely been alleviated.

87 These recommendations are to be based on the objective criteria of (ibid) art. 5 and the formulae of annex Ia.

88 Ibid, art. 28.

89 Ibid, arts. 29 & 29bis. One of the elements in that report is a mandatory biennial EU bioenergy sustainability report, as described in (ibid) annex VIII.

90 Ibid, arts. 30-33 & annex X. There are both national and European inventories (ibid, art. 30(1&2)). The Commission is the manager of the latter, and is assisted in this task by the Climate Change Committee (which is established by art. 37 of the Governance Regulation).

91 Ibid, art. 34.

92 Ibid, arts. 35-37.

93 Ibid, arts. 39-49 and arts. 50-52 respectively.

94 For these criticisms, see in particular paras. 2.5 and 6.4 of this dissertation.

Solid and non-transport fuels have come within the scope of the sustainability criteria, leading to a more uniform approach and an overall higher level of biomass' sustainability. On top, while the rules on ILUC have themselves not been amended greatly, several elements have been added to the directive to reduce (the risk of) ILUC emissions. As said, there is now a standstill-requirement for certain 'high ILUC-risk' fuels and a slow-down-requirement for 'first generation' fuels made from food- and feedstocks. As a result, the use of *inter alia* palm oil and ethanol is now frozen at their current levels of import and production.[95] In addition to all this, my criticism that (the effectiveness of) the Timber Regulation in combatting unsustainably harvested wood hinges on whether the country of origin has imposed national laws in that regard, has also been dealt with under the new biofuels regime.[96] In fact, having such rules in place is now a precondition for forestry materials to be able to meet the sustainability criteria in the first place. Overall, I hence come to the conclusion that the new RED entails a more integrated, as well a more ecological approach than its predecessor.

A similar remark can be made about the new Governance Regulation. The new regulation takes a rather bold integrated approach by explicitly linking the rules and obligations with the commitments entered into under the Paris Climate Treaty. Additionally, it integrates the five pillars of the Energy Union, and the related obligations of the Member States under each of these five branches. By furthermore requiring long-term strategies from Member States, and coupling them with regular reviews and updates, it is (at least in theory) ensured that the progress towards sustainable practices is not ad hoc or haphazard. As such, the Governance Regulation implements quite an extensive holistic framework. The newly drafted rules also provide a powerful stimulus for reviewing (the effectiveness of) the policies in place, with the goal of keeping us on a sustainable path. Thus, to a large extent, it provides the rolling review that I have been arguing we need.[97] Coupled, as it is, with sufficient powers and possibilities for amendment, the new legal framework can likely function as a state-of-the-art steering instrument.

Thus, despite the fact that the underlying assumptions of continued economic growth and firm faith in our abilities to assess and predict impacts are not challenged, I can still conclude this Policy Update on a rather bright note: the new framework represents a move in the right direction and forms a bold step in progressing towards ecological governance in EU energy law.

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95 See; 'EU strikes deal on 32% renewable energy target and palm oil ban after all-night session' (Euractiv.com, 14 June 2018) https://www.euractiv.com/section/energy/news/eu-strikes-deal-on-32-renewable-energy-target-and-palm-oil-ban-after-all-night-session/. Palm oil will be phased out completely by 2030, according to Keating (see: 'Palm oil to be phased out in EU by 2030' (Euractiv.com, 14 June 2018) https://www.euractiv.com/section/future-of-mobility/news/palm-oil-to-be-phased-out-in-eu-by-2030/).

96 A little reminder: this situation was the result of the criterion that one cannot put timber on the EU market that has been harvested 'illegally' (see also paragraph 2.4.5 of this dissertation).

97 On this, see in particular Chapter Three and paragraph 6.4 of this dissertation.

Annex II

Posters

Dissertation depicted visually

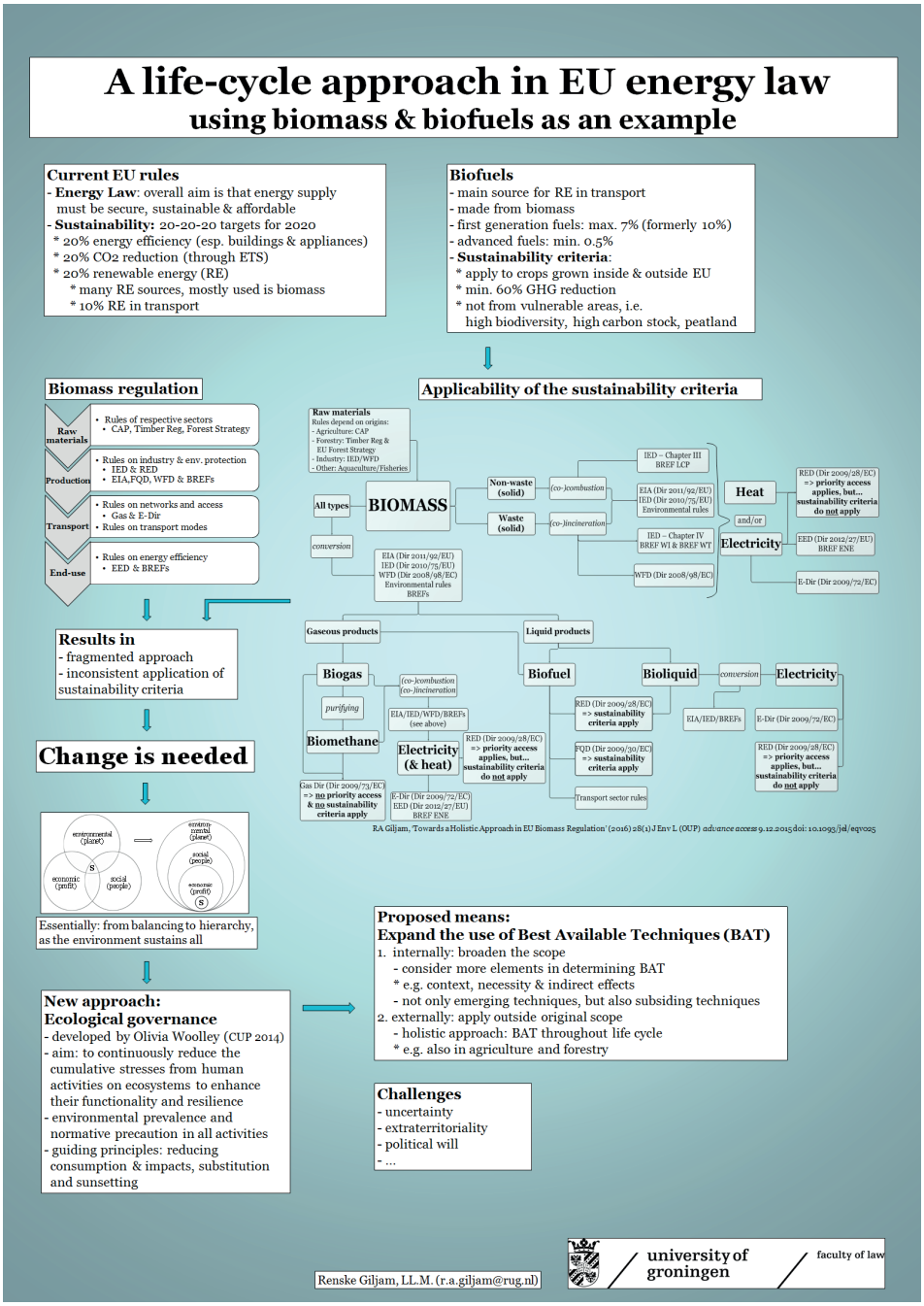


Figure II.1: My research as presented at VMR Conference, March 2016 (poster 1)

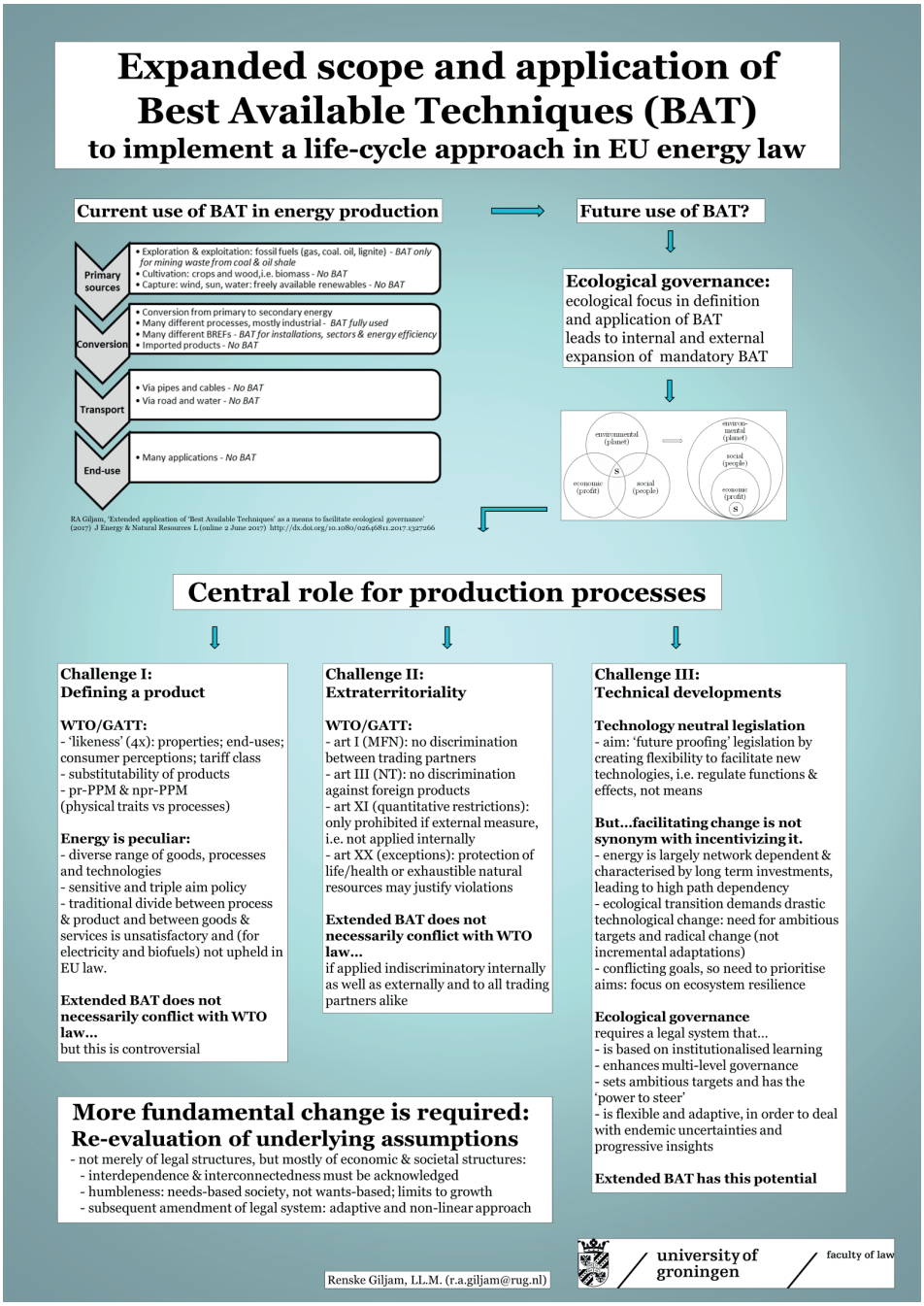
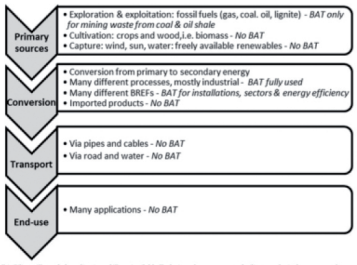


Figure II.2: Second half of my research depicted (poster 2)

Expanded scope and application of Best Available Techniques (BAT)
to implement a life-cycle approach in EU energy law

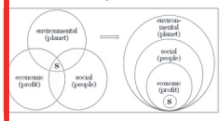
Current use of BAT in energy production



RA Giljam, 'Extended application of 'Best Available Techniques' as a means to facilitate ecological governance' (2017) J Energy & Natural Resources L (online 2 June 2017) http://dx.doi.org/10.1080/02646811.2017.1327266

Future use of BAT?

Ecological governance:
ecological focus in definition and application of BAT
leads to internal and external expansion of mandatory BAT



Central role for production processes

Challenge I:
Defining a product

WTO/GATT:
- 'likeness' (4x): properties; end-uses; consumer perceptions; tariff class
- substitutability of products
- pr-PPM & npr-PPM
(physical traits vs processes)

Energy is peculiar:
- diverse range of goods, processes and technologies
- sensitive and triple aim policy
- traditional divide between process & product and between goods & services is unsatisfactory and (for electricity and biofuels) not upheld in EU law.

Extended BAT does not necessarily conflict with WTO law...
but this is controversial

Challenge II:
Extraterritoriality

WTO/GATT:
- art I (MFN): no discrimination between trading partners
- art III (NT): no discrimination against foreign products
- art XI (quantitative restrictions): only prohibited if external measure, i.e. not applied internally
- art XX (exceptions): protection of life/health or exhaustible natural resources may justify violations

Extended BAT does not necessarily conflict with WTO law...
if applied indiscriminatory internally as well as externally and to all trading partners alike

Article 3

Challenge III:
Technical developments

Technology neutral legislation
- aim: 'future proofing' legislation by creating flexibility to facilitate new technologies, i.e. regulate functions & effects, not means

But...facilitating change is not synonym with incentivizing it.
- energy is largely network dependent & characterised by long term investments, leading to high path dependency
- ecological transition demands drastic technological change: need for ambitious targets and radical change (not incremental adaptations)
- conflicting goals, so need to prioritise aims: focus on ecosystem resilience

Ecological governance
requires a legal system that...
- is based on institutionalised learning
- enhances multi-level governance
- sets ambitious targets and has the 'power to steer'
- is flexible and adaptive, in order to deal with endemic uncertainties and progressive insights

Extended BAT has this potential

Article 4

More fundamental change is required: Re-evaluation of underlying assumptions

- not merely of legal structures, but mostly of economic & societal structures:
  - interdependence & interconnectedness must be acknowledged
  - humbleness: needs-based society, not wants-based; limits to growth
  - subsequent amendment of legal system: adaptive and non-linear approach

Renske Giljam, LL.M. (r.a.giljam@rug.nl)

un groningen ... of law

Expanded scope and application of Best Available Techniques (BAT)
to implement a life-cycle approach in EU energy law

Current use of BAT in energy production

Primary sources
- Exploration & exploitation: fossil fuels (gas, coal. oil, lignite) - *BAT only for mining waste from coal & oil shale*
- Cultivation: crops and wood,i.e. biomass - *No BAT*
- Capture: wind, sun, water: freely available renewables - *No BAT*

Conversion
- Conversion from primary to secondary energy
- Many different processes, mostly industrial - *BAT fully used*
- Many different BREFs - *BAT for installations, sectors & energy efficiency*
- Imported products - *No BAT*

Transport
- Via pipes and cables - *No BAT*
- Via road and water - *No BAT*

End-use
- Many applications - *No BAT*

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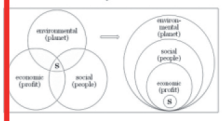

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  - humbleness: needs-based society, not wants-based; limits to growth
  - subsequent amendment of legal system: adaptive and non-linear approach

Renske Giljam, LL.M. (r.a.giljam@rug.nl)

un groningen / of law

Annex III

English summary

English summary

The central theme of this dissertation is how a full life-cycle approach might be implemented in European energy law, in order to facilitate and expedite the energy transition. The idea behind this is that by considering the full life cycle of a(n) (energy) product and its corresponding environmental effects in the regulation of that product, a 'hierarchy' can be established regarding the desirability or acceptability of these products and their production processes. This general theme was broken down into eight sub-questions, which were subsequently analysed, and my findings were published as four separate articles in different journals. Hence, the body of this dissertation (Chapters Two to Five) is formed by these four articles.

In this dissertation, the energy sector was chosen as the focal point, because sufficient energy is crucial for societal functioning, while simultaneously energy production and consumption are the main cause of global anthropogenic GHG-emissions. Thus, any climate change mitigation strategy should have the regulation of energy production and consumption at its core. As 'the energy sector' is rather broad, further demarcation was applied by largely centring the research around the legislation on the use of biomass for energy purposes and the legal framework on biofuels. For the latter, sustainability criteria have been imposed that (should) cover the entire production chain. In first instance, I have therefore investigated whether the current legislative framework can be considered sufficient for implementing such a life-cycle approach for biomass used for energy purposes (Chapter Two). This analysis showed that this is not the case, because the sustainability criteria apply only to a limited amount of applications for biomass, so that for the sustainability of biomass there is no consistent legal framework, but rather a patchy framework has evolved. Due to this, at European level, there are no similar, holistic and/or binding sustainability requirements for, for instance, solid biomass, such as pellets. The sustainability of biomass in its broadest sense, and of biofuels in particular, is further undermined, because the indirect effects of using these materials are not considered under the current rules. Especially indirect land-use changes (the so called ILUC-effects) may cause biofuels to emit more greenhouse gases throughout their life cycle than their fossil fuel counterparts. Currently, it is attempted to resolve this hiatus under the revised Renewable Energy Directive (see also Annex I: Policy Update). What is not addressed in this new Directive is the risk of a 'carbon debt' that arises from the time lapse between the use of the biomass -which usually involves a form of combustion- and the moment at which the emissions are reabsorbed by (regrown) biomass. This temporary increase in atmospheric carbon can thusly further undermine the CO2-neutrality of biomass.

The next step in this dissertation was to analyse how, from a holistic perspective, the current legislation can/could be improved (Chapter Three). The theoretical lens that was used for this was the perspective of 'ecological governance' as developed by Woolley. I have thus investigated

what implications such an ecological approach would have for the design of (energy) legislation and how we could implement the concept in practice. The basis of the ecological approach is that policies should be aimed at a reduction of the (cumulative) stresses that human activities put on ecosystems. Its aim is therefore to contribute to, or at least not to retract from, the (improved) functioning of ecosystems by enhancing their resilience. To this aim the guiding principles distilled by Wooley are: (i) a reduction of consumption and (if necessary) material development in a broad sense; (ii) the replacement of damaging processes and activities by activities and processes that have less of a negative impact; and (iii) halting the most damaging practises and activities. In order to be able to properly assess what this means *in concreto*, under ecological governance, the development of knowledge plays a prominent role, and, on top, it is combined with an adaptive policy, so that continuous revision on the basis of the latest insights is made possible.

Since these guiding principles have a strong resemblance with the concept of 'best available techniques' (BAT), I have next analysed to what extent ecological governance can be implemented via this instrument. In this, I have not so much looked at biomass, but at energy production in a broader sense. Currently, the use of the BAT is only central in the regulation of industrial emissions and not in other parts of the production chain. I have come to the conclusion that much can be gained coupling a by revised interpretation of the instrument itself ('internal changes') with a broader application thereof ('external changes'). In principle, a mandatory and broad application of the BAT to new (legislative) areas seems well possible.

After that, I have looked into whether such a broad application would be in line with (international) trade law, and in particular with the obligations arising under the World Trade Organization (WTO) (Chapter Four). Under the WTO, the rules from the General Agreement on Tariffs and Trade (GATT) are of particular importance. In regard to a broad application (and enforcement) of BAT, the controversy primarily revolves around the question whether products that are manufactured via environmentally friendlier production processes are fundamentally different (i.e. 'unlike') from products of which the production process has a higher ecological impact. Fundamental under the WTO is that (policy) measures taken by its members must be non-discriminatory, proportionate, and reciprocal, so that they are as least trade disruptive as possible. In the case that stringent BAT-requirements are upheld the EU, and are also enforced at its outer borders, according to my analysis, the following applies. At first glance, this situation appears to amount to an import restriction prohibited by the GATT. However, the respective provision only prohibits 'external measures', i.e. measures and requirements that do not apply to 'domestic' products. Since EU-widely applied BAT-requirements in fact impose identical requirements on production processes that take place within the EU and those that take place outside the EU, it is only required (under the GATT) that these requirements do not discriminate between national and foreign products that are 'like'.

The crux is in the word 'like', which forms the core of the debate. The WTO Treaties do not define this term, and the assessment whether two products are, or are not, like occurs case-by-case, on the basis of jurisprudentially developed criteria. The use of environmental criteria, or ecological standards, as a distinctive criterion is controversial, because such standards often do not impact the physical or chemical composition of a product. This physical composition is one of the criteria in the determination of likeness, and so is an appraisal of how the final product is used. As such, it can be reasoned that products that are mutually replaceable, or substitutable in the eyes of the consumer, are like. On the other hand, the perception and preferences of consumers have equal weight in the assessment whether products are like. Specifically in the case of energy, there is a strong perception that renewable energy is significantly different from fossil fuel energy, and as an expression thereof the EU has even partially created a legal differentiation between the two. Moreover, it can be argued that the rigid distinction between a 'product' and a 'production process' is unsatisfactory in the case of energy. This holds particularly true for electricity: a product for which it can be argued that even the distinction between a 'good' and a 'service' is inaccurate. In short, while my conclusion may be controversial, in the light of the above, in principle there appear to be no categorical, legal barriers to externally upholding stringent BBT-requirements, as long as this stringent legislation is applied transparently and non-discriminatory to imports and exports, as well as internally.

In the final phase of this PhD-research, I have analysed to what extent the use of 'technology neutral' legal instruments (such as the BAT-concept) is desirable and/or possible in implementing ecological governance (Chapter Five). Technology neutrality is generally hailed for its potential to make the legal framework 'inclusive' (i.e. widely applicable) and futureproof. This is important in the energy transition, because this transition is largely dependent on technological developments. By designing the legal framework in such a way that these (hitherto unknown) technologies are covered upfront, policies can be geared more towards functionalities and effects, rather than (technological) means. The idea is that, thus, fewer barriers arise in the development of innovations, and that these innovations can, on top, be absorbed in the existing legal framework. The downside of technology neutral legislation is that (too) open or broad formulations could lead to reduced legal certainty and reduced steering power. The latter is confirmed by literature, from which the picture emerges that, for the radical technological progress that is currently necessary in the energy sector more is required than mere 'neutral' formulations. Instead, ambitious goals must be set, with corresponding (production) requirements that cannot be met by current means and technologies. In short, in terms of the required policies, there is an essential difference between simply absorbing innovations and actually incentivising them.

An analysis of the most relevant legislation for the energy sector revealed that within the current legal framework the level of technology neutrality varies, dependent on the primary goal of that specific piece of legislation. The documents that are more of an 'organising' nature -such

as the rules on the internal market- are overall more technology neutral that documents that have more of a 'steering' function -such as the ones aimed at greening the energy sector. None of the current documents, however, impose the kind of stringent requirements that are deemed necessary by literature. Additionally, other factors than technology neutrality are of overriding importance to implementing ecological governance. In particular, it seems more worthwhile to design the legal system is such a way that it can adequately deal with uncertainties and that it can be adapted on the basis of progressive insights and developments, rather than holding on to the idea that today's legislation must suffice for tomorrow's technologies.

During the research conducted for this dissertation, on the basis of progressive insights, it became apparent to me that an ecological approach cannot be implemented in (European) energy law, as long as certain fundamental assumptions underlying the current system are not simultaneously addressed (Chapter Six). In particular, (i) the envisaged (legal) system change must be accompanied by a more respectful attitude towards our (living) environment, upon which we are fully dependent; (ii) we need to be more humble when it comes to our capacity to accurately assess and predict the impact that our activities have on ecosystems, how these ecosystems function, as well as the complex interactions between them; and (iii) we have to challenge the paradigm of permanent growth (which is at the core of our current economic system), in order to avoid that the ecological progress made is annulled by a 'refill'. Thusly, I come to the conclusion that full ecological governance can only be implemented in European energy law, if amendments in the legal framework are accompanied by such paradigm changes. In the policy and/or legal frameworks it is furthermore crucial that favourable conditions are created for gathering data and knowledge and that, on the basis of the latest insights, corresponding policy and/or legal amendments are implemented.

Annex IV

Nederlandse samenvatting

Naar een ecologische benadering in het Europese energierecht

Nederlandse samenvatting (Dutch summary)

Naar een ecologische benadering in het Europese energierecht

met nadruk op de regulering van biomassa en het gebruik van 'best beschikbare technieken'

Wetenschappelijke samenvatting:
Het centrale thema van dit proefschrift is hoe een volwaardige ketenbenadering kan worden geïmplementeerd in het Europese energierecht, met als doel de energietransitie te faciliteren en versnellen. De achterliggende gedachte is dat door de gehele levenscyclus van een (energie)product, en dus de daarbij behorende milieueffecten, in ogenschouw te nemen in de regulering van dat product, een 'rangorde' kan worden vastgesteld wat betreft de wenselijkheid of toelaatbaarheid van deze producten of hun productieprocessen. Dit centrale thema is vervolgens opgebroken in acht sub-vragen die onderzocht zijn, en waarvan de bevindingen zijn gepubliceerd als vier artikelen in verschillende vaktijdschriften. Derhalve wordt de kern van dit proefschrift (Hoofdstuk Twee tot en met Vijf) gevormd door deze vier artikelen.

In dit proefschrift gekozen voor de energiesector als ankerpunt, omdat de beschikbaarheid van (voldoende) energie essentieel is voor het functioneren van de samenleving, terwijl tegelijkertijd de productie en het gebruik van energie de voornaamste bron van mondiale, antropogene broeikasgasemissies zijn. Om deze reden zou de regulering van energieproductie en -consumptie de spil moeten vormen van elke strategie die gericht is op het verminderen van klimaatverandering. Aangezien 'de energiesector' een ruim begrip is, is een nadere afbakening toegepast door het onderzoek deels te centreren rondom de regelgeving voor het gebruik van biomassa voor energieproductie en het juridisch kader voor biobrandstoffen. Voor die laatste zijn duurzaamheidscriteria zijn opgelegd die de gehele productieketen (zouden moeten) beslaan. In eerste instantie heb ik dan ook onderzocht in hoeverre de huidige wetgeving toereikend is om te kunnen spreken van een volwaardige ketenbenadering in de regulering van biomassa voor energiedoeleinden (Hoofdstuk Twee). Deze analyse bracht aan het licht dat dit niet het geval is, omdat de duurzaamheidscriteria slechts van toepassing zijn op een beperkt aantal toepassingen van biomassa, waardoor wat betreft de duurzaamheid van biomassa geen consistent juridisch raamwerk bestaat, maar een versnipperde aanpak is ontstaan. Hierdoor gelden er op Europees niveau geen identieke, holistische en/of bindende duurzaamheidseisen voor bijvoorbeeld vaste biomassa, zoals houtsnippers. De duurzaamheid van biomassa in brede zin, en van biobrandstoffen in het bijzonder, staat daarnaast nog verder onder druk doordat de indirecte effecten van het gebruik van deze materialen niet worden meegewogen binnen het huidige juridisch kader. Met name indirecte veranderingen in landgebruik (de zogenaamde ILUC-effecten) kunnen ertoe leiden dat biobrandstoffen gedurende hun levenscyclus meer broeikasgassen uitstoten dan hun fossiele tegenhanger. Momenteel wordt gepoogd deze hiaten

te repareren in de herziene Hernieuwbare Energie Richtlijn (zie ook Annex I: Policy Update). Wat in die nieuwe Richtlijn niet aan bod komt is het risico van een 'koolstofschuld' (*carbon debt*) die ontstaat door het tijdsverschil tussen het gebruik van de biomassa –wat veelal een vorm van verbranding vereist- en het moment dat de ontstane emissies opnieuw worden geabsorbeerd door (hergroeide) biomassa. Deze tijdelijke toename van atmosferische koolstof kan derhalve de CO2-neutraliteit van biomassa verder ondergraven.

De volgende stap in het onderzoek was te kijken hoe de huidige regelgeving vanuit een holistisch perspectief verbeterd zou kunnen worden (Hoofdstuk Drie). Het theoretische raamwerk dat hiervoor gebruikt is, is de zogenaamde ecologische (keten)benadering ('*ecological governance*') zoals die ontwikkeld is door Woolley. Ik heb hierbij onderzocht welke implicaties een dergelijke ecologische benadering zou hebben op het ontwerp van (energie) regelgeving en hoe we het concept in de praktijk zouden kunnen implementeren. Uitgangspunt bij de ecologische benadering is dat beleid gericht dient te zijn op het verminderen van de (cumulatieve) druk die menselijk handelen legt op ecosystemen. Het streven is dan ook om bij te dragen, of in elk geval geen afbreuk te doen, aan het (beter) functioneren van ecosystemen door het vergroten van hun veerkracht. De door Woolley gedestilleerde leidende principes zijn hiertoe: (i) het verminderen van consumptie en (indien nodig) materiele ontwikkeling in brede zin; (ii) het vervangen van schadelijke processen en activiteiten door activiteiten en processen met een minder grote negatieve impact; en (iii) een halt toeroepen aan de meest beschadigende processen en activiteiten. Om goed te kunnen beoordelen wat dit *in concreto* inhoudt neemt de ontwikkeling van kennis een centrale plaats in binnen de ecologische benadering, en wordt deze bovendien gecombineerd met een adaptief beleid, zodat een doorlopende herziening op grond van de laatste inzichten mogelijk is.

Aangezien de genoemde leidraden sterke overeenkomst vertonen met het concept 'best beschikbare technieken' (BBT), heb ik vervolgens geanalyseerd in hoeverre de ecologische benadering kan worden geïmplementeerd via dit instrument. Daarbij heb ik niet zozeer gekeken naar biomassa, maar naar energieproductie in bredere zin. Momenteel staat het gebruik van de BBT alleen centraal in de regulering van industriële emissies en niet in andere delen van de productieketen. Ik ben tot de conclusie gekomen dat er veel winst valt te behalen door een nieuwe interpretatie van het instrument ('interne verandering') te koppelen met een bredere toepassing ('externe verandering') ervan. In principe lijkt het verplicht en breed toepassen van BBT op nieuwe terreinen goed mogelijk.

Daarna heb ik gekeken in hoeverre zo'n bredere toepassing verenigbaar zou zijn met het (internationaal) handelsrecht, en dan met name met de verplichtingen vanuit de Wereldhandelsorganisatie (WTO) (Hoofdstuk Vier). Binnen de WTO zijn in het bijzonder de regels van de Algemene Overeenkomst over Tarieven en Handel (GATT) relevant. De controverse

draait wat betreft een uitgebreide toepassing (en handhaving) van de BBT met name rond de vraag of producten die middels milieuvriendelijkere productieprocessen worden gefabriceerd wezenlijk anders (i.e. ongelijkwaardig, '*unlike*') zijn dan producten waarvan het productieproces een grotere ecologische impact heeft. Uitgangspunt binnen de WTO is dat (beleids-)maatregelen non-discriminatoir, proportioneel en wederkerig dienen te zijn, zodat ze de handel minimaal belemmeren. In het geval dat strenge BBT-eisen worden gehanteerd binnen de EU, die tevens worden gehandhaafd aan de buitengrenzen, geldt mijns inziens het volgende. Op het eerste gezicht lijkt sprake te zijn van een door de GATT verboden importrestrictie. Echter, het betreffende artikel verbiedt alleen 'externe maatregelen', oftewel maatregelen en eisen die niet voor 'eigen' producten gelden. Aangezien EU-breed gedragen BBT-eisen nu juist identieke eisen opleggen aan productieprocessen die plaatsvinden binnen de EU, geldt slechts dat de maatregelen niet mogen discrimineren tussen nationale en buitenlandse producten die gelijkwaardig zijn.

De crux zit hem in het woordje 'gelijkwaardig', dat de spil van de discussie vormt. De WTO-verdragen definiëren dit begrip niet, en de beoordeling of twee producten al dan niet gelijkwaardig zijn gebeurt per geval, aan de hand van in de jurisprudentie ontwikkelde criteria. Het gebruik van milieueisen, of ecologische standaarden, als onderscheidend criterium is controversieel, omdat dergelijke standaarden vaak niet de fysieke of chemische samenstelling van een product beïnvloeden. Deze fysieke samenstelling is een van de criteria in de beoordeling, net als de inschatting hoe de producten uiteindelijk gebruikt worden. Zo kan op grond van hun onderlinge vervangbaarheid, of inwisselbaarheid in de ogen van de consument, geredeneerd worden dat twee verschillende producten gelijkwaardig zijn. Anderzijds spelen de perceptie en voorkeuren van consumenten een even grote rol in de beoordeling van 'gelijkwaardigheid'. Specifiek in het geval van energie is er een zeer sterke perceptie dat duurzame energie significant anders is dan fossiele energie en als uiting hiervan heeft de EU zelfs gedeeltelijk een juridische differentiatie tussen de twee aangebracht. Daarenboven kan beargumenteerd worden dat het rigide onderscheid tussen 'product' en 'productieproces' voor energie ontoereikend is. Dit geldt in het bijzonder voor elektriciteit, een product waarvan betoogd kan worden dat zelfs het onderscheid tussen 'een goed' en 'een service' inaccuraat is. Kortom, hoewel mijn conclusie wellicht controversieel is, lijken er, in het licht van het bovenstaande, in beginsel geen categorische, juridische belemmeringen te bestaan voor het extern handhaven van strenge BBT-eisen, mits die strengere regelgeving transparant en non-discriminatoir wordt toegepast op zowel import als export, als ook intern.

In de laatste fase van dit promotieonderzoek heb ik gekeken in hoeverre het gebruik van 'technologie neutrale' juridische instrumenten (zoals het BBT-concept) wenselijk en/of mogelijk is in het implementeren van de ecologisch benadering (Hoofdstuk Vijf). Technologie neutraliteit wordt in het algemeen geroemd om de potentie het juridisch raamwerk 'inclusief' (i.e. breed toepasbaar) en toekomstbestendig te maken. In het kader van de energietransitie is dit belangrijk,

omdat die transitie grotendeels afhankelijk is van technologische ontwikkelingen. Door het juridische kader zo te ontwerpen dat deze (tot nu toe onbekende) nieuwe technologieën bij voorbaat al 'gedekt' zijn, kan beleidsmatig meer op functionaliteiten en effecten gestuurd worden, dan op (technische) middelen. Het idee is dat hierdoor minder belemmeringen ontstaan in de ontwikkeling van innovaties, en dat deze innovaties bovendien geruisloos kunnen worden geabsorbeerd in het bestaande juridische kader. De keerzijde van technologie neutrale regelgeving is dat (te) open of brede formuleringen zouden kunnen leiden tot verminderde rechtszekerheid en 'stuurkracht'. Dat laatste wordt bevestigd door de literatuur, waaruit het beeld naar voren komt dat, voor de radicale technologische vooruitgang die momenteel noodzakelijk is in de energiesector, meer nodig is dan 'neutrale' formuleringen. In plaats daarvan moeten juist ambitieuze doelen worden gesteld met daarmee corresponderende (productie)eisen, die niet met de huidige middelen en technologieën bereikbaar zijn. Kortom, qua noodzakelijk beleid is er een essentieel verschil tussen het eenvoudigweg absorberen van innovaties en het daadwerkelijk stimuleren daarvan.

Een analyse van de meest relevante regelgeving voor de energiesector bracht aan het licht dat binnen het huidige juridisch kader het niveau van technologie neutraliteit varieert, afhankelijk van het primaire doel van dat specifieke stuk wetgeving. Zo blijken de documenten die meer 'ordenend' bedoeld zijn -zoals regels omtrent de interne markt- in zijn geheel genomen technologie neutraler te zijn dan documenten die een meer sturende functie hebben -zoals het vergroenen van de sector-. Geen van de huidige documenten stelt echter de hoge eisen die men in de literatuur noodzakelijk acht. Daarnaast blijken andere factoren dan neutraliteit van groter belang voor de implementatie van de ecologische benadering. Met name lijkt het zinvoller om het rechtssysteem zo in te richten dat het adequaat om kan gaan met onzekerheden en aangepast kan worden op basis van voortschrijdende inzichten en ontwikkelingen, in plaats van vast te houden aan het idee dat de wetgeving van vandaag toereikend moet zijn voor de technologieën van morgen.

Gedurende het onderzoek dat voor deze dissertatie verricht is kwam, op basis van voortschrijdend inzicht, steeds meer het beeld naar voren dat een ecologische benadering binnen het (Europese) energierecht niet realiseerbaar is als niet tegelijkertijd bepaalde fundamentele aannames die aan het huidige system ten grondslag liggen ter discussie worden gesteld (Hoofdstuk Zes). Het gaat er dan met name om (i) dat de beoogde (juridische) systeemverandering gepaard moet gaan met een respectvollere houding richting onze (leef-)omgeving, waarvan wij volledig afhankelijk zijn; (ii) dat we nederiger dienen te zijn wat betreft onze capaciteiten om de impact van onze activiteiten op ecosystemen, de werking van die ecosystemen, alsmede de complexe interacties daartussen, accuraat te voorspellen of vast te stellen; en (iii) dat we het paradigma van permanente groei (zoals dat ten grondslag ligt aan ons huidige economisch bestel) aan de kaak moeten stellen om te voorkomen dat de geboekte ecologische vooruitgang door

'opvulling' teniet wordt gedaan. Uiteindelijk kom ik derhalve tot de conclusie dat een volwaardige ecologische ketenbenadering pas in het Europees energierecht kan worden geïmplementeerd als aanpassingen in het juridisch kader gepaard gaan met dergelijke paradigma veranderingen. Binnen het beleids- dan wel juridisch kader is het voorts essentieel dat er gunstige condities worden gecreëerd voor het verzamelen van data en het vergaren kennis en dat op grond van de meest recente inzichten navenante beleidsaanpassingen en/of wetswijzigingen plaatsvinden.

Annex V

Acknowledgements

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This six-year mission, and the coming about of the book that you now hold in your hands, would not have been possible without the love and support of my friends, family and colleagues who have told me to hang in there, who had the patience to hear me out, to listen to my moans or brainstorm about my wildest ideas. It is impossible to name you all or even to find the right words to express what your support has meant to me, so I will keep it short and simple: I owe you all gratitude for pulling me through, so thank you!

Annex VI

Curriculum Vitae

VI

Curriculum vitae

Renske Anne Giljam was born in Amsterdam in 1980. After secondary school (Barlaeus Gymnasium, Amsterdam), she travelled for three years and was involved in various environmental campaigns. In 2001 she commenced her law degree at the University of Groningen, during which time her daughter Noa was born (2004). At the university, Renske first got her Bachelor's degree in International and European Law (2007), and subsequently concluded the Research Master 'Functionaliteit van het Recht' *cum laude* (2011). Renske wrote her Master's thesis on the air quality requirements for modern coal-fired combustion plants. For this thesis she was awarded the first prize by the Dutch Association of Energy Law (NeVER) in 2012.

Questions left unanswered by her thesis, led to a research proposal that was accepted by the University of Groningen in 2012. Thus, for six years, Renske was employed at the Groningen Centre of Energy Law, where she has conducted her PhD research. After finishing this research in 2018, she started a position at the Province of Groningen, assisting in the development of new policies for onshore wind energy.