Towards ecological governance in EU energy law

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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.

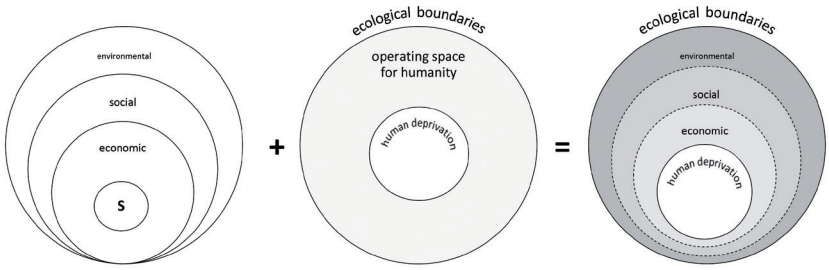

Figure 6.2: Ecological EU energy law

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.