

University of Groningen

## Towards a Holistic Approach in EU Biomass Regulation

Giljam, Renske

*Published in:*  
Journal of Environmental Law

*DOI:*  
[10.1093/jel/eqv025](https://doi.org/10.1093/jel/eqv025)

**IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.**

*Document Version*  
Publisher's PDF, also known as Version of record

*Publication date:*  
2016

[Link to publication in University of Groningen/UMCG research database](#)

*Citation for published version (APA):*  
Giljam, R. (2016). Towards a Holistic Approach in EU Biomass Regulation. *Journal of Environmental Law*, 28(1), 95-124. <https://doi.org/10.1093/jel/eqv025>

### Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

### Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

*Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.*

# Towards a Holistic Approach in EU Biomass Regulation

Renske A. Giljam\*

## ABSTRACT

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

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

## 1. INTRODUCTION

Currently, the European Union (EU) faces the challenge of facilitating the transition to a low-carbon economy. This also involves an energy transition, which is, according to the European Commission, required for three reasons.<sup>1</sup> First, and foremost, low-carbon energy production will contribute to mitigating climate change. In addition, increased use of renewable energy will diversify the energy mix, which contributes to the security of energy supply and increases energy self-sufficiency. Thirdly, the development and deployment of innovative technologies provides economic opportunities.

The energy transition requires that the legal system promotes the ‘greenest’ options in energy generation. However, the current legal framework designed for this energy transition suffers from the only partial internalisation of the environmental effects associated with energy production, which hampers the deployment of renewable energy sources. For instance, fossil fuel energy producers are not confronted with all the costs of damages resulting from combustion-induced pollution. At the same time, renewable energy producers are generally confronted with high start-up

\* PhD Researcher at Groningen Centre of Energy Law (GCEL), The Netherlands. (r.a.giljam@rug.nl)

† Please see late amendments at the end of this article.

1 Commission, ‘Renewable Energy Progress Report’ COM (2013) 175 final, 2.

costs for their relatively new technologies. Ignoring the damages from fossil fuel energy production in the legal framework thus negatively impacts the business case of renewable energy producers *vis-à-vis* their fossil fuel competitors. A similar situation even occurs between different renewable sources, in particular in regard to biofuels. In biofuel production, the indirect effects of the cultivation of energy crops (such as land conversions or the impact on food prices) are not attributed to the fuels. As a consequence, the legal framework does not necessarily promote the most sustainable fuels, as will be addressed in this article.<sup>2</sup>

I argue that this lack of internalisation of the external effects of energy generation can be overcome through the implementation of a holistic approach in EU energy law which will provide the right incentives to achieve a structural energy transition. The need for this approach is stipulated in several EU energy and environmental legislative and policy documents,<sup>3</sup> and it is even argued that the newly created Energy Union should take a holistic approach.<sup>4</sup> However, none of these documents specify what the concept entails, other than aiming to avoid the shifting of effects throughout a production chain. In this article, a holistic approach in law means a regulatory approach that acknowledges to the full extent the importance of the system as a whole and the interdependence of its parts.<sup>5</sup> Furthermore, it reflects the notion that our society is rooted in our (natural) environment, and that our economy, in turn, is rooted in our society. Hence, these three dimensions are entwined in a hierarchical relationship, rather than a balancing act.<sup>6</sup> To ensure that our environment remains able to facilitate all our (economic) activities, all (direct and indirect) environmental effects of human activities throughout the energy chain must be accounted for.<sup>7</sup>

- 2 There is no consensus on a clear definition of 'sustainable'. Most commonly, sustainable development is understood as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' as defined by the Brundtland Report, ie World Commission on Environment and Development, *Our Common Future* (OUP 1987) 43.
- 3 Commission, 'A Policy Framework for Climate and Energy in the Period from 2020 to 2030' COM (2014) 15 final, 7; Commission Regulation 592/2014/EU of 3 June 2014 amending Regulation 142/2011/EU as regards the use of animal by-products and derived products as a fuel in combustion plants [2014] OJ L165/33, recital 8; European Parliament and Council Directive 2010/30/EU of 19 May 2010 on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products [2010] OJ L153/1, recital 2; European Parliament and Council Decision 1386/2013/EU of 20 November 2013 on a General Union Environment Action Programme to 2020 'Living well, within the limits of our planet' [2013] OJ L354/171, recital 26; Commission, 'A New EU Forest Strategy: for Forests and the Forest-Based Sector' COM (2013) 659 final, 2 (Forest Strategy) 4.
- 4 'EU adviser: Energy Union should take "Holistic Approach"' (EurActiv.com, 27 January 2015) <<http://www.euractiv.com/sections/energy/eu-adviser-energy-union-should-take-holistic-approach-311498>> accessed 24 August 2015.
- 5 In essence, this requires a paradigm shift in the perception of sustainable development. See more elaborately: Molly Scott Cato, *Green Economics, An Introduction to Theory, Policy and Practice* (Earthscan 2009) 37 especially. For an elaboration on the ethical foundations underlying this systemic approach and how it affects legal design, see: Olivia Woolley, *Ecological Governance - Reappraising Law's Role in Protecting Ecosystem Functionality* (CUP 2014) chs 2 and 3 especially.
- 6 David Griggs, 'Redefining Sustainable Development' (*Project Syndicate*, 19 March 2013) <<http://www.project-syndicate.org/commentary/redefining-sustainable-development-by-david-griggs>> accessed 24 August 2015.
- 7 See also: WM Adams, 'The Future of Sustainability: Re-thinking Environment and Development in the Twenty-first Century' (Report of the IUCN Renowned Thinkers Meeting, 29–31 January 2006) 3–4.

Additionally, the legal design should provide incentives for the progressive greening of the energy sector. This article will discuss the current legal framework with this view in mind and will analyse which holistic elements are currently present in it.

The article focuses solely on the regulation of biomass used for energy purposes; other means of energy generation will not be discussed here. Biomass, in its broadest sense, concerns any plant or animal matter that is used for energy production. This focus was chosen, first, because biomass is expected to be the largest contributor to the renewable energy targets for 2020.<sup>8</sup> In 2012, almost two-thirds of all primary renewable energy production came from biomass sources.<sup>9</sup> If this continues, the amount of wood used as a primary energy source in the EU in 2020 will be equivalent to today's total wood harvest.<sup>10</sup> To ensure that the use of biomass is sustainable, it is vital to account for all the effects thereof. As the European Commission states: '[d]espite the many benefits associated with biomass use [. . .], there are a number of sustainability risks that need to be properly managed [. . .]. These risks include unsustainable feedstock production; emissions from land use, land-use change, and forestry; lifecycle greenhouse gas (GHG) emission performance; indirect impacts; inefficient bioenergy generation; and air emissions.'<sup>11</sup> The need to introduce a holistic approach in biomass regulation to internalise these effects is therefore pressing.

The second reason to focus on biomass is that in its regulation the most elaborate example of a holistic approach in EU energy law can be found. This concerns the sustainability criteria that apply to the production of biofuels, which are liquid or gaseous fuels for transport produced from biomass.<sup>12</sup> The sustainability criteria, which will be addressed in detail, illustrates how such a holistic approach in law can be designed.

## 2. OUTLINE OF THE LEGAL FRAMEWORK

The legal framework applicable to biomass is extensive and complex for several reasons. First of all, the 'product' that is regulated is not uniform. Biomass is a generic term and biomass sources originate from various sectors. In addition, in EU law, biomass is not defined uniformly. The Renewable Energy Sources Directive (RED) defines biomass broadly, ensuring that it covers a wide variety of raw materials.<sup>13</sup> However, the Industrial Emissions Directive (IED) contains a more narrow definition of biomass.<sup>14</sup> Furthermore, what is considered 'biomass' in one directive can be

8 These targets can be found in European Parliament and Council Directive 2009/28/EC of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC [2009] OJ L140/16 (RED). In the electricity sector alone, an estimated 42% of all renewables will come from biomass (Forest Strategy (n 3) 2).

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

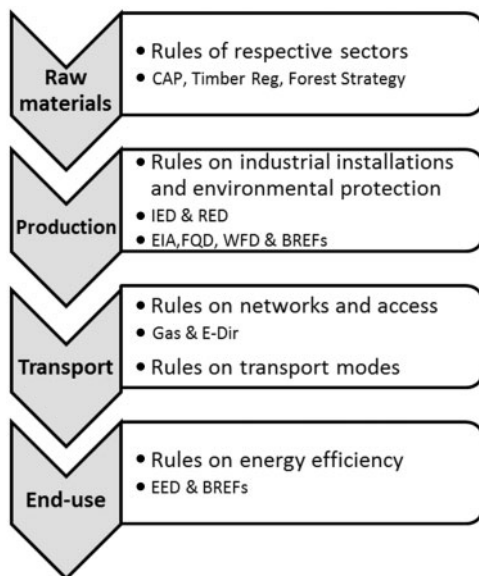
10 Forest Strategy (n 3) 2.

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

12 Renewable Energy Sources Directive, RED (n 8) arts 2(i) and 17.

13 *ibid* art 2(e).

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



**Figure 1** Legal framework applicable in consecutive phases of biomass life cycle.

‘waste’ in another.<sup>15</sup> Such classifications are crucial, because these partially determine how the raw materials can be handled and processed for energy generation. Further complexity is created by the fact that these varied raw materials are processed differently. These diverging conversion techniques are subjected to (partially) different operating conditions and different environmental standards. On top of this, the final products, which include biofuels, electricity, biogas and biomethane, and energy used for heating and cooling, are covered by different rules on transport and/or consumption thereof. All these variations and variables lead to a situation where different rules apply depending on the origins of the raw material, as well as its categorisation in law, its process of conversion and its final use.

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

Although the energy value chain just described provides a comprehensible overview of the complex legislation, the framework for biomass will not be discussed in

15 RED (n 8), art 2(e) v IED (n 14), art 3(31) and European Parliament and Council Directive 2008/98/EC of 19 November 2008 on waste and repealing certain Directives [2008] OJ L 312/3 (WFD), art 2(1)(f).

this order. Instead, the legislation will be addressed by order of its relevance in biomass regulation, ie by order of its level of impact on how biomass for energy can be handled. The following rules combined form this general legal framework. This will be discussed in detail below, but it is useful to give an overview.

The core of this framework is enshrined in the RED and the IED. The former sets targets for renewable energy and sets sustainability criteria for the production of biofuels. The latter lays down the framework for the operation of industrial installations. These two directives are discussed first, because they set the most influential rules of biomass regulation. Additionally, other directives impose important complementary and/or specific rules. First, there are the Environmental Impact Assessment Directive (EIA Directive) and Strategic Environmental Assessment Directive (SEA Directive).<sup>16</sup> The EIA Directive is relevant for virtually all industrial biomass uses, because for all activities that fall within the scope of the IED the expected environmental impacts must be assessed prior to consent. The SEA Directive sets similar rules for public plans and programmes.

The next relevant directive is the Energy Efficiency Directive (EED), which is aimed at energy savings throughout the entire energy chain, thus implementing a rudimentary holistic approach.<sup>17</sup> The EIA Directive and the EED both have generic application to biomass used for energy. In addition to these directives, more specific sectoral rules can be found in the Fuel Quality Directive (FQD) for the production and use of (bio-)fuels,<sup>18</sup> and the Waste Framework Directive (WFD) for waste (co)incineration plants.<sup>19</sup> After that, the regulation of solid biomass is important to consider, as this is not fully covered by the other directives. The Common Agricultural Policy (CAP), applicable to agricultural biomass, needs to be touched upon, but primarily the regulation of forest biomass via the Timber Regulation and the EU Forest Strategy are the focus of this analysis.<sup>20</sup> The last relevant directives in the framework are the Gas Directive and the Electricity Directive (E-Directive), which (partially) lay down the framework for the regulation of the energy market.<sup>21</sup> To complement the overview, five 'BAT Reference documents' (BREFs) will be

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

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

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

19 WFD (n 15).

20 European Parliament and Council Regulation 995/2010/EU of 20 October 2010 laying down the obligations of operators who place timber and timber products on the market [2010] OJ L295/23 (Timber Regulation); and Forest Strategy (n 3).

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

addressed. Formally, these BREFs are ‘only’ soft law, but in practice they provide the detailed norms used in permitting procedures under the IED.

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

### 3. CORE OF THE FRAMEWORK

#### 3.1 Renewable Energy Sources Directive

By far the most important legislative document in biomass regulation is the RED, as this is the prime instrument that promotes the use of biomass as an energy source. First, and foremost, the directive requires that, by 2020, at least 20% of the gross final consumption of energy within the EU must come from renewable energy sources.<sup>22</sup> This gross final consumption is the weighted sum of the consumption of the electricity from renewable sources that is used, the energy from renewable sources used for heating and cooling and the energy from renewable sources that is used in transport.<sup>23</sup> To meet the overall EU target, the Member States have each been assigned national targets.<sup>24</sup> Furthermore, the share of energy from renewable sources in all forms of transport in each Member State must be at least 10% in 2020.<sup>25</sup> To achieve these targets, Member States have to adopt and regularly update ‘national renewable energy action plans’ (NREAPs) containing their intermediate and final goals and the envisaged measures to reach them.<sup>26</sup> Member States are allowed to cooperate in meeting their targets, by using statistical transfers, joint projects and/or joint support schemes, for which the directive sets criteria.<sup>27</sup> Such cooperation may also take place between EU members and third countries, provided that the criteria in the directive are met.<sup>28</sup>

The NREAPs show that the bulk of energy from renewable sources will come from biomass sources, mainly via the co-firing of (solid) biomass in combustion plants and the production of biofuels.<sup>29</sup> To ensure the sustainability of the latter, the RED imposes sustainability criteria for biofuels and bioliquids.<sup>30</sup> Only those fuels

22 RED (n 8), art 3(1).

23 *ibid* art 5(1).

24 *ibid* annex I.

25 *ibid* art 3(4).

26 *ibid* art 4 and annex VI.

27 *ibid* arts 6–8 and 11. More detailed criteria can be found in the Commission’s Guidelines and Decision concerning state aid: Commission, ‘Guidelines on State Aid for Environmental Protection and Energy 2014-2020’ [2014] OJ C 200/1.

28 RED (n 8) arts 9–10.

29 Eurostat (n 9).

30 RED (n 8) art 17.

and liquids that abide by these criteria can be counted towards the renewables target, and only these are eligible for subsidies. The criteria, basically, contain three essential elements. First of all, they require that biofuels reduce greenhouse gas (GHG) emissions by at least 35% compared to conventional fuels.<sup>31</sup> Secondly, the cultivation of the raw materials used in biofuels production is not allowed to cause land-use changes (LUC) in specific (ecologically) vulnerable and valuable areas. Three categories of areas are then listed; these are land with high biodiversity value, land with high carbon stock, and peatland. Not only are conversions of these areas plainly prohibited, if conversions of other areas lead to additional emissions, these are attributed to the cultivation of the biofuel crops.<sup>32</sup> The third important feature of the criteria is that they apply irrespective of whether the raw materials for the fuels were cultivated inside or outside the territory of the EU.

Not all biofuels, however, are made directly from such cultivated agricultural crops. On the basis of the raw materials used for their production, three 'generations' of biofuels are distinguished. First generation biofuels are made directly from food crops; second generation biofuels are created from non-food crops and waste materials; and third generation biofuels are made from especially engineered crops, such as algae.<sup>33</sup> The second and third generation biofuels are also referred to as 'advanced biofuels', and they generally have a smaller environmental impact than first generation biofuels.<sup>34</sup> Therefore, the sustainability criteria apply in full to these biofuels. In addition, agricultural biofuels crops grown within the EU must be cultivated in respect of the principles of good agricultural practise as described in the Common Agricultural Policy (CAP).<sup>35</sup> If, however, biofuels are produced from specific wastes and residues, only the GHG reduction requirement applies and there are no additional requirements on the origins of the raw materials.<sup>36</sup>

By imposing differentiated rules based on the type of raw materials, the sustainability criteria set an excellent example of how holistic rules can be designed. First of all, the length of the chain of effects that is attributed to biofuel production is unprecedented in energy law. Furthermore, it is exceptional in law that the manner in which the raw materials are cultivated is relevant in the production of the final product. Additionally, the criteria touch upon the issue of extraterritoriality as they address agricultural practices outside EU territory, which is often deemed to conflict with national sovereignty and/or trade law.<sup>37</sup>

31 This will go up to 50% by 2017 and 60% by 2018.

32 RED (n 8) annex V.C.7.

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

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

35 RED (n 8) art 17(6). The CAP is also briefly mentioned in para 4.5.

36 *ibid* art 17(1).

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



Despite the merits of the sustainability criteria, they are also criticised for two main reasons. The first is that the criteria apply only to biofuels and bioliquids and not to solid biomass used for other (energy) purposes. As a result, solid biomass that is used to produce electricity is not subjected to binding sustainability requirements, while identical material used in biofuel production is subjected to them.<sup>38</sup> In other words, the way in which the raw material is processed determines whether strict rules apply to its cultivation. Thus, the level of sustainability that is required in crop cultivation becomes dependent on the production paths that are subsequently chosen. As electricity from solid biomass provides the largest share of all EU renewables, only a fraction of biomass used for energy is subject to binding sustainability rules.

The second criticism, and the core of the current biofuels debate, is that the sustainability criteria account only for the effects of direct land-use changes (DLUC), while indirect land-use changes (ILUC) are not considered. Emissions from ILUC occur, when land used for food/feedstock production is diverted to energy crops, leading to a shift of food/feedstock production to a new area, which is converted into agricultural land for this reason. This conversion gives rise to additional emissions, known as ILUC emissions. It is very difficult to accurately estimate or calculate these, but their magnitude depends largely on the type of land that is converted. If attributed to biofuel production, these emissions negatively impact the GHG mitigation potential. Several studies show that ILUC emissions may render specific biofuels to be more environmentally damaging than their fossil fuel counterparts.<sup>39</sup> Internalising ILUC effects is therefore crucial in ensuring the sustainability of biofuels. A legislative proposal addressing ILUC issues was submitted in 2012, but to date no formal consensus was reached.<sup>40</sup>

A further holistic element in the RED can be found in the mandatory preferential treatment of electricity made from renewable energy sources.<sup>41</sup> To promote this electricity, Member States must guarantee its transmission and distribution and they must provide for either priority or guaranteed access to the electricity grid. Priority access ensures that producers of electricity from renewable energy sources can sell and transmit their electricity at all times, while guaranteed access ensures that all electricity that is sold obtains access to the grid.<sup>42</sup> In addition, when dispatching electricity generating installations, Member States must ensure that priority is given to installations using renewable sources.<sup>43</sup> The directive thus explicitly acknowledges that simply promoting the production of renewables is insufficient to ensure its uptake. It is vital that renewables are promoted throughout their full energy chain to

38 The criteria do apply to bioliquids, so that evasion of the sustainability criteria via combustion of these fuels in the electricity sector is avoided. The regulation of solid biomass is discussed in more detail in para 4.5.

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

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

41 RED (n 8) art 16(2).

42 *ibid* recital 60.

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

ensure that this energy actually reaches consumers. Therefore, the different phases of the production chain must be explicitly connected.

Additionally, in regard to the holistic approach, the detailed calculation rules are crucial. These calculations essentially set the boundaries of the energy chain, as they clarify what is attributed to the chain and what is not. Without going into detail, three different calculations impact how holistic the framework actually is. The first is the calculation of the overall 20% target, which is based on the national targets.<sup>44</sup> The total of renewables consumed is expressed as a percentage of total energy consumption. In the calculation, electricity and heat used in the production of energy and energy losses occurring during the transport of the energy are included, but energy losses in the conversion of primary energy into secondary energy are not accounted for.<sup>45</sup> This means that the attainment of the targets of the RED is not influenced by the level of efficiency of the conversion of primary energy.<sup>46</sup>

The second important calculation concerns the required 10% renewables in transport.<sup>47</sup> In calculating the overall consumption, account is only taken of petrol, diesel, biofuels consumed in road and rail transport, and electricity. However, in calculating the amount of energy from renewable sources all types of energy from renewable sources consumed in all forms of transport are considered. Thus, the required 10% becomes easier to achieve. In addition, to promote specific renewables, the share of electricity from renewables used in road vehicles is counted 2.5 times towards the 10% target, and the share of renewable energy from advanced biofuels is counted twice.<sup>48</sup> In effect, this lowers the 10% target and leads to a smaller volume of biofuels being consumed. However, this double counting applies only for compliance with the 10% target. In the overall EU target of 20%, all biofuels and electricity are counted only once. This means that the heating/cooling and electricity sectors must compensate for the lower contribution from the transport sector. Hence, the calculations reflect the interaction between the three energy branches and allow for some flexibility in the realisation of the targets. Furthermore, the calculations are used as a means to improve the environmental performance of the system as a whole.

The third relevant calculation method is that of the GHG savings in biofuel production.<sup>49</sup> For common biofuel production pathways default GHG values are listed in the directive. These are holistic to the extent that they differentiate on the basis of both the raw materials and the production process used. Several of these default values give GHG savings that are lower than the 35% threshold set by the sustainability criteria. In those cases, it is up to the producer to demonstrate that his actual emission savings are higher.<sup>50</sup> However, if treaties regarding sustainability criteria have been concluded with third countries, the Commission may decide that biofuels

44 RED (n 8) art 5.

45 *ibid* art 2(f).

46 Energy efficiency is primarily addressed under the EED (n 17) although the directive focuses on achieving energy savings in the consumption of energy, rather than improving the efficiency of energy conversions.

47 RED (n 8) art 3(4).

48 *ibid* arts 3(4)(c) and 21(2).

49 *ibid*, art 19 and annex V.

50 *ibid* recital 82.

produced with raw materials from those countries automatically comply with those criteria.<sup>51</sup> This is at odds with the notion that specific production pathways do not meet the required threshold.

Default values can only be used if there are no emissions from DLUC. Otherwise, actual values must be calculated. The directive establishes detailed rules for this, and extensively lists the emissions and emissions savings attributable to a biofuel, hence accounting for the vast majority of effects throughout the production chain. This total of emissions is then compared to the average emissions of the type of fossil fuel it replaces. Recently, it has been argued that this fossil fuel comparator is too low, because the higher carbon footprint of unconventional fossil fuels is not considered in it.<sup>52</sup> A higher comparator would lead to higher relative GHG savings from biofuels, thus rendering more fuels compatible with the sustainability criteria.

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

### 3.2 Industrial Emissions Directive

The actual process of the conversion of primary energy sources, including biomass, into secondary energy is regulated primarily under the umbrella of the IED. The IED is of immense importance in energy generation, as it applies irrespective of the type of energy that is generated, and it covers virtually all methods of energy production that are used on an industrial scale.

The IED lays down rules on 'the integrated prevention and control of pollution and emissions arising from industrial activities, in order to achieve a high level of protection of the environment taken as a whole'.<sup>53</sup> This is an explicit holistic approach, although it is confined to one specific phase of the energy chain, namely the actual production phase. To achieve this high level of protection, no installation or combustion plant, waste incineration plant or waste co-incineration plant can be operated without a permit.<sup>54</sup> The directive then lays down the framework for the granting of and conditions in the permit.<sup>55</sup> A key feature of the directive is that these permits must contain emission limit values (ELVs) for various polluting substances, and that these values should be based on the Best Available Techniques (BAT).<sup>56</sup> These 'BAT' are those techniques that are the most effective and advanced in achieving a high general level of protection of the environment as a whole, albeit under

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

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

53 IED (n 14) art 1 and annex I.

54 *ibid* art 4(1).

55 *ibid* arts 12 and 14.

56 *ibid* art 14 and annex II.

economically and technically viable conditions.<sup>57</sup> The techniques, and the corresponding emission levels, are not described in the directive itself, but in ‘BAT Reference Documents’ (BREFs), which are adopted after a procedure of information exchange as formalised by the IED.<sup>58</sup>

In addition to these general provisions, the IED contains several chapters with specific provisions for different types of industrial installations. In regard to biomass regulation, Chapter III concerning large combustion plants and Chapter IV on waste incineration are particularly relevant. For the applicability of these chapters, the categorisation of the raw materials (ie the intended fuel of the installation) as either ‘biomass’ or ‘waste’ is crucial. In the IED ‘biomass’ is defined as ‘products consisting of any vegetable matter from agriculture or forestry which can be used as a fuel for the purpose of recovering its energy content’ and one of five listed types of wastes, ie specific vegetable wastes, paper pulp, cork waste and ‘clean’ wood waste.<sup>59</sup> All other types of waste are not categorised as ‘biomass’, but as ‘waste’ for the application of the IED.

Chapter III applies to combustion plants with a thermal input of 50 MW or more. Almost all power plants fall within this category, including those that are fired or co-fired with biomass.<sup>60</sup> The key provision of this chapter states that the permit must include ELVs that do not exceed those listed in the directive.<sup>61</sup> These ELVs are different depending on the thermal input of the installation, the type of installation, the type of fuel used and the state of this fuel—ie solid, liquid or gaseous.<sup>62</sup> In the case of a multi-fuel firing combustion plant fuel-weighted ELVs have to be set.<sup>63</sup> The ELVs set in this chapter and its annex are Union-wide minimum requirements for large combustion plants, albeit specific exemptions can be made.<sup>64</sup> In practice, the ELVs from the IED are not imposed in the permits, but the significantly more stringent ELVs from the relevant BREFs are. Furthermore, the possibilities for carbon capture and storage (CCS) must be assessed as a potential means to reduce emissions for all modern combustion plants.<sup>65</sup> However, using CCS is not mandatory.

If an installation is fired with waste, instead of biomass, Chapter IV applies.<sup>66</sup> This chapter contains more stringent rules than Chapter III. First, Chapter IV imposes extra requirements on the application of permits and the conditions therein.<sup>67</sup> Furthermore, additional operating conditions are imposed and the rules on breakdowns are more stringent.<sup>68</sup> Finally, no exceedance of ELVs is allowed for incineration plants,<sup>69</sup> while minor and brief exceedances are allowed under the rules for

57 *ibid* art 3(10).

58 *ibid* art 13 and annex III. These BREFs are discussed in para 4.7.

59 *ibid* art 3(31).

60 *ibid* art 28.

61 *ibid* art 30(2-3) and annex V.

62 *ibid* annex V.

63 *ibid* art 40.

64 *ibid* arts 33–35 and 73(1).

65 *ibid* art 36.

66 *ibid* art 42.

67 *ibid* arts 44–45.

68 *ibid* arts 50 and 47 *v* art 37.

69 *ibid* art 49 and annex VI, pt 8.

combustion plants.<sup>70</sup> Thus, the choice of a specific primary fuel (ie waste or biomass) impacts how the subsequent production process can be designed. This differentiation on the basis of the fuel type used exemplifies another strong holistic element within the IED.

#### 4. PERIPHERAL FRAMEWORK

##### 4.1 Environmental Impact Assessment Directive and Strategic Environmental Assessment Directive

The central objective of both the EIA Directive and the SEA Directive is to ensure environmental protection by requiring an assessment of plans, programmes and projects 'likely to have significant effects on the environment' prior to consent.<sup>71</sup> The EIA Directive sets detailed rules for the assessment of individual projects, whereas the SEA Directive concerns itself with public plans and programmes.

The EIA Directive distinguishes two types of projects: 'Annex I-projects', for which performing an Environmental Impact Assessment (EIA) is mandatory, and 'Annex II-projects' for which this decision is left to the Member States.<sup>72</sup> However, the directive does list the criteria on which the Member States must base the decision whether an EIA must be performed for Annex II projects. These criteria include the characteristics and location of the project and the characteristics of the potential impact.<sup>73</sup> It also lists the information that must be provided at minimum by the project developer to enable the Member State to take a decision in individual cases.<sup>74</sup> The directive, furthermore, sums up the requirements for the actual impact assessment,<sup>75</sup> which must include both the direct and the indirect effects of the project.<sup>76</sup> In order to reduce administrative complexity, the requirements of the EIA Directive may be integrated into existing procedures for consent and/or may be coordinated with requirements arising simultaneously from other EU directives.<sup>77</sup> Thus, the information supplied in accordance with the EIA Directive can be used in the description of the project as required by the IED.<sup>78</sup> This information is then examined and used in the granting of the permit under the IED.<sup>79</sup>

The majority of energy-related installations fall within the broad scope of the EIA Directive. Basically, an EIA can be mandatory during any phase of the energy life cycle. For instance, an EIA is mandatory for extraction industries, for oil refineries, for nuclear and thermal power stations, for certain storage facilities and for the construction of some pipelines and cables. Furthermore, 'energy industry' has its own heading in Annex II. Regarding the use of biomass for energy purposes, the EIA

70 *ibid* art 39 and annex V, pt 4.

71 EIA and SEA Directives (n 16) arts 1 and 2(1) and 4(1) respectively.

72 EIA Directive (n 16) art 4.

73 *ibid* annex III.

74 *ibid* art 4(4-5) and annex II, pt A.

75 *ibid* arts 5-10 and annex IV.

76 *ibid* art 3(1).

77 *ibid* art 2(2-3).

78 IED (n 14) art 12.

79 *ibid* art 5(3).

Directive is applicable to the whole spectrum of possible applications, whether this is in thermal power stations, waste incinerators or for biofuels.<sup>80</sup> In the latter case, the cultivation of crops falls under the EIA Directive only if this cultivation causes specific (direct) land-use changes that are listed in the directive.<sup>81</sup> If such land-use changes do not occur, agricultural rules apply instead of the EIA Directive. In both cases, the construction of an installation that processes these crops requires the performance of an EIA.

Summarised, the EIA Directive contains strong holistic elements, as it requires the environmental effects of projects to be fully assessed prior to commencement and prior to consent of these projects. The boundaries of the assessment are rather broad as both the direct and the indirect effects must be assessed not only on a broad range of factors, but also on the interaction between these factors.<sup>82</sup> Additionally, it is not allowed to split a large project into several smaller projects to evade having to perform an EIA.<sup>83</sup> Furthermore, cumulative effects throughout the energy chain are considered via two routes. First, they are addressed indirectly, through a 'series' of EIAs. EIAs are performed for single projects, but because EIAs are mandatory for basically all large projects, eventually, the effects of all these projects are assessed. Furthermore, since the 2014 amendment of the EIA Directive, it is now mandatory to assess the accumulation of effects with other existing and/or approved projects.<sup>84</sup> The latter assessment is required only in so far as such an analysis is necessary to ensure that the EIA of the project in question covers all the notable impacts.<sup>85</sup> Despite these strong holistic elements in the EIA Directive, a full holistic approach cannot be accorded to it, as the performance of an EIA is essentially a procedural requirement and its outcome is not a ground for refusal of a permit. Permits can be refused on the basis of not performing an EIA properly, but this is a procedural obligation, which can then be repaired. As such, the EIA Directive does not assure sustainable production.

The SEA Directive is more holistic in its approach, which is inherent to its focus on 'all plans and programmes which are prepared for agriculture, forestry, fisheries, energy, industry, transport, [. . .] or land use and which set the framework for future development consent of projects listed in [the EIA Directive]'.<sup>86</sup> For these plans and programmes an environmental assessment is mandatory, while for other plans and programmes the Member States have a degree of discretion to make their own decisions.<sup>87</sup> Not only must the likely significant effects of a plan or programme be assessed, but also the reasonable alternatives to it.<sup>88</sup> Similar to the EIA Directive, the outcome of an assessment does not challenge the legality of a plan or programme.

80 Most industrial applications fall under EIA Directive (n 16), annex I. Small-scale projects are listed in annex II.

81 *ibid* annex II(1).

82 *ibid* art 3.

83 C-392/96, *Commission v Ireland* ECLI:EU:C:1999:431 [76, 82].

84 EIA Directive (n 16) annex IV.5.e.

85 C-404/09 *Commission v Spain* ECLI:EU:C:2011:768 [80].

86 SEA Directive (n 16) art 3(2). The SEA Directive is relevant to biofuel and/or biomass regulation insofar as it sets rules to the adoption of (governmental) plans and programmes to promote of these fuels.

87 *ibid* art 3 and annex II.

88 *ibid* art 5(1) and annex I.

#### 4.2 Energy Efficiency Directive

The EED aims to achieve a 20% energy efficiency target by 2020 and further improvements after that.<sup>89</sup> This target corresponds to a quantified maximum EU energy consumption in 2020.<sup>90</sup> Member States are required to use energy more efficiently at all stages of the energy chain, from the conversion of energy to transport and final consumption. As such, the EED takes a holistic approach and affects all parties in the energy market, albeit it is confined to one element relevant in the production chain. To achieve the desired energy reductions, the Member States each had to set an indicative national energy efficiency target which also translates into an absolute level.<sup>91</sup> The targets had to be notified to the Commission as part of the required National Energy Efficiency Action Plans (NEEAPs).<sup>92</sup> These plans comprise the full strategy for achieving the targets, which includes taking specific mandatory measures imposed by the directive.<sup>93</sup> Some of these measures target the end use of energy while others focus on the efficiency in energy supply.<sup>94</sup> Examples of the former are a mandatory long-term strategy in building renovation, in which public bodies must lead by example, an energy efficiency obligation scheme, energy audits, and metering requirements.<sup>95</sup> The latter category concerns *inter alia* the promotion of efficient heating and cooling and high-efficient cogeneration and ensuring energy efficiency in the transformation, transmission and distribution of energy by providing the right incentives.<sup>96</sup>

To promote efficient heating and cooling and high-efficient cogeneration, Member States must assess their national potential via a cost-benefit analysis, which must include *inter alia* the external costs and benefits of the different options.<sup>97</sup> This analysis forms the decision base for qualified prioritization of limited resources at society level.<sup>98</sup> When new power plants are planned or old ones refurbished, the cost-effectiveness of using high-efficiency cogeneration, recovering waste heat and connection to a district heating and cooling network has to be assessed and the most efficient option, as revealed by this cost-benefit analysis, must be chosen.<sup>99</sup> In this assessment, account is also taken of the type of fuel used in the installation. The costs and benefits of an installation that is equipped for cogeneration and/or district heating and cooling are compared to an installation that has no such equipment.<sup>100</sup> The environmental benefits of installing the equipment must then outweigh the costs thereof. Because biomass power plants are less polluting than fossil fuel power plants, the environmental benefits of fully equipping such power plants are smaller. As a result, cogeneration might be less feasible in biomass power plants than in fossil

89 EED (n 17) art 1.

90 *ibid* art 3(1(a)).

91 *ibid* art 3(1).

92 *ibid* art 24(2).

93 *ibid* annex XIV, pt 2.

94 *ibid* chs II and III.

95 *ibid*, arts 4-9.

96 *ibid* arts 14-15 and annex XI-XII.

97 *ibid* art 14(3) and annex IX, pt 1.

98 *ibid* annex IX, pt 1, para 1.

99 *ibid* art 14(5) and annex IX, pt 2, paras 1 and 8.

100 *ibid* annex IX, pt 2, para 1 and 5.

fuel plants. This could create conflict between the aims of the RED to promote both cogeneration and electricity from renewable sources.

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

### 4.3 Fuel Quality Directive

The FQD applies to biofuels in addition to the RED. The FQD sets both technical and environmental specifications for fuels and a target for the reduction of GHG emissions.<sup>101</sup> The general goal is to decrease GHG emissions from all liquid fuels used in the transport sector by a minimum of 6% and a maximum of 10% by 2020.<sup>102</sup> This reduction target applies to the GHG emissions occurring throughout the full fuel life cycle, which includes all relevant stages from extraction or cultivation, including land-use changes, to transport and distribution, processing and combustion, irrespective of where those emissions occur.<sup>103</sup> Consequently, the FQD takes a holistic approach to fuel production. The reduction target is achieved primarily by blending conventional fuels with biofuels. These biofuels must abide by sustainability criteria identical to those in the RED.<sup>104</sup> The FQD's provisions on the verification of compliance with these criteria and the calculation of GHG emissions are also similar to those in the RED.<sup>105</sup> As the rules are basically identical to those of the RED, they will not be repeated here.

### 4.4 Waste Framework Directive

For waste (co-)incineration plants, the rules of the WFD apply in addition to the rules of the IED. In both directives, 'waste' means 'any substance or object which the holder discards or intends or is required to discard'.<sup>106</sup> This is a broad and often disputed definition, and the scope of the directive is narrowed down by excluding several substances, including non-hazardous agricultural or forestry material used for the production of energy, in so far as its processing methods do not harm the environment or endanger human health.<sup>107</sup>

If the WFD applies, so does its 'waste hierarchy'.<sup>108</sup> This is a priority order of waste management that limits how waste can be treated. This order requires that waste must, first of all, be prevented. If that is not possible, it must be prepared for reuse. Only after that, recycling becomes an option. Fourth on the list is 'other

101 FQD (n 18) art 1.

102 *ibid* art 7a(2).

103 *ibid* art 2(6).

104 *ibid* art 7b.

105 *ibid* arts 7c–7d and annex IV.

106 IED (n 14) art 3(37); WFD (n 15), art 3(1).

107 WFD (n 15) art 2.

108 *ibid* art 4.



recovery', which includes energy recovery. The disposal of waste is the fifth and final option, only to be used when all other options are unattainable. Because the use of waste for energy recovery is only fourth on the list, (bio-)waste that can be prevented, reused or recycled cannot be incinerated for energy purposes. Furthermore, waste incineration is only regarded as 'recovery', if the waste is used principally as a fuel or other means to generate energy. Incineration facilities for the processing of municipal solid waste fall under this heading only, if their energy efficiency is at least 60% or 65% depending on the date of permitting. Less efficient incineration is considered to be disposal.<sup>109</sup> Moreover, the incineration must be carried out without endangering human health or the environment, and preferably take place in the proximity of where it was generated.<sup>110</sup> Once the waste has been processed, ie converted into heat and/or electricity, it ceases to be waste.<sup>111</sup>

The above shows that the qualification of biomass as 'waste' has a significant impact on how this biomass can be handled. Due to the stricter standards on waste under both the WFD and the IED, using waste for energy generation is generally less favourable for operators than using 'regular' biomass. This effect is mitigated via less stringent requirements on sustainability and by the 'double counting rule' of the RED.<sup>112</sup> This situation reflects the need to simultaneously regulate waste strictly to protect the environment and to 'reward' useful applications of waste. Thus, the combined directives contribute to a holistic approach in the legal framework.

#### 4.5 Regulation of Solid Raw Materials

The legislation just discussed does not fully cover the use of solid biomass for energy purposes. In particular, these directives do not address the cultivation of materials from agriculture and forestry used in electricity generation, which constitute the largest share of renewable energy. The sustainability criteria of the RED do not apply to these materials. Instead, agricultural biomass grown in the EU has to meet the standards of the Common Agricultural Policy (CAP). These standards take the form of Statutory Management Requirements (SMRs) and Good Agricultural and Environmental Conditions (GAECs). SMRs are legal requirements stemming from specific listed EU (environmental) directives, while GAECs are more general requirements on the state of the land after production is ceased.<sup>113</sup>

Forest biomass is regulated mainly through the Timber Regulation and the EU Forest Strategy.<sup>114</sup> The Timber Regulation prohibits the placing on the market of illegally harvested timber or timber products and requires due diligence from

109 *ibid* annex I–II.

110 *ibid* arts 13 and 16.

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

112 As explained in para 0, around (n 36) of this article.

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

114 Timber Regulation (n 20) and Forest Strategy (n 3).

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

There are, however, initiatives at other levels. Belgium, Hungary, Italy and the UK have adopted national rules on sustainable forest management and/or land criteria. At the same time, the Netherlands is contemplating the adoption of a set of sustainability criteria.<sup>121</sup> Furthermore, there are several industry-led sustainable forest management schemes and several ‘general’ certification schemes for forestry and agricultural products. All of these schemes are voluntary.<sup>122</sup> In addition to these certification schemes, the European Committee for Standardisation (CEN) and the International Organization for Standardization (ISO) develop standards on what they refer to as ‘solid biofuels’.

All in all, a patchwork of measures and initiatives regarding woody biomass is in place. There are international, European, national and private initiatives, regarding harvesting, certification, standard setting and/or criteria development.<sup>123</sup> None of these initiatives set binding criteria on the sustainability of biomass or mandatory participation of operators in the field. Therefore, at EU level, the sustainability of solid biomass is only assured, if the country of origin has specific national legislation in place. This is currently the case in only four out of the 28 Member States. Furthermore, their criteria are not ‘full’ sustainability criteria, nor do they have Union-wide application. As a consequence, the legal framework for solid biomass is

115 Timber Regulation (n 20) art 4.

116 *ibid* arts 5–6; State of Play (n 11) 12.

117 Forest Strategy (n 3) 4.

118 State of Play (n 11) 13.

119 European Parliament and Council Decision 529/2013/EU of 21 May 2013 on accounting rules on greenhouse gas emissions and removals resulting from activities relating to land use, land-use change and forestry and on information concerning actions relating to those activities [2013] OJ L165/80 (LULUCF Decision), arts 3–4 in particular.

120 *ibid* art 10 and annex IV(j).

121 State of Play (n 11) 9.

122 *ibid* 12; Forest Strategy (n 3) 12. All recognised EU sustainability schemes can be found on the website of the DG Energy.

123 Examples in: Uwe Fritsche and others, ‘Extending the EU Renewable Energy Directive Sustainability Criteria to Solid Bioenergy from Forests’ (2014) 38(2) *Natural Resources Forum* 129, 131.

far from holistic and is insufficient to guarantee the sustainability of solid biomass used for energy purposes.<sup>124</sup>

#### 4.6 Gas Directive and Electricity Directive

Virtually all energy produced or traded within the EU falls within the scope of the European legal framework covering the liberalisation of the internal energy market.<sup>125</sup> Only two directives of that framework, the Electricity Directive and the Gas Directive, are discussed here. The Electricity Directive establishes common rules for the generation, transmission, distribution and supply of electricity, and lays down consumer protection provisions.<sup>126</sup> The Gas Directive establishes common rules for the transmission, distribution, supply and storage of natural gas, and also applies to biogas and gas from biomass in so far as it can technically and safely be injected into the natural gas system.<sup>127</sup> Biogas has no formal EU definition, but is narrowly described in an annex to the RED.<sup>128</sup> If biogas is purified to natural gas quality, it is referred to as biomethane. In addition, EU legislation distinguishes biogas from landfill gas and sewage treatment gas, which are all recognised as renewable energy sources.<sup>129</sup> Thus, both directives lay down the rules on the organisation and functioning of their respective sectors. The contents of the directives are much the same, so that they will largely be discussed together.

A key feature of both markets is that the networks for the transport of gas and electricity constitute a natural monopoly. Therefore, rules to avoid abuse of dominant positions play a prominent role in the legislative framework. First, the competitive parts of the market are separated from its non-competitive parts. These 'unbundling requirements' mean that generating and supply activities cannot be performed by an undertaking that is involved in the operation of the networks.<sup>130</sup> Under both directives two types of networks are distinguished: the transmission network and the distribution network.<sup>131</sup> Simplified, the transmission of electricity concerns the transport along the (extra) high-voltage power grid, while the distribution of electricity entails the transport along the lower-voltage power grid. Under the Gas Directive, 'transmission' primarily involves the transport of gas along high-pressure pipelines, while distribution occurs along local or regional pipeline networks.

Under each directive, two different entities are responsible for the transport along the two networks. The transmission networks are operated by a transmission system operator (TSO), while the distribution networks are managed by a distribution

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

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

126 E-Directive (n 21) art 1.

127 Gas Directive (n 21) art 1. This means that raw biogas that is not upgraded to natural gas quality falls outside the scope of the Gas Directive.

128 RED (n 8) annex III.

129 *ibid* art 2(a).

130 Gas and E-Directives (n 21) art 9.

131 *ibid* art 2(3 and 5).

system operator (DSO).<sup>132</sup> At EU level, all TSOs cooperate to develop Community network codes, which are basically detailed rulebooks for the electricity and gas sector.<sup>133</sup> These network codes also contain the detailed rules on Third Party Access (TPA), which are the second important safeguard against abuse of the dominant position of the TSO flowing from its natural monopoly. The Gas and Electricity Directives demand that access to the network is based on non-discrimination, objectivity and transparency.<sup>134</sup>

When dispatching the electricity installations, the TSO is required to give priority to installations that use renewable energy sources.<sup>135</sup> For installations producing combined heat and power (CHP) this priority is optional.<sup>136</sup> The E-Directive explicitly refers to article 16 of the RED, which requires that the TSO provides preferential access to the network for electricity from renewable sources and guarantees its transmission and distribution.<sup>137</sup> Thus, electricity from renewable sources enjoys 'privileges' throughout the energy chain. However, preferential access to the distribution network is not mandatory, as this decision is left to the Member States.<sup>138</sup> As a result, electricity from renewables that is fed into the lower-voltage network may be accorded fewer 'privileges' than it would in the high-voltage network.

By analogy, the requirements from the RED should apply to gas made from renewable sources, but neither the RED nor the Gas Directive mentions a preferential access regime for biogases.<sup>139</sup> Nevertheless, Member States must ensure the integration of large and small scale production of gas from renewable energy sources and remove barriers that could prevent access for such gas.<sup>140</sup>

For the remainder, the two directives are again quite similar. Both directives contain rules on tendering for, and the construction of, new capacity,<sup>141</sup> ensuring security of supply,<sup>142</sup> and guaranteeing the safety of the networks.<sup>143</sup> Furthermore, under both directives the energy efficiency of production, transport and efficient use of energy must be promoted.<sup>144</sup>

132 E-Directive (n 21) chs IV and VI; Gas Directive (n 21) chs III and V respectively. Gas and E-Dir, ch III arts 10–11 Gas Dir, ch V; E-Dir, ch VI.

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

134 Gas and E-Directives (n 21) art 32; further reading: Hannah Kruimer, *The Non-Discrimination Obligation of Energy Network Operators. European Rules and Regulatory Practice* (Energy & Law, Intersentia 2013) vol 15.

135 'Dispatching' is explained in (n 43).

136 E-Directive (n 21) art 15(3).

137 RED (n 8) art 16(2).

138 E-Directive (n 21) art 25(4).

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

140 Gas Directive (n 21) art 40(d-e). Equal requirements for electricity can be found in E-Directive (n 21) art 36(d-e).

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

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

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

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

Summed up, both directives focus mainly on the smooth functioning of their respective markets. The E-Directive sets such rules for the full electricity production chain, while the scope of the Gas Directive excludes the extraction or production of gas.<sup>145</sup> The construction of such sites is then nevertheless addressed.<sup>146</sup> Within these markets ensuring security of supply is crucial. Security of supply in regards to electricity has recently been defined by the General Court (GC) of the Court of Justice of the EU as ‘the availability of power plants that can produce electricity, regardless of climatological or political circumstances’.<sup>147</sup> Furthermore, the same judgment illustrates the lack of a holistic approach in current energy regulations, as the General Court explicitly ruled that ‘environmental protection, which should be integrated into all EU activities according to article 11 TFEU, is strictly speaking not an element of the internal market as defined in article 26(2) TFEU’.<sup>148</sup> This interpretation severely undermines the energy markets potential for sustainable development and comes at the detriment of implementing a holistic approach in energy regulations.

Altogether, the rules for energy market regulation do not ensure that all the effects from energy generation are taken into account. The Gas Directive only imposes a general requirement that ‘Member States shall implement appropriate measures to achieve the objectives of social and economic cohesion and environmental protection, which may include means to combat climate change, and security of supply’.<sup>149</sup> In the E-Directive, several holistic elements can be found in the rules on new generating capacity. These are, for instance, the requirement to consider the contribution of a proposed power plant to the 20% renewables target of the RED and its contribution to the reduction of emissions.<sup>150</sup> However, as these elements are not decisive in deciding what type of power plants to build, the approach is only seemingly holistic. Thus, essentially, the only truly holistic element within the E-Directive is the explicit link to the preferential access regime of the RED.<sup>151</sup>

#### 4.7 BAT Reference Documents

The last legislative documents to discuss are five ‘BAT Reference Documents’ (BREFs). These BREFs are lengthy documents that set technical specifications and emission values associated with specific techniques. A BREF is a descriptive

145 Gas and E-Directives (n 21) art 1. The extraction of natural gas is (partially) covered under the European Parliament and Council Directive 94/22/EC l of 30 May 1994 on the conditions for granting and using authorisations for the prospecting, exploration and production of hydrocarbons [1994] OJ L164/3 (Hydrocarbons Directive).

146 Gas Directive (n 21) art 4.

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

148 *ibid* [189].

149 Gas Directive (n 21) art 3(7).

150 E-Directive (n 21) art 7(2)(j&k).

151 *ibid* arts 15(3) and 25(4).

document that does not prescribe the use of any technique or specific technology. It merely specifies techniques that are considered to be the Best Available Techniques (BATs). BREFs may either be restricted to issues related to particular industrial activities ('vertical' BREFs) or may deal with cross-sectoral issues ('horizontal' BREFs).<sup>152</sup>

Formally, BREFs are soft law, but with the adoption of the IED the BREFs' *de facto* status as a secondary source of EU law has been formalised. The procedure for their adoption, as described in article 13 of the IED, is the codification of a long existing practice. The old, more informal BREF-system has often been criticised for lacking transparency and for according too much weight to economic arguments.<sup>153</sup> The codification was meant to address these objections.

In essence, the adoption of BREFs concerns a lengthy, extensive information exchange procedure between multiple stakeholders. As such, the procedure for adopting BREFs is decisive in how holistic the adopted norms will be. After all, it is during the debate that different views are expressed and that arguments in favour of or against including specific techniques are put forward and discussed. Therefore, the point at which, and the way in which, such arguments are presented largely determines the boundaries of what is eventually adopted and accounted for under a BREF. The determination of the BAT is of vital importance, because the BAT conclusions are the reference point for setting permit conditions under the IED.<sup>154</sup> Hence, the BAT conclusions and their associated emission and consumption levels largely determine the level of environmental protection that is required from industrial installations.

All horizontal BREFs roughly have the same structure and each chapter helps to build up to the final BAT conclusions. Thus, the contents of each chapter have an (indirect) effect on how holistic these conclusions are. In the first chapter, the scope of the BREF is determined and general information on the sector (or cross-sectoral issues) is given. Then the applied techniques of a specific sector are discussed, as are current emission and consumption levels. After that, the techniques considered in the determination of the BATs are described and discussed. In determining the BATs, consideration must be given *inter alia* to the criteria listed in the IED, such as the nature of the raw materials or energy efficiency.<sup>155</sup> The iterative process of BAT determination can be summarised as follows.<sup>156</sup> First, the key environmental issues for the sector are identified. Next, the techniques most relevant to address these key issues are examined. Then the best environmental performance levels are identified, followed by an examination of the conditions under which these environmental performance levels were achieved. On this basis, the BATs are selected together with their associated environmental performance levels. The BREFs do not prescribe a

152 Commission Decision 2012/119/EU concerning guidance on the collection of data and on the drawing up of BAT reference documents and on their quality assurance [2012] OJ L63/1, ss 1.1.1 and 1.1.2.

153 See more generally: Bettina Lange, *Implementing EU Pollution Control, Law and Integration* (CUP 2008).

154 IED (n 14) art 14(3).

155 *ibid* annex III.

156 Commission, *Revision of the Standard Texts used in BREFs to Adapt Them to the IED Regime*, 20 July 2012 <[http://eippcb.jrc.ec.europa.eu/reference/BREF/Codified\\_version\\_of\\_standard\\_text29\\_08\\_12.pdf](http://eippcb.jrc.ec.europa.eu/reference/BREF/Codified_version_of_standard_text29_08_12.pdf)> accessed 22 May 2015, [4].

specific environmental performance level, but rather set a range of feasible emission and/or consumption levels. The best available techniques are then described in the BAT conclusions together with a description of any emerging techniques.<sup>157</sup> Normally, consensus is achieved on the BAT conclusions, but split views are also possible and this will be indicated in the BREF.<sup>158</sup>

In the field of energy generation and related biomass uses, five BREFs are particularly relevant. Three of these are vertical BREFs applicable to different categories of industrial (biomass) installations. Hence, there are separate 'BAT Reference Documents' for large combustion plants (called the BREF LCP), for waste incineration plants (called the BREF WI), and for other forms of waste treatment (referred to as the BREF WT).<sup>159</sup> All three BREFs provide feasible emission levels for the production processes that are considered BATs in their respective sectors. In case of conflict between any of the norms, the most stringent ones apply.<sup>160</sup> All three BREFs take a holistic approach to one phase of the energy cycle, as they lay down the numerical specifications of the integrated approach required under the IED. Thus, they contain detailed 'instructions' on how to avoid cross-media effects in each segment of the production phase.

The fourth relevant BREF is the reference document on energy efficiency (called BREF ENE).<sup>161</sup> This is a horizontal BREF, applicable to all installations that fall under the IED regime. The BREF discusses techniques that are considered BAT to achieve energy efficiency at both the installation level and at the system level. However, the BREF does not set energy efficiency values, like the BREF LCP and BREF WI do for the emissions from their respective installations. Instead, the BREF ENE's aim is to ensure that all IED installations are operated in such a way that energy is used efficiently overall. Out of the five BREFs, the BREF ENE is the most holistic one as it is the only one that considers the full length of the energy chain. At the same time, the chain under consideration is extremely thin, as energy efficiency is one element in the production chain.

The final relevant document, the 'Reference Document on Economics and Cross-Media Effects' (REF ECM), is also a horizontal reference document.<sup>162</sup> Unlike the other BREFs, this document does not determine any BATs. Instead, it describes methodologies that may assist in determining BATs in other BREFs. The REF ECM gives methodologies for assessing and weighing cross-media effects, for balancing

157 Commission Decision 2012/119/EU (n 152) s 2.2.

158 *ibid* s 4.6.2.3.2.

159 These are respectively: Commission, *Reference Document on Best Available Techniques for Large Combustion Plants* (July 2006) <[http://eippcb.jrc.ec.europa.eu/reference/BREF/lcp\\_bref\\_0706.pdf](http://eippcb.jrc.ec.europa.eu/reference/BREF/lcp_bref_0706.pdf)> accessed 9 September 2015 (BREF LCP); Commission, *Reference Document on the Best Available Techniques for Waste Incineration* (August 2006) <[http://eippcb.jrc.ec.europa.eu/reference/BREF/wi\\_bref\\_0806.pdf](http://eippcb.jrc.ec.europa.eu/reference/BREF/wi_bref_0806.pdf)> accessed 9 September 2015 (BREF WI); and Commission, *Reference Document on Best Available Techniques for the Waste Treatments Industries* (August 2006) <[http://eippcb.jrc.ec.europa.eu/reference/BREF/wt\\_bref\\_0806.pdf](http://eippcb.jrc.ec.europa.eu/reference/BREF/wt_bref_0806.pdf)> accessed 9 September 2015 (BREF WT).

160 BREF WI (n 159), preface, xiv.

161 Commission, *Reference Document on Best Available Techniques for Energy Efficiency* (February 2009) <[http://eippcb.jrc.ec.europa.eu/reference/BREF/ENE\\_Adopted\\_02-2009.pdf](http://eippcb.jrc.ec.europa.eu/reference/BREF/ENE_Adopted_02-2009.pdf)> accessed 9 September 2015 (BREF ENE).

162 Commission, *Reference Document on Economics and Cross-Media Effects* (July 2006) <[http://eippcb.jrc.ec.europa.eu/reference/BREF/ecm\\_bref\\_0706.pdf](http://eippcb.jrc.ec.europa.eu/reference/BREF/ecm_bref_0706.pdf)> accessed 9 September 2015 (REF ECM).

costs and benefits of different technologies, and for assessing the economic viability of specific techniques. Furthermore, it provides data and information that can be useful in these assessments. Altogether, the REF ECM takes a holistic approach in avoiding the shifting of effects during the production phase. In addition, the REF ECM considers alternative methodologies for the calculation of external (health and environmental) costs of industrial processes. However, the document only establishes guidelines for Member States, so it does not impose holistic obligations.

Furthermore, in the costing methodologies external costs are not accounted for.<sup>163</sup> This is also the case in calculating costs under the other four documents. As a consequence, the price of the protective measures required from operators is lower than the actual overall societal costs incurred by a specific industrial process. For instance, the average EU health-related costs of NO<sub>x</sub> emissions are estimated to be at least €4.40 per additional kilo of NO<sub>x</sub>, while emission reduction measures required from operators are deemed 'reasonable' (ie cost effective) up to a maximum of €2.50 per kilo of abated NO<sub>x</sub>.<sup>164</sup> Several health effects are thus ignored, as are any environmental effects. This monetary limitation therefore ultimately limits how holistic the regulatory approach is, as it essentially gives economic considerations preponderance over environmental and/or health concerns.

## 5. CONCLUSIONS

### 5.1 Holistic Elements and the Current Framework

The analysis of the legal framework for biomass for energy shows that some strong elements of a holistic approach are present, but mostly this approach remains embryonic. Still, holistic elements can be found at three levels. First, several provisions take a holistic approach to the environmental effects occurring within one phase of the energy (production) chain. The most well-known example are the environmental protection requirements under the IED referred to as the 'integrated prevention and control of pollution' aimed at avoiding the shifting of pollution between water, air and/or soil.<sup>165</sup> At a higher level, holistic provisions link different parts of the energy (production) chain. Awareness on the mutual influence of (actors within) the different phases of the energy chain has led to an increase in this type of rules.<sup>166</sup> The strongest example found in biomass regulations is the preferential treatment of electricity from renewables, as required under the RED.<sup>167</sup> This provision links the raw materials phase to the transport phase and 'rewards' the more sustainable options. At a third level, there are provisions aimed at a more systemic holistic approach, ie targeting the full energy chain. These rules may focus on either one specific type of energy generation or on the energy system as a whole. The most elaborate example of the former is found in the sustainability criteria of the RED and FQD that explicitly attribute the emissions from cultivation, transport and production to the biofuels.<sup>168</sup>

163 *ibid* 41.

164 These estimates are from 2006. See: REF ECM (n 162) 61 v 121.

165 IED (n 14) art 1.

166 These phases are depicted in [Figure 1](#).

167 RED (n 8) art 16(2).

168 *ibid* art 17 and FQD (n 18) art 7b.



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

Altogether, the current legal framework lacks a coherent vision on how to achieve the often advocated holistic approach. The current framework is characterised by rules that are at times ‘clustered’ with similar rules, but often function parallel to each other. In this regard, the IED Directive serves as an ‘umbrella’ to which the EIA Directive and several BREFs are strongly attached. The WFD is connected more loosely, whereas the EED and RED remain parallel and unattached to the IED cluster. Nevertheless, energy saving requirements can be found throughout the legal framework. Furthermore, the Gas Directive and E-Directive are not related to the IED umbrella and, out of the two, only the E-Directive is loosely linked to the RED. The SEA Directive and the FQD do not converge with the other rules, although the FQD echoes the wording of the RED. The resulting fragmentation within the framework partly stems from the fact that the rules were drafted at different times and with different aims in mind. Additionally, the directives each serve multiple interests and EU energy law in general serves the triple aim of ensuring an affordable, secure and sustainable energy supply.<sup>169</sup>

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

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

The second example is the importance of the classification of biomass as waste. The legal framework reflects the tension between, on the one hand, the desire to regulate waste strictly in order to protect the environment and/or human health, and, on the other hand, the desire to promote waste as a useful resource in order to simultaneously reduce natural resource usage and waste production. To promote the use of biomass in electricity generation, several types of waste are excluded from the waste provisions in the IED; instead the regular combustion rules apply.<sup>170</sup> Similar

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

170 IED (n 14) arts 3(31) and 28(j).

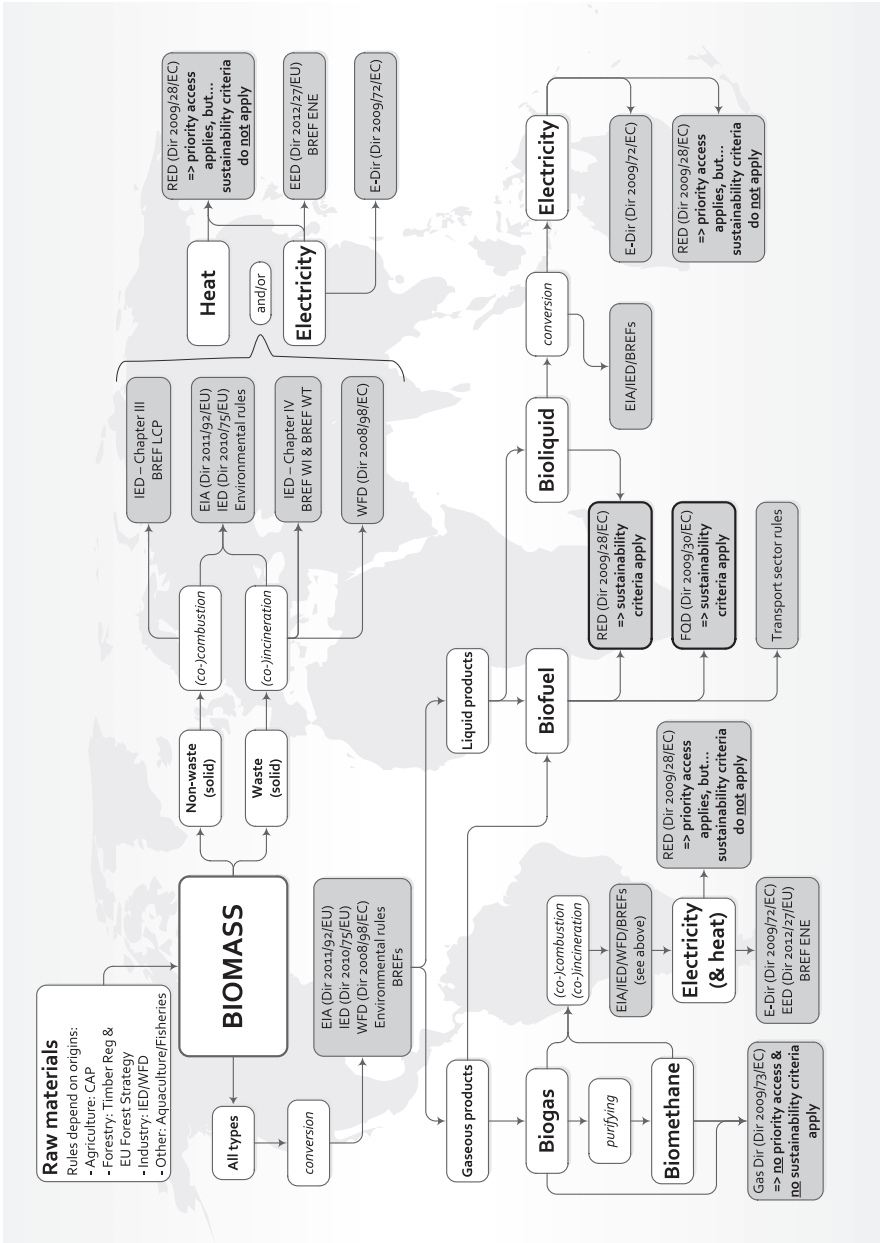


Figure 2 Flowchart of rules applicable to different biomass applications.

exclusions exist for the application of the WFD.<sup>171</sup> This approach narrows down the term ‘waste’, and as a result biomass sources such as residual wood chips can be used more easily in energy generation. At the same time, in the application of the EIA Directive, the term ‘disposal’ is interpreted to include ‘recovery’, while under the WFD ‘recovery’ is regarded as a special type of recycling, and not a form of disposal.<sup>172</sup> This interpretation broadens the scope of the term waste for the application of the EIA to ensure that waste incineration for energy purposes is covered by the EIA.

Despite this need for diversification, differentiation becomes unwanted if it leads to fragmentation, as this decreases the frameworks potential to achieve a holistic approach and may result in the omission of specific effects. A coherent holistic approach is further undermined by a lack of knowledge of the side effects of either the envisaged measures and/or of the production pathways that are regulated. This is particularly true in regard to the application of the sustainability criteria of the RED (and FQD). First of all, these criteria apply to only a fraction of all biomass-for-energy applications, as they cover only roughly 2.5% of overall energy consumption.<sup>173</sup> The practical effectiveness of the most advanced example of holistic legislation thus remains rather marginal, since no binding sustainability criteria are applicable to any other biomass applications. Furthermore, it is striking that the applicability of the criteria is largely dependent on the form and manner in which the raw materials are eventually consumed. This results in inconsistent application of the criteria, which is most prominent in relation to biogas regulation. Biogas itself is generally not used as a transport fuel; hence, biogas is not covered by the sustainability criteria.<sup>174</sup> However, biomethane, which is purified biogas, can be used as a fuel for vehicles, in which case the sustainability criteria do apply. If biomethane is used in any other way, ie not as a biofuel, the sustainability criteria again do not apply. Consequently, under the current legal regime, the same gas (biomethane), produced in the same manner from the same raw materials, is for one application subjected to stringent sustainability criteria, while for another it is not.<sup>175</sup> In addition, its ‘raw version’, biogas, is not subjected to sustainability criteria. This inconsistent application of sustainability requirements conflicts with the need to come to a more sustainable overall energy supply.

## 5.2 Carbon Neutrality

The sustainable use of biomass for energy is further undermined by the general assumption of carbon neutrality of all types of biomass, while in fact this neutrality

171 WFD (n 15) art 2(1)(f).

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

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

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

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

depends on the time frame considered and the biomass source used.<sup>176</sup> Regarding the time frame, it is problematic that the current legal framework does not acknowledge the carbon debt resulting from the time-lapse between the occurrence of emissions and the reabsorption thereof. The fact is that most biomass applications rely on combustion techniques and that combustion causes carbon emissions. Thus, biomass used for energy production actually increases atmospheric carbon and it takes time to rebuild an equally sized store of carbon.<sup>177</sup> This results in a carbon debt, which can take decades or even centuries to repay. According to the Scientific Committee of the European Environment Agency, 'the premise that biomass combustion, regardless of the source of the biomass, would not result in carbon accumulation in the atmosphere results in a serious accounting error'.<sup>178</sup> This reality, which is currently ignored in law, should be explicitly acknowledged by the legal framework, if there is to be a holistic approach.

A second implication resulting from this time-lapse is that biomass supplies are not endless, as it takes time for supplies to regrow. This means that the increased demand for biomass for energy purposes must be reconciled with all other, potentially competing biomass uses. It is therefore vital to develop a framework that prioritises these uses and establishes a mandatory cascading use, similar to the waste hierarchy advocated by the WFD. For woody biomass, a cascading use approach would require that, the first application of this biomass is for wood-based products. The second preferred option is reuse and third comes recycling. Bioenergy should be only the fourth application, just before disposal. This cascade use ensures that woody biomass is used in the most efficient manner and that competition over biomass sources is avoided, which is particularly important for woody biomass used in electricity generation.<sup>179</sup>

In regard to biofuels, their carbon neutrality is also undermined by the fact that ILUC emissions are not accounted for. From a regulatory perspective, it is problematic that ILUC emissions vary according to the interaction between dynamic (global) economic and physical systems. This leads not only to scientific uncertainty about their size but also to variations of their size in time. Regulating ILUC emissions is further complicated by the fact that a higher demand for biomass increases the risk of deforestation, hence leading to higher ILUC emissions.<sup>180</sup> To date, no sufficiently accurate models have been developed to calculate ILUC emissions. However, the alternative cannot be to ignore these emissions, as doing so equals setting them to

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

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

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

179 Forest Strategy (n 3) 5–6.

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

zero in the calculations, which significantly distorts the outcome of the overall environmental performance of biofuels.<sup>181</sup>

Similarly, it is argued that such distortions occur, because the fossil fuel comparator currently used is not accurate. Ecofys, a consultancy agency, argues that this comparator should be adjusted upward to reflect that more unconventional fossil fuels, that typically have higher carbon footprints, will come onto the market.<sup>182</sup> Such an adjustment would improve the relative environmental performance of biofuels. However, Nusa Urbancic argues that the comparator suggested by Ecofys is too high, because it is based on flawed assumptions regarding the role of unconventional fuels in the future energy mix.<sup>183</sup> This discussion illustrates the importance of the assumptions underlying (GHG) calculations, as such assumptions can significantly impact the relative environmental performance of biofuels or even whole energy systems.

### 5.3 Consequences for Legal Design

All in all, to ensure the transition to a low-carbon energy system, it is essential to develop a fully holistic approach and to impose sustainability criteria for all types of biomass. The latter could be achieved by a minor amendment to article 17 RED to make the criteria applicable to 'bioenergy' rather than 'energy from biofuels and bioliquids'. Alternatively, criteria similar those applicable to biofuels could be adopted for solid biomass. The starting point could be the proposal already drawn up by the Commission, which was never submitted due to industry opposition.<sup>184</sup> Additionally, these criteria should account for ILUC emissions and the existing carbon debt.

Without such criteria, an ambitious bio-based economy increases the risk of non-sustainable supply and overexploitation of natural resources.<sup>185</sup> At the same time, the potentially available supply of biomass is strongly influenced by the strictness of any adopted sustainability criteria.<sup>186</sup> The stricter these criteria are, the smaller is the amount of available biomass. Ironically, the available supply of biomass is further affected by climate change itself, because temperature increases, rainfall pattern changes and increased frequency of extreme events will influence and interact with the biomass resource potential.<sup>187</sup>

According to the Intergovernmental Panel on Climate Change, 'bioenergy has a significant [...] GHG mitigation potential, provided that the resources are developed sustainably [...]. Certain current systems and key future options [...] are able to deliver 80 to 90% emission reductions compared to the fossil energy

181 Opinion SC EEA (n 178) 7.

182 Van den Bos and Hamelinck (n 52).

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

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

185 PBL note (n 180) 9.

186 PBL note (n 180) 7.

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

baseline'. However, the overall impact of bioenergy is positive or negative depending on local conditions and the design and implementation of specific projects. A proper design is all the more crucial, as bioenergy has complex societal and environmental interactions. If improperly designed, climate change feedback, land use conversion and unsustainable forest management can 'in some cases more than neutralize the net positive GHG mitigation impacts'.<sup>188</sup>

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

Despite the risk of overstimulation, not all biomass energy can or must be instantaneously replaced by wind, solar or other renewable sources. The fact is that each renewable energy source presents its own challenges to the energy system. For instance, with biomass the main issue is its sustainability, while with wind and solar energy the main challenge lies in dealing with intermittent supply. Security of supply is essential, as energy is, in the words of the Commission, 'the life blood of our society'.<sup>189</sup> Thus, striking the right balance in the deployment of the different energy sources is crucial. To find this balance, accurate boundary setting in law is of the utmost importance, as the inclusion or exclusion of specific elements and effects, and the assumptions underlying them, significantly impact the performance of the system as a whole. Currently, the environmental effects of (biomass) energy production are insufficiently accounted under the legal framework. Furthermore, recent emphasis lies on strengthening the market and security of supply through the creation of the Energy Union, rather than on implementing a strong holistic approach to combat climate change and halt the fragmentation of the legal framework.<sup>190</sup> In this light, the recent ruling of the General Court that 'environmental protection is strictly speaking not an element of the internal market' is worrisome, as it leaves leeway for evasion of environmental considerations in market regulations.<sup>191</sup> In addition, this view encourages compartmentalisation of the legal framework, rather than integration. Despite these hurdles, climate change compels us to overcome the methodological challenges arising in the development of the holistic approach in order to intensify the energy transition.

#### ACKNOWLEDGEMENTS

The author wishes to thank Prof. Hans Vedder and Prof. Martha Roggenkamp for their valuable comments and contributions.

188 All quoted from: IPCC SRREN (n 187) 214–15.

189 Energy 2020 (n 169), 2.

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

191 *Castelnuovo Energia* (n 147) para 189.

### LATE AMENDMENTS

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

The main amendments are:

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