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On a Common Road Towards Sustainable Biofuels? EU and U.S. Approaches to Regulating Biofuels

Max S. Jansson[*] & Harri Kalimo[**]

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[*] Researcher at the Institute for European Studies, Vrije Universiteit Brussel.

[**] Senior Research Fellow and Programme Director at the Institute for European Studies, Vrije Universiteit Brussel. E-mail: harri.kalimo@vub.ac.be.

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I. INTRODUCTION

A. BIOFUELS—ON THE ROAD TOWARDS SUSTAINABLE ENERGY POLICY?

Effective climate change mitigation requires decisive measures, in particular in the production and consumption of energy. Biomass as a renewable source of energy has obtained an important role in the transition towards more sustainable energy policies. President Obama expressly referred to the topic in his land mark climate change speech at Georgetown University on June 25, 2013, claiming that "We'll need scientists to design new fuels, and we'll need farmers to grow new fuels."[1]

The overall environmental performance of biomass has nevertheless become increasingly uncertain. Concerns are raised on the effects of using biomass on biodiversity, and for some even its credentials in mitigating climate change have become uncertain. Clear criteria to determine the sustainability of biomass have become indispensable.

Due to their increased role, biomass—and biofuels in particular—are also increasingly traded on the world scale. The EU's plans to increase the share of renewable energy sources in transport to 10% by 2020 relies fundamentally on large quantities of biofuel being imported from abroad. The global nature of biofuels would seem to speak strongly in favor of establishing global standards for this group of products.[2] Considering the environmental concerns on biofuels, the global standards also need to include stringent requirements on their sustainability.

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[1] Remarks by the President on Climate Policy (June 26, 2013), *available at* http://www.whitehouse.gov/the-press-office/2013/06/25/remarks-president-climate-change (last accessed Apr. 11, 2014).

[2] Seita Romppanen, *Regulating Better Biofuels for the European Union*, EUROPEAN ENERGY & ENVT'L L. REV. 123, 133–35 (2012).

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To create global standards on sustainable biofuels, the participation of the EU and the U.S. is quintessential. They are among the largest producers and consumers of biofuel globally, yet have also been the vanguards of establishing sustainability criteria for biofuels. International cooperation on biofuels could therefore build on the experiences of these two regimes. There nonetheless appears to be an understanding that the biofuel sustainability criteria applied on the two sides of the Atlantic are "incomparable."[3] Both the EU and the U.S. have also faced vehement criticism regarding the deficiencies of their biofuels policies, and the criticism has pointed in particular to biofuels' sustainability.[4] Are the calls for global action in greening the biofuel policies, to be spearheaded by the EU and U.S., thus completely unjustified? Will the meager achievements and the poor coherence of the European and American approaches block any efforts to create global standards on sustainable biofuels? This paper sets out to explore this conundrum with the objective of evaluating transatlantic commonalities as a starting point for international cooperation.

B. A STAIRWAY TO (A GHG FREE) HEAVEN?

The paper starts with a parallel substantive analysis of the EU and U.S. sustainability criteria for biofuels. Identifying similarities and differences between the normative solutions and their implications for different categories of biofuels should facilitate a better understanding of the legal challenges and potentially provide insights into new solutions. This initial analysis alleviates many concerns about the incompatibility of the European and American approaches. While the concepts and methods of calculation used in these two jurisdictions may differ in various respects, the underlying

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[3] *Sustainability Requirements for Biofuels and Biomass for Energy in EU and U.S. Regulatory Frameworks*, 28 NL Agency, Ministry of Economic Affairs, Agriculture and Innovation, The Netherlands, May 2011 [hereinafter *NL Agency Biofuel Report*].

[4] *See, e.g.*, Stewart Fast, Mike Brklacich & Marc Saner, *A Geography-Based Critique of New U.S. Biofuels Regulation*, GCB BIOENERGY 243 (2012); *see also* Romppanen *supra* note 2, at 127–35.

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challenges, objectives and policy structures seem in fact quite well aligned. These are what matters in terms of striving towards commonalities on a global scale. Also the stringency of the sustainability criteria—or precisely the lack thereof—appears much more similar than what would appear from the surface. Indeed, the criticisms pointed at the two systems are analogous in ways that reveal potential for common improvements. Overall, it appears to be exactly the failure to exploit the benefits of close collaboration, rather than fundamental divergences in the visions for the future, that has been characteristic to European and American biofuels policy-making so far.

On the basis of the initial analysis, the paper will as the second step highlight areas where the European and American biofuels sustainability policies can move forward in better synchrony. The analysis makes it obvious that there is still a long way to go, in both jurisdictions. The task of developing policy in such a complicated area needs to be undertaken with care. For example, the EU biofuels rules can learn from the American experiences in terms of integrating the effects of indirect land use change (ILUC) in the sustainability calculations. The American model then again could be improved by integrating a more comprehensive approach and by accepting actual case-by-case life-cycle evidence on specific biofuels production pathways as is done in the EU. Perhaps the thorniest issue for both European and American biofuels policies—and hence for biofuels globally speaking—will be to disentangle sound and sustainable biofuels policy from the economic ego-centrism of vested interests.

The concluding part of the paper will discuss the observed linkages and sketch means to move forwards on the road towards more sustainable biofuels policies.

II. EU AND U.S. BIOFUELS REGIMES

A. SUSTAINABLE AND UNSUSTAINABLE BIOFUELS

Bioenergy is a form of renewable energy that is extracted from biomass. Biomass can be turned into a liquid or gaseous fuel that is used either for

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transport (biofuels) or for other energy purposes (bioliquids). The focus in this paper is on biofuels.[5] The role of biofuels in a more sustainable energy policy has been the subject of intensive debate in both the EU and the U.S. Questions are being raised on whether biofuels really represent a sustainable solution and if they under a "well-to-wheels" life-cycle assessment actually lower the GHG emissions in comparison with fossil fuels. Biofuels may, for example, increase the need to cultivate land, which due to the use of fertilizers and deforestation can also increase GHG emissions. The cultivation of land may also, by replacing virgin land or food crop-producing land, indirectly threaten biodiversity and the supply of food.

In an effort to distinguish sustainable and unsustainable biofuels, the EU and the U.S. have both adopted legal sustainability criteria. The approach in both the EU and the U.S. mostly builds on incentives: only biofuels that meet sustainability criteria qualify for the benefits offered to renewable energy sources.[6] The lack of scientific consensus on the sustainability of biofuels has nevertheless obscured and complicated the development of legislative norms.

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[5] Whereas the sustainability criteria only apply to biofuels and the transport sector in the U.S., they also apply to bioliquids used in other sectors in the EU. *See* Directive 2009/28/EC of the European Parliament and of the Council of *April 23, 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, OJ L 140/16, 5.6.2009, art. 1 [hereinafter Renewable Energy Directive or RED].

[6] *See* K. Kulovesi, E. Morgera & M. Munoz, *Environmental Integration and Multi-faceted International Dimensions of EU Law: Unpacking the EU's 2009 Climate and Energy Package*, 48 COMMON MKT. L. REV. 829, 881 (2011). (The sustainability criteria only apply to biofuels in the U.S. and bioliquids (incl. biofuels) in the EU. Criticism has been raised regarding the lack of sustainability criteria for solid biomass.) There have been plans to introduce criteria for solid biomass. *See* Renewable Energy Directive, *supra* note 5, at art. 17(9) and report from the Commission to the Council and the European Parliament on sustainability requirements for the use of solid and gaseous biomass sources in electricity, heating and cooling, COM(2010) 66,

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B. EU AND U.S. REGULATORY FRAMEWORKS

Both the EU and U.S. renewable energy regimes include long-term targets and are composed of several elements. Part of this renewable energy will be produced as sustainable biofuels that replace fossil fuels in certain sectors.[7] The laws also contain provisions that determine the parties who are obliged to comply with the requirements.[8] Further incentives for biofuels production are created through legislation on tariffs and state aids.

EU law on biofuels has two main elements: the Renewable Energy Directive (RED) and the Fuel Quality Directive (FQD).[9] The first directive on biofuels was enacted by the EU in 2003,[10] and revised and subsequently

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10. *See also* Romppanen, *supra* note 2, at 127–35 (A more holistic approach could even see criteria for agriculture more in general.).

[7] *See* Renewable Energy Directive, *supra* note 5, pmbl. pt. (67) (Targets for biofuels are limited to certain sectors. In U.S. biofuels are to replace fossil fuels only within the transport sector. The EU rejected the U.S. approach due to fear that it would put the objective of reducing GHG emissions at risk since there would be limited need to cut down the production of more polluting fuels when they could be used in other sectors than transport.).

[8] The U.S. targets refiners and importers of fuel directly, whereas the EU targets member states that individually need to implement incentives for their industry. In principle, an EU member state could implement the RED by introducing a similar system to that applied in the U.S.

[9] Directive 2009/30/EC of the European Parliament and of the Council of April 23, 2009 amending directive 98/70/EC as regards the specification of petrol, diesel and gas-oil and introducing a mechanism to monitor and reduce greenhouse gas emissions and amending Council directive 1999/32/EC as regards the specification of fuel used by inland waterway vessels and repealing directive 93/12/EEC, OJ L 140/88, June 5, 2009 [hereinafter FQD].

[10] Directive 2003/30/EC, of the European Parliament and of the Council of *May 8, 2003* on the promotion of the use of biofuels and other fuels for transport, OJ L 123/42, May 17, 2003. *See also* Directive 2001/77/EC on the Promotion of Electricity Produced from Renewable Energy Sources in the Internal Electricity Market, OJ L 283/33, Oct. 27, 2001.

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repealed by the RED in 2009.[11] The RED sets a mandatory Union level target that by 2020, at least 20% of the final consumption of energy is from renewable sources. In the transport sector, the share has to be 10%. The EU is currently in the process of further amending RED in terms of its requirements on indirect land use change (ILUC).[12] The second element of EU biofuels policy, the Fuel Quality Directive, sets targets on fuel suppliers in particular in terms of the fuel GHG reductions. Amendments to the original Directive of 1998 introducing the current sustainability criteria were enacted in parallel with RED in 2009. The sustainability criteria for biofuels in RED and FQD are the same and constitute total harmonization: the Member States are limited in their ability to adopt stricter criteria.[13]

In the U.S., biofuels sustainability criteria were introduced in the Renewable Fuel Standard program (RFS1), which was a part of the EPA's implementation of the federal Energy Policy Act (EPAct) of 2005. Soon after the EPAct, the Energy Independence and Security Act of 2007 (EISA) required fuel producers to increase the volumes of renewable fuels gradually by 2022, and established separate quotas for different biofuels: 36 billion gallons of renewable fuels in total by 2022, of which at least 21 billion gallons are "advanced biofuels." In addition, a large part—16 billion

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[11] Renewable Energy Directive, *supra* note 5.

[12] *European 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, Brussels, Oct. 17, 2012 [hereinafter *2012 Commission Proposal to Amend RED*]. Neither the Parliament nor the Council could reach internal consensus in 2013. Negotiations are not expected to continue until the fall of 2014.

[13] Renewable Energy Directive, *supra* note 5, at art. 17(8); FQD, *supra* note 9, at art. 5; *see also* art. 6 FQD, which does allow for derogation under certain circumstances. On the contrary, in the U.S. state-level criteria can exist side by side with federal criteria. For example, California has done so with the adoption of the Low Carbon Fuel Standard.

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gallons—of the advanced biofuels should be of cellulosic biofuels in 2022.[14] EISA led the EPA to update and expand the sustainability criteria of RFS1 in the RFS2.[15] The final rule was published in 2010. However, details of the program are constantly being monitored and modified. In addition to federal legislation, some states like California have their own sustainability scheme.[16]

Viewed as a whole, one may notice both similarities and differences in the structure of renewable energy and biofuels legislation in EU and U.S. An important commonality is that both regimes have been forced to adopt legal definitions and criteria for determining the sustainability of biofuels on the basis of evolving scientific knowledge, and the consequent the controversy surrounding the issue.

Sustainability is usually seen as including an environmental, a social and an economic dimension.[17] Despite the wide range of concerns regarding sustainability, no specific, generally accepted criteria for the three dimensions of sustainability have been developed.[18] These dimensions intertwine in a

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[14] Clean Air Act, 42 U.S.C. § 7545(o). (The renewable fuel mandate of EISA is a part of Section 211(o).)

[15] 40 C.F.R. 80 subpart M.

[16] The California Low-carbon Fuel Standard, 17 CAL. CODE REG. §§ 95480–95490.

[17] United Nations Conference on Environment and Development, Rio de Janeiro, Braz., June 3–14, 1992, *Agenda 21*, U.N. Doc. A/CONF.151/26 (vol. I); Stavros Afionis & Lindsay C. Singer, *European Union Leadership in Biofuels Regulation: Europe as a Normative Power?*, 32 J. CLEANER PRODUCTION 114, 116–17 (2012).

[18] *Compare* Renewable Fuel Standard, 75 Fed. Reg. 58, 14839 (Mar. 26, 2010) (to be codified at 40 C.F.R. pt. 80), with Renewable Energy Directive, *supra* note 5, at art. 17(7) and pmbl. pt. (9) (Social sustainability includes considerations of impact on food availability and working conditions. EU legislation contains obligations to report regularly on these issues. Hence the EU appears to have adopted a broader perception of sustainability than the U.S. legislator.).

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challenging manner over the issue of biofuels. However, the focus of this paper is not on such interaction but rather specifically on the criteria for environmental sustainability.

Environmental sustainability requirements can be roughly divided into two groups: those that deal with GHG reductions, and those that relate to other aspects of the environment, such as the quality of air, water and soil.[19] In both the EU and U.S. renewables law, there are specific provisions on the lowering of the levels of GHG emissions. As for non-GHG impacts, the EU and the U.S. legislatures have adopted systems for analysis and reporting,[20] as well as requirements on the type of land that sustainable biofuel feedstock can be produced on.

The division between GHG and non-GHG related requirements are not strict, of course: there are rules that in parallel enhance decarbonization and tackle other environmental concerns such as the protection of biodiversity. Both types of effects need to be assessed from an overall life-cycle perspective. Next, the paper will analyze in more detail the EU and U.S. requirements in terms of their non-GHG and GHG related sustainability criteria.

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[19] Tereza Bicalho, Jacques Richard & Cecile Bessou, *Limitations of LCA in Environmental Accounting For Biofuels Under RED*, 3 SUSTAINABILITY ACCOUNTING, MGMT. & POL'Y J. 218, 224 (2012); Jolene Lin, *The Environmental Regulation of Biofuels: Limits of the Meta-Standard Approach*, 5 CARBON & CLIMATE L. REV. 34, 36 (2011); and Melissa Powers, *King Corn: Will the Renewable Fuel Standard Eventually End Corn Ethanol's Reign?*, 11 VT. J. ENVTL. L. 667, 683–84 (2011).

[20] For EU requirements see Renewable Energy Directive, *supra* note 5, at art. 17(7), and for U.S. evaluation see Renewable Fuel Standard, 75 Fed. Reg. 58, 14799–816 (Mar. 26, 2010) (to be codified at 40 C.F.R. pt. 80) and Renewable Fuel Standard, 75 Fed. Reg. 58, 14852–58 (Mar. 26, 2010) (to be codified at 40 C.F.R. pt. 80). The environmental impacts are also dealt with from a broad perspective in Environmental Protection Agency, EPA 420-R-10-006, Renewable Fuel Standard Program (RFS2) Regulatory Impact Analysis (2010).

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III. SUSTAINABILITY CRITERIA FOR PROTECTING BIODIVERSITY AND LAND WITH HIGH CARBON STOCK

This part discusses the main aspects of the European and American biofuels sustainability requirements on environmental effects other than the green house gases thresholds. The main concern in both jurisdictions is in this respect the protection of biodiversity—the variation of life forms within a given species, ecosystem or biome.

Collection of biomass from sensitive, ecologically valuable land may threaten biodiversity. There are environmental, economic and even moral reasons for protecting biodiversity.[21] The reasons are connected to climate change, because the carbon sinks may decrease if land of high biodiversity is cleared to make the cultivation of biofuels feedstock possible. Hence, biofuel feedstock collected from certain sensitive ecologically valuable land will not be considered sustainable renewable energy.

A. THE NEGATIVE LIST APPROACH OF THE EU RED

The EU RED has adopted a list of land types that are to be protected from conversion into production sites of biofuel feedstock. No outright ban on producing biofuels on these lands exists, but the biofuels produced will not gain the status of renewable energy. The protected land types listed in Article 17 of the directive include primary forests, threatened ecosystems and grasslands of high biodiversity.[22] The lands are indefinitely protected if they fell within one of the noted categories of land in or after January 2008. This applies even if the land was later modified to another, unprotected form due to reasons unrelated to the production of biofuels.

Restrictions also apply on the use of designated nature protection areas for the cultivation of feedstock. These areas can only be utilized in the

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[21] Renewable Energy Directive, *supra* note 5, pmbl. pt. (69).

[22] *See* Renewable Energy Directive, *supra* note 5, at art. 17(3) for a more detailed listing of the lands with high biodiversity.

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production of sustainable biofuels, provided that the activity does not interfere with the nature protection purposes.[23] For example, the collection of biomass in the form of thinnings in a protected forest can, under some circumstances, actually enhance a healthy natural environment and hence might not interfere with the protection purposes.

There are also areas that are primarily protected due to their high carbon stock.[24] This category of protected land includes areas that were wetlands, continuously forested areas or large forests in January 2008 but no longer have that status. In addition, peatlands[25] are protected from cultivation of feedstock for sustainable biofuels in case it would cause drainage.

The EU legislation hence provides an extensive list of protected areas, ensuring that land conversion does not make biofuel production unsustainable. The negative list approach is nonetheless problematic precisely because it requires the definition of such a wide range of land types.[26] Consequently, the provisions can be criticized for their scope and inadequate accuracy. The EU has established a duty for member states to biannually report on the changes in land use and the impacts on biodiversity that are caused by biofuels production. In addition, the Commission will monitor these impacts and will report biannually to the Parliament and the Council.[27] This system of monitoring should ideally reveal any weaknesses in the approach.

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[23] Renewable Energy Directive, *supra* note 5, at art. 17(3)(b).

[24] *See* Renewable Energy Directive, *supra* note 5, at art. 17(4).

[25] *Id.* at art. 17(5).

[26] All definitions are not yet available in current legislation. For comments see Robert Ackrill & Adrian Kay, *EU Biofuels Sustainability Standards and Certification Systems—How to Seek WTO-Compatibility*, 62 J. AGRIC. ECON. 551, 560 (2011); and *NL Agency Biofuel Report*, *supra* note 3, at 20.

[27] Renewable Energy Directive, *supra* note 5, at art. 22(1)h, art. 22(1)j, art. 23(3), art. 23(5)b, art. 23(5)c, art. 23(5)f.

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B. The Positive List Approach of the U.S. RFS2

The American non-GHG related biofuel sustainability criteria in the RFS2 are based on a regulatory approach that is the opposite of the European RED. There is no list of land types that are unsuitable for sustainable biofuel production; instead, the types of land on which sustainable biofuels *may* be produced are defined in paragraph 80.1401 of RFS2.

In accordance with the positive list in RFS2, sustainable biofuel can be produced from crops planted on land that was cleared or cultivated for *agriculture* prior to December 2007 and was at that point in time still either actively managed or fallow. The acceptance of fallow land as an area suitable for biofuel production has effects that are potentially different from those under the EU regime. A fallow could have, for example, become grassland with high biodiversity by December 2007, or at any later stage, yet it would still qualify for the cultivation of biofuel crops. This would not be the case in the EU; hence this type of land would enjoy better protection under EU law.

Feedstock for the production of sustainable biofuels, as defined in RFS2, may also be collected from tree plantations. This source is limited to trees planted on non-federal land that had been cleared and was actively managed in December 2007. According to RFS2, the sustainability of collecting feedstock from tree plantations does not extend to federal land.[28] Changes to this situation have been under evaluation.[29] The exclusion of federal lands appears quite categorical, and the differential treatment of federal and non-federal forests seems odd in case there is no environmental difference

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[28] Kelsi Bracmort & Ross W. Gorte, Cong. Research Serv., R40529, Biomass: Comparison of Definitions in Legislation 2 (2012). (U.S. legislation is not coherent on this point since in contrast with the biomass definition in EISA of 2007 the corresponding definition in the Food, Conservation and Energy Act (Farm Bill) of 2008 includes raw material from federal land.)

[29] Kelsi Bracmort, Cong. Research Serv., R41106, Meeting the Renewable Fuel Standard (RFS2) Mandate for Cellulosic Biofuels: Questions and Answers, 5, 12–13 (2012).

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between them. On the other hand, in many cases, the federal forestlands would under the RED likely be considered primary forest, and would be similarly excluded from sustainable sources.

Slash and thinnings can be collected in all types of forests, including those on federal land, and used for the production of sustainable biofuel under the condition that the land is not ecologically sensitive. Ecological sensitivity is defined in the law as an absolute concept and not in relation to the activity planned on the area.[30]

Finally, sustainable biofuel may under the RFS2 be produced from biomass collected from agricultural lands and forestlands that are located in the vicinity of buildings if there is a risk of a wildfire. This may have a positive environmental impact, since the risk of destruction of nature through wildfires is decreased through environmental management.

U.S. legislation has been criticized for not excluding from the group of sustainable renewables biomass produced on land that is intended for conservation in accordance with agricultural planning.[31] This portrays a lack of coherence in the U.S. on environmental protection policy. Another land type that has raised some controversy is pastureland. Currently neither the U.S. nor the EU regime has criteria reflecting the sustainability of feedstock cultivation on such land.[32]

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[30] *See* Renewable Energy Directive, *supra* note 5, at art. 17(3)b (EC) (An example of a provision that incorporates the idea of relative ecological sensitivity is the non-interference exemption in RED Article 17(3)b regarding the possibility to collect biomass from nature protection areas. Regarding several other land types the RED however prohibits all cultivation of feedstock for the purpose of producing sustainable energy and does not allow for considerations on how the activity affects the nature.).

[31] Renewable Fuel Standard, 75 Fed. Reg. 58, 14692–693 (Mar. 26, 2010) (to be codified at 40 C.F.R. pt. 80), and Powers, *supra* note 19, at 701.

[32] Powers, *supra* note 19, at 701, and *2012 Commission Proposal to Amend RED*, *supra* note 12, pt. 4, at 7.

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C. DIFFERENT ROUTES, SAME DESTINATION?

A comparison of the U.S. and EU laws reveals that they reflect a relatively similar view on land that is suitable for growing feedstock for sustainable biofuels. The regimes even have similar time frames: they constrain biofuel driven loss of ecologically valuable land after a date close to January 1, 2008.

The similarities do not imply, however, that the two regimes could not learn from one another: the opposite, "positive" and "negative" list approaches bring forth important nuances in the coverage. Both approaches seem under- and over-inclusive at the same time. EU law appears to have definitions that lack in precision: they would need to ensure the coverage of every form of vulnerable land but at the same time through exceptions allow for positive measures such as land management for the prevention of wildfires[33] and wildlife corridors.[34] In turn, the U.S. law might be over-inclusive to cover land that is not ecologically vulnerable—especially federal land—yet it may be under-inclusive as regards subareas of high biodiversity within tree plantations and agricultural fields.

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[33] Renewable Energy Directive, *supra* note 5, at art. 17. In EU biofuels legislation the idea of protecting against wildfires is not explicitly recognized. In the case of nature protection areas one could under certain circumstances perhaps rely on the exemption in art. 17(3)(b) RED, that covers the collection of material that did not interfere with the nature protection purposes. For grassland mentioned in art. 17(3)(c) RED and forested areas mentioned in art. 17(4) RED, the possibilities to take this aspect into account for land protection purposes seem currently scarce.

[34] Some wildlife corridors, but not all, could be interpreted to fall under art. 17(b)(ii) RED, *supra* note 5, that covers areas assigned for the protection of internationally recognized rare species.

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IV. Sustainability Criteria for Reducing GHG Emissions

A. GHG Savings Thresholds

Biofuels can contribute to overall environmental sustainability only if their production and use emits sufficiently less greenhouse gases than do fossil fuels. In the long term, as fossil fuels are phased out, the point of comparison will become even more stringent. In order for a biofuel to qualify for the beneficial treatment of sustainable renewables, the reduction in GHG emission needs to meet a threshold value in both jurisdictions.

Article 17 of the RED sets a 35% reduction in GHG emissions as the threshold value in the EU.[35] Biofuels that do not meet the threshold are not considered renewables. Hence, there is a sharp contrast in the legal treatment of biofuels with GHG savings of 34%, which are not sustainable, as opposed to the sustainable biofuels that meet the 35% limit.

The American RFS2 does not differ noticeably in this respect, although the threshold for sustainable biofuels is as low as 20%. In practice this threshold is of tantamount importance to corn-based biofuels: they just barely—perhaps even erroneously—pass the 20% limit, yet make up for 95% of the U.S. biofuels market.[36] Another important aspect of the thresholds in RFS2 is "grandfathering." Grandfathering means the exclusion of biofuels facilities existing at a certain moment in time from the sustainability requirements of later biofuels law. In the U.S. the grandfathering is very extensive, as it excludes from the 20% threshold, up to a baseline volume, the fuel produced from facilities the construction of which was started before the

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[35] This will increase to 50% for all facilities in 2017 and further in 2018 to 60% for installations built from January 2017 onwards. However, a proposal from the parliament would increase the threshold to 60% already in 2014 for installations built that year or later.

[36] Daniel A. Farber, *Indirect Land Use Change, Uncertainty, and Biofuels Policy*, 2011 U. ILL. L. REV. 381 (2011); Powers, *supra* note 19, at 706.

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EISA was enacted (December 2007) and completed by December 2010.[37] Subsequent changes in the emission thresholds will also only apply to facilities constructed after that (future) date in question, or to volumes surpassing the baseline. The EU RED contains minor grandfathering provisions as will be explained in more detail when grandfathering is discussed further in Section 4.4.2 below.

However, the U.S. legislation also has a threshold of 50%. Biofuels that reach this higher threshold are considered "advanced." The RFS2 hence creates three main categories: unsustainable, sustainable and more sustainable (advanced).

In the U.S. system, two separate subcategories of biofuels have also been established within the general category of advanced biofuels. Biofuels made from cellulosic material and with life-cycle GHG emissions of at least 60% less than the baseline form a subcategory "cellulosic biofuels."[38] The other subcategory is biodiesel, which however has the same 50% threshold as other advanced biofuels. Cellulosic biofuels and biodiesel separately, and all advanced biofuels (including cellulosic and biodiesel) as a group, have their target quotas that need to be met by producers and importers.

Under the rigid categorizations of the EU and the U.S. legal frameworks, it is crucial to reach the threshold. It is of no relevance by how much the threshold is exceeded. This has been viewed as rather problematic with regards to WTO compatibility. As an alternative, it has been suggested that the biofuels producers would rather receive benefits in proportion to the GHG savings that they generate.[39] Environmental sustainability would be

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[37] 40 C.F.R. §§ 80.1401, 80.1403 (2014). (When certain criteria are met installations under construction no later than by December 2009 can also be exempted when the biofuel produced is ethanol.)

[38] 40 C.F.R. § 80.1401 (2014).

[39] Andrew Mitchell & Christopher Tran, *The Consistency of the European Union Renewable Energy Directive with World Trade*

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considered a continuum. In theory such a model would reflect the environmental sustainability of products more exactly. The drawback could be the increased uncertainty surrounding GHG calculations. New scientific research and results would automatically force changes in GHG savings levels and the benefits offered. The flexibility could create continuous economic uncertainty and litigation on the correct values, which could in turn deter investors. Then again, the shifts in the savings levels, and thus in the benefits, would appear much more gradual than in a system of rigid thresholds. This could in fact reduce rather than increase market volatility, and lead to dynamic efficiencies by creating incentives to continuously improve the sustainability. The graduated approach would also raise questions on whether non-GHG sustainability aspects also should not be put on a scale. After all, some biofuels, produced with slightly higher GHG emissions than other biofuels might be more sustainable overall because of their lower biodiversity or social impacts.

The EU and U.S. requirements for GHG savings cannot be assessed solely based on the thresholds. The comparator values to which the percentages relate—*i.e.* the reference levels of emissions assigned to fossil fuels—are of equal relevance since they form the baseline. When calculating the actual value of emissions in accordance with RED, the value for fossil fuel is the latest actual average of emissions in the EU. The calculation method therefore takes into account that fossil fuel emission may be reduced through technological advances. If no data is available, a default value of 83,8 gCO2/MJ applies for fuels used in the transport sector.[40] The same default value for fossil fuels appears also to have been applied when calculating the default values for GHG savings for different pathways implemented in the

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Organization Agreements: The Case of Biofuels, 1 RENEWABLE ENERGY L. & POL'Y REV. 33, 43 (2010).

[40] Renewable Energy Directive, *supra* note 5, Annex V(C)(19) (For other sectors than transport the actual value will not be calculated and a default value between of 77 or 91 gCO2/MJ is used depending on the sector.).

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RED.[41] The 35% reduction rate means that emissions for a sustainable biofuel had to be below 54,5 gCO2/MJ for its default value to meet the threshold. When applying actual values, the emissions need to remain at that level—or even lower, if the average for fossil fuels has decreased below 83,8 gCO2/MJ.

In the U.S., the baseline for calculating GHG savings has been the emission level of fossil fuels produced in 2005. This level has been determined to be 102-103 gCO2/MJ.[42] A 20% reduction for sustainable biofuels results in a threshold emission level of 81.8 gCO2/MJ. This is considerably higher than the calculated 54.5 gCO2/MJ threshold in Europe, and in fact only barely below the EU default value of 83.8 gCO2/MJ for fossil fuels.[43] The U.S. approach of a baseline representing emissions in 2005 also does not seem to take into account the subsequent potential technological advances in limiting emissions in fossil fuel production.

The combination of higher threshold percentages and lower estimated emissions for the reference fossil fuels lead to conclude that the EU requirements for sustainable biofuels are much stricter than those in the U.S. However, further analysis will reveal that this is not the full picture.

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[41] Renewable Energy Directive, *supra* note 5, Annex V(C)(19); European Commission Joint Research Centre, *Input Data Relevant to Calculating Default GHG Emissions from Biofuels According to RE Directive Methodology*, SUSTAINABILITY OF BIOENERGY, *available at* http://re.jrc .ec.europa.eu/biof/html/input_data_ghg.htm (last accessed May 5, 2013).

[42] Regulation of Fuels and Fuel Additives, 75 Fed. Reg. 14670, 14788 (Mar. 26, 2010) (to be codified at 40 C.F.R. pt. 80) (The value is expressed as 97–98 kgCO2/MMBTU.).

[43] Renewable Energy Directive, *supra* note 5, Annex V(C)(19) (For advanced biofuels the required 50% reduction to the 2005 baseline in the U.S. can be calculated to give a threshold of approx. 51,5 gCO2/MJ, not too far off from the value for any sustainable biofuel in the European model (54,5 gCO2/MJ; calculated as 83,8 gCO2/MJ minus 35%)).

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B. Calculating GHG Savings

1. Life Cycle Analysis

In calculating GHG savings, the decision on what phases of the production process to include is of major importance. The U.S. and the EU have both opted for a full life cycle approach (LCA). The objective of this form of analysis is to cover all impacts of the biofuel production process; everything from the production of the feedstock to the end use of the fuel. Hence, all GHG emissions from the cultivation of the raw material, the processing and transportation of materials to the end uses of the fuels are calculated and added together. These overall lifecycle GHG emissions may vary considerably between different types of biofuels.

The challenge of conducting a fully comprehensive LCA on biofuels is obvious. For example, criticism has been directed at the assumption of carbon neutrality of combustion, shared on both sides of the Atlantic.[44] Carbon neutrality means that the CO2[45] emissions during use are assumed to be zero, because the amount of CO2 emitted during use is assumed to have been absorbed when the crops for the biofuels were grown.[46] How about the

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[44] Renewable Energy Directive, *supra* note 5, Annex V(C)(13); *see generally Opinion of the Committee of the EEA Scientific Committee on Greenhouse Gas Accounting in Relation to Bioenergy*, 2011 O.J.; Office of Air and Radiation, *Deferral for CO2 Emissions from Bioenergy and Other Biogenic Sources under the Prevention of Significant Deterioration and Title V Programs: Summary of Public Comments and Responses*, EPA (June 28, 2011), *available at* http://www.epa.gov/airquality/nsr/documents/RTC_6-30_final.pdf (last accessed Apr. 11, 2014).

[45] The method refers to CO2, not N2O and CH4 that are included in GHGs elsewhere in the methodology. *See* Renewable Energy Directive, *supra* note 5, Annex V(C)(5).

[46] Commission Staff Working Document, Annex to the Impact Assessment, Document accompanying the Package of Implementation Measures for the EU's Objectives on Climate Change and Renewable Energy for 2020, SEC (2008), 85, vol. II, at 180 (Feb. 27, 2008).

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emissions caused by the production of the machines and buildings needed in the process—should the EU and U.S. calculations of GHG savings include them?[47] Probably the most fundamental issue is the proper inclusion of the effects of land use change, to be discussed further below.

Despite these shortcomings, the LCAs introduced in the EU RED and the U.S. RFS2 are rather extensive. Previous research has found that the LCA applied in the RFS2 is broader than the European model.[48] This is mainly, but not exclusively, due to the fact that the RFS2 takes Indirect Land Use Change (ILUC) into account, while the RED does not yet do so.[49]

In the U.S., the Environmental Protection Agency, with a high level of specialist expertise and staff, conducts the LCA for each biofuel. This allows for taking into account even the small emissions that may be relevant for only some types of biofuels. In Europe, policy making is backed by the scientific expertise of EU's Joint Research Center (JRC) in Ispra.[50] The economic operators conduct their LCAs in accordance with a calculation model offered in the RED. This model allows for the calculation of specific, actual values case-by-case. The verification method needs to be approved by the

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[47] *See* Sampo Soimakallio & Kati Koponen, *How to Ensure Greenhouse Gas Emission Reductions by Increasing the Use of Biofuels? Suitability of the European Union Sustainability Criteria*, 35 BIOMASS AND BIOENERGY 3504, 3506–509 (2011). (Discussing elements excluded from the LCA.)

[48] Kristina J. Anderson-Teixeira et al., *Do Biofuels Life Cycle Analyses Accurately Quantify the Climate Impacts of Biofuels-Related Land Use Change*, U. ILL. L. REV. 589, 612 (2011); *see also* Romppanen, *supra* note 2, at 131. (State-level regulation, such as the LCFS of California, would cover even a wider range of effects in its LCA.)

[49] *2012 Commission Proposal to Amend RED*, *supra* note 12, at 2.

[50] *See EU Renewable Energy Targets in 2020: Analysis of Scenarios for Transport*, at 5 (Mar. 2011), *available at* http://ies.jrc.ec.europa.eu/uploads/jec/JECBiofuels%20Report_2011_PRINT.pdf (last accessed Apr. 11, 2014).

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implementing member states. However, the components in the calculation model leave room for interpretation.[51]

Important for the outcome of an LCA is not only what sources of emissions are included, but equally the time frames used. This is particularly relevant in measuring the impacts of the direct land use change (DLUC) and ILUC, respectively, because they often take place over longer periods of time. The methodology of Greenhouse Gas Values (GHGVs), for example, considers the "timing of emission," over which the emissions are released, as well as the "analytical time frame" during which the GHGs stay in the atmosphere, thereby impacting the climate. The latter is analogous to the "time horizon," which the IPCC uses in calculating the Global Warming Potentials (GWPs).

Ideally, the LCA would cover the emissions from all sources and the whole time frame of their impact. In practice it would however be impossible to estimate the eternal impact. The RED has adopted a 20-year analytical time frame for emissions.[52] During the preparation of the RFS2, a 100-year period was considered but the legislature finally chose a 30-year analytical time frame.[53] The impact of emissions is thus spread over more years in the U.S. model. This allows for a longer period of carbon capture to compensate for the GHG debt associated with LUC.[54] The EU LCA model thus appears to be

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[51] Because the member states themselves are obligated to meet the national renewable energy targets as established in RED, they have incentives to approve a wide range of biofuels as sustainable. In the absence of case law and guidance from the Commission, we believe they might give a narrow interpretation to emission sources to be included and a broad interpretation to the effects of carbon capture.

[52] Renewable Energy Directive, *supra* note 5, Annex V(C)(7).

[53] Regulation of Fuels and Fuel Additives: Changes to Renewable Fuel Standard Program; Proposed Rule, 74 Fed. Reg. 99, 25035 (proposed May 26, 2009) (to be codified at 40 C.F.R. pt. 80) [hereinafter EPA RFS2 Proposed Rule].

[54] Anderson-Texeira et al., *supra* note 48, at 615–19.

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stricter in its evaluation of GHG emissions when it comes to the time frame chosen for the calculations.[55] Overall, issues relating to timing in the biofuels LCAs would deserve further attention to properly account for LUC and ILUC.[56]

The biophysical effects of LUC, which means the regulation of climate through the water and energy exchange between land surface and the atmosphere, is another aspect where modern LCAs are developing, and that could thus be updated in both the EU and the U.S. approaches. Partial LCAs risk leading to environmentally suboptimal, even counterproductive solutions.[57] Obviously, the challenge of maintaining the policies abreast with the constant developments in scientific knowledge applies to all fields of energy and environmental policy, not just biofuels.

2. Regulatory Approaches to GHG Savings

GHG emissions and other environmental impacts can be assessed in different ways. One can consider each individual case separately, count aggregate default values for entire biofuel production pathways (*e.g.*, palm oil biodiesel with methane capture at oil mill) or use disaggregated default values for specific parts of the life cycle (*e.g.*, cultivation, processing or transport) per biofuel pathway. Article 19 of the RED lists all these possibilities in assessing whether the threshold value of 35% is met, but their use may be subject to limitations.

The RED has first of all established certain aggregate and disaggregate default values for fuel types from different feedstock. The aggregate and disaggregate default values may be applied if the net carbon emissions from DLUC are zero or less, and if the feedstock has been cultivated in non-

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55 For a more detailed discussion on the problem of timing in LCA *see generally* Soimakallio & Koponen, *supra* note 47, at 3509; Anderson-Texeira et al., *supra* note 48, at 598–601 and 615–17.

56 Anderson-Texeira et al., *supra* note 48, at 620–21.

57 *Id.*

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member states or within the EU, but on land listed as having expected low GHG emissions from cultivation.[58] The default value may also be applied if there will be no land use change and the feedstock has been produced from residues that are not from agriculture, aquaculture or fisheries. In all other cases actual emission values *must* be used.

Actual values however *may* be used in the EU, even if a default value were available. An incentive to use an actual value would exist in cases where the default value for the feedstock does not meet the threshold requirement. An actual value is obtained in accordance with the formula given in the legislation by adding together the emission levels from growing the feedstock, transporting etc.[59]

Calculating actual values means estimating the GHG emissions for the different components of the production procedure, such as cultivation, transport and the processing in the refinery. An actual value for some component in the equation can, if the above-described preconditions on the use of default values are met, be replaced with the disaggregated default value available for such individual component. This seems to leave some room for tailor-made speculation in cases where the actual emissions during a specific part of the pathway are high. For example, a producer with high emissions specifically in the processing phase can choose to replace the actual value with a lower default value.

The possibility of calculating actual emissions values means that the EU model is open for case specific LCAs. This should give incentives for the producers to use methods to lower their emissions in all phases of the

[58] *See* Renewable Energy Directive, *supra* note 5, at art. 19(1), art. 19(2), art. 19(3) and Annex V. This rule offers an advantage for foreign feedstock. In the 2012 Commission Proposal to Amend RED, EU and non-EU feedstock are proposed to be treated equally in this regard in the future. *See 2012 Commission Proposal to Amend RED*, *supra* note 5, amended art. 19, at 15.

[59] Renewable Energy Directive, *supra* note 5, Annex V(C).

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process. Of course, the availability of a default value will in practice limit the use of actual values even if the latter could be lower, and hence reduces the incentives to lower emissions. An applicable default value is advantageous for the producer since the biofuel can be classified as sustainable even though the actual emissions are high.

It is perhaps the differences in the calculation methods of emissions that have led some observers to consider the U.S. and EU regimes incomparable.[60] Under the RFS2, the calculation of GHG emissions is based on a set of typical values. The EPA has been assigned the role of calculating the typical level of GHG savings for fuel types based on combinations of feedstocks, production processes and products. In case a value reaches the emission savings threshold of 20%, that combination of feedstock, process and fuel type will be included in the list of sustainable biofuels. To qualify as an advanced biofuel, the savings need to be at least 50%. Upon request, GHG savings for new pathways may be calculated by the EPA.

The U.S. system of fixed values determined on the basis of national averages bears similarities to the default value option in the RED. There are a number of constants: for example, emissions over a pathway are assumed to be the same, regardless of which city, state or country the production takes place in.[61] The inclusion of the process method used in the biorefinery as the third factor alongside the fuel type and the feedstock in calculating the value of GHG savings pathways[62] provides the U.S. model with a bit more nuance than RED, where the process is taken into account in the default values for only a few types of feedstock.[63] Interestingly, despite differentiating cases

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[60] *NL Agency Biofuel Report*, *supra* note 3, at 10 and 28.

[61] For justifications *see* EPA RFS2 *Final Rule Preamble*, 14680 and 14793.

[62] 40 C.F.R. § 80.1426 (2013).

[63] Renewable Energy Directive, *supra* note 5, Annex V. Wheat and corn ethanol are given higher savings values if produced in CHP plant and palm oil gets a lower value if produced with a methane capture process. For

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based on the biorefinery process, the U.S. model does not differentiate cases based on farming methods, but applies national averages. This has been the case although the EPA has recognized that farming factors such as crop yields and the use of fertilizers differs among regions and farms.[64] The importers of biofuels have argued that the natural environments in countries in various parts of the globe may indeed be completely different from one another. Naturally, it is hard to model in all environmental factors. But, it seems to be one thing not to include environmental factors in the typical values *ex officio*, and quite another not to accept evidence of actual differences in the emission levels on specific pathways. The U.S. model can therefore be criticized for not always properly distinguishing the sustainable from the unsustainable. Parts of this criticism apply also to the default value mechanism in EU's RED.

3. DEFAULT VALUES—ADMINISTRATIVE EFFICIENCY AT THE COST OF SUSTAINABILITY?

General estimations of GHG emissions, such as default values or national averages, have the advantage of low levels of administrative burden and low costs when compared to the establishment of actual emission values.[65] In addition, these types of general calculations can decrease the risk of fraud.

The disadvantages of default values or relying on national averages are twofold. There is evidently the risk that the actual emissions in the production of the biofuel are in reality higher, so the ability to rely on a default value decreases the incentive to make the production environmentally more

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critique of the limited consideration regarding production methods in the RED *see* Stephanie Switzer & Joe McMahon, *EU Biofuels Policy—Raising the Question of WTO Compatibility*, 60 ICLQ 729 (2011).

[64] EPA RFS2 Proposed Rule, *supra* note 53, at 25022–23; *see also* Fast et al., *supra* note 4, at 243–52.

[65] Renewable Energy Directive, *supra* note 5, pmbl. pt. (82); Fast et al., *supra* note 4, at 251.

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sustainable.[66] There is, however, also the risk that the actual emissions are lower, so that sustainable biofuels are unduly excluded from the market, and thus do not replace a less environmental source of energy. A solution is to rely comprehensively on local, or even farm specific values, as is case in the RED model of actual values. The U.S. model of using national averages does not solve this potential problem.[67]

A further, powerful argument *against* an extensive use of default values or fixed values based on national averages, is that they may more easily skew the entire analysis. This is critical when the pathways are likely to have values that are close to the thresholds. Farber has argued,[68] for example, that the national emissions average for corn ethanol in the U.S. may have passed the threshold value of 20% for renewable sources merely due to less than ideal treatment of the uncertainties in measuring the impacts of indirect land use change (ILUC). According to Farber, the EPA's erroneous reliance on the mathematical medians rather than the means of the probability distributions of the pathways had the effect of increasing the national average to 21%, just above the 20% threshold.

Although the median of GHG reduction for corn-based biofuel exceeds 20%, the mean does not. In addition, the individual pathways of a large share, potentially even the majority, of corn-based biofuels produced for the U.S. market do not meet the 20% threshold value. It may furthermore be recalled that the 20% threshold was in itself already criticized for being very low. These issues are highly relevant, because corn makes up for the vast majority of the American biofuels market. Consequently, it seems like the fixed value for corn-based biofuels calculated on the basis of a national median has resulted in a more beneficial status for the corn industry than a model of

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[66] The risk has been recognized in Renewable Energy Directive, *supra* note 5, pmbl. pt. (85).

[67] Fast et al., *supra* note 4, at 243–52 (suggesting this solution as a critique to both regimes, hence seemingly failing to recognize the attributes of the calculation of actual values in the EU model).

[68] Farber, *supra* note 36, at 381–412.

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actual values would have resulted in. It appears challenging to argue that the regulatory choices have been purely environmental, without any influence from the agricultural interests of the corn producers.

To be sure, the American biofuels framework is not exceptional in being pressured by vested interests, from the agricultural sector and other producers in particular. The fundamental question in the EU too is whether or not a certain biofuel reaches the limit value for sustainability—the minimum 35% at the first stage, 50% in 2017 and from 2018 onwards 60%.[69] Biofuels over these thresholds are accorded favorable treatment, while those under the threshold are denied it. Rapeseed is the main feedstock cultivated in the EU for the production of biofuels.[70] Hence, it is notable that the default value of EU for rapeseed biodiesel (38%) is just above the current, crucial 35% mark. However, from 2017 onwards rapeseed biodiesel will not meet the new higher threshold and the feedstock will lose its preferential standing.

The 49% default value for the pathway of domestically produced corn ethanol currently grants European products the sustainability label. One can only speculate why such a decisive default value is in fact only available for "community produced" corn ethanol, but not for imported ethanol from corn, since it is possible that the pathway for corn produced in *e.g.*, the United States would also surpass the 35% limit. Be that as it may, it is difficult not to detect traces of possible arbitrariness and favoritism in the way that the sustainability thresholds resonate with the domestic GHG emission saving default values. This problem will, however, no longer be relevant after 2017 when the threshold is raised to 50% and corn no longer reaches that threshold.

Since the EU system of default values and the U.S. system of fixed values calculated on the basis of national averages might be used for protectionist means, closer collaboration between the European and American

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[69] Renewable Energy Directive, *supra* note 5, at art. 17(2).

[70] Mark Harvey & Sarah Pilgrim, *The New Competition for Land: Food, Energy and Climate Change*, 36 FOOD POLICY S40, S48 (2011).

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authorities regarding calculation methods could potentially be beneficial for international trade. Cooperation could also bring administrative scale advantages, for example through a sharing of information on the scientific aspects of the life cycle assessments.

C. INDIRECT LAND USE CHANGE (ILUC)

Agricultural land utilized for growing energy crops is often equally suitable for growing food crops. Environmentally speaking, it usually makes no or limited difference in terms of the use of the land whether the cultivated crops, such as wheat, are intended for food or for fuel. The environmental impact of changing from the cultivation of one crop to another may also be modest. The largest environmental impacts may indeed be caused by Indirect Land Use Change (ILUC).[71] The need to maintain the overall level of food crop production might namely in cases of a change of land use from food crops to fuel crops result in other pieces of land being converted into food farms. Besides the risks relating to inflationary food prices and loss of biodiversity, ILUC might also increase the release of carbon stock from the soil and decrease carbon capture due to deforestation.

The environmental effects of ILUC have been estimated to be substantially larger than the effects of direct land use change.[72] Both the RED and RFS2 contain major aspects of the DLUC effects, in particular the storage term of the displaced native ecosystems, which consists primarily of CO2 release. Other researchers have concluded the RFS2 to be more comprehensive, especially as it includes the displaced CO2 fluxes.[73]

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[71] Ecofys, *What is ILUC and How Large Is the Effect?*, presentation by U. Fritsch at SOCIO-ECONOMIC IMPACTS OF BIOFUELS AND BIO-PRODUCTS Conference, Brussels (organized by Global-Bio-Pact Project) (Jan. 30, 2013) (presentation on file with authors).

[72] *See, e.g.*, Fritz Hellman & Peter H. Verburg, *Impact Assessment of the European Biofuel Directive on Land Use and Biodiversity*, 91 J. ENVT'L MGMT. 1389, 1395 (2010).

[73] Anderson & Texeira, *supra* note 48, at 613.

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The much more important difference between the RED and RFS is that the EPA was mandated by the EISA[74] to include the effects of ILUC in its calculations, while the EU calculation model contains no ILUC component. Calculating the effects of ILUC is not straightforward in any sense, and the U.S. EPA has faced a difficult task in trying to include such a complex aspect in the approach. There is no scientific consensus on how much emissions increase per unit of modified land, nor on how much land would indirectly be converted as a result of the increasing biofuels production. Observations on the developments also give limited insight due to the difficulties in determining what share of land use changes are actually indirectly caused by biofuel production and not by other societal changes. Further complicating the calculations is the fact that ILUC is not restricted geographically and can also take place abroad. The uncertainties surrounding the calculations of ILUC have fueled the debate on whether ILUC should be considered at all. However, since the emissions resulting from ILUC are likely not zero, it seems unjustified to ignore them altogether just because the decision involves uncertainties.[75]

The fact that RED does not include the effects of ILUC in its GHG calculations renders its restrictions more lenient. During the process of drafting RED, the European Parliament's Committee on Industry in fact discussed the possibility of including it.[76] However, ILUC was not included in the final version of RED. During the preparatory phase of RFS2, a similar debate on ILUC was witnessed in the U.S. Based on stakeholder feedback, the U.S. EPA adjusted its initial estimations of emissions from ILUC to a considerably lower level, although it did not go as far as deleting ILUC from

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[74] *See* 42 U.S.C. § 7545(o)(1)(H).

[75] *See* David Zilberman et al., *On the Inclusion of Indirect Land Use in Biofuel Regulations*, 2011 U. ILL. L. REV. 413, 432 (2011). *But see* Farber, *supra* note 36, at 410.

[76] Committee on Industry, Research and Energy, Report on the proposal for a directive of the European Parliament and of the Council on the promotion of the use of energy from renewable sources, A6-0369/2008, at 124–74, 223–41 (Sept. 26, 2008).

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the calculations. As was explained above, the EPA's method of dealing with uncertainties while integrating ILUC was contentious, and probably decisive in enabling corn ethanol to be included within renewable biofuels despite its considerable ILUC effects.[77]

Although the GHG calculations of RED do not include ILUC, the European decision makers did recognize its merits.[78] The RED does contain, for example, a requirement that the Commission report to the Parliament and Council biannually on the effects of ILUC.[79] The currently debated European Commission proposal from 2012 to amend the directive has been drafted to better address the ILUC issue.[80] Different options have been carefully considered in the impact analysis.[81] One alternative would be to favor even more heavily second generation biofuels produced from e.g. waste, because they have a lower risk of ILUC than do biofuels produced from agricultural or forestry feedstock. The proposal includes an element of this idea by proposing a limit of 5% of the transport fuels for first generation biofuels. This would limit ILUC indirectly by capping first generation biofuels to approximately their current level of consumption.[82] In late 2013, the proposal

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[77] Farber, *supra* note 36, at 396–97.

[78] Renewable Energy Directive, *supra* note 5, pmbl. pt. (85). *See also* art. 19(6), where some consequences of later introducing ILUC to the directive are already established.

[79] *Id.* at arts. 23(3), 23(5)(f).

[80] *2012 Commission Proposal to Amend RED*, *supra* note 12.

[81] *See* Commission Staff Working Document, Impact Assessment, SWD(2012) 343 final (Brussels Oct. 17, 2012) [hereinafter Impact Assessment].

[82] *2012 Commission Proposal to Amend RED*, *supra* note 12, pmbl. pt. (9), pt. (10), at 8 (Currently the share of first generation biofuels, which compete for land with food crops, is approx. 4.7% of all transport fuels in the EU); *Lithuania Mounts Rescue Bid for First Generation Biofuels,* EURACTIVE (Nov. 30, 2013), *available at* www.euractiv.com/energy/lithuania-mounts-rescue-bid-gene-news-532030 (last accessed Apr. 11, 2014).

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was discussed both in the Parliament and the Council, but neither institution reached a common internal position. The main element of the discussions was the suggestion of the Lithuanian presidency to raise the limit of first generation biofuels from 5 to 7%. As no agreement was reached, further negotiations were likely postponed to the fall of 2014.[83]

Another indirect method of reducing the unwanted effects of ILUC would be to increase the threshold levels for all biofuels. This approach is also incorporated into the Commission proposal.[84] The problem with both introducing limits for first generation fuels and increasing the threshold values is that the measures might put some first generation biofuels produced from food crops out of business, even though they could contribute to decarbonization and be more sustainable than oil, which is currently the dominant fuel. However, the Commission is perhaps having second thoughts on the sustainability of first generation biofuels, because according to its Proposal, subsidies to first generation biofuels with low GHG savings should cease after 2020.[85]

Apart from lifting thresholds and introducing a 5% limit for first generation biofuels, the EU is now also planning to introduce default values for ILUC, but only in the calculations for reporting purposes.[86] Reporting and

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[83] Valerie Flynn, *EU Ministers Fail to Agree on Biofuels Reform*, ENDSEUROPE (Dec. 12, 2013), *available at* www.endseurope.com/34193 (last accessed Apr. 11, 2014) (Many states were ready to accept the compromise proposed by Lithuania. However, the Benelux countries and Denmark wanted a low cap, whereas Poland and Hungary did not want any cap at all. Other issues of concern were also the inefficiency of the reporting requirements in the proposal and the effects of double counting the contributions of later generation biofuels. *Id.*).

[84] *2012 Commission Proposal to Amend RED*, *supra* note 12, pmbl. pt. (8), at 8.

[85] *2012 Commission Proposal to Amend RED*, *supra* note 12, at 3.

[86] *2012 Commission Proposal to Amend RED*, *supra* note 12, amended art. 19(9), at 16, Annex VIII at 21 (The member states would have to take

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monitoring still represent quite a soft approach, and the EU is intensively working to develop its approach to ILUC. Considerable pressure also exists from the industry to make a decision because the EU's indecisiveness on ILUC has created a chilling effect on investments.[87] The possibility of a major policy change makes investors careful.[88]

The Commission's proposed amendments to the current RED do not, as said, directly incorporate the effects of ILUC into the analysis of the sustainability of biofuels. In contrast, in the U.S., the RFS2 ILUC values are estimated directly for different feedstock based on currently available knowledge.[89] It would appear possible to apply this U.S. ILUC approach together with EU's default values. An estimated ILUC component could probably also be incorporated as a default value in the actual value calculations. Due to the holistic nature of ILUC it is in any event not possible to calculate an actual *in casu* ILUC value for each single farm or plantation individually.

One reason why the EU has still opted not to incorporate estimated ILUC values is that this alternative would, in practice—even with the current

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into account certain default values for ILUC when reporting to the Commission and the Commission would further take this into account in its reports. The new reporting requirements would emphasize the role of member states in keeping track of ILUC effects.).

[87] For an example of the chilling effect on major investments, *see, e.g.*, Press Release, *Vapo Freezes the Kemi Biodiesel Project*, Feb. 21, 2014, *available at* www.vapo.fi/en/media/news/1997/vapo_oy_freezes_the_kemi_biodiesel_project (last accessed Apr. 11, 2014).

[88] Statements by industry representatives at a special event on second generation and advanced biofuels held by Leaders of Sustainable Biofuels at the European Parliament May 8, 2013.

[89] *See generally* Comm. on Environment, Public Health, and Food Safety, Study on Indirect Land Use Change and Biofuels (Feb. 2011), *available at* http://www.euro parl.europa.eu/document/activities/cont/201203/20120301ATT39667/20120301ATT39667EN.pdf (last accessed Apr. 11, 2014).

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thresholds of 35%—seriously threaten the market of first generation biofuels. This concern is especially relevant in countries like Sweden, where the share of first generation biofuels is already approximately 8%, and hence well above the suggested limit of 5%.[90] The current availability of second-generation biofuels is too limited to compensate for the loss.[91] A further controversy regarding the U.S. model of calculating the effects of ILUC is that the model poses problems to the foreign biofuel industry, especially in developing countries. In developing countries the agricultural sector is dominant and large areas of land with high biodiversity still exist. ILUC in these areas is expected to be high, and consequently accounting for ILUC would give the industry in developed countries a competitive advantage simply because a lot of land use change took place many decades ago. This raises questions of social and economic fairness. Obviously, the opposite side of the story is that preventing the loss of biodiversity in the less developed countries (LDCs) is precisely what the sustainability values aim to accomplish. Thus, to the extent that the sustainability of biofuel production in the LDCs cannot be properly ensured, high thresholds would protect the global environment.

To summarize, although the RED has, in our analysis so far, appeared in many respects stricter than the RFS2, the issue of ILUC is an exception of major importance. Due to the inclusion of ILUC, the U.S. sustainability standards are closer to the European level than might first appear. While efforts to include provisions on ILUC in RED would perhaps *in form* narrow the gap between U.S. and EU renewables law, they would in fact further broaden the gap *in substance*. However, the EU plans to solve the ILUC dilemma have been quite different from the approach of the U.S. The U.S. approach relies more directly on scientific predictions about future developments. In addition to capping first generation biofuels, the EU idea is to put a heavy emphasis on governance, monitoring and reporting. It would

90 *Parliament Opt For 6% Limit on Crop-Based Biofuels*, ENDSEUROPE, *available at* http://www.endseurope.com/33039/ (last accessed Jan. 15, 2014).

91 *See* Impact Assessment, *supra* note 81, at 69.

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introduce default values for ILUC in the calculations for reporting purposes only. The U.S. approach relies more directly on scientific predictions about future developments.

The ILUC debate epitomizes a tricky balancing act between many legitimate concerns: legal certainty, protection of investments, as well as environmental concerns of various, and sometimes conflicting types, such as climate change, biodiversity and resource scarcity. It seems nonetheless hard to justify the exclusion of ILUC on the grounds of uncertainty. It also appears important to take seriously the efforts of various parties to tackle the issue, in particular while the impacts that the vast majority of sectors—agriculture in the forefront—has on ILUC are largely overlooked under similar, if not often identical circumstances Once again, trans-Atlantic collaboration should be close to take full advantage of the U.S. experiences in the EU debate on ILUC.

D. PRECAUTION

1. *IN DUBIO PRO NATURA*

The uncertainty regarding the environmental effects of biofuel production causes a considerable dilemma for the policy maker. On the one hand, the GHG emissions of fossil fuels are high and the ensuing environmental concerns urgent. On the other hand, while biofuels potentially decrease the negative environmental impact of energy production, there is also a risk that they do more harm than good. A careful precautionary approach to the promotion of biofuels has therefore been suggested to limit the expansion of the industry.[92] The precautionary principle means that where existing scientific evidence is uncertain, yet there are indications of reasonable grounds for concern for the environment, the level of protection may be chosen accordingly. "Better safe than sorry," to put it in simple terms.

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[92] Lin, *supra* note 19, at 42; *see also Roundtable on sustainable biofuels, global principles and criteria for sustainable biofuels production, version zero*, Lausanne, Switzerland, at 4, Apr. 13, 2008.

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The uncertainties on biofuels are asymmetric: in particular the actual ILUC emissions may be larger than estimated in more ways than they may be smaller, as many of the variables are bounded by zero to the left.[93] The great magnitude of the risks and the potential irreversibility of the decisions also speak for precaution. Then again, in a situation where the business as usual of continuing to use fossil fuels is bound to have serious negative environmental consequences, there might be unusually strong arguments for taking calculated risks. Would it also not contravene the precautionary principle to prematurely foreclose a potentially sustainable pathway? Therefore, it is not always evident whether it is promoting or limiting the expansion of the biofuels industry that is in accordance with the principle of *in dubio pro natura*.

The EU has not been fully consistent in its application of the precautionary principle. Certain provisions in the RED limit the scope of sustainable biofuels because their impacts are uncertain. For example, the default values for GHG savings chosen by law makers for the directive are lower than typical values.[94] In addition, it is stipulated in Article 19(7) that any new default values should under normal circumstances be conservative. These provisions reflect precaution regarding the effects of increased production. On the contrary, the requirement of using conservative estimations of GHG savings does not apply to cases where actual values are calculated. Moreover, the EU has, unlike the U.S., excluded ILUC from the calculation of GHG savings. This may lead to more extensive biofuel production, potentially in contradiction with the precautionary principle.

U.S. renewables law does not expressly mention the precautionary principle. Indeed, the U.S. reluctance to apply the precautionary principle has been seen as a major difference to EU environmental law.[95] The U.S.

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[93] Farber, *supra* note 36, at 398–99.

[94] Renewable Energy Directive, *supra* note 5, at Annex V(A).

[95] Daniel C. Esty, *Thickening the International Environmental Regime*, Robert Schuman Centre For Advanced Studies (2002), *available at* www.eui.eu/RSCAS/WP-Texts/02_08p.pdf (accessed Apr. 11, 2014).

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Supreme Court has occasionally referred to the principle in its jurisprudence, at least implicitly.[96] As far as RFS2 is concerned, the EPA has aimed for high accuracy in calculating and applying typical values for GHG savings instead of using more precautionary, conservative values. The EPA calculations for corn ethanol, for example, were revised *upwards* from the initial value of 14% to have a typical GHG savings value of 21%, just over the 20% threshold boundary. With a conservative approach, the corn-based biofuels would not have gained the status of a sustainable renewable biofuel. That being said, the U.S. model has an element of precaution of including ILUC. In terms of the strictness of the thresholds and default values, on the one hand, and the inclusion of ILUC on the other, the EU and U.S. approaches to precaution seem like mirror images of one another. The precautionary elements of the European approach can be seen as compensating for the lack of an ILUC provision.

In the ILUC debate, the precautionary principle indeed means that the EU policy makers cannot indeterminately hide behind scientific uncertainty: once there are scientific indications of reasonable grounds for concern, the responsibility shifts from the scientists to the policy makers to make the value decision regarding the (un)acceptability of the risk in question.[97] An argument for not including ILUC has been the absence of ILUC considerations in other sectors. This reasoning needs to be reversed; biofuels

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[96] HARRI KALIMO, E-CYCLING: LINKING TRADE AND ENVIRONMENTAL LAW IN THE EU AND THE U.S. 235 (Transnational Publishers 2006); *see also* Maine v. Taylor, 477 U.S. 131, 149 (1986); Ethyl Corp. v. EPA, 541 F.2d 1, 31–32 (D.C. Cir. 1976); Indus. Union Dep't v. Am. Petroleum Inst., 448 U.S. 607, 656 (1980).

[97] *Report from the Commission on Indirect Land-Use Change Related to Biofuels and Bioliquids*, at 14, COM (2010) 811 final (Dec. 22, 2010) (showing that the EU has recognized that under the precautionary principle ILUC needs to be addressed); Lorenzo Di Lucia et al., *The Dilemma of Indirect Land Use-Changes in EU Biofuel Policy—An Empirical Study of Policy-Making in the Context of Scientific Uncertainty*, 16 ENVTL. SCI. & POL'Y 9 (Elsevier Ltd. 2012) (discussing ILUC and precaution); Romppanen, *supra* note 2, at 130–31.

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can rather appear as spearheading the management of ILUC, drawing along other important sectors such as agriculture and urban planning. In the spirit of another environmental principle, integration, environmental problems need to be addressed holistically within all sectors of the society, and because ILUC is international in nature, potential exists for common Trans-Atlantic leadership on the matter.

2. GRANDFATHERING

Precaution does not only relate to the calculation of GHG savings. The thresholds and calculation models will create expectations among investors, and a traditional way to protect such expectations is "grandfathering." Grandfathering means the exemption of facilities from subsequent, stricter biofuels rules. As was explained above (*see* Section IV.A), RFS2 has very generous rules on grandfathering. Biofuels produced in installations that were already under construction in December 2007 when EISA was enacted and were ready for operation in 2010 do not need to meet the 20% threshold regarding GHG savings for an amount of biofuels reaching up to a baseline.[98] In practice, this exemption allows for extensive production of sustainable biofuels from corn with old technology, which does not guarantee any GHG savings in comparison to fossil fuels. Grandfathering could in other words render ineffective the efforts to lower emissions through new, stricter rules.

The U.S. grandfathering provisions have been criticized for creating a lock-in effect. Once the legislation has been passed, it becomes more difficult to reverse any of its negative environmental effects. While the intention may be to protect existing investments, grandfathering deters investments into new facilities and technologies. Grandfathering is a bet on existing technology and mostly on a single crop—corn—at the cost of future advances. This would seem quite opposite to the logic of precaution. A more precautionary approach would be to allow for flexible, yet transparent modifications in the

[98] RFS2, 40 C.F.R. §§ 80.1401, 80.1403 (2012) (The baseline in question is the volume of ethanol that facilities stated they were able to produce when the sought the initial air quality permits, or the facility's peak capacity before 2008.).

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sustainability requirements that are gradually but determinedly phased in, even for the existing facilities when new scientific information becomes verified.[99] Indeed, as the EPA itself acknowledged,[100] there are alternatives between an unconditional grandfathering and no grandfathering at all. For example, the exempted facilities can have an expiry date, there can be volume limitations to production from exempted facilities, or "significant production units" within the existing facilities can be considered new and thus outside of the grandfathering. The EPA did not, in its final rule on grandfathering, opt for an expiry date (even if it reserved the right to revisit the question later), but it did opt for a volume limitation. The EPA's position on what kinds of changes within the existing facility would be considered grandfathered seems vague.[101] Not to be forgotten is that there is also a considerable mandatory increase in the relative share of advanced biofuels in the overall volumes by 2022.

So far, RED has contained a limited, "prospective" grandfathering clause: installations that will start production on or after January 1, 2017 will in 2018 face a threshold of 60%, while savings from earlier ones only need to be 50%.[102] The Commission is however now proposing a slightly more comprehensive grandfathering rule. New refineries starting operations after July 1, 2014 would need to comply with the higher threshold of 60%.[103]

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[99] *See* Farber, *supra* note 36, at 401–03; Powers, *supra* note 20, at 673, 701–05.

[100] EPA RFS2 Proposed Rule, *supra* note 53, 24,904–25,143 and EPA RFS2 Final Rule, 14688–91.

[101] RFS2, 40 C.F.R §§ 80.1403(d)–(e), 80.1450(f) (2012) (The EPA Final Rule determines a baseline volume for each facility, above which the 20% emission savings target has to be met. The EPA does withhold however the possibility to revisit the expiration date question, i.e. to end the grandfathering at some further point in time when it no longer is useful.).

[102] Renewable Energy Directive, *supra* note 5, at art. 17(2)(2).

[103] *2012 Commission Proposal to Amend RED 2012*, *supra* note 12, at 15.

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Facilities that existed prior to July 1, 2014 only need to achieve savings of 35% up until January 1, 2018, after which the threshold increases to (only) 50%. The risk of serious adverse environmental consequences is lower than in the U.S. grandfathering clause since even old installations need to meet some threshold. In addition, the proposed five to 7% limit on first generation biofuels on energy consumption in the transport sector would also affect old facilities, clearly constraining the benefits that grandfathering grants to them.

From a long term perspective, the EU's decision to incorporate some grandfathering could still create irreversible policy lock-ins, just as seems to have happened with corn in the U.S. On the basis of the U.S. experience, Farber has argued that in cases of doubt one should err on the side of caution in deciding whether or not to approve specific biofuels, especially if the approval risks creating permanent policy lock-ins. The objective is that investments flow towards those that are the most environmentally sustainable and efficient—whichever technology or crop that may entail. The trust of investors needs to be kept intact, but that cannot take place at the cost of producers not being required to follow technological developments. Any exemptions for existing facilities must therefore be limited to the strict minimum and for limited periods of time. Dynamic efficiency—the ability of the regulatory framework to encourage technological developments—is particularly important to drive biofuels production towards a more and more sustainable future.

3. Precaution in Multiple Directions

To conclude, the EU and American examples demonstrate how the application of the precautionary principle on biofuels is important—but it is also challenging, because the principle seems to cut in various directions. Overall, it appears precautionary to maintain the biofuel path open in energy policy, even for first generation biofuels when there is adequate evidence of sustainable practices. Such precautionary assessment must also, however, include the effects of ILUC. Conversely, whereas the evidence on negative GHG savings, destruction of biodiversity, or other severe environmental harm is mounting, it is precautionary to close the pathway. Maintaining the possibility of case-by-case assessments appears precautionary and indeed crucial because circumstances vary far too widely to permit extensive reliance on default values and national average levels. The EU and U.S. examples

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show that they lead to both under- and over-inclusive determinations. In other words, precaution is traded too lightly for administrative efficiency. Finally, grandfathering should be allowed rarely, and if allowed, only in substantively and time-wise carefully limited respects. In a rapidly evolving field such as biofuels, the notions of grandfathering and precaution seem difficult to combine.

E. Scientific Data on Emissions

The establishment of sustainability criteria for biofuels has two intrinsically linked parts: science and politics. The discussion on the precautionary principle above showed how the two sides intertwine. Environmental policy—and biofuels is in this respect a prime example—is often burdened by the enormous complexity of the scientific part of the equation. In principle, the scientific models can have a greater impact on the outcome of legislation than the adopted regulatory approach. Radical differences in scientific data about the environmental impacts of biofuels that is used for legislating in the EU and the U.S. could lead to considerable variance in the policy choices. Scientific divergence would render harmonization challenging.

It may nevertheless be difficult to assess whether the sometimes considerable discrepancies between the EU and U.S. values are caused by differences in scientific data, by political determinations, or perhaps by both. The estimated emissions from some types of feedstock, such as those of soybean and rapeseed (canola oil), appear to be examples of large differences between the EU and the U.S. values, even if direct LUC (DLUC) and ILUC emissions were excluded from the comparison. This may or may not be explained by the fact that while EU values represent conservative estimations of savings with any production method, the U.S. calculations only apply to the production in plants run by natural gas. Overall, there is a shortage of

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easily comparable values, as the specific details of the calculations of emissions are not fully published in the preparatory works.[104]

Since the EU and U.S. approaches to LUC are different, a comparison of the sustainability criteria can only be carried out with regards to values of non-LUC origin. Equally important to note is that the GHG savings percentages in the EU and the U.S. are not suitable for direct comparisons because the benchmark values of fossil fuel emissions also differ. The default values therefore need to be converted for comparison back to emissions as expressed in gCO2/MJ.

[104] *See* Susie Wilks, *Clean Fight*, THE LAWYER (July 25, 2011, at 29), *available at* www.thelawyer.com/clean-fight/1008719.article (last accessed Apr. 11, 2014) (The uncertainty and different outcomes of various studies has led to demands of greater transparency in the models adopted by the legislators. Several cases on the accessibility to information regarding the studies on the effects of biofuels have been filed to the EU General Court.).

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Table 1. Emissions of Non-LUC Origin (gCO2/MJ)[105]

Production pathway					
Feedstock	**Production method**[106]	**Product**	**EU typical emissions value**	**EU default emissions value**	**Emissions value in U.S. EPA calculations**
Sugarcane	Any	Ethanol	24,0	24,3	34,8
Palm oil	Natural gas as process fuel	Biodiesel	30,3	36,9	36,9
Corn	Natural gas as process fuel	Ethanol	37,0	42,7	51,7

105 The values for the U.S. are available in the preparatory works for the RFS2. The values have been calculated for EU on the basis of Annex V of the RED and from European Commission, *Input data relevant for calculating default GHG emissions from biofuels according to RED Directive Methodology*, Joint Research Centre, Institute For Energy and Transport JOINT RESEARCH CENTRE, INSTITUTE FOR ENERGY AND TRANSPORT (Nov. 14, 2008), http://re.jrc.ec.europa.eu/biof/html/input_data_ghg.htm (last accessed May 22, 2013) (Note: The typical *emissions* values are the real calculated estimates and the default emissions value is normally slightly higher because of uncertainties in the modelling, hence resulting in a lower GHG *savings* value as default value as compared to the typical savings value.).

106 Production method here refers to the activities, which the RED and RFS2 define, i.e. usually the process fuels used in the refinery.

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Table 1 is an illustrative example of differences in EU and U.S. values. It indicates non-LUC emissions values pathways on three biofuel products, produced from specific feedstock using a specific production method. The emissions for palm oil are identical in the EU and the U.S. For sugarcane and corn ethanol, the estimated emission levels in the U.S. calculations are 43% and 21% higher than in the EU default emissions values, respectively. In other words, even without adding the effects of ILUC, which would only increase the difference, scientific data appears to create a stronger push for sustainability in the U.S. than in the EU; i.e. the GHG emissions of biofuels are estimated to be higher. Moreover, the variation within the missing elements of DLUC, and especially ILUC emissions, are likely to be high. As one can note, the differences in some of the values may appear substantial. But will the differences lead to inconsistent outcomes in the practice of producing and using various biofuels?

F. FEEDSTOCK APPROVED FOR SUSTAINABLE BIOFUELS

An analysis of the total GHG savings values of different feedstock against their respective thresholds under EU and U.S. regimes will reveal whether there are differences in the practical effects of the legislations. This type of an assessment shows, in other words, which feedstock is accepted for the production of sustainable biofuels under each regime, and under what conditions it is accepted. It should be added, however, that under RED the producers are also allowed to apply the actual values. A comparison of the default values will therefore not fully reflect the differences—or similarities—in the end result. The use of actual values can in other words either widen or narrow the gap between what are sustainable pathways in the EU and U.S. A comparison of default values will, in any event, indicate where the producers' access to the market is granted using a similar, simplified procedure.

Under both RED (Annex V) and the RFS2, feedstock with no or only minor LUC effects are generally approved for producing sustainable biofuels. This applies to some feedstock such as *waste* and *cellulosic* materials, which are assigned with GHG savings of 70 to 100%.

Sugarcane ethanol, produced mainly in Brazil and Argentine, typically achieves savings of approximately 70%, disregarding LUC. It may be

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considered sustainable in both the EU and the U.S., but under slightly different conditions. Sugarcane ethanol is sustainable under RED when default values can be applied, i.e. when there are no net carbon emissions from DLUC and the feedstock is either cultivated outside of the EU or within the EU but on specific, listed land types. In comparison, under the RFS2, LUC emissions have, by default, been included in the equation. According to the calculations, sugarcane reaches the 50% threshold only when produced with certain sustainable methods.[107]

Biofuels produced from *corn* ethanol are regarded as sustainable only under very strict conditions. The GHG savings, disregarding any LUC, have been estimated at around 50% under both legislations under the condition that the production plant runs on natural gas. The U.S. produces an enormous amount of biofuels from its domestic supply of corn feedstock. The inclusion of ILUC considerations lowers the savings values to such an extent that corn-based biofuels are only sustainable thanks to the low 20% threshold and under strict conditions regarding production methods.[108]

In the EU, corn can qualify as sustainable under the default values in those cases when it has no DLUC emissions, and is *farmed* either outside of the EU or within the EU but on certain listed types of land. In RED the qualifying default value is 49%. It is, however, applicable only if the final *production* (refining) of the fuel takes place within the EU, which seems to rather openly favor EU fuel producers. Hence, a non-EU producer can only rely on the actual value methodology. The conditions under which corn-based biofuel qualifies as sustainable in the EU are thus strict and generally favor EU refiners and non-EU feedstock farmers. In 2017, the threshold in the EU

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[107] *See* 40 C.F.R. § 80.1426 (2013), *see also* Regulation of Fuels and Fuel Additives: 2013 Renewable Fuel Standards, 78 Fed. Reg. 9285–86, 9298–9300 (proposed Feb. 7, 2013).

[108] 40 C.F.R. § 80.1426(f) tbl.1 (2013). For example, a dry mill process using natural gas, biomass or biogas for process energy and additional criteria, or alternatively a wet mill process with biomass or biogas for process energy.

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will increase to 50%, just over corn's default value of 49%, rendering corn-based biofuels unsustainable by default in the EU.

Corn is an important example of a situation in which the EU's actual value rule can be of practical relevance. If biofuels from corn were refined—in the EU, the U.S. or anywhere else in the world—using methods as sophisticated as those elaborated in U.S. legislation, corn-based ethanol could indeed meet the EU's higher 35% threshold of sustainable feedstock through the alternative of calculating actual values, as ILUC effects need not be added.

For *soybean* and *rapeseed*, the non-LUC U.S. calculations give GHG savings of roughly 90%. However, the LUC emissions are very high. Hence, after taking them into account, the values do remain above the 20% renewables threshold, but pass the 50% advanced biofuels threshold only if produced through certain environmentally friendly methods, such as trans-esterification.[109]

The EU has not set any direct requirement for clean production methods for soybean or rapeseed. However, soybean based biodiesel with a default value of 31% does not meet the 35% GHG savings threshold in Europe. Biodiesel from rapeseed at 38% currently still meets the threshold, but only barely. However, when the threshold is raised to 50% in 2017[110] it will no longer fulfill the criteria. This implies that raising the threshold or introducing ILUC into the actual calculations could have a large impact on the domestic production of feedstock in Europe, because it currently consists mostly of

[109] According to the original proposition there would have been no GHG savings at all for soybean but after adjustments to the calculation, especially regarding ILUC, the value ended up at above 50% in the final rule. This portrays the large difference small modifications to a model can have for the final rule.

[110] *See* Renewable Energy Directive, *supra* note 5 (Or even 60% as early as 2014 if the proposed amendments to the RED entry into force.), *see 2012 Commission Proposal to Amend RED*, *supra* note 12.

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rapeseed.[111] Although the default values for biodiesel from soybean today and rapeseed in the near future will not reach the threshold in the EU, the actual values alternative provides incentives for soybean and rapeseed producers to adopt clean production methods. The drawback to this system obviously is the lack of legal certainty and added costs from individual testing.

The feedstock that has probably caused the most controversy is *palm oil*. This form of raw material is produced mainly in South-East Asia. As with soybean, the EU default value for biodiesel from this pathway (19%) is below the threshold of 35%. However, if palm oil biodiesel is produced with methane capture mechanisms, the RED allocates it a considerably higher, threshold-passing default value of 56%.[112] Some palm oil biodiesel could also be classified as sustainable when actual values are applied, especially since the calculations do not include ILUC. In contrast, the U.S. does not currently accept palm oil as a suitable feedstock: it is under evaluation and the final rule is yet to come. U.S. estimations disregarding LUC emissions are at approximately 60%, but LUC emissions reduce the savings considerably. The total savings would fall short of even the 20% threshold.[113]

Both the EU and U.S. rules also contain in their lists types of feedstock that have not yet been given a value in the other jurisdiction. For example, sugar beet ethanol, sunflower biodiesel and wheat ethanol under strictly defined production conditions are given default values above the 35% threshold in the RED. In the RFS2, grain sorghum can meet either the 20% or the 50% threshold depending on the production method used. In 2013, also biofuels from giant reed and napier grass were added to the U.S. list of

[111] *See* Harvey & Pilgrim, *supra* note 70, at 40.

[112] *See* Renewable Energy Directive, *supra* note 5, at Annex V (Similarly, hydrotreated vegetable oil from palm oil does not meet the threshold unless the process involves methane capture (26% and 65%, respectively).).

[113] Notice of data availability Concerning Renewable Fuels Produced from Palm Oil Under the RFS2 Program, 77, Fed. Reg. 18, 4300–18 (proposed Jan. 27, 2012).

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advanced biofuels.[114] There are, however, some restrictions on these feedstocks due to the risk that they are invasive. Invasiveness may become increasingly relevant as further advanced biofuels are developed, and is therefore likely to receive attention also in the EU debates.

All in all, it appears that for most part the main feedstock, apart from palm oil in the U.S., may in practice be accepted as sustainable biofuels in roughly similar situations. Of course, even small differences in the EU and U.S. conditions may be decisive in individual cases. Roughly speaking, however, the EU and U.S. renewable fuels standards do in fact seem to lead to a similar outcome—it is just that they have been formulated in quite different terms. In the U.S., there are clear rules on how feedstock is accepted if they follow the specified production methods in the refinery. In the EU, the approach is more flexible, since it allows for the use of actual values and in many cases also aggregate or disaggregate default values. The main EU criteria for using default values are linked to the place of cultivation of feedstock. Additional criteria on the method of refining apply only for a few of the production pathways. Hence, the phase of the biofuels production pathway where the producer can benefit from a simplified model differs. The actual values also in the EU can help in having fuels accepted; high emissions during the cultivation phase, for example, can be compensated through low emissions in the refining phase. In practice, the flexibility in the accepted pathways in the EU may close the gap in what might be accepted feedstocks in the EU and U.S. In specific cases the flexibility can broaden the scope of accepted pathways in the EU well beyond the ones accepted in the U.S., in particular as the U.S. appears slow in responding to individual requests for additional feedstock. While flexibility allows for the utilization of all available methods to reach sustainability, it also creates some uncertainty for producers.

[114] 78 Fed. Reg. 133, 41,708–12 (July 11, 2013).

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V. Further Measures to Secure Sustainability

The sustainability criteria in the EU and the U.S. create a rather elaborate set of requirements for the use of first generation biofuels. However, both regimes actually do rather little to incentivize the most sustainable options. The more advanced biofuels of later generations include, for example, those produced from waste, feedstock grown on poor land that is not suitable for growing food crops, cellulosic materials and algae. In particular the need to use fertilizers and the ILUC emissions of these types of feedstock could be very limited.[115]

Despite their clear environmental advantages, later generation biofuels have so far been commercialized to a relatively limited extent. The main problem is the high production cost. Therefore, further legislative measures have been envisioned to promote their development.[116] RED has a clause specifically aimed at improving the market position of second generation biofuels. According to the "double-counting" rule in Article 21(2), the volume of biofuel from waste and cellulosic feedstock is accounted to twice its amount when calculating compatibility with the target levels of renewables.[117] The Article may succeed in promoting some of the cheaper

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[115] *See* Farber, *supra* note 36, at 409 (concluding that second and third generation biofuels need to be promoted. In contrast, questioning the benefits of second generation biofuels), *see also* David Pimentel & Marcia Pimentel, *Corn and Cellulosic Ethanol Cause Major Problems*, 1 ENERGIES 35, 35–37 (2008).

[116] *See* C-201/08, Plantanol GmbH & Co. KG v. Hauptzollamt Darmstadt, ECR 2009, I-8343 (Before the entry into force of the new RED in 2009, EU member states had a wide discretion over the means to promote the most sustainable biofuels.). *But see* Renewable Energy Directive, *supra* note 5, at art. 17(8) (limiting the sustainability considerations on all biofuels to those explicitly mentioned in the directive).

[117] Renewable Energy Directive, *supra* note 5, at art. 21(2) (The multiplication factor might increase to 4 if the new proposal is adopted.); *see*

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second generation biofuels, but its effectiveness in promoting a wider variety of options remains doubtful. The most sustainable options are currently so many times more expensive than the cheapest sustainable biofuels that the double counting rule may be inadequate.

The main mechanism for promoting later generation biofuels in the U.S. is very different from the EU model. Under the CAA and RFS2, certain minimum volumes of renewables need to be advanced biofuels and a share of the advanced biofuels needs to be biodiesel.[118] In other words, the U.S. system introduces a quota for advanced biofuels. As many first generation biofuels are also considered advanced, this does not promote second generation biofuels alone. The RFS2 also includes provisions on the minimum level of cellulosic biofuels to be produced each year. This share will increase dramatically to 16 billion gallons by 2022, which represents more than a third of all renewables. The problem with the U.S. model at the moment is the lack of supply of second generation biofuels, especially when it comes to cellulosic biofuels. Hence, critics view the volume targets as just an added tax for refiners and importers, and consequently, lawsuits have been filed against the EPA. As a reaction, the EPA has partially waived the requirement of cellulosic biofuels.[119]

During RED's drafting, a provision was proposed that would have established a requirement on the Member States that a minimum amount of their energy consumed be from second generation biofuels.[120] Under the

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2012 Commission Proposal to Amend RED, *supra* note 12, amended art. 3(4), at 14.

[118] *See* RFS2 § 80.1401, 42 U.S.C. § 7545(o)2.

[119] Nick Snow, *API Lawsuit Challenges 2011 RFS Biofuels Provision*, OIL & GAS J., July 25, 2012; Holly Jessen, *API Mounts Another Attack on RFS, Biofuels Industry Fights Back*, BIOMASS MAG., Nov. 11, 2012.

[120] *EP seals climate change package*, EUROPEAN PARLIAMENT (Dec. 17, 2008), *available at* www.europarl.europa.eu/sides/getDoc.do?language=en&type=IM-PRESS&reference=20081208BKG44004 (last accessed Apr. 11, 2014).

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proposed mandate, states or economic operators would in others words have been forced to supply the funding for second generation biofuels even if the costs were high. The fact that the minimum requirement would have applied to any form of second generation biofuels would have rendered the model rather flexible and therefore less affected by problems of inadequate supply. In the end, the EU instead opted for a model of supplementing the sustainability criteria with the above-noted method of double-counting, a requirement on the Member States to report on their production of second generation biofuels and efforts to promote such production,[121] as well as a system of monitoring by the Commission.[122] The current EU approach will also help to keep track of overall environmental effects, but the effectiveness in actually steering the biofuels industry to more sustainable alternatives seems doubtful. Hence, while preparing amendments to the Commission Proposal to Amend RED, the European Parliament has been discussing the option of including a quota for second generation biofuels.[123]

Yet another type of second generation biofuel that both the EU and the U.S. attempted to promote in the legislative initiatives is *waste*. *Waste* as an advanced biofuel constitutes nonetheless specific challenges. The first one relates to the definition of waste: having a clear understanding of the precise scope of this feedstock is of crucial value for the investors, yet the details are still missing in the RED, although they are included in the Commission Proposal to Amend the directive.[124] Second, even waste is a limited resource,

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[121] Renewable Energy Directive, *supra* note 5, at art. 22(1)(c), art. 22(1)(i), art. 23.

[122] Renewable Energy Directive, *supra* note 5, at art. 23.

[123] Discussion among MEPs at a special event on second generation and advanced biofuels held by Leaders of Sustainable Biofuels at the European Parliament May 8, 2013. The Parliament discussed the quota for second generation biofuels as an alternative to the Commission proposal of a 5% cap for first generation biofuels. In essence, the effect of both alternatives would be very similar.

[124] *See 2012 Commission Proposal to Amend RED*, *supra* note 12, amended art. 2, at 13; Soimakallio & Koponen, *supra* note 47, at 3508.

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although it would obviously not be environmentally sustainable to encourage the generation of more waste just to respond to energy concerns.[125]

Unlike the RED, the RFS2 does not provide for double-counting of biofuels from waste and cellulosic feedstock. However, the RFS quota for cellulosic biofuels can almost exclusively be fulfilled through the production of biofuels from cellulosic biomass extracted from waste and residues.[126] Hence, the RFS2 also promotes biofuels from waste. Ethanol from non-cellulosic waste receives a less favorable treatment in the U.S. RFS2 quota system than in the EU RED, however, because it obviously cannot be considered a cellulosic biofuel, but must fall under the quota of "normal" advanced biofuels.

A further mechanism to improve sustainability is the promotion of energy efficient biofuels. Energy efficiency decreases the need to cultivate and produce biofuels and hence also reduces GHG emissions. The RFS2 in the U.S. promotes energy efficient biofuels through a system of Renewable Identification Numbers (RINs) that are assigned to units of biofuel. These RINs values work in a manner resembling an emissions trading system: each biofuel product is assigned a RIN, which can be transferred separately from the product. Enough RINs need to be obtained to meet a given volume target. The RINs granted will, however, depend not only on the volume of fuel because the volume is multiplied by an equivalency value (EV). The EV is determined by the energy content of the biofuel in question. Ethanol has an EV of one. For instance Butanol, which has higher energy content than ethanol is given an equivalency value of 1.3, and biodiesel has an even higher value, 1.5.[127] By giving high equivalency values for butanol and biodiesel,

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[125] Directive 2006/12/EC of the European Parliament and of the Council on waste, OJ (L 114) Apr. 27, 2006; Soimakallio & Koponen, *supra* note 47, at 3508.

[126] 40 C.F.R. § 80.1426 (Supp. II, 2014).

[127] 40 C.F.R. § 80.1415 (Supp. II, 2014); Jay P. Kesan & Timothy A. Slating, *A Legal Analysis of the Effects of the Renewable Fuel Standard (RFS2) and Clean Air Act on the Commercialization of Biobutanol as a*

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these products become more attractive in fulfilling the RIN trading targets. This is believed to increase the incentives to invest in alternatives that are more efficient, and hence more sustainable, than domestic corn ethanol. However, the RIN system appears to suffer from the same weakness as the EU's double-counting model: under the current market conditions, the RIN system with the equivalency values do not appear to sufficiently compensate for the higher costs.[128]

VI. CONCLUSIONS

The EU and the U.S. have quite similar biofuels policies but seem to partly adopt rather different regulatory approaches in implementing them. This is well portrayed by the provisions on the types of land on which the feedstock for sustainable biofuels can or cannot be produced. The positive list in the U.S. law and the negative list in EU law lead, in the end, to a fairly similar outcome.

Comparing these two regimes on the calculation of GHG savings also reveals a pattern of similarities. The EU has a higher minimum threshold, the benchmark value of emissions from fossil fuels is lower, the emissions' time frame is shorter and the default values are to be estimated in accordance with the precautionary principle. All of these factors give the impression that EU sustainability criteria are strict, and indeed stricter than their American equivalents. However, the different regulatory approach adopted by U.S. policy makers just means that the strictness presents itself in other ways. First, the U.S. model does not allow for the calculation of actual values and, hence, does not offer the same flexibility as the EU model. Second, some

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Transportation Fuel in the United States, 4 GCB BIOENERGY 107, 111–12 (2012) (The GHG emissions of butanol have been evaluated by the EPA but this form of fuel is not given any default value in the RED. The commercialization in the U.S. is highly dependent on production processes that would make the fuel reach the 50% GHG savings threshold.).

[128] Powers, *supra* note 19, at 693–95 (Perhaps an even greater reason for the failure of the system is found in the generous subsidies and tax benefits granted to 1st generation feedstock, mainly produced from corn.).

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biofuels are given higher emission values than in the EU, which renders more difficult their consideration as sustainable. Third, the U.S. model incorporates the effects of ILUC in its calculations, which the EU model does not do. This tightens the U.S. standards considerably and brings them, on the grand scale of things, relatively close to the EU requirements.

Despite giving a first appearance of notable differences, both regimes also lead to quite similar outcomes regarding which biofuels can be considered sustainable. Most of the biofuels that are considered sustainable under the U.S. scheme get the same status when the EU default values are applied. The important exception is palm oil, which the U.S. currently excludes from the scope of sustainable biofuels.

Including the effects of ILUC in RED, which is currently the subject of a heated debate, would formally lead the EU to take a step in the direction of the U.S. approach. Paradoxically, closing the gap in terms of the regulatory approach by including a provision on ILUC can be expected to widen the gap with regard to the policy outcomes. The inclusion of ILUC would render the EU's overall sustainability standards on biofuels stricter than those in the U.S.

The inclusion of ILUC has been objected to on the grounds that ILUC is not considered in other social sectors, either. This argument seems nonetheless inverted. Biofuels should instead constitute a harbinger of managing ILUC, leading by example sectors such as agriculture and urban planning. The holistic and international nature of the phenomenon seems well suited for common Trans-Atlantic leadership and global action.

Hovering around the entire policy field of biofuels is nevertheless the shadow of protectionism. Both the American and European experiences seem to have indications of policy choices that are sometimes based on grounds other than environmental protection. In a nascent field it is very hard to draw lines between justifiable infant industry support, on the one hand, and protectionist barriers that merely shield vested interests with few long term benefits for the economy or the environment, on the other.

International collaboration and agreement on the objective scientific basis for environmental policy is a crucial platform in moving forward. On this platform, countries are able to exert their sovereign right to decide upon

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the level of environmental protection—obviously taking into account the international nature of many environmental harms, and the consequent advantages of harmonization. Although the use of LCAs is frustratingly complex, it seems to offer the most promising way to proceed, respecting the notion of evidence based policy making. Proposals to use the Californian LCFS or the EU RED as a model design for a future global standard[129] are very welcome inputs to the policy discourse. The clout of the European and American environmental protection machineries, combined, can pave the way in greening the transport policies.

The common policy goals and the similarities in an LCA-based approach to biofuels should allow the EU and U.S. regimes to find common ground for closer cooperation. This is important, because while optimally more sustainable than the current alternative of fossil fuels, there is still considerable room for improvement in terms of accuracy, non-discrimination and the level of ambition. Exploiting the full potential of sustainable biofuels can prove essential in meeting objectives of global climate policies. The EU and the U.S. should therefore take global leadership in the area of fully sustainable biofuels policy. The process obviously needs to include all the major biofuel producing nations, as well as all other interested and affected parties. The field is international in a manner that renders unilateral actions even by such major players quite incomplete.[130]

There is work currently conducted on the harmonization of LCA approaches,[131] in particular on the standardization of the sustainability criteria for biofuels. The European CEN/TC383 standards on the sustainability criteria for biomass for energy applications have been completed for the most

[129] Romppanen, *supra* note 2, at 136.

[130] Claudia Brühwiler & Heinz Hauser, *Biofuels and WTO Disciplines*, 63 AUSSENWIRTSCHAFT 7, 33–34 (2008); Romppanen, *supra* note 2, at 133–39; Switzer & McMahon, *supra* note 64, at 734–36.

[131] Reid Lifset, *Toward Meta-Analysis in Life-Cycle Assessment*, 16 J. INDUS. ECOLOGY S1 (2012); Weiss et al., *A Review of the Environmental Impacts of Biobased Materials*, 16 J. INDUS. ECOLOGY S161, S171 (2012).

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part.[132] An international ISO/TC 248 standard ("Sustainability criteria for bioenergy") is foreseen for the spring of 2014.[133] Alongside the standard, a technical report on indirect land use will also be published.

To get further on the road towards sustainable development, however, it is necessary to first finish the beginning part of the trip by much more thoroughly exploiting the commonalities in the science and policy of sustainable biofuels in the EU and the U.S.

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[132] The standard "EN 16214-4 on Sustainably produced biomass for energy applications—Principles, criteria, indicators and verifiers for biofuels and bioliquids—Parts 1—4" have been published by winter 2013. Part 2 on Conformity assessment including chain of custody and mass balance, should be published before the end of 2013 as a Technical Specification.

[133] *ISO/CD 13065 Sustainability Criteria for Bioenergy* (Jan. 28, 2014), *available at* www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=52528 (last accessed Apr. 11, 2014).

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