German Environment Agency

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Scientific Opinion Paper

What issues need to be addressed in the RED II draft to ensure environmental integrity and net climate benefit of bioenergy use?

What issues do we see in the RED II draft?

As in accordance with our (UBA, the German Environment Agency) motto, „For our environment", we appreciate the European Union's common goal to increase the share of renewable energy in order to combat climate change as proposed by the European Commission in the new Renewable Energy Directive (RED II), which will be reviewed by European Parliament in January 2018. We also welcome the extension of sustainability and GHG saving criteria to solid and gaseous biomass fuels for electricity and heat production. The Energy Council agreed on a general approach on the RED II on 19 December 2017, which will be the Council's starting point for the trilogue with the European Parliament. However, the general approach on the RED II does not ensure optimal bioenergy use with regard to sustainability and GHG emission savings.

With this scientific opinion paper, we aim to raise awareness for some issues leading to insufficient GHG savings and potentially causing a gap between two climate and energy legislative frameworks of the European Union: the recast of the Renewable Energy Directive (RED II) and the Land Use, Land Use Change and Forestry Regulation (LULUCF Regulation). There is a risk that bioenergy, used to fulfill the renewable energy target may contribute to GHG savings only to a limited extent, but at the same time lead to intensification of forest management and therefore reduce the carbon sink potential of forests. Yet the impact on forest carbon sinks is currently not properly addressed in either draft legislation, meaning an increase in net-emissions caused by bioenergy will not necessarily require compensation through increased mitigation efforts in other sectors.

In the following we will highlight some essential issues and our suggestions for improving the effectiveness of the REDII legislation towards climate change mitigation.

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Improve the accountability for the impact of bioenergy on LULUCF-Emissions

The aim of both RED II and LULUCF Regulation is climate change mitigation, but failure to appropriately address the link between both could result in bioenergy use becoming counterproductive.

Only a fair consideration of the full lifecycle emissions of bioenergy pathways enables to choose the most climate friendly bioenergy option. For forest biomass, these lifecycle emissions need to include biogenic CO_2 emissions that arise from intensification of forest management. Already in 2016, the analysis of the European Commission`s impact assessment on sustainability of bioenergy[1] has identified "minimal or even negative greenhouse gas savings compared to fossil fuels" as a key risk of an increased demand for forest based bioenergy.[2] It also states that the inclusion of woody biomass from forests in the REDII will likely increase consumption of forest biomass and that "an increase in use of forest biomass for energy may lead to limited greenhouse gas savings or to an increase in emissions"[3]. While emissions from land use change, such as deforestation, are included in the methodology for GHG emission calculation (factor e_l; RED II Annex VI part B), those from land management change, such as forest degradation, are not taken into consideration in the recently adopted general approach of RED II[4].

In the RED II logic, this is compensated by requiring a functioning LULUCF-accounting system in the country, region or sourcing area of biomass origin (Art. 26 (6)). Despite the fact that this would still not enable a fair assessment of the GHG saving of the respective bioenergy pathway, a robust LULUCF-accounting regime is essential to at least track the potential emissions or reductions in removals resulting from increases in forest biomass use, driven by the RED II. The underlying assumption behind the RED II logic is that such LULUCF accounting provisions are robust enough to include these emissions in tracking progress towards national GHG-mitigation targets. This way if bioenergy causes any negative impact on mitigation in LULUCF, it would have to be compensated with further emission reductions in another sector for a national mitigation target to be achieved.

In accordance with this logic, under Article 26.6.a. certain LULUCF requirements must be met for biomass to be eligible for RED II. The biomass must originate from a Party that has ratified the Paris Agreement, includes LULUCF in its NDC and either accounts for changes in carbon stocks against its target, or has policies and laws in place that ensure

[1] See: European Commission (2016) Commission staff working document – Impact assessment Sustainability of Bioenergy;
[2] See Section 2, pg. 13 of European Commission (2016)
[3] See Section 2.1.2, pg. 16 of European Commission (2016)
[4] All draft versions and the General Approach document (#15236/17) from 13 December 2017 are available at the document register of the Council of the European Council, including several recent and slight changes to the General Approach agreed by the Council in document #15893/17 from 20 December 2017.

protecting and enhancing forest carbon sinks. However, according to Article 26.6.b., if these criteria are not met, biomass is still eligible if there are "management systems in place at sourcing area level to ensure that carbon stocks and sinks levels in the forest are maintained over the long term".

There are three reasons why these criteria do not guarantee forest based bioenergy will positively contribute to GHG-mitigation:

1. Tracking the change in carbon stocks doesn't guarantee tracking the active reduction of carbon sinks from intensified forest management, yet Article 5[5] of the Paris Agreement as well as the EU strive to maintain and enhance carbon sinks – not reduce them.

   The EU LULUCF regulation does require Member States to extrapolate historic forest management practices while taking into account age related effects in forests when setting their forest reference levels. Projecting management intensification and the resulting reductions of forest carbon sinks as a baseline due to an increased demand for bioenergy is therefore not allowed. This means an intensification in forest management that results in reduced sinks will be detected.

   However, one problematic element of the recently adopted LULUCF-Regulation reduces the effectiveness of these otherwise stringent rules. Between 2021 and 2030 as a group Member States are able to cancel up to 369 million tons CO_2 in debits resulting from forest management intensification in comparison to the reference level – as long as there is an equivalent surplus of credits in other Member States. This means if forest sinks are further reduced by the increasing bioenergy use, individual Member States will not have a strong incentive to maintain their forest sink, as they might bet on there being a surplus of LULUCF credits in the EU.

2. Other Parties to the Paris Agreement may have less robust accounting of forest management and therefore may not fully track impacts of bioenergy on LULUCF emissions and removals. Under the Paris Agreement there have not yet been any discussions regarding the establishment of international accounting rules for LULUCF. Particularly due to the self-determined nature of the contributions as well as informal indications by Parties, there seems to be little interest for developing such rules, and Parties might use their own preferred method for tracking LULUCF emissions and removals. Experience from the Kyoto Protocol shows that Parties generally prefer either historic or projected baselines which at least partially mask future reductions in sinks from forest

[5] Article 5.1 of the Paris Agreement states "Parties should take action to conserve and enhance, as appropriate, sinks and reservoirs of greenhouse gases as referred to in Article 4, paragraph 1 (d), of the Convention, including forests."

management intensification[6,7].

There is also no guarantee that Parties will include all of their forests when accounting towards their Nationally Determined Contribution to the Paris Agreement. Developing country Parties may in many cases not meet the RED II criteria of national LULUCF accounting (26.6 a.), since many only track emissions and removals in a specific region or jurisdiction for their efforts to reduce emissions from deforestation and degradation (REDD+). Therefore, the forest is not fully accounted for and subnational as well as international leakage are potential risks. Considering that the forests in many REDD+ countries are currently a net-source of emissions, sourcing forest bioenergy from these countries could cause an increase in emissions. However, management systems may be in place on a subnational level and forest biomass could therefore technically fulfill subparagraph 26.6 b. Yet importing forest based bioenergy from such countries would still risk exacerbating deforestation and forest degradation, possibly without the bioenergy emissions being accounted for.

3. One of the major sources of EU forest-based bioenergy is the US. It is currently unclear whether the US will remain in the Paris Agreement or if there will be a national accounting of LULUCF. Yet biomass originating from the US could still fulfill criteria 26.6 b., since management systems may be in place "at forest sourcing area [ ] level to ensure that carbon stocks and sink levels in the forest are maintained over the long term". However it is unclear how this will be verified and who has the burden of proof. One underlying study[8] of the RED II Impact Assessment gives evidence that increasing bioenergy consumption in the EU is and will continue to cause management intensification in the South East US, by reducing rotation lengths and displacing other current uses of forest biomass (causing management intensification further forests of the region). There is a risk of long term reduction of stock, since due to reduced rotation lengths, original carbon stock levels may not be reached again (since harvest repeatedly occurs before the original stocking level is reached). However, reducing emissions and enhancing carbon sinks in the next decades is critical for limiting global average temperature rise to well below 2°C.

Therefore the reliance on LULUCF accounting both within and outside the EU is not enough to guarantee that bioenergy from forests is contributing to GHG-mitigation. Nor will it guarantee that bioenergy use conflicting with

[6] See: Umweltbundesamt. The Environmental Impact of LULUCF Accounting in a Future Climate Regime. Final Project Report Dessau-Roßlau: UBA, 2016.

[7] See: FCCC/KP/AWG/2011/INF.2: Synthesis Report of the technical assessments of forest management reference level submissions (conducted while developing the LULUCF accounting framework under the Kyoto Protocol 2nd Commitment Period).

[8] See: COWI (2016): Environmental implications of increased reliance of the EU on biomass from the South East US.

GHG-mitigation will be compensated through further mitigation measures in other sectors.

To close the described policy gap, we suggest **including GHG emissions as well as a loss of CO_2 removals due to land management change** in the calculation of the GHG impact of biomass fuels by defining the **factor e_l** in RED II Annex VI part B (7) accordingly.

Enlarge scope of application to include smaller and already operating installations

For approximately 70% of the biogas feedstock and more than 30% of the woody biomass feedstock currently used in Germany to produce electricity and heat, the sustainability and GHG criteria do not apply according to the European Council`s general approach of RED II. This is because they are used in installations with less than 2 MW (gaseous biomass fuels) and 20 MW (solid biomass fuels) total rated thermal input (Art. 26 (1)).

Moreover, the GHG emission saving criteria only apply for electricity, heating and cooling production from biomass fuels used in installations starting operation after 1 January 2021 (Art. 26 (7) (d)). Biomass fuels with typically high GHG emissions could in consequence still be used in older plants as the result of a reallocation and without an overall GHG emission reduction. For a large share of biomass fuels compliance with sustainability criteria and the GHG saving criteria would thus not need to be demonstrated according to the European Council`s general approach of RED II. In order to impose sustainability criteria and GHG saving criteria to a larger share of biomass fuels, a **threshold** of **5 MW for solid and 1 MW for gaseous** biomass fuels (Art. 26 (1)) is more appropriate. Additionally, the GHG emission saving criteria also need to apply for biomass fuels used in older plants. Possibly after a transition period, the lower **reduction threshold should be valid for all installations** (Art. 26 (7) (d)).

Remove incentive for co-firing of biomass in inefficient coal plants

Energy efficiency is an important prerequisite for lowering GHG emissions. This is also true for bioenergy, as a limited natural resource. The efficiency criterion laid down in the European Council`s general approach of RED II Art. 26 (8) however only applies to new installations and installations that switch to co-firing with a total rated thermal input equal to or exceeding 75 MW generating electricity from co-firing biomass fuels. The scope of this criterion is therefore very limited. To ensure a more effective contribution to GHG mitigation we suggest applying this criterion to **existing plants**, **smaller plants** as well as **purely biomass based plants**.

Co-firing of biomass is not desirable as it contradicts efforts for a transition of the energy system, especially when biomass is co-fired in coal plants. On

page 14 of their impact assessment[9], the European Commission additionally states, "The increasing combustion of large volumes of biomass in low-efficiency installations, driven by public support, can create additional pressure on resources, in particular in the case of electricity only plants". Also incentivizing co-firing in coal plants by setting an additional fossil fuel comparator for heat from direct coal substitution which is much higher than the common fossil fuel comparator for heat (Annex VI part B (19)) is very critical as it may further stipulate co-firing of biomass in inefficient coal-based heat plants. We therefore suggest **removing this fossil fuel comparator for heat from direct coal substitution.**

Remove incentive of BECCS as an alternative to energy efficiency

During the first revision of the RED II draft by the European Council[10], Biomass Carbon Capture and Storage (BECCS) was inserted as an alternative to high efficient cogeneration of heat and electricity in Art. 26 (8). However, BECCS in contrast decreases the efficiency of power plants. Even more biomass fuels are needed to produce the same electricity or heat, thus further decreasing the urgently needed GHG savings through the substitution of fossil fuels. Moreover, the storage capacity for CO_2 and permanence of sequestration is still under controversial discussion. For both reasons, BECCS should not be incentivized. Therefore, we suggest **removing BECCS as an alternative to high efficiency** from Art. 26 (8).

Increase the GHG saving requirements for energy from biomass fuels used for electricity, heating and cooling (at least 80% to 85%)

Already in 2016, the analysis of the European commission`s impact assessment on sustainability of bioenergy[10] showed that a minimum GHG performance for supply chain emissions of bioenergy would only drive emission reductions if the threshold is set above 75% compared to fossil fuels. Thus, in our view, at least the **initial GHG saving criteria of 80%** for electricity, heating and cooling installations from biomass fuels used in installations starting operation after 1 January 2021 **and 85%** for installations starting operation after 1 January 2026 as proposed by the EU Commission[11] **need to be kept**. (Art. 26 (7) (d)). For installations already in operation, however, there are no GHG saving criteria in the European Council`s general approach of RED II. The feedstock supply is however flexible and upgrades are feasible to a certain extent, meaning GHG emission reductions are indeed also feasible for existing installations. After

[9] European Commission (2016) Commission staff working document – Impact assessment Sustainability of Bioenergy;
[10] First revision of the draft by the European Council; 27 September 2017; ST 8697 2017 REV 1
[11] Proposal for a Directive of the European Parliament and of the Council on the promotion of the use of energy from renewable sources (recast); 30.11.2016; COM/2016/0767 final/2 - 2016/0382 (COD)

a certain transition period GHG saving criteria are thus indeed justified and should be included into RED II.

The supply chain GHG emissions regarded in the commission`s impact assessment, that lead to the minimum 75% GHG saving statement, did not include biogenic CO_2. The use of forest biomass may however induce biogenic CO_2 emissions that need to be accounted (see above) for a fair consideration of the full lifecycle emissions

Set more specific guidance for GHG emission accounting from cultivation of agricultural biomass

The GHG emissions from biomass production often dominate the overall lifecycle GHG emissions of bioenergy pathways based on agricultural biomass. In particular nitrous oxide emissions from agricultural soils may account for a significant proportion of GHG emissions from the extraction, harvesting or cultivation of raw materials (term e_{ec} in Annex VI part B). Consequently, the methods used to assess these emissions strongly influence GHG savings of crop based bioenergy pathways and need to be transparent, comparable and verifiable. However, in Annex VI, Part B (5) no information is provided on the method to be used to determine actual values. We feel the **RED II should stipulate precise requirements, i. e. by referring to a calculation tool** to be used, such as - for those crops for which it is available - the generally recognized tools BioGrace or gnoc (for nitrous oxide emissions). It would also be desirable if BioGrace is adapted to new findings and more crops.

The obligatory reports including information on the typical greenhouse gas emissions from cultivation of agricultural raw materials on the geographic level of NUTS 2 territorial units according to RED I constitute a valuable reference for evaluating actual values for feedstock production. According to Art. 28 (2) of the RED II draft, these reports become voluntary. In order to preserve this database for plausibility checks, we find it **important that it remains obligatory for Member States, to submit or update existing reports**.

In order to enable the assessment of the greenhouse gas emissions reported by Member States in accordance with paragraph 28 (4), it is essential to mention the methods used and the data sources used. Furthermore, Art. 28 (2) should **clearly define the method to be used.** This includes the period for which average yields are stated, as well as the method for calculating the greenhouse gas emissions.

Since Art. 28 (3) foresees the possibility for countries outside the EU to provide corresponding reports as well, which can be used for the indication of regional production emissions, there is no reason for the last sentence of Annex VI (5) para 1, regarding calculation of averages as an alternative to reports and actual values. Therefore we suggest it be deleted.

Account for both sides of the coin: crediting GHG emission savings from improved agricultural management only if increased GHG emissions due to management are also accounted for

The methodology for GHG emission calculation in the general approach allows for accounting GHG emission savings due to improved agricultural management (term e_{sca}, RED II Annex VI part B (6)). As pointed out before, in connection with GHG emissions due to intensified forest management (see issue on LULUCF emission accounting above), additional emissions due to agricultural management also need to be reflected in the methodology. The principle of reporting and accounting all significant emissions, removals, gasses and pools on an area of land is upheld within the IPCC Good Practice Guidance as well as accounting systems under the Kyoto Protocol. It is therefore neither conservative nor consistent with existing EU or international land use policies to only consider soil carbon sequestration, but to ignore emissions released by soil when evaluating the carbon benefit of bioenergy from those soils. For agricultural biomass this becomes relevant in particular due to the elimination of Article 17 (6) of RED I (reference to the Common Agricultural Policy in the context of the sustainability criteria; cf. point 74 of the foreword to the European Council`s general approach of RED II) in the proposal of RED II. Generally, to our knowledge, a credible methodology which could be applied in a practical manner and without imposing an undue burden on verifiers currently doesn't exist. Therefore, we suggest removing the **term e_{sca} to improve consistency and conservativeness**.

In any case, we find the alternatively "reasonably expectable carbon stock increase" in RED II Annex VI part B (6) should be deleted, as it contradicts the stipulation in section 6, that reliable and verifiable evidence must be available.

Consider GHG emissions from indirect effects

For all additional energetic use of biomass – gaseous as well as solid biomass fuels, primary biomass as well as wastes – there is a risk of displacing existing uses, thus leading to additional GHG-emissions resulting from a shift tonon-renewable feedstocks or less sustainable modes of production in general.

It seems as if the knowledge gained during long discussions on indirect effects of biofuel use like indirect land use change (iLUC)[12] and displacement effects on competing production in general[13] were not

[12] See e.g. Malins, Searle & Baral (2014) A Guide for the Perplexed to the Indirect Effects of Biofuels Production. icct

[13] See e.g. Searle, S., N. Pavlenko, S. E. Takriti and K. Bitnere (2017). Potential greenhouse gas savings from a 2030 greenhouse gas reduction target with indirect emissions accounting for the European Union. icct

considered for solid and gaseous biomass fuels. While a cap was introduced for food and feed crop based liquid biofuels in order to prevent iLUC, there is no corresponding regulation for gaseous biomass fuels in the RED II draft, even though biogas feedstocks (e.g. maize) also exhibit a high iLUC risk[14]. The GHG emissions from iLUC can negate GHG savings. As has been included for crop based liquid biofuels, we find that a corresponding **cap for food and feed crop based biomass fuels** is necessary in order to prevent negative ecological and social impacts due to iLUC. The Committee on Development of the European Parliament even went as far as to demand 0% land-based biofuels[15]. In addition, the Committee on the Environment, Public Health and Food Safety highlighted in their opinion "From the climate perspective only bioenergy produced from wastes and residues should be promoted, with appropriate safeguards regarding the protection of soil quality, soil carbon and biodiversity, and displacing other uses"[16]. At a minimum, we therefore suggest a cap for food and feed crop based biomass fuels be included in RED II.

Maintain waste hierarchy to ensure that only waste which has no other material use is used for energy purposes

Also regarding residues and wastes, the standards set for solid and gaseous biomass fuels fall far behind those of biofuels. While the principle of the waste hierarchy needs to be taken into account for advanced biofuel (Art. 25 (6bis)), this requirement is not included for solid and gaseous biomass fuels, even though they comprise many waste-based feedstocks. For example, substances referred to in paragraph 3 of point 18 of Annex VI, Part B are used for other uses or can be recycled at a higher value. In accordance with the EC`s Waste Framework Directive, **material recycling must always be preferred to energy recovery**. In order to comply with this superior principle and to account for GHG emissions due to displacement effects, we suggest amending the paragraph by restricting waste-based feedstocks to wastes and residues with no possible alternative use.

More generally, we suggest ensuring the principle of the waste hierarchy by integrating it into the RED II at several paragraphs, e.g. Art. 26 (1) as also demanded by the Committee on the Environment, Public Health and Food Safety[17].

[14] see also RED II Annex VIII part A for estimated GHG emissions from iLUC for biofuel and bioliquid feedstocks based on different feedstock categories including starch rich crops as maize

[15] Opinion of the Committee on Development for the Committee on Industry, Research and Energy 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 (recast); 24.10.2017; DEVE_AD(2017)609284

[16] Opinion of the Committee on the Environment, Public Health and Food Safety for the Committee on Industry, Research and Energy 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 (recast); 13.11.2017; ENVI_AD(2017)604700

[17] Opinion of the Committee on Development for the Committee on Industry, Research and Energy 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 (recast); 24.10.2017; DEVE_AD(2017)609284

Remove emissions saving crediting from carbon capture and storage (CCS) and carbon capture and replacement (CCR)

In accordance with the formula for calculating GHG emissions from the production and use of biomass fuels (Part B (1)), emission savings through carbon capture and geological storage (CCS) may be accounted for in the term e_{ccs}, which is described in more detail in Annex VI part B (14). In order to avoid competition with geothermal energy and additional demand of raw materials (see also BECCS issue above), we suggest **removing** this form of emission credit and thus the **term e_{ccs} from the formula**.

In addition, it is questionable which emission savings are not already taken into account in the term ep, (GHG emissions from the production of biomass fuels), so that the term e_{ccs} significantly increases the testing effort for auditors of the certification, without substantial benefit.

An actual reduction in GHG emissions by capturing biogenic CO_2 and replacing fossil CO_2 ("carbon capture and replacement") can only be guaranteed if the fossil CO_2 was made available specifically for this application, i. e. if it was not used elsewhere or released into the atmosphere when it was replaced by biogenic CO_2. This aspect is not reflected in the proposed wording of Annex VI part B (15) and it is our view that it should be included in the wording by specifying the replaced CO_2 as CO_2 which was previously produced from fossil fuel burnt for the sole purpose of generating that CO_2. Alternatively, we suggest the **term e_{ccr} should be deleted**, also justified by the fact that only very few corresponding applications are conceivable, but the testing effort for auditors of the certification would increase significantly.

In order to prevent incentivizing unsustainable bioenergy use and reduction of forest carbon sinks, which would be counterproductive to the overall goal of RED II and EU Climate Policy in general, we consider it necessary to address the issues raised here.