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SUMMARY OF THE IMPACT ASSESSMENT

Accompanying document to the

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

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1. PROBLEM DEFINITION

The EU needs to increase its use of biomass for energy purposes to reach the 2020 targets agreed under the Renewable Energy Directive[1]. The Directive contains a sustainability scheme for biofuels and bioliquids. Article 17(9) of the Directive requires the Commission to report by 31 December 2009 on requirements for a sustainability scheme for energy uses of biomass other than biofuels and bioliquids.

Solid and gaseous biomass can originate from agriculture, forestry or waste. As biomass resources are not infinite, an efficient and sustainable use of the resource is important.

Market failures may occur because climate change and potential negative impacts on biodiversity, water, soils and ecosystem services are not reflected in market prices.

Regulatory failures may occur because renewable energy policy encourages Member States to support the use of more biomass, while rules or pricing mechanisms for biomass production do not take into account negative externalities, such as deforestation.

These failures are not observed today on a significant scale, and in particularly not in the EU. However, it may be appropriate to create safeguards against their arising in future, where more biomass and an increased amount of imported biomass are expected to be used for energy purposes.

2. ANALYSIS OF SUBSIDIARITY

Biomass can be easily traded. It follows that if Member States act alone, the internal market may be disrupted for biomass traders, suppliers and producers. EU-wide action can ensure that common environmental protection is achieved while avoiding distortions in the internal market.

3. OBJECTIVES OF EU INITIATIVE

The general policy objective is to guarantee a sustainable use of biomass for energy purposes. The specific objectives are to ensure that heat and power uses of biomass leads to (1) sustainable production, (2) high greenhouse (GHG) performance compared to fossil fuels and (3) efficient energy conversion of biomass into electricity and heating and cooling.

The operational objective is to establish sustainability requirements for solid and gaseous forms of biomass used in electricity and heating, as long as they are:

- effective in dealing with problems of sustainable biomass use,
- cost-efficient in meeting the objectives and
- consistent with existing policies.

[1] Directive 2009/28/EC

4. POLICY OPTIONS

Table 1: Summary table of options

A. Production of biomass	Policy Scenario
Option A1: no new EU action	Voluntary schemes continue to elaborate certification schemes for sustainable biomass production and land management.
Option A2: Guidance on intensification methods in forestry	Guidance on land use issues related to increased bio-energy production in forests e.g. increased use of stumps and branches and leaves.
Option A3: minimum criteria on biodiversity and land use	Criteria on biodiversity and land use or so-called 'no-go' areas under the Renewable Energy Directive to apply to all biomass. Forest management issues are left out of the scope.
Option A4a: Option A3 + reporting on biomass origin	As Option A3 + reporting requirements on Member States on biomass origin.
Option A4b: Option A3 + reporting on Sustainable Forest Management (SFM)	As Option A3 + mandatory reporting requirements on Member States on sustainable forest management.
Option A5: Option A3 + SFM minimum obligations	As Option A3 + obligations on Member States to count forest biomass only from sustainable managed forests towards their renewable energy target.
Option A6: Option A3 + LULUCF accounting	As Option A3 + evidence of good practice in case country of origin does not account LULUCF emissions.
B. GHG savings:	
Option B1: no new EU action	GHG performance requirements could be developed in voluntary schemes.
Option B2: labelling of GHG performance	Label GHG performance to give information to electricity or heat consumers and to promote GHG life cycle thinking for production processes. A common GHG methodology for labelling would be necessary to ensure consistency of claims. The obligation could be placed on electricity and heat providers, and the GHG performance could be made available on guarantees of origin, for disclosure purposes.
Option B3: Setting minimum GHG savings requirements - 35% (increasing to 50-60% in 2017/2018)	35% minimum GHG saving requirement for agricultural and forest biomass (compared to fossil alternative) - same minimum requirement as for biofuels and bioliquids in the Renewable Energy Directive
Option B4: minimum GHG requirements in accordance with GHG saving potential	Introduce minimum GHG requirement in accordance with the Best Available Technology (BAT) in each pathway.
C. Conversion	
Option C1: No new EU action	Existing energy efficiency policy will yield results in making the use of all energy resources, including biomass, more efficient.
Option C2: Bonus for better end-conversion efficiency or penalty for lower end-conversion efficiency	Member States to give a bonus/penalty (i.e. financial incentive/disincentive) to improve efficiency through differentiating subsidy levels.

Option C3: banning inefficient use or minimum efficiency standards	Banning certain inefficient biomass technology options or introducing minimum requirements. Small-scale (mainly residential) use is out of the scope as dealt with by other EU policy.
Option C4: labelling efficiency	Labelling to create awareness of the (end conversion) efficiency of a biomass pathway or installation e.g. biomass boiler, by giving insight into its performance e.g. through labelling energy savings on the guarantee of origin.
Option C5: improve supply chain efficiency	A GHG life cycle methodology to include end-conversion efficiency.

Options A2, A4b, A6, C4 and C5 were discarded as it was considered that the policy tools were not effective to address the problems identified.

5. ASSESSMENT OF IMPACTS

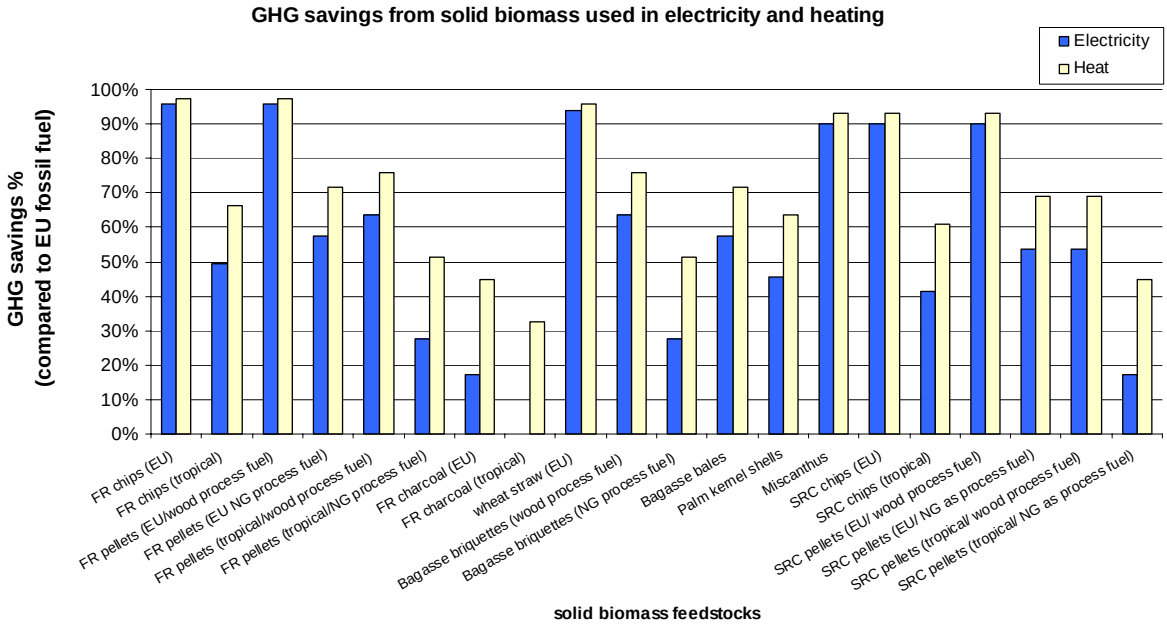
5.1. Environmental impacts

No policy tool can give certainty that forests will be regenerated after biomass is harvested. Options A3 and A4a ensure that highly biodiverse areas, such as primary forests, cannot be converted for the production of biomass and that high carbon stock areas such as forests must remain high carbon stocks areas even after biomass production. Option A5 would require evidence of managing the forest sustainably, however such evidence is difficult to verify without globally agreed common requirements on sustainable forest management.

When considering the GHG benefits of the different options, it is evident that for most solid biomass chains used in electricity and heating, the savings are significant compared to using fossil alternatives (see Graph 1) [2].

Graph 1: GHG savings potential of solid biomass feedstocks in electricity and heating

[2] Land use emissions are assumed to be zero. Losses for energy conversion are included, based on assumptions of 25% electrical conversion efficiency, and 85% thermal conversion efficiency.



*SRC refers to short rotation coppicing, FR to forest residues and NG to natural gas

Given the high greenhouse gas performance of the main feedstocks, labelling these emissions (Option B2) is not likely to lead to additional GHG savings. Option B3 will lead to between 5-20% additional GHG savings and ensure that requirements are set in line with the Renewable Energy Directive to provide consistency for those feedstocks that can be used either for transport purposes or for electricity and heating. Option B4 will lead to some additional GHG savings by leading to improvements in the chain, such as using wood instead of natural gas for the processing fuel. In the case of pelletising, switching from natural gas to wood as process fuel, would lead to an improvement of around 35% GHG savings in electricity production.

When considering the conversion efficiency options, positive environmental impacts are dependent on the effectiveness of policy options to replace fossil fuel alternatives. The biggest improvements in efficiency could come from utilising the heat in electricity only plants (i.e. switching to combined heat and power). Setting minimum efficiency standards (Option C3) only for biomass and not for fossil fuels may lead to negative environmental impacts, as the use of biomass may be disincentivised by higher costs. Providing a bonus or a penalty (Option C2) in support schemes would avoid the switching away from biomass to fossil, as a bonus usually means an additional incentive on top of other incentives to use renewable energy (e.g. more green certificates, price premium on top of feed in tariffs, investment subsidy etc).

5.2. Economic impacts

5.21. Costs to public administration

The cost for public administrations to verify the origin of biomass (chain of custody) under Options A3, A4a, A5, was estimated by using the EU's Standard Cost Model. Total costs for the EU-27 were estimated. One-off costs were estimated to be €0.3-1.1 million and recurring costs between €0.1-0.2 million per year. Recurring costs include the cost of the annual reporting requirements under Option A4a to the Commission. Additional costs will be

incurred for verifying the household use of biomass through surveys. Under Option A5, additional costs may be incurred depending on requirements for sustainable forest management.

The cost for Options B3 and B4 are in the same range as costs under Options A3, A4a and A5 as the highest costs are associated with putting the legislation in place. A single threshold for GHG savings under Option B3 may decrease the administrative burden. Developing default values for pathways using different processes (e.g. wood or natural gas used as process fuel) would allow the use of a single threshold, while reflecting the differences in emissions in the different processes (as under Option B4).

As regards the options to increase energy conversion efficiency, the costs to public authorities are lower where the policy is easily combined with existing measures (e.g. bonus on top of existing support scheme), but higher where minimum standards are set for technologies that are diverse and dispersed (e.g. district heating). Administrative costs were calculated using the EU standard cost model: for option C2 costs range between €400,000-1.6 million and for Option C3 between €700,000-3.7 million.

5.2.2. Cost to economic operators

To estimate the cost of providing proof of the origin of biomass, the EU's Standard Cost Model was used. Recurring chain of custody (CoC) certification costs under Options A3 and A4 were estimated to be between €800-3,000 per year for individual biomass producers. The potential costs of implementing minimum sustainable forest requirements (Option A5) are higher, between €2,000-24,000 per year.

Under Option B2, B3 and B4, it was found that the cost of GHG certification is 10-20% higher when the operators have to show actual GHG savings of the bio-energy chain. Costs calculated for the EU-27 showed that for processors, manufactures, traders and energy producers, the recurring costs are 60-70% higher when GHG certification is imposed compared to CoC certification alone. For individual energy producers above 1 MW capacity the recurring costs can vary between €898-5,643 per year.

The cost of increasing efficiencies through using the produced heat, using add-ons to increase electricity or heat production, increasing the plants size or technology improvement costs were assessed. An option for minimum efficiency requirements (Option C3), which would require the use of heat, could lead to considerable compliance costs, between €50-200 million per installation. It is difficult to say what cost a bonus in a support scheme (Option C2) would have on operators, if any, as support is a voluntary measure, where a company is free to make use of the bonus.

5.2.3. Economic availability of biomass

In developing its renewable energy policy, the Commission had based its assumptions on biomass availability on a study carried out by the European Environment Agency (EEA)[3], which estimated that around 235 Mtoe biomass will be available in 2020 for energy use, without harming the environment.

[3] EEA (2007): Environmentally compatible bio-energy potential from European forests. Copenhagen, European Environment Agency

An updated assessment of wider literature finds that there are large differences in estimates for biomass potentials. These differences are largely due to assumptions made about the availability of land, which is heavily influenced by productivity development assumptions.

The availability studies however did not so far look at the impact of sustainability criteria on costs. The impact assessment found that the underlying studies usually limit their analysis to currently available agricultural lands and exclude highly biodiverse or nature protected areas[4]. It is therefore expected that the lion's share of the biomass potential will meet the land exclusion criteria and not have any impact on their economic availability.

Options B1 and B2 do not impose minimum criteria and therefore would not have any impact on the economic availability of biomass. Option B3 would set a 50-60% minimum threshold for all existing/ new electricity and heat plants from 2017/2018 respectively. It was found that many biomass chains that do not meet the 50-60% thresholds by their 2008 typical values (derived from Annex V of the Renewable Energy Directive) are projected to do so by 2020 through technological or efficiency improvements. The additional costs for carrying out improvements in these chains to reach the GHG savings requirements are estimated to be around €38-€62 million for the year 2020.

In terms of the options for increased conversion efficiency, any impact is likely to be a positive one, as a product of using less biomass to replace more fossil.

5.3. Social impacts

5.3.1. Households

Sustainability criteria for biomass would not lead to significant impacts on households, as GHG savings obligations is not likely to be put on households due to the difficulty in monitoring small-scale users.

5.3.2. Employment

Employment effects are considered negligible. Some employment impacts can arise from sustainability criteria where criteria lead to investment effects, i.e. increase in the demand in biomass related services and biomass-technology producing sectors.

6. COMPARISON OF OPTIONS

The assessment shows that on the production side, the policy option for putting in place minimum requirements for avoidance of biomass production from highly biodiverse lands and avoidance of negative land use change (i.e. same criteria as in the Renewable Energy Directive) is the most cost-efficient. Setting minimum thresholds or obligations for sustainable forest management could lead to high costs for industry.

As regards greenhouse gas performance, consistency with the Renewable Energy Directive is important. An EU-wide harmonised GHG methodology to calculate life cycle emissions is recommended. To avoid distortions in the market, the policy option setting minimum GHG

[4] Dornburg et al (2008): Assessment of global biomass potentials and their links to good, water, biodiversity, energy demand and economy. Bilthoven, MNP.

savings requirement at 35% and increasing to 50% from 2017 for existing plants and 60% for new plants from 2018 is recommended as it is consistent with the Renewable Energy Directive. Wastes and processing residues, which routinely achieve high GHG savings should not need to fulfil such requirements.

On improving energy conversion efficiency, most of the policy options would only be effective if fossil alternatives were also covered by them. It is not recommended to set efficiency standards only for biomass pathways, because that may encourage more fossil energy being used instead. Option C2 is the preferred option, where Member States would be responsible for incentivising high efficiency conversion in their support schemes for large (above 1MW) electricity and heat installations.

When considering the question of whether or not these policy options should be in the form of binding criteria or recommendations to Member States, it was taken into account that biomass will come from both the EU and imported from outside the EU. Currently the import of biomass from outside the EU is around 3%.

Binding criteria would have the effect that only biomass considered sustainable under an EU-wide scheme would count towards the renewable energy target. A voluntary approach based on recommendations from the Commission would not allow Member States to refuse to count biomass which does not fulfil the obligations of the national scheme towards the renewable energy targets. Member States could however decide not to give financial support for biomass not meeting the national criteria.

7. MONITORING AND EVALUATION

The core indicator for meeting the objectives is the increasing use of biomass without leading to deforestation and other negative environmental impacts. Reporting and monitoring systems are available through Eurostat at EU level, but will need to be strengthened, including at national level, for more accurate results.