POLICY BRIEFING: Space for energy crops – assessing the potential contribution to Europe's energy future

Energy crops are amongst the most sought after raw materials used to produce fuel. It is often claimed that they have little negative environmental and indirect land use change impacts. Environmental NGOs Birdlife Europe, the European Environment Bureau, and Transport & Environment have therefore commissioned a study from the Institute for European Environmental Policy (IEEP) to assess how much land is actually available in the EU to sustainably grow energy crops and how much could this realistically be expected to contribute to meet EU energy demand in 2012.

The study looks at the most up to date information about the amounts of crop land that could be available for growing energy crops, without displacing food production and thus provoking indirect land use change, and without causing additional biodiversity loss. It also assesses which types of energy crops could be grown on this land and how much energy could be produced from these types of crops, taking into account the conversion efficiency of different end uses of energy.

This summary for decision makers represents the NGOs' understanding of the study's results, meaning and implications.

MAIN FINDINGS

1. THE EU LACKS CONSISTENT DATA ON LAND USE

The EU lacks consistent data on land use that would provide a robust base for policy making. Defining the precise extent and nature of the land on which this cultivation for energy crops could occur is never the less very challenging, limited for the most part by the availability and specificity of information. The majority of the data sources available at the pan-EU level lack the specificity, focus and rigour needed to determine accurately the types of numbers on which to base policy. This study carried out an estimate based on the best data available.

2. LAND AVAILABLE FOR SUSTAINABLE ENERGY CROP PRODUCTION IS VERY LIMITED

This study found that the amount of land which is available for the sustainable production of energy crops in the EU is equal to approximately **1 350 000 hectares**, corresponding to about one-third of the amount of land used for biofuels production in 2010, or one-third of the area of the Netherlands (this amounted to 4.7% of the energy use in transportation). This is based on an optimistic assessment of the situation, and could be further limited by socio-economic factors, taking into account the availability of land as well as the sustainability and greenhouse gas balance of its use.

To consider a piece of land to be available for energy crops the following general principles were applied to evaluate the suitability of the land. Land considered should a) not displace food production within land currently in agricultural use, b) cultivation of energy crops should happen with minimal negative impacts on the environment and minimal ILUC (if expansion of arable land was involved), and c) should fill the minimum sustainability criteria set by Article 17 of the Renewable Energy Directive.

The land considered to be potentially available for the production of energy crops consists primarily of recently abandoned agricultural land (both cropland and grassland areas), some of the existing fallow land areas, other unutilised areas and a small proportion of contaminated land. Categories of land considered in this study for energy crop production are detailed in the table below.

Category of land	Land included or excluded from calculation	Area (ha)
Natural and forest land		
Existing woodland and forest	Excluded	
Existing non-forest semi-natural habitats (including abandoned grazing land)	Excluded	
Agricultural land		
Recently abandoned cropland (<5 years old)	Included	200 000
(Recently abandoned) Grassland moving out of agricultural use since 2009, most likely out of production, includes transitions to urban land	Included	600 000
Current arable land in rotation (including oilseed rape and other industrial crops being utilised as biofuel or other bioenergy feedstocks) excluding fallow	Excluded	
Fallow land in agricultural rotation – most of which is needed for agronomic purposes	Included	200 000
Uncropped land within arable farms under environmental agreements or similar eg field corners, buffer strips, etc	Excluded	
Current grassland under agricultural management (non-arable)	Excluded	
Other underutilised land within the current UAA but not permanent grassland	Included	300 000
Non-agricultural land		
Suitable contaminated sites (excluding areas suited only for afforestation)	Included	50 000
Total potentially available land based on optimistic assessments of area		**1,350,000**

Precise estimates are nevertheless hard to make due to the surprisingly poor availability of consistent and robust data on land use at EU level. The figures verge towards over estimates rather than under estimates and should be treated only as broad estimates given the lack of information that is available.

The study questions whether this land could or should be cultivated. This depends on geographic location and distribution of this land both within the EU and within the country, the reasons for its abandonment in the first place (economic, topographic, bio-climatic or due to changes in soil), how badly the land is degraded or contaminated and at what cost and/or price of the end product does it become possible and/or economically interesting to use the land again.

In summary, there is very little land potentially available for energy crops in the EU, according to the data found in this study, and much less than the European Commission predictions would foresee being used. This brings into question the oft-heard claims about amounts of land available in different Member States and raises concerns about the sustainability of using that land for energy production.

The Commission's Impact Assessment of the 2030 Climate and Energy Policy Framework assumes that additional demand for bioenergy by 2030 will to a large extent be met through increases in the production of fast rotating plantation wood, classified as perennial crops. Even in this reference scenario

from the Impact Assessment, where the Commission assumes no new climate policies for 2030, the amount of cropland for perennials is assumed to grow from almost zero hectares in 2005 to 7 million hectares in 2030. This represents over 5 times more land than this study found is sustainably available in the EU.

In the most ambitious climate scenario of the Commission, cropland for perennials would grow to 12 million, while land classified as other natural vegetation would decrease by 16 million hectares. The findings of this study suggest that Commission has grossly overestimated the amount of land available for energy crop production in the EU.

3. CONTRIBUTION OF ENERGY CROPS TO ENERGY DEMAND IS VERY MODEST

If all the available land estimated by this study to be within sustainable production limits for growing energy crops were to be grown, there would be between 7.7 and 16.7 million dry tonnes of biomass available out of which between 139 and 300 petajoule (PJ)[1] of energy could be extracted. If all the land was put to the most efficient use in energy terms, i.e. by which most energy use could be displaced, it could at best cover 0.5% of the EU's energy needs in 2012.

From a sectoral perspective, if the full potential of energy crops from the available land was used in dedicated heat production, 5-11% of the energy consumption in the heat sector could be covered. If all energy crops were used in the transportation sector as biofuels, only 1% or less of the energy consumption of the sector could be covered.

Based on the data from this report, it is clear that energy crops from available land won't be the silver bullet for the EU's need for sustainable renewable energy sources. Energy crops can make a modest contribution to the energy mix in certain sectors, namely 0.5 – 1% of the road transport energy use or 0.4 – 0.9% of electricity, if all energy crops were used in one sector. Potential for energy crops would be most significant in the heating sector, contributing to 5.3 – 11.4% of heat production. On regional and local scale energy crops can never the less play a more important role.

4. CULTIVATION OF ENERGY CROPS LIKELY TO HAVE NEGATIVE ENVIRONMENTAL IMPACTS

In most cases growing energy crops on previously uncultivated land will have some negative environmental impacts since the commercial production of energy crops would require more intervention than if the land were left to develop along a natural trajectory (usually towards spontaneous forest, which can also serve as a carbon sink or be harvested for energy and other purposes). However, since each category of land considered in this study covers a wide variety of conditions this will not always be the case, with low level and extensive management in some areas bringing about environmental benefits, or at least no further negative impacts.

The adoption of sustainability criteria for energy crops land usage will still be needed, in order to mitigate the risk of negative impacts on biodiversity, soil and water. Land that is currently cultivated would have less direct environmental impacts but there could still be consequences for food and feed production that need to be taken into account (e.g. indirect land use change). In general perennial crops seem to have fewer negative environmental impacts than annual crops, due to low use of inputs such as fertilizer and pesticides. Annual crops (wheat, rapeseed) which are harvested annually, need more chemical inputs

[1] Petajoules (PJ) are the unit of measure used in the study to allow comparison between different biomass potentials, even if the end use will not be for energy.

As well as having an environmental impact on land whose use is changed, there is also a potential wider impact from converting massive areas of land to energy crop production. There is a risk that it may replicate the issues of the indirect land use change recognised by the European Commission in its proposal to mitigate the impacts of European biofuels policies.

For the small amount of energy that can be extracted from energy crops on available land in Europe, there are considerable environmental consequences. This seems to suggest that the benefits on the energy side are outweighed by the risks on the environmental side. Serious thought should be given to alternative uses of the limited pool of available land, in particular the restoration of natural vegetation which could give huge biodiversity benefits while also storing significant amounts of carbon, providing a range of ecosystem services and even producing a small amount of bioenergy.

POLICY RECOMMENDATIONS

Based on the main findings of this study, BirdLife Europe, the EEB and T&E have issued the following policy recommendations:

- **European Commission assumptions on land available for bioenergy production should be reassessed**. The Impact Assessment of the 2030 framework should reassess its assumptions of bioenergy supply and land areas potentially available for bioenergy production on the basis of best data existing and assess the consequences for the environment and in terms of indirect land use change.
- **More solid figures on land use are needed**. To understand the consequences of policies pushing for increased cultivation of energy crops (or plantation wood), the EU needs to put serious effort into gathering better and more up to date land-use statistics that can address the specific questions related to the energy sector.
- **Extreme caution needs to be applied if designing incentives to promote the use of energy crops in Europe**. Existing policies have already had an impact on land use, notably from first-generation biofuels and maize-based biogas. The EU cannot afford to repeat such a miscalculation nor give false signals to the industry.
- **A coherent approach to land use needs to be developed** to ensure that the various benefits of land use are fully assessed and positive services delivered are protected when land use change or exploitation is planned. This means putting into place effective measures that prevent the destruction of our most valuable sites (e.g. the ploughing up of grasslands in Natura 2000 sites, the conversion of peatlands), stop land sealing, ensure that the land is used in a way that makes agronomic and environmental sense (e.g. by the application of Ecological Focus Areas) and respect the 'Aichi' targets agreed under the Convention on Biological Diversity and EU Biodiversity Strategy.
- **The EU urgently needs an overall vision for biomass use for all end uses,** to prevent detrimental impacts on the environment and climate. The vision should be based on reducing energy demand and thus the need for bioenergy overall, on using bioresources efficiently and on ensuring a balance between biomass demand and sustainable supply. Policy tools for implementing such a vision could include a sustainable limit (cap) on the use of biomass for energy purposes, strict sustainability criteria and full carbon accounting for bioenergy use as well as expanding the principles of the waste hierarchy to biomass use.