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Burning land: How much land will be required for Europe's bioenergy?

**New research reveals the vast land footprint
for Europe's bioenergy needs**

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Burning land

How much land will be required for Europe's bioenergy?

New research by the Vienna University of Economics and Business (WU) for Friends of the Earth Europe shows how Europe's consumption of bioenergy is exerting unparalleled and unsustainable new pressures on the world's land and forests.

With demand for bioenergy (crops and wood used for transport fuel, heating and electricity) set to more than double between now and 2030, **Europe will require an area of land and forest the size of Sweden and Poland combined to meet our bioenergy needs.**

Our consumption of land is out of control. Europe is already the continent with the highest dependence on land from outside its borders, and has the second highest level of land consumption per capita. Our growing hunger for unsustainable bioenergy, encouraged by subsidies, targets and policies, will only exacerbate the disproportionate pressure Europe exerts on precious global land resources.

It is essential that the EU starts to take account of its land footprint by measuring it and setting reduction targets – alongside carbon, water and materials. The European Commission already committed to start measuring and reducing Europe's natural resource consumption in its 2011 'Roadmap to a Resource Efficient Europe'.¹

In its energy policy, the EU must urgently cap and set a trajectory to phase out bioenergy that competes with food (including crop-based biofuels). The 2030 climate and energy package must limit the use of bioenergy to sustainable levels, and support sustainable bioenergy, e.g. from wastes residues, ensuring that they deliver greenhouse gas emissions reductions – within ambitious climate change, renewable energy and energy savings targets.

The scale of Europe's land consumption from bioenergy

According to the WU calculations of Europe's appetite for land for bioenergy:

- The land footprint of bioenergy consumption in 2010 was 45 million hectares, equivalent to the entire land area of Sweden. By 2030, if current trends continue, EU bioenergy consumption is expected to increase by 58%, **occupying 70 million hectares of land – equivalent to the size of Sweden and Poland combined.**
- In 2010, bioenergy accounted for 8% of all energy consumption; this is set to increase to 12% by 2020 and even more by 2030. However, there are **important negative social and environmental consequences** attached to some forms of bioenergy on a large scale, particularly land competition and carbon emissions.
- The use of wood to generate heating and electricity comprises the biggest land footprint – roughly 30 million hectares of forest in 2010, and is set to expand to 40 million hectares by 2030. If all of this wood came from inside the EU, it would **require nearly 40% of all Europe's productive forest area.**
- Unless the EU successfully reforms its biofuels policy, land use requirements for biofuels will increase substantially. Between 2010 and 2020 there would be an increase of 130%, meaning 11 million hectares of agricultural land will be dedicated to biofuel production – **an area the size of Bulgaria** or the whole of Germany's agricultural land area.

¹ http://ec.europa.eu/environment/resource_efficiency/pdf/com2011_571.pdf

What's driving Europe's bioenergy land demand?

Current EU subsidies, targets and policies have led to this increase in use of bioenergy, and unless policy change can limit bioenergy use to sustainable levels and production, the EU bioenergy land footprint will continue to increase dramatically.

Friends of the Earth has documented² how increasing demand for limited land to produce bioenergy is already causing land grabs, conflicts, deforestation, biodiversity loss, climate change and high food price volatility, which threatens global food security. Expansion and intensification of unsustainable agriculture and forestry practices for bioenergy will contribute to the further destruction of vital ecosystems, and can further increase carbon emissions.

A growing land footprint for bioenergy will be met at the expense of the resources of other nations and the quality of life of their citizens, as well as of forests, grasslands and other natural habitats. It makes Europe dependent on the availability of cheap and abundant land around the world for our energy security.³

The EU framework for climate and energy towards 2030 will therefore be crucial in determining bioenergy demand and supply, which will have considerable implications for land pressure and resource use both inside and outside Europe. The future framework must include robust mechanisms to limit the use of biomass for energy to sustainable levels and sustainable land use and forest management; ensure efficient use of biomass and land resources in line with the principle of cascading use;⁴ and guarantee genuine GHG savings.

Europe's overconsumption of land

Whilst bioenergy is a significant driver of land use expansion, it's not the only one (another is meat consumption)⁵. Land is the hidden resource that sustains every aspect of the economy, from food, through material products, furniture, buildings, to energy. Yet the EU is unaware of the real scale of our land consumption.

Previous studies revealed that in 2004, Europe's land footprint (including forestry) was already very high at 640 million hectares, 1.5 times the size of Europe itself⁶ - and likely to increase further in line with consumption and plans to expand biofuels and bioenergy. Calculations of our land footprint from agriculture vary from 0.6⁷ to 0.31⁸ hectares per capita annually. By comparison, the UN recently suggested a target of 0.2 hectares of cropland per person per year, as an equitable global resource share.⁹

It is essential that the EU gets a clear picture of the amount of land it consumes, by measuring its land footprint, setting a reduction target and introducing policies that decrease this land dependency.

² FoEE (2013) *Commodity Crimes* <http://www.foeeurope.org/commodity-crimes-211113>; FoEE (2010) *Africa Up For Grabs* http://www.foeeurope.org/agrofuels/FoEE_Africa_up_for_grabs_2010.pdf

³ Mostly coming from USA, Canada, Russia, Brazil for wood; Argentina, Brazil, USA and southeast Asia for biofuels.

⁴ The principle of cascading use means biomass is used for materials and products first, and the energy content is recovered from end-of-life products, while respecting the waste hierarchy that requires reuse and recycling first.

⁵ FoEE (2013) *Land footprint scenarios* <http://www.foeeurope.org/land-footprint-scenarios-041113>; FoEE (2014) *Meat Atlas* <http://www.foeeurope.org/meat-atlas>

⁶ Sustainable Europe Research Institute (2011) *Europe's global land demand* http://www.foeeurope.org/sites/default/files/publications/Europe_Global_Land_Demand_Oct11%5B1%5D.pdf

⁷ Sustainable Europe Research Institute (2013) *Hidden Impacts* <http://www.foeeurope.org/hidden-impacts-070313>

⁸ United National International Resource Panel (2014) *Assessing global land use* <http://www.unep.org/resourcepanel/Publications/AreasofAssessment/AssessingGlobalLandUseBalancingConsumption/tabid/132063/Default.aspx>

⁹ United Nations Environment Programme (2014) *Sustainable consumption and production: targets and indicators* http://www.iisd.org/sites/default/files/publications/scp_targets_indicators.pdf

The four footprints: understanding the resource impacts of policies

The ‘Roadmap to a Resource Efficient Europe’, concluded that it is essential for the EU to measure land, water, material use and carbon emissions in order to better understand our resource consumption. Using four footprints – land footprint, water footprint, carbon footprint and material footprint (see box) – provides a comprehensive overview of the overall resource use around the world, not just within Europe. Taking the water footprint of biofuels for example, it requires 2500 litres of water to produce just one litre of biofuel.¹⁰

Friends of the Earth believes that the four footprints should be included in the ‘EU Circular Economy Package’, soon to be launched by the European Commission. This means measurement of Europe’s resource consumption using the four footprints, and ambitious reduction targets for each of these. And it means using the four footprints in impact assessments for all EU policies. This will help decision makers to have consistency between policies, and to evaluate whether the introduction of a new policy would increase or reduce Europe’s resource consumption.

By calculating the four footprints, clear links with the impacts caused by our consumption can be made. For example, some forms of bioenergy have a worse carbon footprint than the fossil fuels they replace. Increasing demand for biodiesel from palm oil, soy or rapeseed causes deforestation and habitat destruction, emitting significant quantities of greenhouse gases. Taking account of such ‘indirect’ greenhouse gas emissions gives a carbon footprint for crop-based biodiesel that can be worse than fossil diesel.¹¹ Similarly, scientists have shown that bioenergy from burning whole trees results in a carbon debt that is only repaid over decades, resulting in a net-climate impact that can be worse than coal combustion.¹²

The starting point is to measure and reduce our resource consumption, using the four footprints:



Land footprint: the real area of land used, wherever it is in the world



Water footprint: the total volume of water used, whether freshwater, rainwater or water polluted by the activity



Carbon footprint: the total amount of climate changing gases released



Material footprint: the tonnage of materials used, including the ore mined in order to extract metals

Conclusions

Land is a vital but limited resource, one of earth’s nine planetary boundaries¹³. Europe’s current demand for land to maintain our consumption-heavy lifestyles is not sustainable.

Bioenergy – from crops and primary wood in particular – has a substantial land footprint. Current EU plans to increase bioenergy production to generate a strategic share of EU energy imply a significant increase in Europe’s global land consumption, and lead to competition with other land uses (including food and natural habitats) and with other regions.

Looking at the land footprint of Europe’s bioenergy demand driven by EU policies and subsidies demonstrates the importance of measuring and setting limits to our resource consumption.

¹⁰ FAO (2009) *Water information note* <http://www.fao.org/nr/water/docs/wateratfao.pdf>

¹¹ IEEP (2011) <http://www.foeeurope.org/Europe-biofuels-driving-destruction-101110>

¹² RSPO & FOE (2013) *Dirtier than coal* http://www.rspb.org.uk/Images/biomass_report_tcm9-326672.pdf

¹³ <http://www.nature.com/news/specials/planetaryboundaries/index.html>

Current EU bioenergy policies do not take into account the land consumption required and the knock-on impacts, from land grabbing to biodiversity loss. Friends of the Earth contends that 2008 EU targets for biofuels represent a policy failure which could have been avoided by conducting a full impact assessment including social impacts and a comprehensive assessment of resource consumption (based on the four footprints of land, water, carbon and materials).

It is vital in the next EU climate and energy package towards 2030 to bring together the renewable energy and resource efficiency agendas – to assess its overall resource consumption, and to ensure bioenergy is generated from sustainable sources.

Friends of the Earth calls on the EU to:

- Set three ambitious and binding climate change, renewable energy and energy efficiency targets for 2030: greenhouse gas emissions must be reduced by at least 60% by 2030 with additional finance contributions to developing countries for climate action, and there must be binding targets to reduce energy use by 50% and increase the EU share of energy from renewables to at least 45%;
- Introduce a cap to limit the use of bioenergy to sustainable levels and phase out crop-based biofuels and of the burning of whole trees for bioenergy;
- Ensure efficient and optimal use of biomass resources for bioenergy, in line with the principle of cascading use; introduce comprehensive sustainability criteria covering environmental and social impacts so that only sustainable bioenergy is promoted;
- Implement a comprehensive and mandatory bioenergy carbon accounting system that accounts for indirect land use change, carbon debt and indirect emissions from product substitution;
- Refocus support towards bioenergy from wastes and agricultural and forestry residues, where indirect substitution emissions can be shown to be minimal. This would guarantee emissions reductions;
- Make EU Member States report their land footprint annually – using a standard methodology and data – to be published alongside the material, water and carbon footprints, as per the Resource Efficiency Roadmap;
- Put reduction targets in place in 2014 to help ensure the EU actively pursues the right policies to reduce its land footprint;
- Introduce the measurement of land, water, materials and carbon footprints to EU and Member State impact assessments to enable the creation of policies that would reduce our resource consumption.

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