

POLICIES AND MEASURES TO PROMOTE SUSTAINABLE BIOENERGY PRODUCTION AND USE IN THE BALTIC SEA REGION

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Abstract

The Baltic Sea Region can be regarded as a showcase for the sustainable production and consumption of bioenergy and a frontrunner in innovative technological, policy and business solutions. However, there are a number of environmental sustainability risks associated with increased energy uses of biomass from forestry and agriculture, which also in the future need to be adequately addressed by EU and national legislation. Supporting the *sustainable* production and consumption of bioenergy in the Baltic Sea Region has been one of the key rationales of the INTERREG IV B project *Bioenergy Promotion*, which was selected as one of the flagship projects under the EU Strategy for the Baltic Sea Region. The following paper summarizes selected project findings and recommendations derived from the policy related project work.

Key words: Baltic Sea Region, EU policies, national policies, sustainability criteria, support schemes.

Introduction

In most countries of the Baltic Sea Region (BSR), biomass - particularly from forests - is expected to play a key role for achieving the overall national renewable energy targets and sector targets contained in the Renewable Energy Directive (2009/28/EC) and the National Renewable Energy Action Plans. By 2020 the main bioenergy markets of the European Union will be in the BSR: Germany, Sweden, Finland and Poland.

Bioenergy production and consumption are not automatically sustainable and their promotion has to be performed with a sense of proportion. Governments should promote particularly those bioenergy pathways which are contributing in a beneficial way to climate change mitigation and other sustainability goals. The most promising bioenergy pathways from a *Sustainable Development* perspective are those that use locally available biomass residues from forestry and agriculture, by-products from related industries and biogenic waste streams and which employ highly efficient conversion processes and technologies.

The Renewable Energy Directive contains sustainability criteria for biofuels and bioliquids which are binding for all Member states. Biofuels and bioliquids which do not meet those criteria cannot be counted towards the EU's renewable energy targets and national renewable energy obligations or benefit from financial support. These criteria include minimum lifecycle GHG savings of 35 per cent (50-60 per cent from 2017/2018). Furthermore, the raw material shall not be obtained from land with high carbon stock and from land with high biodiversity value. Production of agricultural raw material cultivated in the European Community should comply with EU environmental requirements for agriculture and be in accordance with the minimum requirements for good agricultural and environmental condition.

In its Report on Sustainability Requirements for the Use of Solid and Gaseous Biomass Sources in Electricity, Heating and Cooling (COM(2010)11), the European Commission refrained from extending the binding sustainability criteria applying to biofuels and bioliquids to solid and gaseous biomass used in electricity, heating and cooling. Instead, the European Commission recommended that Member states that either have or who introduce national sustainability schemes for solid and gaseous biomass used in electricity, heating and cooling, ensure that these in almost all respects are the same as those laid down in the Renewable Energy Directive for biofuels and bioliquids. Due to the characteristics of the production and use of solid and gaseous biomass, certain differences were considered appropriate by the Commission. It was recommended to develop an EU-wide harmonised GHG emissions calculation methodology to calculate lifecycle emissions. It was also recommended that the GHG performance criterion is not applied to wastes, but to the products for which default GHG emission values have been calculated as listed in the Annex II of the Commission's report. To stimulate higher energy conversion efficiency, Member states should in their support schemes for electricity, heating and cooling installations differentiate in favour of installations that achieve high energy conversion efficiencies, such as high efficiency cogeneration plants as defined under the Cogeneration Directive (2004/8EC). The Commission also recommended that sustainability schemes apply only to larger energy producers of 1 MW thermal or 1MW electrical capacity or above.

The Commission committed itself to report again by 31 December 2011 on whether national schemes have sufficiently and appropriately addressed the sustainability related to the use of biomass from inside

and outside the EU, whether these schemes have led to barriers to trade and barriers to the development of the bioenergy sector. It announced to consider if additional measures such as common sustainability criteria at EU level would be appropriate. However, at the time of editing this paper, the Commission's report was not published yet.

Supporting the *sustainable* production and consumption of bioenergy has been the key rationale of the INTERREG IV B project *Bioenergy Promotion*, one of the flagship projects under the EU Strategy for the Baltic Sea Region. *Bioenergy Promotion* is a project co-financed by the EU and the Norwegian government in the frame of the INTERREG IVB programme. The project has been running from 2009 to January 2012 and serves as a platform for cross-sector and trans-national networking to facilitate information and knowledge exchange and coordinated policy development. The project consortium comprised 33 partners from ten countries of the Baltic Sea Region, Lead partner being the *Swedish Energy Agency*. The operation has been selected as one of the flagship projects under the *Action Plan* accompanying the *EU Strategy for the Baltic Sea Region COM(2009) 248 final* and successfully applied for a 2 years extension stage.

The objective of this paper is to summarize selected findings of the policy related work in *Bioenergy Promotion* which has been coordinated by the German Federal Ministry for the Environment, Nuclear Safety and Nature Protection in co-operation with the Environmental Policy Research Centre at the *Freie Universität Berlin*.

Methods

In a series of two workshops and one cross-fertilization seminar in Sweden and Finland, the project partners commonly developed principles and criteria for *sustainable* bioenergy production in the BSR serving as a guidance to multiple stakeholders including biomass producers and users, investors, NGOs, energy companies, etc. The criteria also aim at supporting public decision makers when developing strategies for sustainable production and consumption of bioenergy and optimizing their policy frameworks and support schemes. These principles and criteria go partly beyond those for biofuels and bioliquids contained in the Renewable Energy Directive, as they apply to all energy uses of biomass (not only biofuels and bioliquids) and include the following items: biodiversity, resource efficiency (including land use), energy efficiency, climate change mitigation efficiency, social well-being and economic prosperity.

The principles and criteria developed in the project remain mostly on a general level. However, in some cases quantitative indicators have been developed. For instance, for solid and gaseous biomass sources used in electricity, heating and cooling, the *Bioenergy*

Promotion project partners recommend minimum lifecycle GHG savings of 80 per cent. This ambitious landmark favours the utilization of forest or agricultural residues and precludes pathways using tropical/sub-tropical feedstock, pathways using fossil process fuel, but also a certain pathways utilizing annual energy crops, like maize for biogas.

In a further step the project partners assessed to what extent national policy frameworks and support schemes for bioenergy integrate any sustainability principles and criteria. These assessments consider the following items:

- the transposition and implementation of the binding criteria for biofuels and bioliquids set by the Renewable Energy Directive;
- the recommendations contained in the EU Commission's Biomass Sustainability Report of 2010;
- the principles and criteria developed in the frame of *Bioenergy Promotion* being not or only partly covered by EU legislation (e.g. energy efficiency, resource efficiency).

Finally, the project partners formulated transnational and country-specific policy recommendations.

Results and Discussion

In the following we will focus on the findings related to the use of solid and gaseous biomass for electricity, heating and cooling. We will also provide selected trans-national policy recommendations.

To ensure the sustainable production and use of solid and gaseous biomass, most governments in the Baltic Sea Region rely on sector legislation (e.g. forest legislation, nature protection legislation, cross compliance rules in agriculture). However, *Bioenergy Promotion* also illustrated that those regulations are not always sufficient to prevent undesirable and unsustainable developments due to implementation gaps and lack of enforcement.

None of the governments in the BSR has introduced or is presently planning to introduce any binding sustainability scheme for solid and gaseous biomass sources used in electricity, heating and cooling following the recommendations of the EU Commission contained in the Biomass Sustainability Report of 2010.

In most BSR countries the integration of sustainability principles and criteria into support schemes still plays a marginal role or is in an embryonic stage. Several BSR countries started or plan to integrate sustainability principles into their support schemes for bioenergy. In Germany sustainability principles and criteria have been increasingly considered to amend the support schemes for electricity and heat from biogas (e.g. promoting energy conversion efficiency and resource efficiency).

Most BSR countries have rather effective forest and environmental legislation in place ensuring sustainable

forest management and provide good showcases for sustainable forest management certification. Voluntary forest certification systems like the *Forest Stewardship Council* (FSC) and the *Programme for Endorsement of Forest Certification* (PEFC) cover comparatively high shares of the forest area in the BSR, also compared to the EU average. National PEFC or FSC standards occasionally address critical sustainability issues related to wood fuel harvesting (e.g. removal of logging residues, removal of dead wood, stump harvesting), even though not always in a systematic and consistent manner. Furthermore, the sustainability requirements of corresponding national systems show considerable variations.

The project highlighted a number of promising policy approaches supporting sustainable bioenergy production and consumption in the BSR including

- environmental quality objectives in Sweden for forestry and agriculture;
- effective carbon and energy taxation in Sweden, Denmark and Norway;
- wood energy harvesting guidelines in Finland and Sweden;
- integration of sustainability considerations in (sub-)regional policy frameworks (e.g. agreement on sustainable biomass procurement between *Vattenfall Europe* and the Senate of Berlin);
- integration of sustainability considerations into regional support schemes (e.g. in the federal state of *Schleswig-Holstein* in Germany);
- integration of sustainability considerations into national support schemes, for instance:
 - special *boni* for the use of environmentally beneficial raw material like manure or landscape conservation material in the feed in tariff systems of Germany and Latvia (planned);
 - minimum energy efficiency requirements for biomass/biogas plants, e.g. in Finland, Germany, Latvia or Lithuania (planned);
 - CHP bonus in Germany (up to 2011), heat premium for biomass CHP plants in Finland;
 - institutional support for (sustainable) bioenergy production (e.g. Biogas Secretariat in Denmark).

Although the BSR can be regarded a showcase for sustainable bioenergy development, there are certain environmental sustainability risks associated with increasing energy uses of biomass from forestry and agriculture, particularly related to the removal of logging residues like tops and branches, whole tree harvesting, dead wood removal or the production of dedicated energy crops which should be appropriately addressed by legislation and existing certification systems also in the future.

There is already intensive biomass trade among the countries of the BSR (e.g. wood pellet exports from the Baltic countries to Sweden or Denmark).

Taking into account information provided in the National Renewable Energy Action Plans, biomass imports are likely to further increase in a number of BSR countries, particularly in Denmark, Germany, and Sweden. It can also be assumed that biomass imports from third countries outside the European Union, particularly the Russian Federation, Belarus, Ukraine and other European non-EU countries, but also from North America and other continents can be expected to grow. In this context, solid biomass imports from countries in Central Africa, South America, or Asia, but also from other non-EU countries might raise significant sustainability concerns due to lacking or insufficient safeguards addressing deforestation and forest degradation or ensuring sustainable forest management.

Diverging government positions exist presently in the BSR concerning the introduction of binding sustainability criteria for solid and gaseous biomass used in electricity, heating and cooling. The Swedish government in liaison with the governments of Finland and the three Baltic countries expressed concerns in view of a binding sustainability scheme for solid and gaseous biomass, whereas the German, Danish and Polish governments favour the extension of the binding EU criteria to cover all energy uses of biomass.

In the absence of a binding sustainability scheme at EU level there is a risk of having a patchwork of potentially diverging sustainability regimes across Europe which might cause insecurity for investors, a potential obstacle to biomass trade, and a ‘race to the bottom’. Project partners also pointed out to the inconsistencies of the current EU policy framework where, for instance, biogas used as a transport fuel is subject to sustainability criteria, but not, if used for electricity or heating and cooling.

Several large power companies in the BSR like DONG, FORTUM, Vattenfall, E.ON and corresponding associations (EURELECTRIC) have been advocating in favour of binding EU criteria for solid biomass favouring a consistent approach. A number of utilities have developed voluntary biomass sustainability standards in the frame of their corporate social responsibility policies. In 2010, the companies mentioned above have launched the *Initiative Wood Pellets Buyers*, a joint business co-operation to facilitate trade between utilities through uniform contracting and a common sustainability approach.

Conclusions

Bioenergy production and use can provide multiple environmental and socio-economic opportunities and benefits (e.g. significant reductions of GHG emissions, improvements in energy security and trade balances, opportunities for economic and social development, particularly in rural communities, mitigation of waste disposal problems and better use of natural and other

resources). The BSR can be regarded as a showcase for sustainable bioenergy development and a frontrunner in innovative technological, policy and business solutions.

However, the production, processing, transport and conversion of biomass into energy (e.g. heat and/or electricity) can also have adverse impacts for GHG balances, biodiversity, natural habitats and ecosystem services, soil and water quality, on a global, regional or local scale. The environmental sustainability risks associated with increased energy uses of biomass from forestry and agriculture need to be adequately addressed by EU and national legislation also in the future.

The promotion of bioenergy production and consumption has to be performed with a sense of proportion. Governments should make sure that policy development always considers full life-cycle impacts as well as direct and preferably also indirect effects of bioenergy production and use. Calculations of GHG emissions should consider not only CO₂ emissions, but also other GHG like e.g. nitrous oxide and methane. Biomass is a renewable but limited natural resource; therefore its use should be as efficient as possible.

A vast majority of project partners agreed that actions should be taken at EU and national levels to enable a level playing field for all biomass applications and to progressively develop a coherent and ambitious set of sustainability criteria for all biomass uses across heat, electricity, transport but also for non-energy uses of biomass. A *Knowledge-Based Bio-Economy* where the same biomass streams will be used increasingly for different applications (as in cascading and multiple uses) requires clear regulations and minimum standards which apply to all uses of biomass.

From a *Sustainable Development* perspective, small to medium sized biomass conversion plants can be regarded as particularly promising options offering multiple potential advantages such as: better use of locally available biomass resources, higher resource efficiency due to better utilization of surplus heat in cogeneration processes, lower energy transmission and distribution losses, better opportunities to close material and nutrient cycles, higher contribution to rural/ regional development.

Promoting sustainable production and use of bioenergy requires an integrated, cross-sector and multi-functional perspective. The *Bioenergy Promotion* project partners emphasized the significance of resource efficient and energy efficient bioenergy production and use, and the project delivered a number of examples for multifunctional and integrated bioenergy systems (e.g. multi-product use, symbiosis systems, integrated wastewater/bioenergy systems, integration of material and energy uses of biowaste through combined fermentation and composting of digestate).

“Systems thinking” across a broad range of sectors and the optimization of material flows including biomass, water, residues, nutrients, digestate, or waste, and energy flows in an integrated manner facilitates the development of sustainable bioenergy systems. Hence, national, regional and local governments should create enabling conditions by facilitating cross-sector networking, information exchange, economic incentives and other instruments.

The integration of sustainability principles and criteria into policy frameworks and support schemes is a novel subject of renewable energy policy and related policy research. The country policy assessments developed in the frame of the *Bioenergy Promotion* project provide valuable insights for national and regional governments, but also for the European Commission which has important monitoring and reporting obligations also covering the development of rules related to the sustainable use of solid and gaseous biomass for electricity, heating and cooling.

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