BioTrade2020plus

Supporting a Sustainable European Bioenergy Trade Strategy

Intelligent Energy Europe
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Deliverable 5.4

Advisory document on long-term strategies to include sustainable biomass imports in European bioenergy markets

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The BioTrade2020plus Project

Objectives

The main aim of BioTrade2020plus is to provide guidelines for the development of a **European Bioenergy Trade Strategy for 2020 and beyond** ensuring that imported biomass feedstock is sustainably sourced and used in an efficient way, while avoiding distortion of other (non-energy) markets. This was accomplished by analysing the potentials (technical, economical and sustainable) and assessing key sustainability risks of current and future lignocellulosic biomass and bioenergy carriers. Focus was on wood chips, pellets, torrefied biomass and pyrolysis oil from current and potential future major sourcing regions of the world (US, Latin America, Sub-Saharan Africa, Southeast Asia, Ukraine).

BioTrade2020plus will thus provide support to the use of stable, sustainable, competitively priced and resource-efficient flows of imported biomass feedstock to the EU – a necessary pre-requisite for the development of the bio-based economy in Europe.

Activities

The following main activities are implemented in the framework of the BioTrade2020plus project:

- Assessment of **sustainable potentials of lignocellulosic biomass** in the main sourcing regions outside the EU
- Definition and application of sustainability criteria and indicators
- Analysis of the **main economic and market issues of biomass/bioenergy imports** to the EU from the target regions
- Development of a dedicated and **user friendly web-based GIS-tool** on lignocellulosic biomass resources from target regions
- **Information to European industries** to identify, quantify and mobilize sustainable lignocellulosic biomass resources from export regions
- **Policy advice on long-term strategies** to include sustainable biomass imports in European bioenergy markets
- **Involvement of stakeholders** through consultations and dedicated workshops

More information is available at the BioTrade2020plus website: **www.biotrade2020plus.eu**

About this document

This report corresponds to Deliverable D5.4 of BioTrade2020+ – *Advisory document (green paper) on long-term strategies to include sustainable biomass imports in European bioenergy markets, including final guidelines*. It has been prepared by VITO, with input from all other project partners.

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1. Introduction

1.1.Renewable energy progress

At the Paris climate conference (COP21) In December 2015, 195 countries adopted a global climate deal. Governments agreed on a long term goal to **limit global warming to well below 2°C** above pre-industrial levels. This will require a substantial increase of renewable energy at global level.
The European Commission already set a renewable energy target of 20% by 2020 in the Renewable Energy Directive of 2009 (2009/EC/28); in the 2030 Climate and Energy Framework, presented in 2014, a renewable energy target of at least 27% was announced for 2030. A policy framework for this is in preparation.

Different renewable energy options will be needed in parallel to achieve these renewable energy targets. It is generally acknowledged that biomass will play an important role. Analysis of the data reported by the Member States in their National Renewable Energy Action Plans (NREAP) shows that biomass is expected to contribute more than half of the 20% renewable objective of the gross final energy consumption. Projections imply that in addition to using domestic biomass, European markets will also rely on imports of biomass, in particular in Member States like the UK, the Netherlands, Belgium or Denmark. Some well-positioned regions of the world are already playing a role in supplying biomass to the European markets and could become increasingly relevant in the near future.

As a result of several support measures, the market for bioenergy and biofuels has seen major increases in the past decade. According to Eurostat, biomass had a 63% share of all renewable energy consumption in the EU-28 in 2014. This biomass was mostly used in the heating and cooling sector, followed by transport and electricity. On the longer term an increase in demand will be reinforced by other (non-energy) sectors moving to biomass as renewable feedstock. Reference can be made to the launch of initiatives such as the JTI BBI, which aims at the development of bio-based and renewable industries for the development and growth in Europe. Among the pre-requisites for achieving a more competitive bio-based industry it is necessary to ensure access to renewable raw material at competitive prices and support market creation and stimulate market demand for bio-based products.

By 2020, most of the increase in imports of woody biomass to the EU-28 is likely to be for electricity generation, probably in the form of wood pellets supplied to a limited number of large power stations. The most likely sources are the USA and Canada, but there are other potential sourcing areas of interest as, for example, several regions in Latin America (like Brazil), East Europe, Sub-Saharan Africa and Southeast Asia with relevant potentials in woody biomass, but also other resources (e.g. agricultural residues, and land available for dedicated lignocellulosic crops) that could increase their participation in the international

market when technologies are fully accessible. Lignocellulosic feedstocks are likely to become very important, as they are also the basis for advanced biofuels.

1.2.The BioTrade2020plus project

The main aim of the European project BioTrade2020plus is to provide guidelines for the development of a European Bioenergy Trade Strategy for 2020 and beyond. The project focuses on lignocellulosic biomass (woody resources, agricultural residues and cellulosic crops), with case studies in the following sourcing regions: North America (Southeast United States), South America (Brazil, Colombia), East Europe (Ukraine), Southeast Asia (Indonesia) and East Africa (Kenya).

This report is produced within a central work package focused on defining solid long term strategies on how to include sustainable biomass imports in European bioenergy markets. This started from an analysis of the existing situation of the policy framework in the EU and in the considered sourcing regions of policies which (may) have an impact of biomass trade to the EU. This has been reported in Deliverable D5.1. Factsheets of relevant policies are available at an on-line policy database, which is shared with the sister project S2BIOM (https://s2biom.vito.be/).
Further on, a SWOT analysis was made of the different sourcing regions as a trade partner to the EU, to define their strengths and weaknesses in relation to regulatory stability, investment climate, renewable energy & climate strategies and feedstock governance. This is reported in Deliverable D5.2.

In preparation of the current advisory document on long terms strategies, various stakeholder consultations were performed through workshops, advisory board meetings, teleconferences and surveys. The consultations focused on the following issues:

- Risks and opportunities of biomass trade
  - for import regions (focus EU)
  - for sourcing regions (North America, South America, Africa, Southeast Asia, East Europe)
- Practical barriers for trade
- Key principles of sustainable biomass trade
- Policy options for biomass imports

The stakeholder consultations have been reported in Deliverable D5.3.

This document provides the main conclusions and guidelines from the consortium in terms of long term policy options and strategies at EU level related to bioenergy trade. Mind that these cannot be considered as an official position of the European Commission.

2. Background

This section summarizes the main conclusions from the stakeholder consultations in terms of opportunities, risks and barriers related to biomass trade. Describing opportunities, risks and barriers is politically sensitive. An issue that market actors in one world region may see as a barrier, may for market actors in another region be regarded as an opportunity. Stakeholder consultations are very important in this respect. The tables mentioned in this chapter refer to a global survey that was performed in the period April-June 2015. 127 stakeholders from 35 countries participated in this survey[1].

2.1. Opportunities for EU importing regions

Opportunities are defined as circumstances that allow or facilitate progress in a certain field (economic, environmental, social). The following table shows how many of the survey participants considered a certain statement regarding opportunities for EU importing regions as important or very important. The statements are ranked from highest to lowest support. Only the ones with more than 60% support are shortly discussed.

Table 1: survey results on opportunities for EU importing regions

Opportunity	% important and very important
Higher cost-efficiency to reach renewable energy targets	79%
For regions with limited domestic potential	77%
Complementary with other renewable energy	71%
Broader feedstock portfolio (more flexibility in sourcing, stabilize prices)	68%
Invest in new technologies (substantial biomass volumes needed to reach economy of scale)	61%
Facilitate local bioenergy **infrastructure development** in the EU	52%
Links with **strategic trade partners**	46%

[1] http://www.biotrade2020plus.eu/images/publications/BioTrade2020plus_OnlineSurvey_Summary.pdf

1. Higher cost efficiency to reach renewable energy targets

Imported biomass from regions with abundant and easily accessible biomass can be cheaper than domestic biomass, especially when long in-land supply chains are required to transport this domestic biomass, or when infrastructure is lacking. So including imported biomass can be a cost-efficient way to reach renewable energy targets.

Possible hidden subsidies in these 'cost-efficient' imported biomass streams, and the environmental impact of these trade flows also need to be considered.

2. For regions where domestic biomass potential is limited

Imported biomass is of interest in regions where domestic resources are limited. In particular this is the case in regions with high population density, and relatively high energy demand related to industrialisation. If these countries have energy conversion facilities for biomass already in place and easy access to international markets (through seaports), this creates an extra motivation to include imports.

3. Complementary role of biomass with other renewable energy sources

Biomass is one of the renewable energy options, next to wind, solar, hydro and geothermal energy. Biomass represents the largest share of renewable energy, particularly in heat and transport fuels. In terms of electricity production, in particular wind and solar energy are intermittent energy sources, which need some kind of back-up, often fossil energy. Biomass can play a complementary role in that sense. In terms of heat production, solid biomass is the major renewable energy source, and hence an important alternative for fossil energy. Lignocellulosic biomass is also needed for the production of advanced biofuels as an alternative to fossil fuels in road transport (gasoline and diesel) – high energy dense biofuels are the only viable alternative to substitute fossil fuels in the aviation and heavy road transport sector in order to achieve decarbonisation objectives for 2050.

4. Broader feedstock portfolio

The business case of biorefineries and bioenergy installations in the EU very much depends on their feedstock sourcing. In particular for larger installations, international trade opens up the feedstock portfolio of such installations, creating some flexibility for feedstock sourcing. Increasing and diversifying the supply offers the opportunity of having more stable prices.

5. Investments in new technologies

EU countries can invest in technological solutions like advanced biofuels or biorefineries which need substantial biomass volumes to reach economy of scale. Imports can fill the gap if these volumes are not (yet) available domestically.

2.2.Opportunities for sourcing regions

The following table shows an overview of the share of respondents that rated a certain opportunity important or very important for sourcing regions. The statements are ranked from highest to lowest support. There may be some difference in opportunities between developing and more developed countries, e.g. in terms of capacity building or improved productivity.

Table 2: survey results on opportunities for sourcing regions

Opportunity	% important and very important
Contribution to economic development	76%
Job creation	72%
Improved sustainable management practices	70%
Building up supply chains	69%
Synergies with local sectors	66%
Capacity building	61%
Improved productivity	57%

1. Contribution to economic development

Some sourcing regions have access to abundant biomass feedstocks, which may not be used at the moment. Export markets may provide economic opportunities for these regions to market their excess feedstocks. Some respondents also mentioned that particularly in the US, biomass production for energy is helping to revitalize rural communities and provides a small boost to the forest products market that has been lagging in recent years due to the economic downturn.

2. Job creation

In relation to the previous argument, biomass export creates economic activity, thereby creating or sustaining jobs in forestry, agriculture, industry … Some respondents stated it was not so much about job creation, but about preventing job loss in the forestry and wood processing sector. This sector suffered from a building crisis and lower demand for paper products. In terms of job creation it is also important to make sure that these are properly paid and opportunities are provided for socio-economic development (proper learning).

3. Improved sustainable management practices in forestry, agriculture and industry

Demand from outside the region - with specific sustainability requirements, or request for sustainability certification – may contribute to improved sustainable practices in forestry, agriculture and industry. Mind that sustainability practices depend on local regulations and the capacity of the government to enforce them.

4. Building up supply chains

Setting up biomass supply chains and building infrastructure based on demand from outside the region may trigger local use of biomass for energy in these regions.

5. Synergies with local sectors

Providing an outlet for biomass residues from agriculture, forestry, or the wood processing industry may improve the business case of these sectors. This may bring synergies between domestic and export sectors.

6. Capacity building

Cooperation with sourcing regions may add to capacity building (skilled jobs) and improved know-how and awareness of sustainable/efficient biomass use. This may be the case in some developing regions. There may also be opportunities to process feedstock up to a certain point, so a higher value added product is traded (more value added locally).

7. Improved productivity

Additional demand may create an incentive to improve productivity of forestry and agriculture.

2.3.Risks for EU importing regions

The following table shows an overview of the share of respondents that rated a certain risk important or very important for EU importing regions. The statements are ranked from highest to lowest support. Only the ones with more than 60% support are shortly discussed.

Table 3: survey results on risks for EU importing regions

Risk	% important and very important
Business case uncertainty	68%
Impact of subsidies on feedstock prices	61%
Import dependency remains	44%
GHG emissions related to pre-treatment and transport	42%
Domestic potential underutilized (subsidized imports, lower environmental constraints)	39%
Longer coal reliance (for co-firing)	39%

1. Business case uncertainty

Bioenergy investors may experience a lack of long-term stability in terms of policies and prices. Policy support has changed frequently in the past years and post 2020 prospects remain quite unclear in the EU. Moreover fluctuating fossil fuel prices reduce the economic viability for EU bioenergy players (cfr. price reductions related to US shale gas and the recent price drop of crude oil). So the current investment climate is quite difficult.

2. Impact of subsidies on prices

Subsidies in the EU renewable energy sector may drive up world market prices of feedstocks for other sectors.

Other factors were rated less important.

2.4.Risks for sourcing regions

The following table shows an overview of the share of respondents that rated a certain opportunity important or very important for sourcing regions. Anticipated risks strongly depend on the sourcing region, so the table makes distinction between them.

Table 4: survey results on risks for sourcing regions

Region (#respondents)	North-America (37)	South-America (15)	East EU (non-EU) & Russia (26)	Southeast-Asia (5)	Africa (14)	No specific region (21)
Unstable EU policy	**67%**	**79%**	58%	60%	**85%**	**71%**
Overexploitation (biodiversity loss and carbon loss in forests and soils)	38%	**67%**	**69%**	80%	**85%**	**67%**
Mainly opportunity for large players, less for smallholders	26%	**73%**	**65%**	**100%**	**85%**	43%
Displacement of local biomass/land use	23%	40%	**62%**	80%	62%	**57%**
Low value-added exports	21%	53%	54%	80%	62%	50%
Reduced access to land	11%	**60%**	38%	**100%**	69%	48%
Lower local renewable energy opportunities	23%	20%	42%	60%	69%	43%

1. Unstable EU policy

Changing support frameworks and requirements (quality and sustainability) in the EU may harm the business model in sourcing regions. A stable policy is important for emerging industries to ensure confidence in the marketplace for investors, especially taking into account that long term contracts are often required before investments are done in new biomass production lines. This statement came out as important risk for all considered sourcing regions.

2. Overexploitation

Additional demand for tradable biomass generates a risk of overexploitation in forestry and agriculture. Without precautions this may result in biodiversity loss and a loss of carbon in forests and agricultural soils. This risk was rated important in all regions, with exception of North America. It was stated by respondents that overexploitation can be managed if sustainability guidelines receive strict attention.

3. Large players vs smallholders

Focus of international trade is generally on large scale players. There may be limited opportunities for smallholders to access these new export markets. This risk was rated important in all regions, with exception of North America, where it was stated that there are ways for smallholders to participate (e.g. sell their woody residues to pellet plants, or work through cooperatives).

4. Displacement of local biomass or land use

Subsidized demand from the EU may increase local prices of biomass feedstocks and land. So demand from outside the region may compete with local use, drawing away feedstocks and land from local applications (energy, materials, food). For East Europe (non-EU) & Russia, Southeast-Asia and Africa the majority of the respondents indicated this risk to be important to very important. This was less supported for North and South America.

5. Low value-added exports

Export is generally restricted to low value-added products, limiting the economic impact in sourcing regions. This statement was not supported for North America; around half of the respondents considered it important or very important for the other regions.

6. Access to land

There is a risk of 'land grabbing' of large players, limiting the access of local people or smallholders to land. This was indicated for South-East Asia, Africa and to a smaller extent South America.

7. Renewable energy opportunities

Claiming certain feedstocks for export may lower future opportunities in sourcing regions, e.g. to use their own resources for (modern) energy production. This statement got some

support in relation to Africa or Southeast Asia; for North- and South-America the majority of the respondents did not rate this risk as being important.

2.5.Barriers for trade

Bioenergy trade barriers are defined as '*any issue that either directly or indirectly hinders the growth of international trade of biomass commodities for energy end-use*'. A number of potential barriers were listed in the on-line survey. Only the ones which were rated as important or very important by over 60% of the respondents are listed here.

Table 5: survey results on barriers for biomass trade

Barrier	% important and very important
Public knowledge & public opinion	
Insufficient knowledge of public/media/policy makers	81%
Bad public image due to claims of unsustainable practices for biofuels	80%
Sustainability criteria & certification systems	
Different sustainability requirements in EU Member States for solid biomass (not EU-wide)	78%
Differences in sustainability governance of agriculture and forestry policies (legislation and enforcement) by country/region	74%
Lack of sustainability criteria for fossil fuels creates an unlevel playing field	69%
Changing sustainability requirements creates uncertainty for stakeholders	67%
Sustainability criteria only required for energy and not for other applications of biomass	66%
Proliferation of certification systems	64%
Logistics	
Lack of roads and port infrastructure in sourcing regions	65%

1. Public knowledge and public opinion

There has been growing public debate on biofuels in the past 10 years, with claims of unsustainable practices and side effects (iLUC), which created a **bad public image** in society (public, media and policy makers) for biofuels and – by extrapolation – for bioenergy in general. This has reduced the willingness to support bioenergy considerably.

In general, the **public is not very well informed about possibilities and opportunities of biomass and bioenergy**, or about sustainable practices, and therefore it is susceptible of simplifying headlines/one-liners on a topic which has different sides to it. Respondents argue that more and better education and training is needed on how bioenergy supply chains can be deployed in a sustainable way.

2. Sustainability criteria and certification systems

At present numerous biomass and biofuel sustainability certification schemes are being developed or implemented by a variety of private and public organizations. Schemes are applicable to different feedstock production sectors (forests, agricultural crops), different bioenergy products (wood chips, pellets, ethanol, biodiesel, electricity), and whole or segments of supply chains. There are multiple challenges associated with the current status of sustainability certification, i.e. the proliferation of schemes has led to – to name a few – confusion among actors involved, fear of market distortion and trade barriers, an increase of commodity costs, questions on the adequacy of systems in place and uncertainty over how to develop systems that are effective and yet cost-efficient.

Several issues in terms of sustainability criteria and certification systems are identified which may impact trade opportunities:

Different sustainability requirements in EU Member States for solid biomass

In contrast to liquid biofuels, at the moment there are no binding criteria for solid biomass at the European level. In the absence of mandatory EU-wide sustainability criteria for solid biomass, a number of individual MS unilaterally develop (further) sustainability criteria, while others maintain the status quo. Such a development could have two consequences:

(1) diverging sustainability criteria could undermine the environmental effectiveness of national schemes. This situation is likely to promote leakage effects with less sustainable raw materials, subject to mandatory requirements, being moved to parts of the EU where they will not receive the same level of environmental scrutiny;

(2) a heterogeneous regulatory approach to biomass sustainability raises a number of concerns from an internal market perspective, including causing potential distortions to biomass trade, market segmentation and overall market inefficiency.

Differences in sustainability governance of agriculture and forestry policies (legislation and enforcement) in sourcing regions

When looking at the regional and international level, it is clear that some regions already have a wide range of policies (legislation, regulations and guidelines) and sufficient enforcement in place to safeguard sustainable biomass production and regulate related markets, i.e. sustainable bioenergy laws, forestry and agricultural management practices and other complementary regulations such as nature and environment protection regulations, land use and related planning acts. The problem of unsustainable biomass production most likely occurs in countries with none existing or weak governance structures (i.e. lack of

enforcement and control mechanisms). A risk evaluation system could be considered to determine the need for certification, as it is often done in financing, by private companies purchasing biomass from around the world, or will be done in relation to the EU Timber Regulation (EUTR). Working towards equivalence or mutual recognition is an alternative to take into account existing legislation/governance in the sourcing region while avoiding creating new barriers to trade by the multiplication of sustainability criteria.

Changing sustainability criteria have a profound impact on the industry. For example, with the establishment of sustainability criteria in the Renewable Energy Directive for liquid biofuels, many biofuel producers deemed it certain that compliance with these criteria would guarantee long-term market access. However, the debate regarding indirect land use change (iLUC) which lasted from 2010 until 2015 has caused significant concern amongst the industry. Similarly, the on-going scientific insights and discussions regarding the definition of 'primary forests' and perhaps even more significant the carbon accounting of forest biomass, have increased uncertainty amongst industrial stakeholders. It may discourage broad new investments in solid biomass conversion capacity, and ultimately may act as indirect barrier for solid biomass trade.

No binding sustainability criteria for non-energy biomass applications

Sustainability criteria are only required for biofuels/bioenergy, but remain voluntary for other applications of biomass. The market drive to certify the production of biomass only comes from the part which is destined for bioenergy. Consequently the incentive of biomass producers to certify their feedstock may be limited.

No sustainability criteria for fossil fuels

Sustainability requirements placed on biomass for energy create an extra administrative burden and cost to these value chains. This gives them an extra disadvantage compared to fossil fuels which don't have to track their chain of custody or demonstrate their performance in terms of sustainability criteria.

Proliferation of certification systems

The main driver for companies to seek sustainability certification is to comply with legislated requirements and maintain or gain market access. The proliferation of schemes has led to competition among schemes in the market. This may bring further improvements in efficiency and effectiveness, but different approaches and requirements may also lead to confusion in the market place. There may be a tendency for the use of the least demanding system, or even 'green washing'. With regard to the ease of implementing a scheme, a good balance is needed between comprehensiveness and the economic and administrative accessibility of schemes.

3. Logistics

When setting up biomass fuel supply chains for large-scale biomass systems, logistics are a pivotal part in the system. Various studies have shown that long-distance international transport by ship is feasible in terms of energy use and transportation costs but availability of suitable vessels and meteorological conditions (e.g. winter time in Scandinavia and Russia) need to be considered. Harbour and terminal suitability to handle large biomass streams can also hinder the import and export of biomass to certain regions. Limited logistical infrastructure (e.g. railways, roads) can seriously hamper transport of inland biomass to the ports for international trade.

The survey respondents identified the **lack of roads and port infrastructure in sourcing regions** as the main barrier in terms of logistics.

3. Key principles for sustainable biomass trade

As a basis for a long term trade strategy, a number of key principles are suggested as a prerequisite to have sustainable biomass trade. These principles were also discussed in the various stakeholder consultations.

Common principles of sustainable use of biomass for energy purposes, can be found in several initiatives aiming at the certification of biomass, biofuels and bioenergy, such as the Cramer Commission in the Netherlands (Cramer et al., 2007), or the 24 GBEP sustainability indicators for bioenergy (2011). In recent evolutions efficient use of resources is added, which implies that energy efficiency should be optimized as biomass is a limited resource, and – where possible – priority should be given to higher value applications or a biorefinery approach and the 'cascading' principle' should be acknowledged.

Mind that in the BioTrade2020plus project the focus is on trade, which implies that the final use of the biomass energy carrier is not in focus of the discussion. This is treated in other dedicated projects like Biomass Policies[2] or S2BIOM[3].

The following principles were collected and discussed in four stakeholder consultations: an international workshop on 24 October 2014, a teleconference on 27 November 2014, a discussion with the project advisory board group on 11 February 2015, and the on-line survey, carried out from April to June 2015 (with 127 participants from 35 countries).

Table 6: survey results on key principles for sustainable biomass trade

Principles	% agree or totally agree
Trade should be based on sustainable and legally acquired biomass sourcing (traceable and verifiable).	97%
Markets should be transparent, with clear reporting and monitoring systems.	90%
Full value chain (from feedstock production up to end conversion) as a basis for performance assessments (e.g. energy, GHG).	88%
Trade should follow the principles of fair trade, i.e. all actors in the value chain receive a fair share of the benefits.	86%
Markets should be open (WTO compliant), and there should be no discrimination in market access.	80%
Local use of biomass should have priority over trade. Displacement as a result of trade demand should be avoided.	76%
Displacement/indirect effects in the sourcing regions should be taken into account in support mechanisms for biomass/bioenergy.	75%

[2] http://www.biomasspolicies.eu/
[3] http://www.s2biom.eu/en/

1. Sustainable and legal biomass sourcing

Trade should be based on sustainable and legally acquired biomass sourcing (traceable and verifiable). Practically all stakeholders agree with this principle.

There should be biomass sourcing requirements for 'good management practices' in forestry, agriculture, landscape management, waste management (e.g. in terms of biodiversity, carbon stock, soil, water, social conditions, land tenure) and the requirement that it is legally acquired. If feedstock is produced in regions with lower levels of sustainability governance (compared to the EU), this may create a competitive advantage for these feedstocks, so there may be an unlevel playing field between domestic and imported biomass.

2. Transparent markets

To have a clear view on long term sustainable trade, markets should be transparent, with clear reporting and monitoring systems. 90% of the respondents agreed or fully agreed with the principle that markets should be transparent.

3. Full value chain as a basis for performance assessments

Assessment (and incentives) of biomass value chains should be based on an evaluation of energy use and greenhouse gas emissions over the whole value chain, including biomass production, pre-treatment, transport and final conversion to electricity, heat and/or biofuels. For traded material, pre-treatment to tradable commodities and long-distance transport are important to be considered.

Although most respondents agree that the full value chain has to be taken into account, it is also questioned whether biomass processors can have an influence on the previous steps within the value chain.

4. Fair trade

Trade should follow the principles of 'fair trade', i.e. all actors in the value chain receive a fair share of the benefits. Various voluntary fair trade schemes exist, mainly for food purposes. Also with this principle the majority (i.e. 86%) of the respondents agrees or fully agrees. However, various respondents indicated that 'fair' should be better defined.

5. No discrimination in market access

This principle states that markets should be open, and there should be no discrimination in market access. It includes WTO compliance and avoidance of protectionist market mechanisms. Sustainability requirements are often perceived as trade barriers. It is important to find a balance between sufficiently strong quality and sustainability requirements and market access. In terms of small vs large actors: trade typically involves large players. Administration and practical procedures to demonstrate sustainability criteria

can be a barrier for smallholders, so there need to be solutions to also open up opportunities for smallholders.

6. Local use of biomass should have priority over trade

In principle trade is about balancing excess availabilities in some regions with shortages in other regions. The main question about the potential for trade is if there really is an excess of supply in the sourcing regions, or if in fact local use is displaced through subsidized demand from European side. This could reduce opportunities in these regions towards their own renewable energy potential or producing higher value products, or it may drive existing applications away to other less sustainable resources (fossil fuels, or non-certified forest land). As a basic rule, local use of biomass should have priority over trade and displacement as a result of trade demand should be avoided.

7. Displacement/indirect effects should be taken into account

In relation to the previous principle, it is important that potential displacement effects are identified and understood. A level playing field should be the basis between domestic use and exports, but also amongst the various types of biomass applications, so market distortion by subsidies should be avoided. Indirect effects in the sourcing regions should be taken into account in support mechanisms for biomass/bioenergy. Nevertheless, quantifying indirect effects and including these in value chain assessments (cfr. iLUC) is difficult and very assumption dependent. Another way to deal with this is to approve a list of practices/value chains which have low indirect effects and therefore are entitled to support.

4. Long term strategies and guidelines on European bioenergy markets and trade

In fact, this document will not propose a specific European trade strategy in terms of biomass for energy, but it suggests to consider overall bioenergy strategies and the fact that trade will be part of these markets. So a number of recommendations for long term strategies and guidelines which are relevant for bioenergy trade will be proposed.
The following points are the result of various stakeholder consultations. A first list of concrete policy options was part of the survey of April-June 2015. In the last months of the project a number of ideas for long term strategies have been discussed in the last advisory board meeting, the final BioTrade2020+ workshop, and in a dedicated webinar.

4.1.Consistent policy framework & long term vision

A positive investment climate is crucial for further developments and growth of the sector. This implies long term perspectives and a consistent policy framework. Uncertainties and stop & go policies are detrimental for investments. This does not mean that nothing can be changed. **Policy needs to be consistent, but also dynamic to be effective** (e.g. in case of price fluctuations). It is very important to have a **long term policy vision**.
Timeframe for a vision can be 20 years and more (e.g. 2050); a policy framework needs to be clear for the next 10 to 20 years, as this is also the timeframe for investments.

Biomass and developments in the biobased economy link to different policy fields (agriculture, forestry, environment, climate, energy, trade, economy …). It is important that there is **consistency between these policy fields**.

4.2.Project financing & investment models

Risk perception is high in the biobased economy and **access to finance** is an issue. Governments can use tools to reduce financing risks, e.g. through providing guarantees, low-interest loans.
Government support can also be about developing knowledge (through research projects) and spreading knowledge through the support of demonstrators and cooperation platforms. This also helps reduce risk perception, which improves the investment climate.

4.3.Market access & WTO rules

Trade is a natural part of all supply-demand markets; some regions are short of material, while others are abundant. Some regions may have lower production costs and/or better growing conditions than other, which may compensate the additional costs of pre-treating and transporting the material. Open markets also provide more flexibility in feedstock sourcing and can stabilize prices. There can be some volatility in international biomass markets, as they may relate to harvest yields (good or bad growing seasons, droughts), forest fires, storms… so import-export balances may fluctuate. WTO rules imply an equal treatment of domestic and imported material; there should be **no discrimination in market access, but all materials should also comply with the same legal (sustainability) requirements imposed on them**.

It is important to keep sustainability goals in mind. Reaching renewable energy targets in Europe should not be at the expense of negative sustainability impacts elsewhere. The different pillars of sustainability need to be considered (ecologic, economic, social). Important starting point is the list of **UN Sustainable Development Goals**[4].

Sustainability requirements can be justified in terms of WTO compliance, if they are not intended as a trade barrier to protect or prioritize domestic resources. Mind that the line may be difficult to draw and involvement of legal experts may be needed to define if certain requirements may represent an unjustified trade barrier or not. The use of existing international standards may be a good starting point.

In terms of social issues, strategies should be defined with export countries. Mechanisms are already in place to safeguard food security or land tenure, e.g. through temporary export restrictions.

4.4.Sustainable biomass production systems

One of the basic principles is that biomass production and harvests (in forests, agriculture or in nature management) should fit in the frame of long-term sustainability. **A sustainability frame is to be applied to the management of forest or agriculture overall, independent of the end use of its products**. Again, the sustainability frame includes environmental, social and economic aspects (see GBEP sustainability indicators for bioenergy and UN Sustainable Development Goals).

Sustainability performance should be demonstrated; **transparency and controllability** of the chain of custody are key. Sustainability requirements are important and necessary to get acceptance from society ('social license to operate'), but it should also be kept in mind that

[4] http://www.un.org/sustainabledevelopment/sustainable-development-goals/

such requirements need to be workable in practice. If tougher barriers are made than needed, there is also a '*cost of doing nothing*'.

Consistency in sustainability requirements along Members States and different markets (e.g. biofuels, electricity, heat, potentially also materials in the longer term) is needed to avoid market distortions. 85% of the respondents of the on-line survey agreed that **harmonized and binding sustainability criteria** are needed on EU level, also for solid and gaseous biomass for energy. There was also high agreement (90%) that when forestry biomass is used, some proof of sustainable forestry management should be required. This can be in the form of certificates (FSC, PEFC), but also through the endorsement of local (national) governance systems, e.g. through bilateral agreements. The Commission could follow a risk based approach (requiring more proof in high risk areas).
It is important to **build on existing systems**, e.g. the EU Timber Regulation (EUTR) or FLEGT agreements or other voluntary schemes in the market. The EUTR is currently on legality of wood, but could in future be extended with sustainability criteria.

The European Commission needs to be work within the principles of *subsidiarity and proportionality,* which regulate the powers by the European Union and define whether the competence lies at European, national, regional or local level. Mind that EUTR is related to trade, which is EU competence. On the other hand forest management within the EU is Member State's competence, so the Commission can only publish guidelines on these.

For regions outside Europe, the EU should put more dedicated efforts in **cooperation/good practice exchange** towards sustainable practices in biomass production and harvesting, and capacity building.

4.5.Reduce the consumption of fossil fuels

A serious and urgent reduction of fossil fuels is needed in the frame of climate change mitigation. Current markets and systems are designed for fossil fuels, these are still the standard; so the alternative is always ,*to do nothing and continue to use fossil fuels*'. The use of biomass has different sides and conditions to it (carbon storage, land use, biodiversity, water, emissions …), and this complexity is frequently used as an excuse for not acting.

Fossil fuels are by definition unsustainable and currently they don't have to demonstrate their sustainability performance, e.g. in terms of GHG emissions, land use, … This creates an unlevel playing field with the alternatives on biomass which have to put efforts in chain of custody reporting and certification.
There may be ways to deal with the **phasing out of fossil fuels**, e.g. through the introduction of a carbon tax, potentially in combination with ETS/carbon pricing, specific phasing out

policies for fossil fuels, or potential sustainability requirements for fossil fuels. This issue requires dedicated analysis and study work, which goes beyond the scope of this study.
Mind that principles of subsidiarity and proportionality should again be taken into account.

4.6.Support sustainable mobilisation of biomass

Mobilisation of biomass is the key for further deployment of the biobased economy. The aspects of mobilisation have been treated more in depth in the sister projects Biomass Policies and S2BIOM. In relation to trade, two approaches are of interest:

- focusing on higher mobilisation within the EU may reduce the need for biomass imports;
- there are opportunities to support sourcing regions in their mobilisation of sustainable resources so a larger biomass pool could become available for European markets.

In particular in developing countries there may be opportunities for concurrent benefits (social, environmental, …) in mobilising biomass resources, e.g. in increasing agricultural productivity and food production, improve soil carbon and sustain soil fertility or biodiversity, improved waste management, sustainable forest management, …
Cooperation/good practice exchange (as mentioned previously) would help in these regions to facilitate progress in agricultural productivity, forest management and waste management. Also support in developing infrastructure and logistics can induce progress.

4.7.Monitor direct and indirect impacts of EU policies on markets

It is important to monitor the impacts related to EU policies on markets, both in the EU and on global markets. There can be co-benefits (e.g. in terms of triggering good practices) or negative impacts (e.g. displacement of other uses). It is not always clear from the beginning when policies are adopted what would be the impacts on global markets, in particular indirect impacts. Further fine-tuning of policies may be needed to avoid negative impacts.
Monitoring of the real impact is complementary to modelling, which by definition simplifies reality and provides trends.

The question is how to implement monitoring in a practical way and define at different levels who is most competent and capable to carry out the monitoring (Member States, economic operators, traders …).

A particular impact which has been discussed frequently in the past years is indirect land use change (iLUC), which has led to the iLUC Directive in relation to biofuels. An option which has received less attention is the approach to ‚**demonstrate innovative approaches to avoid or deal with iLUC and identify cases where iLUC is low or even positive**'. Such approaches can be defined and demonstrated as good practices to the markets.

On the other hand, the European Commission may also define which types of feedstock have higher risks of indirect effects/displacement and potentially excluded these from support, or support can be capped to a certain amount of feedstock.

4.8.Value chain assessment & resource efficiency

When assessing the performance of biomass value chains, the full chain (from production of biomass, over logistics, conversion, up to the end use) needs to be taken into account.
In terms of **greenhouse gas emissions**, this is included in the sustainability criteria for biofuels, and this could be extended to other applications of solid and gaseous biomass for electricity and heat.

Overall energy efficiency over the full value chain is another parameter which fits in the concept of resource efficiency. Improved energy efficiency means that more can be done with the same amount of biomass. Energy use over the value chain can be a basis for calculating greenhouse gas emissions; however, currently the combustion of biomass over the value chain is not included as it is considered carbon neutral. So a **dedicated monitoring of energy use** over the full value chain is needed. In terms of biomass trade, the question should be answered how much energy is needed for pre-treatment and transport, and how this related to the final energy produced by the imported biomass.
Of course the energy discussion also fits in the principle of the ‚trias energetica', which defines the following priorities of energy policies: (1) reduce energy demand, (2) improve efficiencies, (3) replace the remaining energy demand by renewable resources. It should not be the aim to substitute fossil energy with bioenergy one on one; the **first step is always to increase efficiency and reduce demand**. Energy policy per se goes beyond the scope of this study.

In the discussion about resource efficiency, also cascading use of biomass is often mentioned. Cascading defines a certain priority of use (materials, energy) of biomass, depending on its quality. In a biorefinery approach synergies between energy and (new) material markets can be explored. The question is how and if policy should interfere and impose a priority list in terms of cascading use, or that this should be left to markets. This project was more about trade of biomass; end use has been less in focus. A more thorough analysis of resource efficiency was done in the sister project Biomass Policies.

4.9.Inform the public debate

As mentioned before, the bad public image of bioenergy and the fact that the public, media and policy makers are not very well informed about possibilities and opportunities of biomass and bioenergy are considered some of the most important barriers of bioenergy.

The negative image is particularly the case for biomass imported from other parts of the world, even though imports are only a small share of overall bioenergy production.

Independent answers should be given to some of the concerns to **provide clarity for policy makers and the public** and also demonstrate opportunities. Assessments should preferably be based on monitoring; one should be careful with model results, or anecdotal information. A typical debate at the moment is about carbon accounting principles. There are diverging opinions, slogans and methodologies and clarity also needs to be provided in this debate. The comparison with fossil value chains and other counterfactuals always needs to be highlighted. It is also important to relate biomass and land use for energy to other applications, e.g. food, feed and materials.

Carbon accounting as established in the Paris Climate Agreement (COP21) treats imports more favourable than domestic production (carbon footprint of imports is not accounted). This can be counterproductive. Such system boundaries lead to '*exports of environmental impacts'* because they are accounted in the sourcing country.

Carbon accounting may not be the first concern of the public, which may focus more on local effects, e.g. number of trucks passing by, emission impacts, deforestation, land ownership …

4.10. Biomass quality and commodities

Variability of biomass quality is an issue, particularly for residues or herbaceous material. Most biomass potential is in low-quality material; for higher quality material there is more demand, often also in other markets, which creates a risk for competition.

A major step to mobilize lignocellulosic materials for international markets (and trade) is to turn them into real commodities. Technical standards would be needed and preferably agreed at international level (ISO), including trade codes to monitor trade. For wood based materials such standards already exist, although they can still not be considered as real commodities. Low quality material would need to be converted to an intermediate product, e.g. pyrolysis oil or pellets (potentially torrefied or steam explosion treated material). Commodities are fully tradable and compatible with storage facilities, shipping and conversion processes. This facilitates contracting, opens markets and provides easier access to finance. Governments can stimulate this process.

5. Conclusions

This document shows the main conclusions and guidelines from the BioTrade2020plus consortium in terms of long term strategies at EU level related to bioenergy trade. It starts from the main conclusions derived from stakeholder consultations in terms of opportunities, risks and barriers related to biomass trade, as well as 7 key principles for sustainable biomass trade.

Starting from this background, a number of long term strategies and guidelines were proposed in relation to bioenergy trade. In fact, the project does not propose a specific European trade strategy in terms of biomass for energy, but suggests to consider overall bioenergy strategies and the fact that trade will be part of these markets.

The recommendations and guidelines can be summarized as follows:

- Policy needs to be consistent, but also dynamic to be effective (e.g. in case of price fluctuations). It is very important to have a long term policy vision. There should be consistency between different policy fields.
- Risk perception is high in the biobased economy and access to finance is an issue. Governments can provide tools to improve this.
- Market access needs to fulfil WTO rules, there can be no discrimination between imported and domestic biomass. Sustainability requirements can be justified in terms of WTO compliance, if they are not intended as a trade barrier to protect or prioritize domestic resources.
- A sustainability frame is to be applied to the management of forest or agriculture overall, independent of the end use of its products. Transparency and controllability of the chain of custody are key. Consistency in sustainability requirements along Members States and different markets is needed to avoid market distortions. It is important to build on existing systems like EUTR or voluntary schemes.
- A serious and urgent reduction of fossil fuels is needed in the frame of climate change mitigation. Fossil fuels are by definition unsustainable and currently they don‘t have to demonstrate their sustainability performance, e.g. in terms of GHG emissions, land use, … This creates an unlevel playing field with the alternatives on biomass which have to put efforts in chain of custody reporting and certification. Tools for phasing out fossil fuels (like carbon tax) need to be considered, also to remove the unlevel playing field of fossil fuels versus its alternatives.
- Mobilisation of biomass is the key for further deployment of the biobased economy. Cooperation/good practice exchange would help in developing regions to facilitate progress in agricultural productivity, forest management and waste management and develop infrastructure and logistics to mobilize biomass.
- It is important to monitor the impacts related to EU policies on markets, both in the EU and on global markets. These can be co-benefits or trade-offs. In terms of iLUC it is

important to demonstrate innovative approaches to avoid or deal with iLUC and identify cases where iLUC is low or even positive.

- When assessing the performance of biomass value chains, the full chain (from production of biomass, over logistics, conversion, up to the end use) needs to be taken into account, with a focus on greenhouse gas emissions and energy use. Improved energy efficiency means that more can be done with the same amount of biomass.
- Bioenergy has a bad public image and the public, media and policy makers are not very well informed about possibilities and opportunities of biomass and bioenergy. Independent answers should be given to some of the concerns to provide clarity for policy makers and the public, but also demonstrate opportunities.
- Variability of biomass quality is an issue, particularly for residues or herbaceous material. A major step to mobilize lignocellulosic materials for international markets (and trade) is to turn them into real commodities. This can also be supported by governments.

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