BioTrade2020plus

Supporting a Sustainable European Bioenergy Trade Strategy

Intelligent Energy Europe
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Deliverable 5.3

Discussion document on Opportunities, risks and barriers of international biomass trade, key principles for sustainable trade and potential policy frameworks around imports

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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 will be accomplished by analyzing the potentials (technical, economic and sustainable) and assessing key sustainability risks of current and future lignocellulosic biomass and bioenergy carriers. Focus will be placed on wood chips, pellets, torrefied biomass and pyrolysis oil from current and potential future major sourcing regions of the world (Canada, US, Russia, Ukraine, Latin America, Asia and Sub-Saharan Africa).

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.

In order to achieve this objective close cooperation will be ensured with current international initiatives such as IEA Bioenergy Task 40 on “Sustainable International Bioenergy Trade - Securing Supply and Demand” and European projects such as Biomass Policies, S2BIOM, Biomass Trade Centers, DIA-CORE, and PELLCERT.

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 D5.3 of BioTrade2020+– Opportunities, risks and barriers of international biomass trade, key principles for sustainable trade and potential policy frameworks around imports. This report contains the final discussion document. It has been prepared by: VITO, with contributions of Univ. Utrecht, CENER, WIP, IINAS and Imperial College.

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Acronyms

ATEX	EU directives on the use of equipment in explosive atmospheres
CEN/TC	European Normation Institute/Technical Committee
CN/HS	Combined Nomenclature/Harmonised System
EC	European Commission
EN	European Norm
EU	European Union
EU-28	The European Union, consisting of the current 28 Member States
EU-TR	European Timber Regulation
FSC	Forest Stewardship Council
GBEP	Global Bioenergy Partnership
GHG	GreenHouse Gas
IEA	International Energy Agency
iLUC	indirect land use change
IMO	International Maritime Organization
IMSBC	International Maritime Solid Bulk Cargoes
IPPC	International Plant Protection Convention
ISO	International Standards Organization
JTI BBI	Joint Technology Initiative Bio-Based Industries
NFPA	National Fire Protection Association (US)
NREAP	National Renewable Energy Action Plans
PEFC	Programme for theEndorcement of Forest Certification
RE	Renewable Energy
RED	Renewable Energy Directive (2009/28/EC)
SFM	Sustainable Forest Management
SPS	Sanitary and phytosanitary requirements
USA	United States of America
WPAC	Wood Pellet Association of Canada
WTO	World Trade Organisation

1. Introduction

1.1. Market trends

European targets set by 2020 in the Climate and Energy package and the Renewable Energy Directive (2009/28/EC) will require a serious increase in biomass demand for energy purposes. The analysis of the data reported by the Member States in their National Renewable Energy Action Plans (NREAP[1]) shows that biomass is expected to contribute more than half of the 20% renewable objective of the gross final energy consumption. However the data provided and trade statistics have revealed that the quantity of woody biomass required to satisfy the 2020 targets, is likely to be too large to be met by increased production within the EU. Instead, various Member States will have to rely on imported biomass (especially wood products) from elsewhere; based on analysis of the NREAPS, countries like Belgium, Denmark, France, Germany, Poland and Spain will all face a biomass deficit by 2020 (Hoefnagels et al., 2012). Importing this biomass from outside the EU may occur at the risk of damaging ecosystems in other parts of the world, while actually increasing the EU's own carbon footprint.

As a result of several support measures, the market for bioenergy and biofuels has seen major increases in the last few years. According to Eurostat[2], biomass had a 65% share of all renewable energy consumption in the EU-28 in 2012. This biomass was mostly used in the heating and cooling sector (73%), followed by transport (15%) and electricity (12%). On the longer term this increase in demand will be reinforced by other (non-energy) sectors moving to biomass as renewable feedstock. We can refer to the launch of initiatives 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 (Pelkmans et al., 2012). 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), Sub-Saharan Africa and Southeast Asia with relevant potentials in 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] http://ec.europa.eu/energy/en/topics/renewable-energy/national-action-plans
[2] http://ec.europa.eu/eurostat/statistics-explained/index.php/Renewable_energy_statistics

1.2. The BioTrade2020plus project

Today in the European Union, the achievement of existing and future bioenergy targets implies that in addition to using domestic biomass, European markets will also **rely on imports of biomass**. 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.

Trade can be a logical result of a **supply-demand balance**: some regions can mobilize much more biomass than needed in domestic markets, while others have shortages, which can balance out through trade. Another argument is that export regions potentially have more **cost-efficient** production systems - reasons can be higher productivity (because of favourable climate and oils) or also inexpensive labour - so they can compete with EU domestic resources, even with trade cost included. Some of these regions are developing export markets, but don't (yet) extensively focus on domestic use of their resources. To some extent, in this phase their **market** is **initiated** by European demand.

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. Some of the principles of this strategy will be to ensure that imported biomass feedstock is sustainably sourced and used in an efficient way, while avoiding distortion of other markets. It will be important to find a basis for a **balanced approach** between promoting the use of domestic biomass, while also keeping markets open for sustainable imports of biomass.

The project will focus 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/Malaysia), and
- East Africa (Kenya/Mozambique).

In terms of trade strategies, other relevant regions like Canada or Russia will also be included.

1.3. Stakeholder consultations

This report is produced within the work package 'Strategies to secure sustainable import of biomass'. The knowledge of what sectors perceive as opportunities, risks and barriers, as well as a shared view on key principles for sustainable trade will form the basis to come to long-term strategies and suggested policy frameworks around biomass trade.

Describing opportunities, risks and barriers is politically sensitive. An issue that market actors in one world region may see as a barrier to bioenergy, may for market actors in another region be regarded as an opportunity. Stakeholder consultations are very important in this respect.

The following actions are performed for the dialogue with stakeholders:

- International workshop on 24 October 2014 in Brussels[3]. The workshop had 65 participants. In the interactive part of the workshop, discussions were organized on the following topics:
    - How to translate technical potentials into sustainable potentials?
    - How to assess local demand?
    - Opportunities and risks of international biomass trade
    - Key principles for sustainable trade and policy options
- Telephone conference on 27 November 2014 on key principles for sustainable trade[4].
- Advisory Board meeting on 11-12 February 2015 in Munich.
- On-line survey (launched in April 2015) on opportunities, risks, barriers, key principles and policy options. Target was to have at least 100 responses from different sectors and regions involved in the value chains. We received 127 responses to the survey from 35 different countries.
- A workshop on 'Policy options for sustainable biomass trade' was organized as side event to the European Biomass Conference and Exhibition in Vienna on 3 June 2015. The workshop had 50 participants and was focused on the options to ensure sustainable biomass sourcing and how to avoid displacement of local use.
- Other telephone conferences and consultations will be organized in the course of end 2015 – early 2016 on biomass trade strategies.

In the remainder of this document, the main conclusions of the different stakeholder consultations will be brought together. For a more detailed description of the consultations, we refer to the respective summary reports.

[3] http://www.biotrade2020plus.eu/images/BioTrade2020_Workshop24Oct2014_Summary_final.pdf
[4] http://www.biotrade2020plus.eu/images/publications/BioTrade2020plus_Deliverable_6.7.pdf

2. Opportunities and risks of international biomass trade

In terms of markets and society, there are clear opportunities and risks related to international biomass trade. Distinction can be made between opportunities and risks for the **importing regions** (in this case EU countries), and on the other side opportunities and risks for **sourcing regions** (distinction can be made between North America, South America, Africa, Southeast Asia, East Europe & Russia).

We kept the amount of statements limited to the main issues. A first list of statements on opportunities and risks was discussed in the interactive session of the workshop of 24 October 2014 in Brussels. The statements were also discussed using an online questionnaire in order to gather the opinion of a broader public from different organizations and regions. The statements concerning policy options for sustainable biomass trade were also discussed in the interactive workshop that was organized as side event of the 23rd European Biomass Conference & Exhibition on 3 June 2015 in Vienna. The main outcomes of the stakeholder consultations are reported for each statement in *italics*.

2.1. Opportunities for importing regions in the EU

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. Solid (lignocellulosic) biomass represents the largest share of renewable energy. 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, so very important in that sense as an 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.

70% of the respondents of the survey indicated that the fact that biomass can be complementary to domestic intermittent energy sources like solar or wind is important to very important. One respondent indicated that biomass is especially interesting in district heating and that a district heating network can also be used as a sink for excess renewable electricity. Some respondents also indicated the potential of biomass to be used as baseload power. However, another respondent indicated that imported biomass is mainly used in larger facilities which are less flexible and, therefore, the complementarity is of less importance. Also, biomass is exposed to fuel price fluctuations and is in that sense not so different than fossil based baseload energy. Another respondent replied that the current applications are not enough for balancing, but that this may change in the future.

Role of imports in regions where domestic biomass potential is limited
In addition to the previous argument, 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 (presence of industry). 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.

Overall it can be concluded that the potential of importing biomass to countries with limited biomass potential is seen as important by the respondents. However, agricultural biomass producers indicated a lower importance for this opportunity in comparison with the other groups.

The first two statements were included in one statement in the Brussels workshop. 75% of respondents rated this opportunity important or very important. Also the majority (i.e. 75%) of the respondents from the survey indicated this opportunity important or very important. Despite the fact that most respondents indicate this opportunity as important, also some concerns are raised. Some respondents indicated that countries should focus on their own strengths rather than import large amounts of biomass. One respondent indicated the problem with sustainability when importing biomass. Furthermore, attention should be provided that only biomass with a high energy content should be imported and not for example straw with a low energy content per ton biomass.

One argument that is raised during every stakeholder consultation round is that, although there are clear opportunities in international markets, priority should be given to local biomass.

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.

In the survey almost half of the respondents indicated a broader feedstock portfolio as an important opportunity. The opportunity was indicated to be very important or of moderate importance by respectively 19% and 23% of the respondents. The flexibility of feedstock and suppliers is indicated by the respondents to be key for successful biomass projects. Solid biofuel producers and traders indicated in general a higher importance for this opportunity.

Cost-efficiency

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 imported biomass can be a cost-efficient way to reach renewable energy targets. Mind that there may be hidden subsidies in these ‘cost-efficient’ imported biomass streams (see risks).

76% of respondents in the Brussels workshop rated this opportunity important or very important. Also from the survey it seems that the majority (79%) of the respondents rate this opportunity as being important to very important. Although the majority of the respondents agrees that this opportunity is of large importance, some concerns are raised:

- *Is this biomass sustainable?*
- *Is the cost-efficiency guaranteed on the long term?*
- *Is the biomass really abundant or would it be better to use the biomass locally?*

For this opportunity the wood processing industries indicated a lower importance.

Infrastructure build up
Biomass imports can be an intermediate situation to start biomass related activities in some EU countries. This may facilitate the development of local biomass infrastructure.

From the respondents 33% indicated this opportunity to be important and 27% to be of moderate importance. Based on the arguments provided by the respondents it can be concluded that major doubts exists about whether this might stimulate local infrastructure. Furthermore, they mention that infrastructure should be in place before imports can be realized.

For the opportunity 'infrastructure build-up' the respondents that were most familiar with 'North-America' responded it to be more important. Respondents that were most familiar with Africa rated it less important.

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.

83% of respondents in the Brussels workshop rated this opportunity important or very important. In contrast to the respondents in Brussels, only 61% of the respondents from the survey indicate this opportunity to be important to very important. Some respondents indicated that the larger amounts of biomass, which are possible via imports, are used in large burning installations and are not available for new technologies that focus more on domestic types of biomass.

The wood processing industries and energy producers were very diverse in their responses concerning the importance of investments in new technologies.

A more dispersed answer was provided concerning the importance of the opportunity 'investments in new technologies' by respondents that were most familiar with Africa.

Reduce domestic competition for biomass
Existing domestic industries (e.g. wood processing and paper industries) regularly state that their access to feedstocks is reduced because of the competition with the energy sector. Opening markets for imported biomass can reduce the stress on domestic biomass resources.

This statement was also presented in the Brussels workshop. Answers were divided. Only 33% of respondents rated this opportunity important or very important. Respondents of the survey indicated this opportunity as being one of the least important among the presented opportunities. However, still 46% of respondents indicated it to be important to very important. The main argument in favour of this opportunity is that competition will help to improve efficiency and reduce cost. Still, more arguments against this opportunity are raised:

- *What about biomass draining in exporting regions?*
- *Domestic competition for wood pellets is low and market pull is strongest from EU.*
- *There is a lack of markets for domestic biomass. A lot of the domestic biomass is not utilized as infrastructure is lacking and policy is instable.*

Trading links

EU countries have strategic trade partners all over the world. Biomass trade could bring more trading links with strategic partners.

From the respondents 11% indicated this opportunity to be very important, another 35% rated the opportunity as important. A lower importance was provided to the opportunity 'trading links' by the respondents that were most familiar with Africa.

An overview of the percentage of respondents that rated the statements concerning opportunities for importing regions in the EU as important or very important is provided in the table below.

Table 1. Opportunities for importing regions in the EU

Statement	Percentage important and very important	
	Brussels workshop	**Online survey**
Complementary with other RE	75%	71%
Limited domestic potential	75%	77%
Broader feedstock portfolio		68%
Cost-efficiency	76%	79%
Infrastructure build-up		52%
Investments in new technologies	83%	61%
Reduce domestic competition	33%	45%
Trading links		46%

Other opportunities that are mentioned by the respondents of the online survey are the following:

- *Faster and more efficient mitigation of climate hazards.*
- *Policy decisions of stem wood use in bioenergy.*
- *Raise of awareness about the need for more transparency in the general trade of woody biomass and as such stimulate the disclosure of illegal trade practices and contributing to a more level playing field.*
- *Security of supply.*
- *Adequate knowhow on markets, quality, standards and technology.*
- *Global balancing of local strengths and weaknesses.*
- *Assisting forestry management practice in other regions.*

In general regulators/administrators indicated a lower importance for the different opportunities. Also NGOs indicated a lower importance for most opportunities.

2.2. Opportunities for sourcing regions

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.

81% of respondents in the Brussels workshop rated this opportunity important or very important. Also in the survey the majority of the respondents indicated this opportunity as very important or important for all regions. For Africa also 18% of the respondents indicated this opportunity to be not important or of low importance. Whereas almost no respondent indicated this for the other regions.

One respondent indicated that this biomass is abundant only due to a lack of local incentives to use it for energy. Another respondent indicated that biomass production in the US is helping to revitalize rural communities and provide a small boost to the forest products market that has been lagging in recent years due to the economic downturn. Supporting strong markets and forestry jobs in turn creates more forests as forest landowners are encouraged to keep their forests as forests, rather than converting to other land uses such as agriculture or commercial development. However, it is also argumented that low-value added products that are exported do not promote development.

Job creation
In relation to the previous argument, biomass export creates economic activity, thereby creating or sustaining jobs in forestry, agriculture, industry, … 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).

88% of respondents in the Brussels workshop rated this opportunity important or very important. In the survey the majority of the respondents agrees that this opportunity is important or very important. However, for North-America only 56% of respondents agreed.

Respondents indicated that it usually concerns non-specialised manforce, that only few jobs are created and that it therefore is less important. It is also questioned whether biomass export creates more jobs than domestic usage of biomass.

Respondents that answered this question for the region East Europe (non-EU) & Russia indicated that it is 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.

For Africa respondents indicated that when the capacity to grow more biomass can be extended that it should be used domestically to reduce import-dependency and to provide local jobs.

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.

60% of respondents in the Brussels workshop rated this opportunity important or very important. Only when the respondents of the survey replied with no specific region in mind, only 48% indicated the opportunity to be important or very important. With a specific region in mind, between 63% and 83% of the respondents agreed.

One of the respondents argumented that local people may find new economic activities, but that most of the chain actions may be carried out with specific companies which are not always local. Another respondent replied that it might prevent local alternative business cases to be developed, taking into account that export is an easy way out.

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

Only 39% of the respondents replied that this opportunity is important or very important for sourcing regions when they responded with no specific region in mind. In case they have a specific region in mind, the majority of the respondents agreed that the opportunity is important or very important. For Southeast Asia even 100% of the respondents indicated the improved productivity as being important or very important. However, for South-America and Africa also respectively 27% and 20% of respondents replied that this opportunity is of low importance or not important.

Some of the respondents responded that an improved productivity is something that happens on the longer term.

Sustainable practices
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.

60% of respondents in the Brussels workshop rated this opportunity important or very important. Also in the survey more than 60% of the respondents indicated this opportunity to be important to very important for the different sourcing regions. However, also 18% and 23% of respondents indicated this opportunity to be of low importance or not important for respectively North-America and East Europe (non-EU) & Russia.

One of the respondents indicated that sustainability practices are dependent on regulations and the capacity of the government to inforce them. And that in underdeveloped regions with scarce governance, it will be more difficult to realize such practices. Also other respondents responded that sustainability will be pushed by legislation.

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.

56% of respondents in the Brussels workshop rated this opportunity important or very important. Only for North-America less than 60% of respondents indicated 'building up supply chains' as being an important to very important opportunity.

One respondent indicated that much is possible in Africa since port infrastructures are being developed.

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).

There is some variations in the responses for this opportunity depending on the region for which this statement is provided. For North-America, East Europe (non-EU) & Russia, and in case no specific region was selected, 53% to 57% of the respondents indicated this opportunity to be important to very important. For South-America this percentage is 67%, for Africa 82% and for Southeast-Asia it raises further to 100% of respondents. For North-America also 25% of respondents indicated the opportunity to be of low importance or not being important.

A respondent indicated that better trade monitoring might stimulate the general transparency and legality of trade practices of biomass which is especially important in South-America, Africa or Southeast-Asia. Another argument that is raised by one respondent is that biomass in Africa is used to replace coal in their operations. The respondent is concerned that this, economic and sustainable local use which receives no economic subsidies may be threatened by exports to Europe. Such exports would be driven by subsidies in Europe as biomass use there, is not yet economic versus coal or pet coke.

An overview of the responses for the different opportunities per sourcing region are provided in the tables below. Table 2 provides the number of respondents that indicated an opportunity to be important or very important and Table 3 provides the number of respondents that indicated an opportunity to be of low importance or of not being important.

Table 2. Opportunities for sourcing regions to the EU – Important or Very Important

Region (# respondents)	North-America (41)	South-America (15)	East Europe (non-EU) & Russia (30)	Southeast-Asia (6)	Africa (11)	No specific region (24)
Economic development	73%	80%	77%	100%	64%	78%
Job creation	56%	80%	77%	83%	90%	74%
Synergies with local sectors	63%	80%	70%	83%	73%	48%
Improved productivity	60%	67%	53%	100%	60%	39%
Sustainable practices	68%	80%	63%	83%	91%	61%
Building up supply chains	58%	73%	79%	100%	64%	68%
Capacity building	53%	67%	57%	100%	82%	57%

Table 3. Opportunities for sourcing regions to the EU – Low Importance or Not Important

Region (# respondents)	North-America (41)	South-America (15)	East Europe (non-EU) & Russia (30)	Southeast-Asia (6)	Africa (11)	No specific region (24)
Economic development	7%	7%	7%	0%	18%	0%
Job creation	10%	7%	10%	0%	10%	0%
Synergies with local sectors	13%	0%	10%	0%	18%	4%
Improved productivity	10%	27%	7%	0%	20%	13%
Sustainable practices	18%	0%	23%	0%	0%	4%
Building up supply chains	18%	20%	11%	0%	18%	5%
Capacity building	24%	7%	13%	0%	0%	9%

2.3. Risks for importing regions in the EU

Domestic potential underutilized
Domestic potential in the EU may be outcompeted by imports (potentially favoured by subsidies or lower environmental constraints), leaving some of it underutilized.

51% of respondents in the Brussels workshop rated this risk important or very important. From the survey only 39% of the respondents indicated the risk to be important or very important. The main arguments raised by the respondents for this score is the fact that regulations and control keep this risk to a minimum and that demand is higher than supply.

Import dependency
Relying on imported biomass moves the problem of energy import dependency from one region to another. This presents no real solution in terms of energy security.

72% of respondents in the Brussels workshop rated this risk important or very important. The majority (i.e. 34%) of the respondents from the survey indicated that this risk is of moderate importance. They indicated that diversification can provide additional value for energy systems. However, import is often shifted towards politically more stable regions. Also, respondents indicated that local resources should be utilized first.

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

60% of respondents in the Brussels workshop rated this risk important or very important. Also 61% of the survey respondents agree that this risk is important to very important. Several respondents agree that you can't discuss this without applying the same principles to fossil fuels.

Impact on greenhouse gas balance
Pretreatment and long distance transport movements consume substantial amounts of energy and reduce the greenhouse gas advantage of bioenergy.

Only 12% of respondents in the Brussels workshop rated this risk important or very important. In contrary to the respondents in the Brussels workshop, 66% of the respondents from the questionnaire indicated this risk to be of moderate importance to being very important. Respondents noted that local use is always better and that 'substantial' might not be the correct term, however, that the amounts of energy and GHG emissions is large. They also argue that it depends on the type of transport and that in some cases large distances by truck within a country might even be worse than imported biomass using a ship. However, respondents also noted that more research is needed in this field. Also, some respondents argued that this is not a risk if it is taken into account in the sustainability criteria for biomass.

Longer coal reliance

Support for pellet co-firing may extend the life of older coal power facilities, or encourage investments in coal facilities and therefore lead to a longer reliance on coal for power production.

Only 39% of respondents from the survey rate this risk as being important or very important. Different arguments are raised by the respondents to indicate the lower importance of this risk. Coal plants will remain working, with or without pellets. Whereas a trend of full conversion from coal to pellets is noticed in some other regions. For example in the Balkans coal power plants must be shut down. In Finland fuel peat is used and pellets are mainly used for heat production. Another respondent argued that this can easily be prevented by policy.

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.

68% of the respondents from the survey agree that this is an important risk for importing regions in the EU.

Other risks for importing regions that are mentioned by the respondents are:

- GHG emissions related to time period for regrowth to occur of harvested product and impact on biodiversity.
- Imports undermine the EUs climate and renewable efforts.
- There is a risk for colonization with bioenergy as driving force.

An overview of the percentage of respondents that rated the statements concerning risks for importing regions in the EU as important or very important is provided in the table below.

Table 4. Risks for importing regions in the EU

Statement	Percentage important and very important	
	Brussels workshop	Online survey
Domestic potential underutilized	51%	39%
Import dependency remains	72%	44%
Subsidies and prices impacts	60%	61%
GHG emissions related to transport	12%	42%
Longer coal reliance		39%
Business case uncertainty		68%

2.4. Risks for sourcing regions

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.

76% of respondents in the Brussels workshop rated this risk important or very important. Only for North-America the respondents indicated that this risk is not important. For the other regions more than 65% of respondents indicated this risk to be important to very important. However, for South-America and East Europe (non-EU) & Russia also respectively 27% and 15% of the respondents indicated this risk to be of low importance. For Southeast-Asia and Africa respondents were more unanimous.

Also from the comments provided by the respondents that answered the question for North-America it can be concluded that they agree that overexploitation can be managed and that there is no problem when sustainability guidelines receive strict attention. The respondents also point out that the US biomass industry uses forest residues and unmerchantable saw timber which is unwanted or unusable by other industries. Therefore, the higher-value industries drive harvesting and there has not been an increase or in other words a risk of overexploitation.

In Finland forest legislation guarantees that no overexploitation takes place. Other respondents from the survey also indicated that this issue is especially important in low development countries where legislation and sustainability criteria are harder to implement.

One of the respondents that answered with Africa in mind, indicated that especially the displacement effects (land taking, diversion of biomass and water) are likely to occur.

Displacement
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).

75% of respondents in the Brussels workshop rated this risk important or very important. For East Europe (non-EU) & Russia, Southeast-Asia and Africa the majority of the respondents indicated this risk to be important to very important. Also when the respondents had no specific region in mind, the majority indicated this risk to be important. For North-America and South-America respectively 23% and 40% of the respondents indicated this risk to be important or very important.

For North-America some respondents replied that displacement is taking place for certain industries such as pulp & paper. Another respondent answered that the subsidies power generators receive from EU governments are designed to cover the costs between securing supply of renewables and purchasing coal. Therefore, the subsidies do not increase the paying capacity of US biomass producers.

Access to land
In relation to the above, there is a risk of 'land grabbing' of large players, limiting the access of local people or smallholders to land.

81% of respondents in the Brussels workshop rated this risk important or very important. For this statements you can notice large differences in responses depending on the region. For North-America 71% of respondents indicated that this risk is of low importance or not important. For East Europe (non-EU) & Russia ca. 35% of the respondents indicated the risk to be important, however, also 35% of respondents indicated it to be of no or low importance. For South-America, Southeast-Asia and Africa respectively 60%, 100% and 69% of respondents indicated the risk to be important to very important for the sourcing region.

Respondents indicated that this is especially important in Africa, Asia and South-America.

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.

65% of respondents in the Brussels workshop rated this risk important or very important. Responses from the survey on the importance of this risk for sourcing regions were diverse for all regions. However, for North- and South-America it is clear that the majority of the respondents does not rate the risk as being important, only 20-23% of respondents indicated it as being important or very important.

Some respondents replied that the opposite is the case and that many regions started as exporting regions and that this 'security of supply' triggered national usage. Another respondent indicated that this is not noticeable in Finland. For Latvia, a respondent indicated that, export is higher than import, although the export value is half of the import value, but there is a lack of interest from the government for renewable energy.

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.

73% of respondents in the Brussels workshop rated this risk important or very important. For most regions the respondents of the survey agree that the risk is important or very important. Only for North-America the majority of the respondents indicated that there would be no risk for limited opportunities for smallholders to access the new export markets.

One respondent that provided an answer to this statement with North-America in mind indicated that smallholders could participate through cooperatives or via dealers. Another respondents indicated that many of the smallholders sell to pellet plants.

Some respondents also indicated that the development of commodities helps smallholders to access the market. Whereas other respondents replied that international trade requires a certain expertise that small players might not have. Also, a respondent answered that

economies of scale are key for a profitable biomass trade and these are only reserved for big players.

Low value-added exports
Export is generally restricted to low value-added products, limiting the economic impact in sourcing regions.

Only for Southeast-Asia 80% of respondents indicated this risk to be important to very important. For the other regions this percentage is lower, however, still more than 50%. Only for North-America only 21% of the respondents indicated it as an important risk.

One of the respondents replied that this is true for a lot of imported resources in the EU and not only for biomass. Another respondent indicated that this is especially important on the long run. Whereas one respondent pointed to the fact that although the added value might be low, if the volumes are large, it can still have a large economic impact.

A respondent that replied with Europe in mind, indicated that free trade is needed in order to optimize the production and refinement. And another respondent mentioned that this is only a problem to the extent that energy wood competes with industrial wood.

A respondent indicated that it is unlikely that high value-added products are produced from the same biomass as low value-added products. However, indirect impacts are important in this case.

Unstable EU policy
Changing support frameworks and requirements (quality and sustainability) in the EU harm the business model in sourcing regions.

For all regions the majority of the respondents agreed that this risk is important to very important.

One respondent indicated that this statement is true, however, that business models quickly adapt to where the money is. Other respondents indicated that a stable policy is important to 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. It is also pointed out by respondents that especially NGOs have a large impact on authorities.

In general it can be concluded that respondents answered differently for North-America in comparison with the other regions, except for the last statement (i.e. unstable EU policy).

Other risks that are mentioned by the respondents are:
- *Lack of sustainable forest management (SFM) requirements for traded biomass could hamper the introduction of SFM practices locally.*
- *Biomass development needs to be in tandem with agricultural development, not compete with it.*

An overview of the responses for the different risks per region are provided in the tables below. Table 5 provides the number of respondents that indicated a risk to be important or very important and table 6 provides the number of respondents that indicated a risk to be of low importance or of not being important.

Table 5. Risks for sourcing regions in the EU – Important or Very Important

Region (# respondents)	North-America (37)	South-America (15)	East Europe (non-EU) & Russia (26)	Southeast-Asia (5)	Africa (14)	No specific region (21)
Overexploitation	38%	67%	69%	80%	85%	67%
Displacement	23%	40%	62%	80%	62%	57%
Access to land	11%	60%	38%	100%	69%	48%
Renewable energy opportunities	23%	20%	42%	60%	69%	43%
Large players vs smallholders	26%	73%	65%	100%	85%	43%
Low value-added exports	21%	53%	54%	80%	62%	50%
Unstable EU policy	67%	79%	58%	60%	85%	71%

Table 6. Risks for sourcing regions in the EU – Low Importance or Not Important

Region (# respondents)	North-America (37)	South-America (15)	East Europe (non-EU) & Russia (26)	Southeast-Asia (5)	Africa (14)	No specific region (21)
Overexploitation	43%	27%	15%	0%	8%	10%
Displacement	57%	20%	19%	20%	0%	10%
Access to land	71%	13%	35%	0%	0%	14%
Renewable energy opportunities	60%	33%	38%	20%	15%	29%
Large players vs smallholders	53%	0%	15%	0%	0%	14%
Low value-added exports	44%	27%	12%	0%	23%	30%
Unstable EU policy	8%	7%	8%	0%	0%	10%

3. Barriers for international trade

Junginger, et al (2011) defines bioenergy trade barriers as '*any issue that either directly or indirectly hinders the growth of international trade of biomass commodities for energy end-use'*. It is difficult to draw a clear line what (indirect) trade barriers are, and what general barriers hamper the use of biomass (irrespective of being traded or used domestically).

We start from this reference, although the set-up was broader, including trade of ethanol, biodiesel and wood pellets, while the BioTrade2020+ project focuses on trade of lignocellulosic biomass.

The following overview presents a number of potential barriers, which are also included in the on-line survey launched in April 2015. People can rate these barriers from very important to not important.

3.1. National/regional protectionist policies and trade tariffs

The use of biomass for energy is supported in many countries by governments, the main drivers of support policies being energy independence, climate change mitigation and rural development. To mitigate the generally higher production costs of biofuels and bioenergy, many governments have supported domestic production and consumption through the granting of incentives, such as tax exemptions and subsidies, or through obligation quota. Incentives are often geared towards the promotion of domestic feedstocks and interests. In principle, three types of 'protectionist' policy instruments can be distinguished which can distort the competitive position between domestic and imported biomass.

Measures to promote domestically produced biomass for energy purposes in EU Member States' policies

Some renewable energy regulations in EU Member States specifically promote the use of domestically produced biomass feedstocks. They either focus on technologies which use biomass that is typically available locally (like waste or agricultural residues), or exclude/limit support for larger scale installations (typically relying on international markets), either give a bonus or higher incentives to regional biomass or even state maximum distance requirements for eligibility to financial incentives. The reasoning is usually the view to reduce the risk of unwanted negative side effects associated with imported biomass and also to promote regional economic development.

In the survey it was asked whether the respondents rated the barrier that domestic bioenergy is favoured over imports in EU Member States' policies as being important. Almost half of the respondents rated the barriers as important or very important. However, based on the arguments respondents gave, it seems that the respondents don't see it as a big issue.

Import tariffs for various biomass commodities to the EU

Import tariffs are mainly applied for liquid biofuels (ethanol, biodiesel), partly to protect the domestic biofuel production against cheaper imports, partly as a reaction to subsidized biofuels entering the EU ('anti-dumping'). Often there are preferential rates for certain 'vulnerable' developing regions, although this can create loopholes (e.g. ethanol trade through Caribbean area). For woody biomass, no examples of import tariffs are known.

47% of respondents rated this barrier as important or very important. However, also 16% of respondents responded 'I don't know'.

Subsidies for exported biomass/biofuels and export tariffs in certain sourcing regions
Subsidies for exported biomass/biofuels or export tariffs in sourcing regions can also have an impact on trade of biomass commodities. So far this has mainly played for liquid biofuels (biodiesel, bio-ethanol) in some regions. A typical example in the period around 2008 was biodiesel from the United States which received blender tax credits, also when exported to the EU.

In terms of lignocellulosic biomass, there has been an example in Russia, which imposed export tariffs for roundwood, which particularly limited the export to the Baltic countries and Finland (Heinimö and Alakangas, 2009). This in turn diminished the amount of roundwood processed (and sawdust produced), which in the end effectively limited wood pellet production and export from these countries, and thus indirectly affected the wood pellet trade.

The majority of the respondents (i.e. 48%) rated this barrier as being of moderate importance or important.

Some comments respondents gave:

- *Subsidies and tariffs must promote easy and fair trade between countries and regions.*
- *Not really an issue in North-America.*
- *Not an issue in regions where large export occurs.*

3.2. Technical standards

Technical standards describe in detail the physical and chemical properties of fuels or materials. In principle standards facilitate trade, as products can become 'commodities' with specific properties. Conformity to (international) standards helps reassure consumers that products are safe, efficient and good for the environment.

In the EU, the CEN/TC 335 working group (established in 2000) developed biomass standards to describe all forms of solid biofuels within Europe, including wood chips, wood pellets and briquettes, logs, sawdust and straw bales, resulting in the European EN14961-1 to -6 product standards and EN15234 for fuel quality assurance. ENplus certification scheme for *residential wood pellets* is currently the only scheme based on the European Standards EN14961-2:2012 and EN15234-2:2012. The quality seal ENplus includes the whole supply chain for wood pellets – from production till delivery to the final customer, therefore ensuring high quality as well as transparency. The European standard includes quality classes A1 and A2 that are also implemented via ENplus. Class A1 is the premium quality mainly used in private household boilers or stoves. A1 pellets produce the least amount of ash and fulfill the highest requirements. Class A2 is mainly used in larger installations and produces more ash. Industrial pellets are not called "ENplus", but can be certified as "EN B".

The committee ISO/TC 238 was established in 2007 to develop the relevant global standards for the market for solid biofuels, just like CEN/TC 335 did for Europe. The new standard EN ISO 17225 supersedes EN14961 since 2014.

In Europe there are several approaches to certify other assortments than wood pellets (e.g. wood chips, logs, briquettes). However, currently none has been brought to market maturity. The most advanced is currently in the field of wood briquettes ('ENplus for briquettes'), which have a comparable process and supply chain as pellets. Large efforts have been made by bioenergy associations and certification companies to achieve a system for wood chips because this plays an important role in the regional energy production of heat and/or electricity in many European countries.
Source: SolidStandards (2014)[5]

In terms of international trade, there could be three issues hampering trade:

1. technical standards are made with specific feedstocks in mind, therefore imposing **too strict requirements for certain other feedstocks**,
2. technical quality **standards diverge** between countries/regions or even companies, thereby creating a barrier for trade,
3. uncertainty about standards that are still in negotiation phase.

The majority of the respondents agree that the 2nd and 3rd barrier is important or very important. One respondents argued that not the technical standard divergence is a barrier, but the label that is put on the products (e.g. a biofuel in Ukraine is a waste product in Slovakia). Many of the respondents mentioned the importance of standardization. For the 3rd barrier the respondents agree that uncertainty is very important, however, they also answered that this uncertainty is mainly concerning sustainability issues and not concerning technical specifications. Also, respondents indicated that industry can be involved in the negotiation phase, however, they argue that more involvement from industry is needed.

Only 32% of the respondents rated the 1st barrier as important or very important. From the arguments it can be concluded that the respondents feel that technical standards are needed in order to guarantee sustainable practices and to realize commoditization of biomass. Also, they argue that technical standards are relatively easy to be met by large players.

3.3. 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. **Availability of vessels** is of course closely linked to international shipping rates of dry bulk (for wood pellets). **Harbour and terminal suitability** to handle large biomass streams can also hinder the import and export of biomass to certain regions.

[5] http://www.solidstandards.eu/images/Project_reports/SolidStandards_Publishable_report.pdf; http://www.solidstandards.eu/images/Standardisation/module-general_eng_with_Ann2_Final.pdf; http://www.solidstandards.eu/images/Project_reports/D7.5_Report_on_final_seminar.pdf; http://www.solidstandards.eu/images/Standardisation/D4.4_Development_of_certification_schemes_Final.pdf

The most favorable situation is when the end user has the facility close to the harbour avoiding additional transport by trucks.

Local transportation by truck or train (both in biomass exporting and importing countries) may also be a high cost factor, which can influence the overall energy balance and total biomass costs. **Limited logistical infrastructure** (e.g. railways) can seriously hamper transport of inland biomass to the ports for international trade.

The lack of **significant volumes** of biomass can also hamper logistics. In order to achieve low costs, large volumes need to be shipped on a regular basis. Only if this can be assured, there will be forthcoming investment on the supply side (e.g. new biomass pellet factories) as this will reduce costs per ton significantly through economies of scale. The **bulky nature of biomass fuels** and the relatively low value per unit would restrict availability of suitable areas for handling these fuels in busy ports. On the other hand, this bulky nature in combination with high demand for specific biomass streams means that the present capacity (incl. storage, handling equipment, etc.) of some European harbours is fully utilized. A further increase in biomass handling would require specific investments.

For the on-line survey we identified two items to be rated as trade barrier in terms of logistics:

- lack of roads and port infrastructure in sourcing regions
- lack of port infrastructure in Europe

The lack of roads and port infrastructure in sourcing regions is seen as important or very important by 65% of the respondents. However, some respondents indicated that this is not a problem in the US. The lack of port infrastructure in Europe is less important according to the respondents. Only 32% of the respondents indicated this barrier to be important or very important. However, 15% also answered that they didn't know whether this barrier is important. Also, some respondents indicated that this is mainly a problem for the Southern part of Europe.

In the survey we also asked the respondents to provide other logistical barriers. Some of the barriers mentioned by the respondents are the following:

- *Lack of rail facilities for long distances;*
- *Limited experience in handling solid biofuels in many regions;*
- *Lack of infrastructure between the port and the plant location (even when nearby);*
- *Lack of needed harvesting equipment;*
- *Lack of system approach;*
- *Lack of public support for storage and logistics of biomass.*

3.4. Safety and sanitary/phytosanitary requirements

Safety requirements

The properties of a biomass material and the intended use determine how the material should be safely transported and stored. Self-heating, off-gassing and dust explosions are significant challenges for the industry that have already resulted in significant losses of capital investments and even tragic loss of life. Likewise, exposure to biologically active material, such as moulds and spores may form a serious hazard for the health of workers involved. With the growth of the bioenergy sector, it is important not only that opportunities

for bioenergy are implemented in an efficient and economic manner, but also in a safe manner. Koppejan et al. (2013) provided an overview of health and safety aspects of solid biomass storage, transportation and feeding.[6]

NFPA guidelines in North America and ATEX regulations in the EU have to be followed, as well as state and provincial regulations. Apart from legislative requirements, it is typically also demanded by insurance companies involved. The risk classification for sea-going vessels is regulated under the International Maritime Solid Bulk Cargoes (IMSBC) Code. This code is administrated by the International Maritime Organization (IMO). The Wood Pellet Association of Canada (WPAC) together with the British Columbia Forest Safety Council (BCFSC) in 2011 developed a safety certification scheme for the pellets industry in Canada. The scheme consists of annual on-site audits of production facilities with review of safety based on a rigorous protocol for all handling and processing facilities and the building fire codes (http://www.bcforestsafe.org/other/Base.htm).

For the on-line survey we asked if safety requirements (which may differ by region) can be considered a trade barrier. The barrier was indicated to be important by 30% of the respondents. From the respondents 14% rated the barrier as being very important and another 23% rated it as being of moderate importance.

Sanitary and phytosanitary requirements

Final products may face sanitary and phytosanitary (SPS) measures or technical regulations applied at borders. EU rules on plant health aim to protect crops, fruit, vegetables, flowers, ornamentals and forests from harmful pests and diseases (harmful organisms) by preventing their introduction into the EU or their spread within the EU. Council Directive 2000/29/EC (EC, 2000) provides the basis for this aim. The general principles are based upon provisions laid down in the International Plant Protection Convention (IPPC).

Plant Health controls apply to a wide range of wood products, including some of those destined for use as biofuel (UK Forestry Commission, 2009). These cover fuel wood in the form of chips or particles from coniferous wood and non-coniferous wood, respectively, whether or not agglomerated in logs, briquettes, pellets or similar forms. However, due to the manufacturing process which removes the risk of pests being present, plant health controls do not apply to wood agglomerated in logs, briquettes, pellets or similar forms. Under the EU directive 2000/29/EC, the importation of wood chips for whatever purpose is regulated under the lumber standard of kiln drying which requires heat exposure of 56°C for 30 minutes.

For the on-line survey we asked if SPS requirements (which may differ by region) can be considered a trade barrier for lignocellulosic biomass. The majority (i.e. 55%) of the respondents agrees that this barrier is important to very important. However, also one fifth of the respondents answered 'I don't know' on the statement.

[6] http://www.ieabioenergy.com/wp-content/uploads/2013/10/Health-and-Safety-Aspects-of-Solid-Biomass-Storage-Transportation-and-Feeding.pdf

3.5. 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.[7]

Several issues in terms of sustainability criteria and certification systems are identified for the on-line survey 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 (EC, 2014). 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 (Pelkmans et al., 2012):

(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.

Almost 80% of the respondents agree that this barrier is important or very important. Only 5% indicated this barrier as not important or being of low importance. Also different respondents argued that it is difficult to have one set of criteria that is applicable on a EU level or to take into account country-specific criteria without being too bureaucratic.

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.

[7] http://www.bioenergytrade.org/downloads/iea-sust-cert-summary.pdf

From the online survey, 64% of respondents agreed that this barrier is important or even very important. Respondents argued that it sounds logical that one searches for the least demanding scheme as this might also be the cheapest one. However, respondents also noted that these might not prevent for the largest risks.

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 (EU-TR).

This barrier is seen as one of the most important ones. Almost 75% of respondents agreed that this barrier is important to very important.

Some claim that **different rules for domestic feedstock vs import** are distorting markets.
While certain regions can be identified as having higher risk of illegal and unsustainable practices, requirements should remain unbiased, and unfounded trade barriers should be avoided. The same requirements should be applicable for all non-food biomass sources. However, national legislation may form an important framework to comply with certain requirements/minimum standards. The widely differing environmental conditions in different countries and climatic zones should also be taken into account.

In comparison to the previous barriers concerning sustainability criteria and certification systems, only 47% of the respondents indicated this barrier as being important or very important. Some respondents argued that the same rules should apply. Other respondents mentioned that rules for domestic feedstock might be more strict, however, there is no barrier for trade in that case.

No binding sustainability criteria for other biomass applications
Sustainability criteria are only required for biofuels/bioenergy, but remain voluntary for other applications of biomass. So the market drive to certify the production of biomass only comes from the part which is destined for bioenergy. So the incentive of biomass producers to certify their feedstock may be limited.

From the respondents, 66% indicated that this barrier is important or very important.

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.

From the respondents, almost 70% indicated this barrier as being important or very important. However, also 13% of the respondents indicated this barrier to be not important. Various respondents indicated that fossil fuels are unsustainable and that it therefore would be useless to demand for criteria.

Sufficient sustainability requirements in certification systems
According to some organisations, various certification systems are insufficient to prove sustainability of the biomass value chain, as not enough requirements are included or control mechanisms fall short.

The opinions concerning the importance of this barrier are very diverse.

Mind that **WTO may not allow specific sustainability requirements** - like social criteria – as this would be against trade agreements.

Only 41% of the respondents argued that this barrier is important to very important. Also 14% of respondents replied 'I don't know' to this statement.

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 recent debate regarding indirect land use change (iLUC) and the proposal of the European Commission for adjusted policies, 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.

More than 65% of the respondents indicated that this barrier is important or very important. Some respondents argued that they do not know any case where an effect was noticed. Other respondents suggested to implement sustainability criteria stepwise.

3.6. Global classification and trade statistics

There are trade classifications for woody biomass, see CN/HS (Combined Nomenclature/Harmonised System) chapter 44 'wood and articles of wood, wood charcoal'. "Fuel wood, in logs, in billets, in twigs, in faggots or in similar forms; wood in chips or particles; sawdust and wood waste and scrap, whether or not agglomerated in logs, briquettes, pellets or similar forms" are listed in main CN code 4410, "wood charcoal" under CN code 4402 and "round wood" under CN code 4403. As of 2012, wood pellets are captured in a separate code 440131. Before it was not possible to detect pellets from sawdust or wood waste.

Trade codes only refer to the physical appearance of commodities and not their final end use. When defining the amount of woody biomass trade for energy, absolute global trade streams for specific commodities have to be broken down into their different end use

fractions. Officially reported volumes cover energy related and other streams, e.g. for material purposes in the case of wood chips and roundwood. In addition, one needs to account for potential cross-trading such as re-exports or wholesale activities to avoid double-counting. Official trade data can thus be seen as a theoretical upper limit of possible energy related trade. (Lamers et al., 2014)

While the majority of global *roundwood* production and trade is not connected to bioenergy, there is a large amount of this material (wood processing residues) which are used afterwards to produce energy – this is called indirect trade for energy. *Wood chips* represent the second largest absolute single trade stream, and mainly consists of high quality chips for pulp and paper production. Some energy wood chips are traded, generally produced from waste wood or harvesting residues. *Wood pellets* have become the largest single energy-policy related trade stream. As of 2012, they are tracked under a specific trade code.

For the on-line survey we asked if the following issues represent a trade barrier:

- There is no clear view on biomass trade statistics, in particular which part is used for energy.
- There are problems with reporting trade flows, making some trade statistics unreliable.

For both statements 55% of the respondents agreed that the barrier is important or very important.

Opinions concerning the availability of statistics are somewhat diverse. Several respondents argued that information is important and some even indicate that this information is already available, however, the impact on trade is questionable.

3.7. 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. (Cacciatore, 2012)

For both the public image and the lack of public knowledge, 80% of the respondents indicated the barrier to be important to very important. From the arguments it seems that many respondents agree that actions should be taken to improve the image of biofuels/bioenergy and that mainly NGO influence media. Also, respondents argue that more and better education and training is needed.

An overview of the percentage of respondents that rated the statements concerning barriers for sustainable biomass trade as important or very important is provided in the table below.

Table 7. Barriers for sustainable biomass trade

Statement	Percentage important and very important
National/regional protectionist policies and trade tariffs	
Domestic bioenergy is favoured over imports in EU Member States' policies.	47%
Import tariffs for biomass commodities to the EU.	47%
Subsidies for exported biomass and export tariffs in certain souring regions.	38%
Technical standards	
Technical standards are too strict for certain feedstock.	32%
Diverging technical quality standards between countries/regions or even companies.	51%
Uncertainty about standards that are still in negotiation phase.	55%
Logistics	
Lack of roads and port infrastructure in sourcing regions	65%
Lack of port infrastructure in Europe	32%
Safety and sanitary/phytosanitary requirements	
Varying or inconsistent safety requirements for traded biomass.	44%
Varying or inconsistent sanitary/phytosanitary requirements.	55%
Sustainability criteria & certification systems	
Different sustainability requirements in EU Member States for solid biomass (not EU-wide).	78%
Proliferation of certification systems.	64%
Differences in sustainability governance of agriculture and forestry policies (legislation and enforcement) by country/region.	74%
Different rules for domestic feedstock vs imports.	47%
Sustainability criteria only required for energy and not for other applications of biomass.	66%
Lack of sustainability criteria for fossil fuels creates an unlevel playing field.	69%
Certification systems don't include sufficient aspects of sustainability.	39%
WTO doesn't allow specific sustainability requirements (like social criteria).	41%
Changing sustainability requirements creates uncertainty for stakeholders.	67%
Global classification and trade statistics	
No clear view on biomass trade statistics, in particular which part is used for energy.	55%
Problems with reporting of trade flows and unreliable statistics.	55%
Public knowledge & public opinion	
Bad public image (towards public, media and policy makers) due to claims of unsustainable practices for biofuels.	80%
Insufficient knowledge of public/media/policy makers.	81%

4. Key principles for sustainable biomass trade

For a long term trade strategy, a number of key principles need to be agreed upon with different stakeholders which are a prerequisite to have sustainable biomass trade.

4.1. Introduction – principles for sustainable bioenergy

Sustainability of bioenergy addresses the whole value chain, including biomass production, pretreatment, logistics and conversion to energy. It is a multi-dimensional concept, aiming not only to reduce greenhouse gas emissions but also to focus on issues like soil carbon, biodiversity aspects, energy efficiency principles, social well-being and economic development.

Common principles of sustainable use of biomass for energy purposes, as found in several initiatives aiming at the certification of biomass, biofuels and bioenergy. Already in 2007, the Cramer Commission in the Netherlands published a list of sustainability principles for the use of biomass for energy (Cramer et al., 2007):

1. The **greenhouse gas balance** of the production chain and application of the biomass must be positive.
2. Biomass production must not be at the expense of important **carbon sinks** in the vegetation and in the soil.
3. The production of biomass for energy must not endanger the **food supply and local biomass applications** (energy supply, medicines, building materials).
4. Biomass production must not affect protected or vulnerable **biodiversity** and will, where possible, have to strengthen biodiversity.
5. In the production and processing of biomass the soil and the **soil quality** are retained or improved.
6. In the production and processing of biomass ground and surface **water** must not be depleted and the water quality must be maintained or improved.
7. In the production and processing of biomass the **air quality** must be maintained or improved.
8. The production of biomass must contribute towards **local prosperity**.
9. The production of biomass must contribute towards the **social well-being** of the employees and the local population.

In December 2011, GBEP (the Global Bioenergy Partnership) published a list of 24 sustainability indicators for bioenergy. This is mainly a tool to inform the development of national bioenergy policies and programs, monitor the impact of these policies and programs, as well as interpret and respond to the environmental, social and economic impacts of their bioenergy production and use.

The themes identified by GBEP are the following (GBEP, 2011):

Environmental pillar	Social pillar	Economic pillar
Greenhouse gas emissions	Price and supply of a national food basket	Resource availability and use efficiencies in bioenergy production, conversion, distribution and end-use
Productive capacity of the land and ecosystems	Access to land, water and other natural resources	Economic development
Air quality	Labour conditions	Economic viability and competitiveness of bioenergy
Water availability, use efficiency and quality	Rural and social development	Access to technology and technological capabilities
Biological diversity	Access to energy	Energy security/Diversification of sources and supply
Land-use change and indirect effects	Human health and safety	Energy security/Infrastructure and logistics for distribution and use

In recent evolutions **efficient use of resources** is emphasized, 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'[8] should be acknowledged.

Mind that in the BioTrade2020+ project our focus is on trade, which implies that the final use of the biomass energy carrier is not part of the discussion. This will be treated in other dedicated projects like Biomass Policies[9] or S2Biom[10].

4.2. Principles for sustainable biomass trade

The following principles were collected from three stakeholder consultations: the international workshop of 24 October 2014, a teleconference of 27 November 2014, and a discussion with the advisory board group on 11 February 2015. People also gave their opinion concerning the principles in the on-line survey.

Sustainable and legal biomass sourcing
Trade should be based on **sustainable and legally acquired biomass sourcing** (traceable and verifiable).

94% of respondents in the Brussels workshop agreed or fully agreed with this principle. Also in the survey 97% of the respondents agreed or fully agreed with the 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

[8] L. Pelkmans et al. (2014): Guidelines and indicators for the evaluation of sustainable resource efficient biomass value chains. Biomass Policies D2.6
[9] www.biomasspolicies.eu
[10] www.s2biom.eu

(compared to the EU), this creates an unlevel playing field between domestic and imported biomass.

A workable contents of 'sustainable' is to be defined. The Renewable Energy Directive (for liquid biofuels) and the EU Timber Regulation can be a starting basis. Requirements can evolve step by step and some aspects can be region specific. The final goal should be that sustainability requirements for biomass sourcing are extended to all applications of biomass (food/feed/materials/energy).

Some sourcing regions can develop further towards sustainable practices through,

- sharing good practice experiences,
- developing their own opportunities in terms of renewable energy and higher value products,
- fully understanding market requirements, so these don't form market/trade barriers. Sustainability requirements/codes of good practice and voluntary schemes can trigger good practices in sourcing regions, e.g. better forest management increases annual wood increment and therefore the available potential.

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, pretreatment, transport and final conversion to electricity, heat and/or biofuels. For traded material, pretreatment to tradable commodities and long-distance transport are important to be considered.

97% of respondents in the Brussels workshop agreed or fully agreed with this principle. In the survey 58% of respondents totally agreed and another 32% agreed with the statement that the full value chain has to be used as a basis for performance assessment.

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

Local use of biomass should have priority over trade

70% of respondents in the Brussels workshop agreed or fully agreed with this principle. In the online survey 76% of respondents agreed or totally agreed, 22% was neutral and 2% answered 'I don't know'.

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, 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.

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.

63% and 75% of respectively respondents in the Brussels workshop and online survey agreed or fully agreed with this principle. Respondents argued that more studies are needed in order to identify the best way to put this into practice.

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.

From the online survey 80% of the respondents agreed or fully agreed with this principle.

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.

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.

An overview of the percentage of respondents that agreed or totally agreed with the statements concerning key principles for sustainable biomass trade is provided in the table below.

Table 8. Key principles for sustainable biomass trade

Statement	Percentage agree or totally agree	
	Brussels workshop	Online survey
Trade should be based on sustainable and legally acquired biomass sourcing (traceable and verifiable).	94%	97%
Full value chain (from feedstock production up to end conversion) as a basis for performance assessments (e.g. energy, GHG).	97%	88%
Local use of biomass should have priority over trade. Displacement as a result of trade demand should be avoided.	70%	76%
Displacement/indirect effects in the sourcing regions should be taken into account in support mechanisms for biomass/bioenergy.	63%	75%
Markets should be open (WTO compliant), and there should be no discrimination in market access.		80%
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 transparent, with clear reporting and monitoring systems.		90%

Other principles that are mentioned by the respondents are the following:

- *Biomass usage should follow an integrated path and applications other than energy should always be considered.*
- *One should focus on the main demands such as GHG emission reduction and reduction of fossil fuel usage. Other sustainability demands are as relevant as they are to other trade chains (e.g. coffee and bananas).*
- *It is important to have a multi-stakeholder definition of sustainable practice.*

5. Suggested policy options for biomass imports

Policy recommendations will be developed further on in the project and discussed with stakeholders. At this stage, we selected a number of **policy options** in relation to the key principles. These are included in the on-line survey for feedback. Mind that these are to be considered as *statements* on which people can react.

5.1. Sustainability criteria for bioenergy

- **Harmonized/common sustainability criteria** for bioenergy are needed at EU level, not only for biofuels/bioliquids (as foreseen in the RED), but also for solid and gaseous biomass for energy. Different rules for different applications, or differing Member States rules results in market distortions. Towards the future also non-energy applications (bio-products) should be envisaged.
- The current sustainability criteria for biofuels/bioliquids in the RED (greenhouse gas emissions, biodiverse land, high carbon stock land) are mainly designed with agricultural land use in mind. Requirements for solid biomass – often related to forestry practices - should **go further than the current RED criteria** for biofuels.
- When forestry biomass is used, a proof of **sustainable forestry management** (e.g. FSC, PEFC) should be required.
- The EU should put more dedicated efforts in **cooperation/good practice exchange with sourcing regions** towards sustainable practices in biomass production and harvesting and **capacity building**.

More than 85% of respondents from the online survey agree with the 1st, 3rd and 4th suggested policy option concerning sustainability criteria. Only with the second option (i.e. requirements should go further than current RED criteria) fewer respondents agree. However, still 70% of respondents agree or totally agree with this option.

The participants of the international workshop in Vienna also agree with the different criteria. 90% of the respondents totally agrees or agrees with the first, third and fourth option and 70% with the second.

Despite the large number of respondents that agree with the different policy options, some comments were provided:

- *Biomass is not a common product across the EU and, therefore, it is hard to provide common sustainability criteria.*
- *It is not clear why local usage should be regulated according to harmonized/common sustainability criteria.*
- *Criteria that are suggested by the respondents on top of the current RED criteria are social criteria, prosperity, environment (water, air, soil), and wellbeing. However, various respondents indicated that the current RED criteria are sufficient and that adding more criteria would make it too complicated.*
- *FLEGT and EUTR can be combined in order to achieve cooperation or good practice exchange with sourcing regions.*

5.2. Displacement/indirect effects

- Certain types of feedstock that have higher risks of indirect effects/displacement should be **excluded from support**, or support can be capped (as is suggested for crop based biofuels).
- There should be incentives for market parties to improve their performance and tend to **practices that avoid or reduce negative indirect effects**. The EC should clearly define which practices are approved to be entitled for support.
- Indirect effects should be **quantified** and included in value chain calculations (e.g. in terms of GHG balance).

The majority of the respondents agree with the three policy options, respectively 80%, 80% and 72% of the survey respondents agreed or totally agreed with option one, two and three concerning displacement/indirect effects. In the workshop the respondents were less in favor of the policy options. More specifically 63%, 74% and 52% agrees or totally agrees with respectively the first, second and third policy option.

For the first policy option not all respondents agree that certain types of feedstock should be excluded from support. They argued that more measures are needed or that one should look at practical situations instead of feedstock type. The respondents also indicated that the risk exists that a large part of the potential will be excluded.

Some respondents indicated that the quantification of indirect effects is interesting, however, they questioned the way it has to be quantified. They also noticed that these effects should also be taken into account for other energy sources in that case. Therefore, although most respondents agree that this is an important policy option, they question whether it can be put into practice.

5.3. Standards & labeling

- **Technical standards** for traded biomass should be agreed at international level, e.g. ISO.
- All wood-derived products (i.e. materials and energy carriers) should be **labelled** if they come from **legal and sustainable** forests or not.

For both statements 85% of the respondents from the online survey indicated to agree or totally agree with the policy option. Also in the international workshop in Vienna, 85% of the respondents agrees or totally agrees with the first policy option and even 100% with the second option.

5.4. Monitoring

- There needs to be clarity and transparency about trade flows. Better **monitoring systems** with distinct classifications are needed for international trade flows of wood and other lignocellulosic products.

83% of the survey respondents and 85% of the participants of the international workshop in Vienna agree or totally agree with the policy option.

An overview of the percentage of respondents that agreed or totally agreed with the policy options is provided in the table below.

Table 9. Policy options (EU) for biomass imports

Statement	Percentage important and very important	
	Survey	**Vienna workshop**
Sustainability criteria for bioenergy		
Harmonized/common binding sustainability criteria are needed on EU level, also for solid and gaseous biomass for energy.	85%	90%
Requirements should go further than the current RED criteria for biofuels (greenhouse gas emissions, biodiverse land, high carbon stock land).	69%	70%
When forestry biomass is used, a proof of sustainable forestry management (e.g. FSC, PEFC) should be required.	90%	90%
The EU should put more dedicated efforts in cooperation/good practice exchange with sourcing regions towards sustainable practices in biomass production and harvesting, and capacity building.	86%	90%
Displacement/indirect effects		
Certain types of feedstock that have higher risks of indirect effects/displacement should be excluded from support, or support can be capped to a certain amount of feedstock.	80%	63%
There should be incentives for practices that avoid/reduce negative indirect effects. The EC should clearly define such practices.	80%	74%
Indirect effects should be quantified and included in value chain calculations (e.g. in terms of GHG balance).	72%	52%
Standards & labelling		
Technical standards for traded biomass should be agreed at international level, e.g. ISO.	85%	85%
All wood-derived products (i.e. materials and energy carriers) should be labelled to indicate if they come from legal and sustainable forests or not.	84%	100%
Monitoring		
Better monitoring systems with distinct classifications are needed for international trade flows of wood and other lignocellulosic products.	83%	85%

6. Conclusions

The main aim of the project BioTrade2020plus is to provide guidelines for the development of a European Bioenergy Trade Strategy for 2020 and beyond. This **draft discussion document** intends to present a background overview for this strategy in terms of:

- opportunities and risks of sustainable biomass trade, perceived by different stakeholders, both for importing and exporting regions,
- the current technical barriers for market parties when they are involved in trade,
- a number of suggested key principles to be agreed upon with different stakeholders as a prerequisite to have sustainable biomass trade and
- suggested policy options for biomass imports.

The different sides of sustainability come forward in most items: ***environmental*** in terms of climate impacts, biodiversity, soil, water, air and sanitary-phytosanitary requirements; ***social*** in terms of market access, fairness, access to local resources, avoiding displacement and creating socio-economic opportunities (as new jobs…); ***economic*** in terms of markets and business case, e.g. building up infrastructure and logistics, creating economic opportunities, cost-efficiency, flexibility, and clarity of standards/requirements.

Describing opportunities, risks and barriers is no exact science and can be politically sensitive. Mind that many of the statements in this discussion document are still open for debate. All statements were also included in an on-line survey, and stakeholders gave feedback on these. The survey was launched in the course of April 2015.

The main conclusions that can be drawn based on the different stakeholder consultations are summarized below.

The respondents indicated ‘limited domestic potential’ and ‘cost-efficiency’ as the main opportunities for importing regions. The fact that EU countries can build trading links with strategic trade partners is seen as the least important opportunity.

Economic development and job creation are the main opportunities for sourcing regions that were indicated by the respondents when they had no specific region in mind. Also for North-America the main opportunity that is indicated by the respondents is economic development. Also it was indicated as an important opportunity that demand from outside the region with specific sustainability requirements or request for sustainability certification contributes to improved sustainable practices in the sourcing region. The latter is also indicated as an important opportunity for South-America. The respondents indicated for all opportunities that these are most important for Southeast-Asia. One of the most important opportunities that is indicated for Southeast-Asia by the respondents is building up supply chains. For Africa the most important opportunity is triggering sustainable practices according to the respondents.

The main risk for importing regions, according to the respondents of the survey, is a difficult investment climate due to the lack of long-term stability in terms of policies and prices. The underutilization of the domestic potential and a longer coal reliance are less important risks according to the respondents.

For the sourcing regions the risks that were indicated as being the most important ones differ a lot depending on the region. With no specific region in mind, 'overexploitation' and 'unstable EU policy' are indicated as the most important ones. The unstable EU policy is also indicated as the most important one by the respondents that answered with North-America in mind. Furthermore, it is noticeable that the respondents that answered with North-America in mind, didn't really see the provided risks as being important. For South-America, 'large players vs smallholders' and an unstable EU policy are the main risks. The respondents indicated the risk of overexploitation and the focus on large scale players as the main risks when they had East-Europe (non-EU) & Russia in mind. In general the risk are rated to be more important when the respondents had southeast Asia or Africa in mind. For both regions especially the risk of land claiming is rated higher in comparison with the other regions.

The bad public image due to claims of unsustainable practices for biofuels and a lack of knowledge of public, media and policy makers are seen as the most important barriers for trade. Furthermore, respondents indicated the difference in sustainability requirements in EU Member States for solid biomass and the differences in sustainability governance of agriculture and forestry policies by country/region as one of the main barriers. The lack of port infrastructure in Europe, subsidies for exported biomass and export tariffs in certain sourcing regions, and technical standards that are quite strict for certain feedstocks are less seen as trade barriers by the respondents.

In comparison to the other statements, the respondents were relatively unanimous in their answers concerning the key principles for sustainable biomass trade. All principles were indicated to be important, however, the most important one is that trade should be based on sustainable and legally acquired biomass sourcing (traceable and verifiable). Also, respondents indicated that the full value chain should be the basis for performance assessment.

In the last part of the survey some policy options were provided and respondents agreed most with the following two options: (1) harmonized/common binding sustainability criteria are needed on EU level, also for solid and gaseous biomass for energy, and (2) a proof of sustainable forestry management should be required when forestry biomass is used. The respondents were less in agreement with the option that requirements should go further than the current RED criteria for biofuels. Although most respondents agreed with harmonized/common binding sustainability criteria, they also wondered whether this is possible, taking into account that biomass is not a common product across the EU. Also, respondents questioned whether local usage should be regulated according to harmonized/common sustainability criteria. Most respondents also indicated that taking into account displacement/indirect effects is important, however, they question whether it can already be put into practice.

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Annex 1: Brussels workshop

See the Workshop Summary of the International workshop 'Towards sustainable international biomass trade strategies' of October 24, 2014 in Brussels.

Annex 2: Online survey

See the Survey Summary ‘Policy options for sustainable biomass trade’ of October, 2015.

Annex 3: Vienna workshop

See the Workshop Summary of the International workshop ‘Policy options for sustainable biomass trade’ of June 3, 2015 in Vienna.