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Regional Networks for the development of a Sustainable Market for
Bioenergy in Europe



D 3.4: Fuel quality and sustainability issues in the Target Regions

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1 Introduction to quality and sustainability aspects of bioenergy

Increasing the use of biomass feedstocks for energy purposes creates adverse socio-economic and environmental consequences. Concerns over the various effects bioenergy causes on the human influence on climate change and biodiversity for example, has propelled serious efforts to generate frameworks for sustainable biomass use. During the recent years, several sustainability standards especially for transport biofuels have been published, both as mandatory national and EU schemes and as voluntary certification schemes. At the heart of the standards are the criteria for sustainability, often setting requirements on life-cycle GHG emission reductions compared to fossil fuels, sustainable land use and social sustainability. Criteria for liquid biofuels set in the current renewable energy directive 2009/28/EC are highly relevant in the European context.

Article 17 of the renewable energy directive (RED) 2009/28/EC of the European Union lays down sustainability related conditions of taking into account the consumed transport biofuels and bioliquids in each Member State's efforts to fulfil its binding target of the share of renewable energy in the gross final consumption of energy. In the same article, the Commission was required to report by the end of the year 2010 on the necessity of a sustainability scheme for energy uses of biomass other than transport biofuels or bioliquids. The Commission of the European Union adopted the report COM(2010)11 on the 25th February 2010 (European Commission, 2010), resolving not to propose, at that stage, any binding sustainability criteria for the use of solid or gaseous biomass for bioenergy purposes. The wide variety of biomass feedstocks was seen as one of the difficulties of producing such criteria. Risks relating to sustainability of domestic production of biomass from wastes and residues were also regarded as low. Therefore, the Commission proposed simple criteria for the member states planning to include requirements on sustainability of bioenergy production in their national legislation to follow. The requirements include a quite similar GHG reduction requirements and prohibition to use certain land areas for biomass production as in the Article 17 of the RED. Additionally, the recommendations included monitoring of the biomass and differentiation of the national support schemes for favour of efficient conversion technologies. The sustainability requirements should only be imposed on installations more powerful than 1 MW. This propositions in COM(2010)11 were made to prevent discrimination and inconsistencies in the biomass markets.

As currently there is no imposing legislation on EU level concerning sustainability standards for solid or gaseous biomass use for energy purposes, the bioenergy sector generally operates within frameworks related to agriculture, forest management and waste management. Debate on the necessity of binding EU wide sustainability criteria on all biomass use for energy purposes is however continuing and European Commission is set to publish a report on this by the end of the year 2011. A lack of national and international holistic framework for assessing and monitoring sustainability, due to its complex nature, remains an opposing force to such harmonized legislation. Regardless of the availability of a holistic approach to sustainability, binding criteria such as the ones presented in the COM(2010)11 can be imposed on all bioenergy production, depending on the public, industrial and political view in the future.

Sustainable design of a regional bioenergy system cannot be given from outside the local perspective, but has to be built case specifically. The standardized method for life-cycle assessment, and database tools for sustainability impact assessment and multi-criteria decision making play an important role here. On the other hand, use of verified sustainability certification schemes can offer the most sensible way to ensure a level of sustainability for the operations, given that the certificate framework covers the most important aspects of sustainability for the target region and complies to current or, if needed, foreseeable legislation on sustainability requirements.

Regarding the quality of solid biomass in energy production, EU gave a mandate to European standardisation institute (CEN) to develop standards for solid biofuels. Technical committee CEN/TC 335 has developed 37 standards for solid biofuels. These standards cover terminology (EN 14588), fuel specification and classes (multipart standard EN 14961), fuel quality assurance (multipart standard EN 15234), sampling (EN 14778) and sample preparation (EN 14780), physical and mechanical properties (15 standards) and chemical analysis (6 standards). Standards have been developed during 2000 – 2011 and are now published for market use. In EN 14961 multipart standard fuel specification is based on origin and source and different quality requirements are set for different types of traded forms (e.g. wood chips, pellet and firewood). EN 15234 multipart standard includes the whole supply chain, setting requirements on the traceability and documentation of the certified forest material.

1.1 Goal and scope of the task

The goal concerning sustainability aspects is to establish recommendations on how to take into account the sustainability requirements in the planning and use of regional bioenergy systems. In this project, a “bioenergy region” covers at least one third of its energy need from heat and power produced from regional and sustainable energy sources, mainly from solid biomass.

Regarding the quality requirements of the produced and consumed biomass-derived solid and liquid fuels, compliance requirements to any relevant standards, such as to CEN multipart standards EN 14961 and EN 15234, are pointed out.

Only the use of published standards and frameworks of sustainability and quality requirements are assessed in the task.

2 Criteria and indicators of sustainability

Activities of bioenergy production cause impacts which can be categorized in various ways, for instance effects on GHG emissions. In order to deem if an activity is sustainable or not, a qualitative or a quantitative target, representing public values or scientific principles, has to be set for each impact category. Criteria of sustainability are formed this way. The measure of each criterion is called an indicator, again either qualitative or quantitative.

The comparable relevancies of sustainability criteria are to a large extent subjective, and have to be either formed by questionnaires or justified according to current legislation or well-defined social and environmental issues in the target region. The following are examples of criteria expressed in published certification schemes and standards of sustainability:

- **Environmental:** GHG balance, energy balance, soil protection, water management, natural resource efficiency, ecosystems protection, waste management, adaptation capacity to environmental hazards and climate change, crop diversity, species protection, control of pests and use of chemicals and fertilizer, potentially hazardous atmospheric emissions other than greenhouse gases, land use change, use of GMOs, ecosystems connectivity, exotic species applications.
- **Social:** Participation, compliance with laws, monitoring of criteria performance, food security, working conditions of workers, planning, property rights and rights of use, respect for human rights, cultural acceptability, respecting minorities, social cohesion, land availability for other human activities than food production, standard of living, noise impacts, visual impacts.
- **Economic:** Microeconomic sustainability, economic stability, employment generation, macroeconomic sustainability.

The sustainability criteria in the renewable energy directive (RED) and Commission report COM(2010)11 are essential in the European context, and they are given special attention here.

2.1 Harmonized EU policy on sustainability requirements for renewable energy

2.1.1 RED criteria for biofuels and bioliquids (Directive 2009/28/EC)

The criteria in RED address the greenhouse gas emissions saving from the use of transport biofuels or bioliquids. Criteria are also set for the impact on the biodiversity in the production environment, with a no-go for production on primary forest and wooded areas with undisturbed ecosystems, on areas reserved for nature protection purposes and on grasslands with a high biodiversity. Raw material for the biofuels or bioliquids can neither be obtained from land with high carbon stock, namely wetlands and continuously forested areas. Land converted from peatland after 2007 shall neither be used for the raw material production unless evidence is provided that production does not involve drainage of previously undrained soil.

The renewable energy directive does not give sustainability requirements for solid biomass, only for biofuels for transport purposes and for bioliquids for energy production within the EU. In order to assess the fulfilment of the criteria by a certain bioliquid, the following information must be gathered:

- Full chain GHG reductions compared to a fossil alternative. The RED gives methodology and default values to use in the assessment.
- Origin of the raw material. Lands of high value of biodiversity such as primary forest and other wooded land, grasslands with high biodiversity and areas designated for nature protection purposes are not allowed for production. Raw material production may not take place in areas of previously high carbon stock that were converted to croplands after January 1th 2008. Areas of significant carbon stock include wetlands, continuously forested and certain semi-forested areas, and previously undrained peatland.
- Conformity of production to good agricultural practices.
- Impacts on soil, water and air, as well as social impacts on the area of production must be reported to Commission.

The European Committee for Standardization (CEN) has prepared the standards prEN 16214-1, prEN 16214-2 and prEN 16214-3 for public enquiries, which are aimed to harmonize the interpretation of the RED sustainability criteria.

2.1.2 Commission recommendations on sustainability criteria for solid biofuel use

The RES Directive required Commission to give report on the issue whether harmonized sustainability requirements should be given for solid biomass used in energy production, keeping in focus the proper functioning of the biomass markets within the community. COM(2010)11 was published in 2010 for this purpose. Mandatory sustainability criteria were not seen necessary, but Commission gave recommendations for criteria to which any national acts or regulations should conform to. Moreover, any obligations should be given only to power or heat installations of over 1 MW.

Current Commission recommendations for the sustainability criteria for bioenergy, as in COM(2010)11, are:

- Prohibition on the use of biomass from lands converted from high carbon stock areas, such as forests, or areas of high bio-diversity.
- The national support schemes for energy production should be differentiated in favour of installations with high conversion efficiencies.
- The origin of the fuel biomass should be documented.

- The GHG emissions from the whole bioenergy value chain should be at least 35 % lower compared to EU's fossil energy mix. This would concern only non-waste materials, except as listed in the annexes. The GHG emission reductions should increase to 50 % in 2017 and 60 % in 2018.

The annexes of the report COM(2010)11 contain a methodology for calculating the GHG savings from bioenergy use. They include, in a similar manner as the annexes of the RED, default values for a set of bioenergy alternatives such as wood chips, briquettes, pellets and biogas from different feedstocks.

2.2 Published certification schemes and standards of sustainability

2.2.1 RED compatible standards and meta-standards

International Sustainability and Carbon Certification ISCC

The ISCC is based on RED criteria and is aimed for all feedstocks and all regions, being operational in EU. The six principles of ISCC are (ISCC 2011):

- Biomass shall not be produced on land with high biodiversity value or high carbon stock and not from peat land (according to Article 17, 3. of the Directive 2009/28/EC and § 4 to 6 of the German BioSt-NachV and BioKraft-NachV). HCV areas shall be protected. The restriction applies if the area had one of the above statuses in or after January 2008.
- Biomass shall be produced in an environmentally responsible way. This includes the protection of soil, water and air and the application of Good Agricultural Practices.
- Safe working conditions through training and education, use of protective clothing and proper and timely assistance in the event of accidents.
- Biomass production shall not violate human rights labour rights or land rights. It shall promote responsible labour conditions and workers' health, safety and welfare and shall be based on responsible community relations
- Biomass production shall take place in compliance with all applicable regional and national laws and shall follow relevant international treaties.
- Good management practices shall be implemented.

Other sustainability standards designed to fulfil the RED criteria include:

- French sustainability scheme for RED compliance 2BSvs (2BSvs 2011)
- German scheme for biomass sustainability under RED REDcert (REDcert 2011)
- Sustainably produced biomass NTA 8080/8081 (formalized Cramer Criteria, NL) (NTA 8080/8081 2011)

- Better Sugarcane Initiative BSI (BSI 2011)
- Roundtable on Responsible Soy RTRS (RTRS 2011)
- Red Tractor Farm Assurance RTFA (RTFA 2011)
- Roundtable on sustainable Palm oil RSPO (RSPO 2011)
- Roundtable on Sustainable Biofuels RSB, Version 2.0 (RSB 2011)
 - Lausanne based RSB has advanced to standard version 2.0 concerning sustainable biofuel production. Moreover the RSB has launched standard called RSB Standard for EU market access, which ensures that all the biofuels and biomass produced for EU markets conform to both the RED sustainability criteria and the principles set in the RSB meta-standards, mainly the version 2.0 of the RSB Principles & Criteria for Sustainable Biofuel Production.

2.2.2 Forest management certificates

Forest Stewardship Council FSC

The FSC certification scheme for forest is globally applicable. Certificates are issued by accredited third-party certification bodies. Compliance to FSC conditions are monitored annually through auditing. As an overview, an applicant must assess and adopt the following criteria (Forest Stewardship Council 2011):

- Compliance with all applicable laws and international treaties
- Demonstrated and uncontested, clearly defined, long-term land tenure and use rights
- Recognition and respect of indigenous peoples' rights
- Maintenance or enhancement of long-term social and economic well-being of forest workers and local communities and respect of worker's rights in compliance with International Labour Organisation (ILO) conventions
- Equitable use and sharing of benefits derived from the forest
- Reduction of environmental impact of logging activities and maintenance of the ecological functions and integrity of the forest
- Appropriate and continuously updated management plan
- Appropriate monitoring and assessment activities to assess the condition of the forest, management activities and their social and environmental impacts
- Maintenance of High Conservation Value Forests (HCVFs) defined as environmental and social values that are considered to be of outstanding significance or critical importance

- In addition to compliance with all of the above, plantations must contribute to reduce the pressures on and promote the restoration and conservation of natural forests.

Programme for the Endorsement of Forest Certification PEFC

PEFC Sustainable Forest Management (SFM) requirements are set in national standards (such as PEFC Latvia), and the certificates are issued by local accredited certification bodies (such as VIDES KVALITATE – EQ in Latvia). As an overview, a PEFC sustainable forest management certification can be obtained if the following best practices in forest management are followed (PEFC 2011):

- Biodiversity of forest ecosystems is maintained or enhanced
- The range of ecosystem services that forests provide is sustained
 - they provide food, fibre, biomass and wood
 - they are a key part of the water cycle, act as sinks capturing and storing carbon, and prevent soil erosion
 - they provide habitats and shelter for people and wildlife; and
 - they offer spiritual and recreational benefits
- Chemicals are substituted by natural alternatives or their use is minimized
- Workers' rights and welfare are protected
- Local employment is encouraged
- Indigenous peoples' rights are respected
- Operations are undertaken within the legal framework and following best practices

Finnish PEFC certification also includes criteria for energy wood (www.eubionet.net).

2.2.3 Other standards and voluntary certification schemes

Nordic Ecolabel for Pellets

Nordic Ecolabel for pellets is intended primarily for pellets used in small to medium sized boilers in private use. Boilers can however be as large as required for heating an apartment block or a public building. Nordic Ecolabel itself is official ecolabel of the Nordic Countries, established by the Nordic Council of Ministers in the 1989. The criteria are summarized here as they are especially given for pellets (Nordic Ecolabelling 2011).

Ecolabelled pellets must be manufactured environmentally and quality controlled conditions, including documenting the traceability of raw materials, planned changes and unplanned unconformities in

production. The pellet grade must be kept constant, which is analysed daily and also annually through third-party inspection. The grade specifications and relevant CEN standards describing the verifying test methods are given in the criteria. The manner of and requirements for the delivery of raw material to the manufacturer and produced solid biofuel to consumers must be established throughout the value chain.

The regulatory requirements include a declared full compatibility of pellet production with relevant national legislation and agreements on recycling of materials. Also the adherence to laws and regulations on working safety and environment must be declared.

Wood raw material must be chemically untreated wood residues without bark (EN 14961-1 class 1.2.1.1). Otherwise untreated wood may however contain traces of adhesives. Virgin wood material may not originate from protected forest environments, and a given portion of the wood must be grown in certified forests. Additives may not be used in the production unless the levels of heavy metals and halogenated compounds in the product do not exceed those of pure wood. The emission and ash properties must be verified by an accredited laboratory.

The energy consumption during the pellet manufacture is under normative limits, and must be monitored and documented. The origin and consumption of energy by various sub-processes must be declared accordingly. The greenhouse gas emissions per produced pellets are under normative limits as well and must be assessed.

Finally, the dimension, calorific value, ash content, moisture, density, raw materials and additives must be specified in the product declaration.

Nordic Ecolabel has also published sustainability criteria for biofuels, which are publicly available from the website as Nordic Ecolabelling of fuels (<http://www.nordic-ecolabel.org/>). Other sustainability certification schemes, mainly for agricultural production of biomass include:

- Genesis QA (UK, primarily for agricultural food production)
- Linking Environment and Farming LEAF
- Sustainable Agriculture Standard/Rainforest Alliance, SAN/RA (promotes sustainable agriculture in the tropics)

3 Relevant quality standards

3.1 EN 14961 Solid biofuels – Fuel specification and classes

Under EN 14961-1 (Solid biofuels – Fuel specification and classes – Part 1: General requirements) the solid biofuels are classified based on origin, source, major traded forms and properties. The Standard is intended for general but mainly for industrial use, and was published in 2010. The traceability of the whole fuel chain needs to be unambiguous. Origin and source are normative requirements and are always to be stated. Information on moisture and ash content are among the normative requirements as well. Net calorific value or energy density of hog fuel must always be stated. For the more uniform wood chips, these are only informative data.

Classification for the solid biofuel biomass (CEN 2011):

- 1 Woody biomass
 - 1.1 Forest, plantation and other virgin wood
 - 1.2 By-products and residues from wood processing industry (1.2.1 chemically untreated and 1.2.2 Chemically treated)
 - 1.3 Used wood
- 2 Herbaceous biomass
- 3 Fruit biomass
- 4 Biomass blends and mixtures (blends are intentional, mixtures unintentional)

The standard sets additional requirements for chemically treated biomass (e.g. glued, painted, laminated or lacquered wood). The biomass is considered as chemically treated if other treatment than exposure to water air or heat has been used. Chemically treated solid biofuels may not include heavy metals or halogenated compounds, such as in case treatment with wood preservatives or coating. Nitrogen (N), sulphur (S) and chlorine (Cl) contents are regulated and must be stated for chemically treated solid fuels.

EN 14961-4 (Wood chips for non-industrial use) classifies wood chips for non-industrial use into virgin wood (classes A1 and A2), plantation wood fertilized by sewage sludge (class B1) and chemically treated or used wood (class B2). Net calorific value as received, bulk density and moisture content are regulated for wood chips in classes A1 and A2, and for class B they need to be stated. Ash content is regulated for all of the classes.

Other standards of the EN 14961 family are (CEN 2011):

- EN 14961-2 Wood pellets for non-industrial use

- EN 14961-3 Wood briquettes
- EN 14961-5 Firewood
- EN 14961-6 Non-woody pellets for non-industrial use (approved not published)

3.2 EN 15234-1 Solid biofuels - Fuel quality assurance - Part 1: General requirements

Fuel quality assurance standard serried (EN 15234) is based on ISO 9000 standard including quality assurance and quality control part. The overall aim of this European Standard is to guarantee the solid biofuel quality through the whole supply chain, from the origin to the delivery of the solid biofuel and provide adequate confidence that specified quality requirements are fulfilled. This European Standard for fuel quality assurance is only concerned with the fuel part. To ensure the efficient use of solid biofuels, the relationship between the fuel and the combustion unit is also important to consider. (CEN 2011)

In addition to information required by EN 14961-1 about the traded form and origin and source of the solid biofuel, the product declaration by according EN 15234-1 includes supplier information. As an example, the product declaration of wood chips for power production would include producer information such as producer, lot number, origin and source and traded form according to EN 14961-1. Also information on product properties would be stated, including particle size, moisture and ash content and net calorific value. Also product same product standards for wood pellets, wood briquettes, wood chips, firewood and non-woody pellets are prepared for quality assurance (EN 15234-2 to 6). (CEN 2011)

4 Compiled Target Region's checklist for quality and sustainability issues of local bioenergy

This chapter compiles the sustainability criteria of the applicable existing standards and certification schemes listed in chapter 2.2. The criteria and requirements are presented for relevant feedstocks, biomass products and for bioenergy production in general.

4.1 Feedstock

4.1.1 Forest based raw materials

Are the current forest resources certified in an up to date manner which takes sustainability into account? The following voluntary certification schemes can be used:

- Forest Stewardship Council FSC.
- Programme for the Endorsement of Forest Certification PEFC

Essential conditions that should be ensured based on the principles of the above schemes:

- Compliance with all applicable laws and international treaties.
- Local employment is encouraged, respecting the workers' rights and welfare.
- Biodiversity of forest ecosystems is maintained or enhanced. Impacts of logging activities on the ecological functions and integrity of the forest are managed and reduced.

4.1.2 Raw material from field biomass

Is the imported or locally cultivated field biomass produced in certified farms? RED criteria can be used as a guideline to assess the sustainability of the raw material production. This can be ensured by using the following voluntary standards:

- International Sustainability and Carbon Certification ISCC.
- Version 2.0 of the RSB Principles & Criteria for Sustainable Biofuel Production

Essential conditions that should be ensured based on the principles of the above schemes:

- Compliance with all applicable laws and international treaties
- Land area used for biomass production conforms to the Article 17.3 of the RED.
- Protection of air, water and soil.

4.2 Products

4.2.1 Pellets

Do the utilized pellets have a certificate of sustainability applicable on the target region, such as Nordic Ecolabel for Pellets in the Nordics? Is the quality of the produced or imported pellets assured and declared under the appropriate CEN standards EN 14961-1, EN 14961-2, EN 14961-6, EN 15234-1, EN 15234-2 and EN 15234-6?

Essential conditions that should be ensured based on the principles of the above schemes and standards:

- Source and origin, major traded forms and properties are stated and classified. Moisture and ash content are among the normatively controlled properties
- Traceability of the product chain is unambiguous.
- Traces of chemicals in the product are monitored and below normative limits.
- Product declaration made according to requirements.
- Pellets must be manufactured environmentally and quality controlled conditions. The energy consumption during the pellet manufacture should be managed.

4.2.2 Wood chips

Do the used or imported wood chips conform to any relevant quality standard? European standards concerning the quality of wood chips include:

- EN 14961-1 Solid biofuels – Fuel specification and classes – Part 1: General requirements
- EN 14961-4 Solid biofuels – Fuel specification and classes – Part 4: Wood chips for non-industrial use
- EN 15234-1 Solid biofuels - Fuel quality assurance - Part 1: General requirements
- EN 15234-4 Solid biofuels - Fuel quality assurance - Part 4: Wood chips for non-industrial use

Essential conditions that should be ensured based on the principles of the above standards:

- Source and origin, major traded forms and properties are stated and classified. Moisture and ash content are among the normatively controlled properties
- Traceability of the product chain is unambiguous.
- Traces of chemicals in the product are monitored and below normative limits if chemically treated wood or used wood are used (only for class B1 and B2 in EN 14961-4).

- Product declaration made according to requirements.

4.2.3 Bioliquids

Does the bioenergy production using bioliquids comply with the RED criteria for biofuels and bioliquids? Once published, the CEN standards prEN 16214-1, prEN 16214-2 and prEN 16214-3 will have relevance here.

Essential conditions that should be ensured based on the RED criteria:

- Full chain GHG emission should comply with the requirements.
- Land area used for biomass production conforms to the Article 17.3.
- Conformity of production to good agricultural practices.
- Impacts on soil, water and air, as well as social impacts on the area of production must be reported to Commission.

4.2.4 Biogas

Biogas production remains fairly untouched by sustainability schemes and standards. In addition to RED sustainability principles, the following requirement from the Nordic Ecolabel of pellets should be assessed concerning waste derived biogas:

- The regulatory requirements include a declared full compatibility of production with relevant national legislation and agreements on recycling of materials.

4.3 General bioenergy production chains

Is the sustainability of the whole bioenergy chain managed? In general, the sustainability management, standardisation and certification are currently in developing stage. In addition to taking into account the sustainability criteria in RED, the following standard and meta-standard can be assimilated:

- Sustainably produced biomass NTA 8080/8081 (formalized Cramer Criteria, NL)
- RSB Standard for EU market access (essentially RED criteria and the version 2.0 of the RSB Principles & Criteria for Sustainable Biofuel Production)

Summary of the essential conditions that should be ensured based on all the presented standards and certification schemes:

- The socioeconomic status of local stakeholders impacted by biofuel operations should be improved. Local employment is encouraged, respecting the workers' rights and welfare.

- Production of biomass for energy purposes should not have negative impacts on the production area's food security.
- GHG emissions are reduced compared to fossil alternatives.
- Carbon stocks, ecosystems, biodiversity and recreational values should be ensured. Agricultural production should conform to good agricultural practices
- All applicable laws and international treaties should be complied with. The regulatory requirements include a declared full compatibility of production with relevant national legislation and agreements on recycling of materials.
- Traceability of the product chain is unambiguous.
- Land area used for biomass production conforms to the Article 17.3. of the RED.

5 Fuel quality and sustainability issues in Target Region Action Plans: the site visit objectives and questionnaire

5.1 The objectives of the visits on the Target Regions

The aim of Task 3.3 is to ensure that all biomass produced and consumed in the target regions complies with the CEN standards for the fuel quality (EN 14961 and EN 15234), relevant sustainability criteria, and relevant causes of the EC Directive 2009/28/EC promoting Renewable Energy Sources.

Therefore, the primary objective of the target region visits were to gain enough information about the current situation in order to make suggestions how to improve the above mentioned areas of biomass supply and use. This was done by interviewing stakeholders and visiting strategic sites and companies. While doing this, other issues of supply chains and a draft version the Target Region Action Plan were discussed as well.

The full version of the questionnaire used in the interviews with local stakeholders is presented in the annex 1.

5.1.1 Fuel quality

Fuel quality issues were one part of the Target Region Action Plan. In the beginning of the interviews general issues were discussed:

- Establishment of long-term vision with clear objectives – current progress in planning the Target Region Action Plan
- Measures and policies to implement this Target Region Action Plan (investments, research and development, education, support incentives etc.)
- Regional, national, bilateral or EU incentives and financing renewable energy investments
- Future actions to implement biomass resources regionally based on available potential
- Supply chains and business models for forest and road-side wood harvesting, transportation and storage
- Quality assurance and control of the biomass and biomass fuel quality
- Prevailing conditions of bioenergy production

5.1.2 Sustainability

The primary objective of the Target Region visits is to ensure the local stakeholders use the concept of sustainability as a tool when planning a regional bioenergy supply. The most obvious matters to assess,

are the possible use of any standardized sustainability management systems, are they audited, are the environmental impacts of biomass use followed and reported, and what indicators may be in use for such purposes.

Concerning the three aspects of sustainability; Environment, social welfare and economy, the main subjects to be discussed with the stakeholders were:

Social:

- What legal requirements are there concerning promotion of sustainability? Are the applicable laws and treaties respected? Also possible agreements on material and waste recycling are of essential importance here.
- How are the local stakeholders affected by bioenergy investments and operations in the region? Is local employment enhanced?

Economical:

- Is local welfare increased economically due to local bioenergy projects?
- Considering plans to deploy more regional biomass supply chains for local bioenergy, is bioenergy seen as a good influence on the area's livelihood?

Environmental:

- What is considered to be the most important indicator of sustainability in the region?
- Are GHG emissions compared between alternative energy routes, most notably between the current situation (base case) and the planned local bioenergy supply and consumption?
- Are the carbon stocks in the area managed and how? How well are the biodiversity, ecosystems and recreational value of the nature taken care of (following the Article 17.3. in the RED)?
- Does the local farming conform to Good Agricultural Practices, and would possible growing of energy crops affect the local food production?
- Can the origin of the biomass used for energy purposes in the region be traced, and is it of local origin? Concerning the local forest biomass as biomass feedstock, is the local forest use managed and planned? Are any certificate schemes used for these purposes? In general, is there a set local forestry policy?
- What kind of emission control requirements are imposed locally on biomass combustion, including combustion in small- scale? How is ash waste taken care of in large boilers?

6 Target Region visit: Limbaži and Salacgrīva, Latvia

6.1 Stakeholders involved in the interviews

6.1.1 Limbaži

Ģirts Ieleja, Head of the Development division, Limbaži local municipality, girts.ieleja@limbazi.lv

Mārcis Krūzenbergs, director of Bumpo, Ltd, "Vaivari", Viļķenes p., Limbažu n., LV-4050, bumpo-vaivari@inbox.lv

Viesturs Krūzenbergs, owner of Bumpo, Ltd.

Ilze Dzene, Ekodoma SIA, ilze@ekodoma.lv

Aiga Barisa, Ekodoma SIA, aiga@ekodoma.lv

Eija Alakangas, VTT

Lauri Kujanpää, VTT

6.1.2 Salacgrīva

Guntis Kārklīns, the chief architect of Salacgrīva municipality, guntis.karklins@salacgriva.lv

Ilze Dzene, Ekodoma SIA

Aiga Barisa, Ekodoma SIA

Eija Alakangas, VTT

Lauri Kujanpää, VTT

6.2 Results from stakeholder interviews: Limbaži

The stakeholder interviews in Limbaži started by a visit to the town hall, where the manager of the municipality's development department was interviewed. The assessment of the state of the region is based on the discussions which followed the short introductions held by Ilze Dzene for behalf of Ekodoma and Eija Alakangas on behalf of VTT, explaining how the organizations affiliate in the Bioregions project.

In order to further discuss issues concerning the forestry and wood procurement chain and forest biomass based solid fuels, a local wood processing plant was visited, where the director and the owner of the plant were interviewed. Most of the results on sustainability, biomass use and fuel quality issues are based on this interview.

6.2.1 State of the region

90% of heat energy supplied in the Limbaži region is produced by biomass combustion. Majority of the biomass is log wood, which is burned in household stoves and small-scale boilers. The town itself has a district heating network fed by two boiler plants. The operator of the boiler house, Limbaži Siltums, is by the majority of shares a municipality owned company. Some new diesel heating capacity has been installed quite recently in Limbaži. There is also a plan to build 4 MW biogas plant in the municipality using energy crops. Current electrical capacity from biogas is proposed to be 2 MW_e, and possibly 4 MW_e in the future.

District heating infrastructure covers only a part of Limbaži town. The district heating network is partly in need of renovation, which is currently being carried out with the help of EU financing. Limbaži town centre is only 9 km², and DH system does not reach outside the centre. One option would be to connect the planned biogas plant to the Limbaži district heating grid in order to increase its capacity. Heat would however be needed elsewhere as well, such as in a wood chip drying facility.

Limbaži boiler house itself is out-dated and over-dimensioned. It was mentioned in the interviews that Siltums has plans to invest in cogeneration. Whether by modifying or re-building the old boiler house, or by building a greenfield facility, Limbaži municipality aims to build a CHP-plant. To this end, private investors are competing for EU financing. Many different suggestions about energy sources are presented by competing companies, but selection of the best alternative has not been started.

Limbaži Community has an up-to-date territorial plan, but which does not include an energy strategy. Limbaži area has been merged quite recently, so the current work has all to do with integration and regional planning. The community, aside from the town centre, is sprawled on a wide area. Centralized energy supply for heating would be very capital intensive. As there is no solid strategy for energy supply, a regional plan for resource use is lacking as well. Some local business for firewood exists, but otherwise the origin of firewood is not being concentrated on and local biomass is not favoured. However, a roadside brush inventory has been initiated.

All in all, the economy of the region is not developing very well. The population on the area is on a decrease, and infrastructure, estates and housing are aging. The energy efficiency of the housing sector should be improved, but the capital is not readily available. At the same time, the risk of log wood prices getting higher is becoming more evident. The Limbaži Siltums currently charges 1 LAT/m² as heating costs of houses within the district heating network.

6.2.2 Biomass use and fuel quality issues

In general, wood is collected manually in the region. Branches are usually chipped by road-side. The quality of the locally used solid biomass could be improved. Management of the moisture content in the fuel would benefit the markets and end use significantly. There is also potential of road-side maintenance wood, which needs to be removed by a municipality. The potential and appropriate harvesting methods should be looked. Usually this kind of fuel does not have any market value.

Currently, the moisture of wood chips is not measured at the BUMPO sawmill, which was visited. It is measured only by the customer, who then pays by cubic meter to the saw mill that's making the wood chips.

Also the quality of wood chips (mainly moisture content) is varying for older boiler in Limbaži Siltums and during winter not full output of boiler can be reached.

Usually wood chips are sold as LVL/tons, so I do not support to have dried wood. VTT has sent a guidebook how to sample wood chips for moisture content measurement and how the trade can be based on LVL/MWh. Only Limbaži Siltums is buying fuel as LVL/MWh basis.

Information about moisture measurement was promised to be sent to some stakeholders.

6.2.3 Sustainability in the region

Economy:

The economy in the region relies on cattle farming, agriculture and wood processing industry. The wood processing industry includes wood drying facilities, saw mills and facilities producing wood chips and pellets for export. 80% of the taxes paid in the region flow back to the municipality. Tax revenues cover 90% of the municipality's budget. Local biomass value chain for energy supply could benefit the local welfare and provide continuity as well as employment to the area.

The use of woodchips is not subsidised by the state. There seems to be no specific fuel tax instrument, only value added tax and emission allowance costs for fossil fuels. About half of the wood chips produced in the area are exported, often to Sweden. General price for the wood chips is 4.5 LVT/loose m³, moisture 55%.

Environment:

Wood from local forests is not favoured and the wood production chain is not traced in daily business. The raw material is not needed to come from certified forests and the origin of the forest biomass is usually unknown. Environmental forest management legislation surely exists in Latvia, but the law is not firmly enforced and thus is followed quite poorly. It mentioned in the interview, that possibly some illegal cuttings happen as well. Disposal or utilization of ashes from combustion of solid forest biomass remained unclear.

When asked what is the most urgent or important environmental matter to take care of in the region, the answer was water. Water protection needs more investment throughout the municipality. EU is currently financing 50% of the water/sewage system renewal underway.

The state has issued an energy efficiency plan for private households, who can get investment support for boiler renewal. Household energy renovations as such are not supported though. The state support

equals a maximum of 7,000 LAT (10,000€), representing a maximum of 50% of the investment. Therefore this is suitable only for the households which have a certain budget for heating renewal.

Another upcoming state project is a competition to be held for state support in GHG reducing investments. Locally however, the investments are not always being willingly directed to technology, as money is needed in more day-to-day matters. This kind of energy efficiency programmes are seen to incur risks as they take up money in the planning stage and require large budgets set aside for the implementation.

Information (society):

Based on interviews with the representative of the municipality, people need more information about possibilities in the field of renewable energy, not just about prevailing use of solid biomass. As action plans are drafted in the project, they should include energy consultation centres.

6.3 Results from stakeholder interviews: Salacgrīva

The stakeholder interview in Salacgrīva was carried out in the local town hall, where a representative of the community was engaged in a discussion.

6.3.1 State of the region

Salacgrīva has a very similar economy and energy palette as Limbaži. The heat supply depends on burning of log wood, while electricity comes mostly from the state grid. Salacgrīva does not have significant biogas capacity, apart from a small biogas-aggregate (based on gasified straw) being commissioned, but on the other hand the first two wind power plants in Latvia were built in the northern parts of shoreline region. Currently half of the wind power capacity is out of service. The wind power plants were mainly products of state politics.

The town of Salacgrīva, around third of the population compared to Limbaži, has a district heating system. The DH boilers use wood as fuel. Half of the heat load is provided by a boiler of a fish processing plant at the town harbour. The fish processing company fires the boiler with wood chips. The other half of the district heating load is provided by an old and oversized boiler house. The energy efficiency is further damaged by the aged DH pipelines which are in need of renovation. Outside the town premises, the habitation is sprawled in Salacgrīva. There is also sea water heat pump to heat some municipal buildings.

On the consumer side, the households are also generally in a need of better insulation and energy renovations. The same state subsidies for boiler renewals apply in Salacgrīva as in Limbaži, provided by the Ministry of Environment's Climate Financing Instrument. The financial restrictions are similar as well, however.

The Salacgrīva community has searched for an energy expert to take part in their permanent staff. Currently the investment plans for energy supply are hard to make, as the funds are lacking. Resources

are taken by other issues of welfare in the region. As in Limbaži, the water management systems are renewed in Salacgrīva with EU funding.

6.3.2 Biomass use and fuel quality issues

Similar notes as for the Limbaži region.

6.3.3 Sustainability in the region

Economy:

Economic restrictions are dominating the regions development. While funds are lacking, the energy investments cannot be prioritised. At least this is seen as bad policy. A Norwegian grant was received lately for heat pump investments. The heat pumps are currently in operation.

Solid biomass markets are working, but local sources seem not to be prioritised, not even in order to generate income and jobs for the community. Forest industry seems, however, to be a quite important industry for the region. There are 2 ports in the region, which are used for biomass export.

Environment:

Biomass flows are not followed. The amount of certified forests is unknown. The municipality feels they are “green” due to the fact of high level of biomass use. Region has made own green declaration to support nature.

Land use policy of the state is seen as annoying in the regions at times and is making decision making harder. Municipality would like to manage their own land use more. A forest management policy was, however, or partly due to the state restrictions, non-evident.

When interviewing the community representative, it became clear that the environmental protection rules set by the state are seen locally as overprotective. Anthropogenic pressure is forbidden in the protected areas, which cover a large part of the region. For instance, the coastline is not available for tourism. The state protection plans are not seen as well justified to the community.

Society:

The municipality aims to generate new employment in the region, but little land (municipality owned) is available for factories or other facilities. Jobs were recently hoped to be available from commerce such as a supermarket, chair factory, and a bakery. Only the bakery was build.

6.4 Summary and recommendations

Only part of the action plan (biomass potential and current use) was discussed during the task 3.3 visit to the region. Fuel quality issues were mainly discussed in general. The main problem concerning both the log wood and the wood chips is the high moisture content of the fuel. The fuel is traded in as

LVL/tons, causing higher price for moist fuel with higher bulk density but lower net calorific value. VTT has provided information about the fuel drying, sampling of moisture content and also of trading based by LVL/MWh, which would support purchasing more dry fuel.

The regions of Limbaži and Salacgrīva are in a very similar situation concerning the economy, industry, resource use and public welfare. The investments in renewable energy or in energy efficient technology are not prioritised in the Target Regions. Good action plans for renewable energy can enable investment support from the European Union.

Local biomass value chains, when combining responsible supply and consumption, are potential local sources of welfare. The know-how is already largely available, as forest industry has been a local livelihood for a long time. A sustainable, more self-sufficient and renewable energy supply should be seen as an opportunity, not as a new form of expense.

The biomass flows should be traced and forest management systems, such as FSC or PEFC certification schemes, implemented. Better quality management of the wood fuels would also benefit the value chain. As the households are for a great part heated with log wood stoves, the public would benefit from information on best practices of fuel preparation and storage and of sustainable resource use in local markets.

Given the regional energy and resource planning in the future address the forest management, market functioning, tracing of solid biofuel flows; the wood chip based energy production is likely not to cause significant negative effects to the environment, economy or society. Sustainability impact of biogas use depend more on the choice of feedstock, and any land use change that might be connected to its implementation. The COM(2010)11 gives default values for GHG emissions for some manure- and agricultural biomass-based biogas routes. The COM(2010)11 can also be consulted for carbon stock change due to land use change.

7 Target Region visit: Trièves, France

7.1 Stakeholders involved in the interviews

Bettina Maeck, SAT

Jyrki Raitila, VTT

Lauri Kujanpää, VTT

7.2 Results from stakeholder interviews

The stakeholder interviews and discussions included meetings with public authorities, a municipality council member, a saw mill entrepreneur and representatives from the state forest association, biomass trading centre and central heating facility.

7.2.1 State of the region

Population in the region of Trièves has increased during the recent years from 8,000 to 10,000 people. The main sources of livelihood are farming and forestry. Therefore, the region has remained rural. Logging is done, practically speaking, solely for the purpose of providing raw materials for local saw mills. The Alpine tree material is highly valued, and labelled as “Bois des Alpes”, referring to its superior mechanical quality. The region is part of a national park and quite well environmentally protected. Logging is however allowed under the supervision of the regional state forest company. Roughly half of the woodland is owned by the state and the rest by many private forest owners with holdings of only a few hectares. A fragmented forest ownership hinders the availability of wood to some extent. In general, however, the region has enough forest biomass potential to cover the needs of the increasing energy demand. The region mainly suffers from inadequate infrastructure for the transport of goods and poor access to the forest resources. Even if access to the forest is provided by forest roads, the mountainous landscape makes harvesting very difficult. Currently the region has 10 metres of forest road per hectare, which is only one third of what is needed. The state subsidises 70% of forest road investments, in order to have better access to private forests.

15% of the residences are heated with wood. About half of these residences use logwood as a fuel. The use of wood for heating is on the increase in the region. Stove investments are encouraged with fiscal incentives. The largest solid biofuel consumers are public boiler houses, which provide heat for small district heating networks. The end users are for instance schools and other public buildings. The heating capacity of boilers ranges from 100 kW to 2,000 kW.

Logging activities usually take place in the public forests where about 50% of the annual increment is logged, compared to only 10% in the private forests. In general, the public forests are well managed, which is not always the case in the private forests. Some 70% of the public forests have a PEFC certificate, compared to only 10% of private forests.

7.2.2 Biomass use and fuel quality issues

As mentioned earlier, all wood fuel comes as a by-product of timber logging from small clear cut patches in the mountains. Both stems and logging residues are harvested and sorted for the end use. Most residues and pulpwood are taken to larger heating plants outside the target region while saw logs and firewood stay in the region.

Wood chips are provided for the public boiler houses largely through a trading centre situated in the region. Fuel can be sold and bought based on bi-lateral agreements as well. The trading centre has, during its rather short history, been unable to respond to all the demand in the region. The city of Grenoble demands significant amounts of wood fuel each year, thus affecting markets in the Trièves region as well.

A visited local school having a 150 kW wood fuel boiler, fires wood chips with the moisture content of 18%. The wood chips are provided by the local trading centre. The customer pays by cubic metres but do not verify the quality by any means.

The existing trading centre was established in 2007. There is also a drying chamber for drying timber and a small heating plant providing heat for the chamber and for drying of wood chips if necessary. The boiler of the drying facility was dimensioned for a higher heat load, but now runs only on 25% of the full capacity. Therefore it is too inefficient for economical use. This further decreases its application and load.

The wood chip quality is very good because they are either made from un-merchantable stem wood or pulpwood, or from residues from wood processing industry. This causes a conflict in raw material use between the industries. However, the trading centre does not have quality control facilities. The moisture content of the chips is measured electrically with a hand-held device, which gives rather inaccurate results.

No clear quality certificates are used for wood chips. Clients of the trading centre can order chips of desired moisture contents. Chips with low moisture content (<30%) are brought from elsewhere to the trading centre, as the drying facility is too uneconomical. The available certificate for the chips is called “Control Qualité Plus”, which sets the standard for the moisture and particle size. The origin and species seem to have been left out of the certificate.

The visited sawmill sells its residues, including bark, saw dust and wood chips to private boiler houses and pellet producers. They must report the origin of the wood to the pellets producers, and the wood must come from certified forests. And they do, as the wood is harvested mostly from public forests.

7.2.3 Sustainability in the region

During logging, all material is collected from the forests. This is said not to pose any threat to biodiversity, as the patches are quite small and rarely exploited. Small clear-cut patches are becoming the mode of logging in the area. The logging is done manually, as demanded by the steep geography.

Economy:

Obviously, manual logging consumes more money than mechanised logging, and therefore only logging for saw wood is economical. The biggest saw mill in the region takes 10,000 m³ of timber wood annually, and produces 6,000 m³ of saw wood products. Up until the 80's, the manual and inefficient logging was profitable, as the price for wood was up and work force was economical.

Environment:

The annual growth in the public forests is roughly 40,000 m³, of which 20,000 m³ if logged. The loggings however, concentrate only in the proximities of the forests roads, therefore causing locally unsustainable burden on the ecosystem.

The management of the sustainability of the region has been increased by the effect of agenda 21 (Part of convention made in Rio de Janeiro). 25% of the farms are organic, compared to national average of 2%.

Disposal of waste ashes from the regionally largest boiler house at the visited biomass trading centre is not yet solved at the time being. The ash reservoirs have not yet been I need for emptying.

Information (society):

The locals are not informed currently on the possibilities offered by the present biomass trading centre.

7.3 Summary and recommendations

It seems that wood chips quality in trading centre is high (low moisture content, homogenous particle size). Biomass trade centre could benefit from the European wood chips standard (EN 14961-4) and could start selling A1 and A2 class wood chips. Also pricing of wood chips could be based on this standard. This standard together with EN 15234-4 includes also specification of origin and source and documentation of forest certified wood material. The standard is available in French and can be easily implemented at trading centres. Most important is to control the moisture content and particle size of fuel, when wood chips are used in non-industrial appliances. Also trading centres could benefit of standards when marketing their products to new customers. Harvesting from mountainous forests is challenging in the region, and needs special care in choosing the right practices, also in transportation.

Most of the harvestings take place in public forest, which are well certified. Moreover, the biomass origin is tracked and documented in the wood markets. As this would suggest a good basis for

sustainable resource use, the poor access to the forests, however, tends to cause uneven exploitation of the forest resources. As some 50% of the annual growth is harvested, but concentrating on the proximities of the scarce forest roads, a risk of undesired effects to the biodiversity exists. Sustainable forest management requires avoidance of overburdening the forest resources.

8 Target Region Visit: Zlin region, Czech Republic

8.1 Stakeholders involved in the interviews

Radek Sedlačík, EAZK

Jyrki Raitila, VTT

Lauri Kujanpää, VTT

8.2 Results from stakeholder interviews

Two district heating entrepreneurs were interviewed during the Target Region visit. An excursion to the largest saw mill in the region was also included in the agenda.

8.2.1 State of the region

In a long term vision, more than 1/3 of the energy should be produced from biomass. The forest biomass potential in the region is currently not fully exploited. For instance, 50-70% of the residues are left in the forests. Smaller harvesting companies do not have proper chipping devices, and they choose often to burn the residues at a logging site.

In addition to better use of logging residues, the region has unused agricultural waste resources. A good straw potential exists as 50% of the straw could be directed to energy production. Another large source might be hay collected from idle meadows. This hay could probably be cofired in the existing biomass boilers. There is also a plan to build a biogas plant near Slavicin. The meadows are cut twice a year but there is not enough animals grazing to eat all available grass. Animal manure cannot be collected, as the cattle are kept mainly outdoors.

15% of the heating energy is produced with wood in residences. To achieve the Bioregion targets for the part of households, the biomass use in residential heating has to be doubled. In terms of heat energy, some 11,000 MWh more is needed. The biggest potential to increase wood heating in residential buildings is in renovating the household stoves.

Although a significant potential to switch from fossil fuels to renewable energy sources exists in the household sector, currently there are no subsidies for private household heating solutions. Energy renovations are still carried out in many houses, and therefore energy consumption is on the decrease.

The number of inhabitants is decreasing as well, and population is getting older. This forebodes difficulties for the economy in the region. Over 14% of inhabitants are unemployed, which is more than the national average. The local economy is not dominated by any industry.

8.2.2 Biomass use and fuel quality issues

Wood fuel used by local heating plants originates from nearby forests. Around 60% of the forests are owned by the state, and harvesting rights are granted and sold by the state forest company. Harvesting is carried out by private logging contractors, who have made bilateral contracts with the end users.

The quality of wood chips is not viewed as a critical issue. Needles and leaves are burned but their share is sufficiently low in the fuel mix. During peak load seasons, one of the visited boiler houses acquires higher quality and drier wood chips from a saw mill. The boiler house is subjected to emission monitoring in every two years. The operator of the boiler house has agreed to receive the gardening residues free of charge from households within the town during the next summer. These residues will be chipped at the plant and fed to the boilers.

At least 5 wood fuel suppliers were mentioned during the site visit. The most significant actor is the local saw mill, which produces some 35,000 m³ of saw wood each year.

Wood chips are delivered in winter because harvesting takes place then too. Wood chips or stems are not seasoned. Energy wood is obtained only during the harvesting of wood for higher value purposes, such as saw wood and pulp wood. Forest biomass from thinnings is usually directed to heat production.

Quality control is not seen that important in the region. If two trading centres are founded, quality control would need to be put into place for small boiler fuels. For wood pellets, German standardization methods are used. Woodchips have a Czech standard, dividing the chips into three categories, for the uses of feed-in tariff regulation for bioelectricity. The standard includes classification based on mainly moisture and particle size. The Czech standards cannot be seen as compatible with the European CEN standards. Although the quality of the woodchips affects the price, the contracts are based on volume.

8.2.3 Sustainability in the region

Economy:

Bioheat is not supported in Czech Republic in the long run. However, currently biomass has a lower VAT than other fuels. Instead, electricity generated by combustion of biomass is subsidised by a feed-in tariff.

Biomass markets are not only local, they are regional and national, as the pellet factories outside the region take raw materials from the region. Woodchips are the cheapest fuel in the region. Chips cost one third of the price of logwood used in residential buildings.

Environment:

The region is under nature protection requirements. The origin of the woodchips has to be documented, and the harvested forest must have a certificate. Both FSC and PEFC certificates are used in the region.

Legislation requires permitting procedures for loggings in protected forests. Laws on biodiversity control the species as well. Forest owners owning more than 50 ha of woodland must make management plans, which are monitored by a state department. Forest management plans are cheap because they are subsidized by the government.

Forestry authorities give permissions for logging both in private and public forests. The shares of public and private forests are roughly equal.

A carbon map has been made for the whole republic, where carbon cycles have been studied. No regional calculations for the regional increase of biomass use have been made.

80-90% of the ashes are presumably recycled back to fields.

Information (society):

Local stakeholders are quite well included, and neighbouring communities are kept informed as well.

Currently unsuitable wastes are burned in household stoves. The agency (EAZK) is trying to provide information to change this. Municipality can give penalties for obvious emissions from households.

8.3 Summary and recommendations

Quality control of biomass fuels should be established based on European standards especially control of moisture content of fuel. Also training of fuel producers and improving working instructions for wood fuel harvesting and storage should be included in the action plan. An information campaign for households for better firing habits of log wood should be organized. Burning waste in stoves should be prevented.

The Action Plan includes new wood chips boiler capacity and a biomass trading centre. In this regard, the risks of generating negative effects on sustainability are low.

Origin of the biomass seems to be well tracked and documented by the DH heat providers. Nevertheless, the issue should be stressed in the Action Plan, along with recommendations to favour local sustainable biomass.

As the major aspects of sustainable biomass use have been addressed in the region, the recommended measures are to promote actions that are above the minimum requirements. At least a stream-lined LCA should be done for the bioenergy plans in the Target Region. Important items to include would be the global warming potential and economic impacts, in comparison to a well-defined reference scenario. The spatial boundaries of the reference scenario, describing the business-as-usual in this case, can be as regional as possible.

Furthermore, promotion of voluntary international sustainability certification schemes should be considered, namely ISCC or NTA 8080.

9 Target Region Visit: Sredna Gora, Bulgaria

9.1 Stakeholders involved in the interviews

Liyana Adjarova, EAP

Vladimir Valkov, EAP

Jyrki Raitila, VTT

Lauri Kujanpää, VTT

9.2 Results from stakeholder interviews

Representatives from the state forest association were interviewed. A tour in the target region was also made.

9.2.1 State of the region

The Target Region, consisting of municipalities of Brezovo, Ihtiman, Panagurishte, Strelcha, Hisarya and Karlovo, is a sprawled rural area, including a less than 10 towns, and restricted by mountain ranges. The region has quite a low level of industrial activity, and the main consumers of energy are the public and private residences and buildings. The main economic activities in the region are agriculture, logging and hunting tourism. Nearest large timber industries are situated outside the target region, some 60 km away.

The household consumption represents approximately 60% of the total final energy consumption. Two of the municipalities in the Target Region, Ihtiman and Karlovo, have renewable energy promotion plans until year 2020. The biomass potential in the municipality of Brezovo has also been assessed.

80% of the households are heated with logwood, and 20% burn coal. Logwood is received from forest administration and municipalities. Municipal buildings fire mainly oil and coal and some logwood. The total energy use in Brezovo for heating is 33,000 MWh, of which 10% is consumed in public buildings. Heating amounts to over 80% of the total energy consumption in Brezovo. The municipality of Brezovo itself has some 3,000 households with 8,000 inhabitants, of which 1,900 are living in the municipality's centre. 13.5 MWh of heat is use on average by people using coal and wood for heating. Electricity is additionally used 2 MWh/family.

Although a legal framework within the RS Energy Law and the Forest Law exists, providing incentives for using biomass for energy purposes, actual projects for best practice use of biomass for heating or electricity production is not subsidised in the region. Electricity production from biomass is supported with a feed-in tariff of 120 €/MWh. Very little electricity is produced, however. Larger boilers are fired with oil and coal in the municipal buildings. District heating investments appear not to be favoured by the decision makers or the public. Concerning the growing of energy crops, no actual plans exist.

The primary option in the BioRegions Action Plan is to involve municipal authorities in promoting solid biofuel use in public buildings and investing in boiler renovations. This would require new markets for biomass supply, and harvesting company involvement is highly essential as well. The action plan for Brezovo municipality consists of a draft for biomass trading centre, including a processing and drying facility for upgraded wood chips, and switching of oil boilers to wood boilers in four municipal buildings. The wood would be collected from the Chekeritza forest property, spanning 14,200 ha in total.

Use of firewood is largely inefficient in the region. Wood is burnt in out-dated stoves, which generates high amounts of near emissions in the region. According to the action plan calculations, 70% of the total energy consumption for heating could be covered with the current logging residues but the markets and logistics are missing.

Hot water is generally heated with electricity throughout the Target Region.

9.2.2 Biomass use and fuel quality issues

No Bulgarian standards for wood-derived solid biofuels exist at the moment. Bulgaria has not participated in development of European standards either. All in all, the use of other solid biofuels apart from logwood is very low in the Target Region at the moment. There are very few high-efficient technologies for the combustion of biomass. The quality issues of the wood fuel have not been viewed very important and quality is not controlled.

The aim in the region is to provide households with better quality wood fuel, and promote better practices in burning and storing the fuel. Establishing local markets for quality classified wood chips or even pellets is one of the possible future alternatives.

9.2.3 Sustainability in the region

Economy:

The municipalities rely mainly on fossil fuels to heat and power the public buildings. The economic resources directed to heating therefore are directed outside the region.

The local economy would probably benefit from the biomass trade; given the resource use is managed on a long term.

Incentives for the use of modern biomass heating installations are lacking.

Environment:

Current inefficient use of logwood generates unsustainable near emissions in the region.

The forest management planning and use of forests seem to be well in order in the region. The Forest Law regulates the supply and transportation of the forest biomass, but the state forest authorities give limited guidelines for harvesting procedures. The origin of the supplied timber and chips are

documented, although in contradiction, some illegal loggings presumably take place. In general, in Bulgaria roughly 20% of the public forests (which amount to some 80% of the total woodlands in the region) are Forest Stewardship Council (FSC) certified. Evidently, the share of certified forests in the Target Region is closer to none.

The regional plans for forest resource development are in the process of making, to take into consideration the possible new markets for solid biofuels.

Apart from the need for energy supply investments, municipalities currently struggle with water management, pipework infrastructure and waste management.

Information (society):

Co-operation between possible end-users, harvesting companies, technology providers and forest authorities have been lacking in the region. Aside from the municipality as the end user, private industries and households are in need to be included in establishing the regionally new markets.

9.3 Summary and recommendations

As local potential of wood residues potential is evident, a change towards more independent, cost-efficient and altogether more sustainable energy use would seem achievable. This would require awareness rising among and motivating of the regional authorities and the public, to induce a common interest in local bioenergy for heating. Social sustainability would benefit from the local biomass supply and use. Municipalities would be able to reduce the heating cost of public buildings, while the spent money would stay in the area in the long run. Political and public attitudes would need to change though. Private households do not have confidence in district heating systems. Heat entrepreneurs and enterprises could serve as common interest organizations. Municipality centres would be highly suitable targets for biomass piloting.

Intensifying local use of biomass for energy would likely generate more local wood fuel supply business. This would lead to a more forestry dependent economy in the region. In preparation for this, the current forestry management plans should be assessed, including the foreseeable availability of forest resources. Promoting the forest certification is an important step towards sustainable forest management in general.

Biomass trading centres might have a good publicity value for municipalities. A trading centre could also introduce good practices in firewood manufacturing and storing (for example split and stacked for drying) and good firing habits for the public.

As the Action Plan for the Target Region includes fuel switching from oil and coal to wood chips made of forestry residues, the risk level for negative effects on the environment, economy and the society is low.

The supply chains for the wood chips need to be established to fulfil the targets of the Action Plan. Here is an important opportunity to promote the documentation of the origin of the wood material.

Improvements in the energy conversion efficiency should not be forgotten in the Action Plan. By renewing the most inefficient heating stoves in households and by promoting better practices in logwood preparation and storage, the near emissions and primary energy use would go down in the residential areas.

10 Target Region Visit: Westmeath, Ireland

10.1 Stakeholders involved in the interviews

Patrick Daly, Westmeath Community Development

Local stakeholders: Eugene Keenan, Morgan Fox, Cathal Donoghue, Aleck Tong, Owen Cooney, Charles Shiez, Michael Breen, Paddy Donnelly, Vincent Nally, Kenneth Worrell, Mr Potter and Carol Carry

Eija Alakangas, VTT

Lauri Kujanpää, VTT

10.2 Results from stakeholder interviews

The stakeholder interviews were organized as single workshop attended by 11 local stakeholders, including representatives from the local power utility company, a solid biofuel trading company, harvesting contractors and Westmeath Community Development.

10.2.1 State of the region

The community of Westmeath is an inland lake district. The local economy is based on agriculture, dairy industry, cattle farming and forestry. The district is surrounded by three condensing power plants, mainly fuelled by peat. These power plants cofire biomass from the whole of Westmeath area.

Two sawmills are within a 50 km radius from Westmeath, although outside the region. At least one the saw mills produces pellets from their residues.

The energy use in the community of Westmeath is coming down slowly due to improvements in energy efficiency. Modest population growth is however to be expected, possibly balancing out each other somewhat.

10.2.2 Biomass use and fuel quality issues

The solid biomass fuels are traded and provided without using any harmonized quality standards. Therefore, quality requirements are agreed case by case. Furthermore, the biomass is consumed commonly in utility fluidized bed boilers, which are quite tolerant regarding to fuel specifications. The specifications of the available fuel are balanced with an appropriate fuel blend. Some sod peat is also used in household stoves.

In addition to peat, the fuel blend fed to the utility boilers consists of miscanthus, straw and black oats, and wood chips made from forest residues and short rotation crops such as willow. Burning of waste wood is prohibited by the permitting authority, so only clean material from thinning and harvesting

residues is utilized. Wood processing facilities are using their own residues for process heat in some cases.

At the harvesting sites, the uncollected residues are often burned in order to reduce their coverage of the land surface. This way forest can be replanted more quickly, which is a prerequisite for a logging permit. Stumps are usually left in the forest as well. If the harvesting company is not collecting the wood residues for use in energy purposes, usually a third party company is unable to collect them later as virgin wood material for such purposes, and they are considered as waste.

The forestry is carried out mechanically in the region. The residues are chipped at the roadside. Roughly 50% of the fuel wood originates from private forests; the rest comes from harvesting in public forests. However, in terms of total volume of harvested wood material, the public forests are more represented. Concerning the wood markets, trading is often done by the harvesting companies.

Ireland has participated in the development of European solid biofuel standards and testing laboratories for fuel quality control have adapted new norms. A wood fuel quality assurance system (WFQA), developed by Irish Bioenergy Association in cooperation with DAFF, NSAI, SEAI, Teagasc and Waterford IT (<http://www.wfqa.org/wfqa-about.php>), is used in the forest biomass markets of Ireland.

10.2.3 Sustainability in the region

When asked about the most important sustainability issues in the region, water protection and management of wood harvesting were underlined concerning the environmental aspects of sustainability. Otherwise the economics of biomass production were generally highlighted through-out the conversation.

Economy:

Intensifying biomass production and recovery and increasing the mix of renewable fuels in the local energy mix would generate negative effects on the economic income from peat production to Westmeath and the surrounding communities. However, according to the judgement of the local stakeholders, the net effect would be positive. This would be the result of more labour intensive production of biomass. Moreover, and concerning the land use change effects, bioenergy would compete mainly with dairy and cattle production in the region.

The local farmers and land owners seemed not in favour of solid biofuel production in the current economic setting. Reluctance towards energy crop production is among other reasons due to the long delay of income come from the start of energy crop investments. Some premium would then be needed to incentives the start-up phase of the production. Also growing hemp for fibre use is tested in area.

The solid biofuel production or their use in heat production is not incentivised under the current national policy. Electricity production from biomass, however, is subsidised.

Environment:

As the forest residues would only provide a modest share of the fuel intake by the intensified bioenergy production, land use change would happen in the region due to increase in energy crop production. Short rotation crops will probably come to compete with the dairy and cattle production. The production of miscanthus is not seen as likely alternative at the moment. Land use change and conversion of land to other productive modes imposes substantial risks in comparison to forest residues utilization.

Guidelines and legislation concerning agriculture and forestry seem to be well in order in the area. Negative environmental impacts of farming are required to be minimized. For instance, a planning commission has to give an acceptance to nutrient runoff measures at fields before any farming operations. Forest certificates are mandatory by the newly imposed law. No permits are given to harvesting unless the forests are sustainably managed.

Some improvements in the management of bioenergy value chains would however be welcome. The origins of the fuels used in the utility boilers are recorded for the companies' own purposes but they need not be reported to any authority or standardization body.

As a curiosity, the natural alkalinity levels of the lakes in the area provide buffering capacity against the negative effects of run-offs from peat production.

Information (society):

Imposed sustainability requirements are not always well received by the local stakeholders. The farmers are quite indignant about environmentalists' requirements and rules. As the economic benefits from biomass production for energy purposes are regarded with suspicion, long term commitment to operations such as forest growing is not readily embraced by the land owners. As a further notion from the stakeholders, the bioenergy value chains need trust between forest owners, harvesters, traders and end users. This applies to energy crop production as well.

10.3 Summary and recommendations

In case of pyrolysis oil production from straw, hay and other field biomass, sustainability requirements of the RED will apply.

Regarding all use of biomass for energy; the importance of documenting the origin of used biomass in energy production must be stressed.

Especially in the Target Region Westmeath, where energy crops are among the envisioned biomass resources, the assessment of net GHG emissions from the planned bioenergy value chains should be given good care.

Most of wood biomass is used in large cofiring power plant and quality is controlled (e.g. moisture content) regularly. It seems that quality is not big problem for woody biomass, because requirements for large power plants are flexible. Higher quality fuel is needed for smaller installations, which are planned for region.

Natural seasoning of woody biomass is challenging because of humid weather and need special actions especially for small-scale users.

11 Summary and recommendations for all target regions

11.1 Fuel quality

In the visited Target Regions biomass fuels are sold based on tons or cubic meters. Fuel quality is controlled only in large energy plants and trade can be based on energy content. New European solid biofuel standards are not applied in biomass fuel production or trade.

In some regions particle size of wood chips were high quality due to raw material (stem wood or wood processing industry residues). Firewood is an important biomass fuel in all target regions and bad quality fuel can cause high dust emissions in the region. Target Regions in Bulgaria, Czech and Latvia would need information campaign or training course for production of good quality firewood and also for learning better firing habits.

General recommendations for biomass fuel quality issues are:

- Applying new European standards of fuel specification (EN 14961 series) in solid biofuel production, trade and use. Standards can be used in specifying different qualities (e.g. classes according standards EN 14961-2 to 6) and in pricing of fuels.
- Establishment of quality assurance and quality control systems based on quality assurance standards (EN 15234), including control of at least the moisture content of fuel and making a product declaration of biomass fuels produced.
- Checking fuel production chains in the region to find out where quality of fuel is decreasing or is not fulfilling customers' requirements and planning corrective actions (e.g. working instructions, making guidelines, training programme, R&D of quality and quality improvement).
- Information campaigns for good quality firewood production and better firing habits for households.
- Organising regional fuel quality days for fuel producers and users for discussing quality issues and showing best practice cases.

11.2 Sustainability of solid biofuel use

Sustainability issues of bioenergy production in the Target Regions and in the EU in general tend to focus more on the environmental and economic aspects of sustainability, and less on the social influences. Moreover, securement of well-functioning community markets in the EU is one of the main drivers motivating any aspirations towards harmonized set of sustainability requirements for bioenergy.

The Directive 2009/28/EC sets sustainability requirements for liquid biofuels only. Similar harmonized sustainability requirements for solid biomass use for energy production are not implemented. According to the Target Regions' action plans and information obtained during the visits, no ambitions to deploy

energy production based on liquid biomass-derived renewable fuels exist, excluding remarks on an interest in pyrolysis oil production among the stakeholders interviewed during the visit in Ireland.

As long as the national legislation is respected, setting sustainability requirements to bioenergy production by combustion of solid or gaseous biomass remains voluntary. Various standards and certification schemes are available for a proof of conformity to the sustainability requirements of the RED, and can be recommended to be used as guidelines for all sustainable biomass production, especially in case of agricultural biomass. The ISCC and NTA 8080 are among the applicable sustainability standards for such biomass production.

Forest biomass plays the largest role in the Target Regions' Action Plans as the first choice for a solid biofuel. FSC and PEFC certificates can be applied within the target regions towards ensuring sustainable forest management. The certification schemes are already in use in part of the Target Regions' forest.

Further elaborating on the relevant sustainability criteria in forest biomass production, the above mentioned FSC and PEFC essentially require a compliance with all applicable laws and international treaties. Local employment must also be encouraged, while respecting the workers' rights and welfare. Regarding environmental sustainability, the biodiversity of forest ecosystems must be maintained or enhanced. Furthermore, the impacts of logging activities on the ecological functions and integrity of the forest must be managed and reduced.

Concerning the production of agricultural biomass, the essential requirements set in standards by the ISCC and RSB consist of compliance with all applicable laws and international treaties and protection of air, water and soil. Another central requirement by these standards is the conformity of the land area used for biomass production to the Article 17.3 of the RED. The Article in question sets restrictions of biomass production on lands with high carbon stocks or valuable biodiversity, with certain conditions.

As a summary of all the essential conditions that should be ensured based on the standards and certification schemes presented in this report are for bioenergy production in general given in the following list. As a remark, the sustainability criteria have been meant to ensure responsible production of the imported biofuels as well as the sustainable production within the EU. Therefore some of the social requirements would not be as relevant in the regional bioenergy production in the Target Regions.

- Social and economic sustainability requirements are:
 - The socioeconomic status of local stakeholders impacted by biofuel operations should be improved. Local employment is encouraged, respecting the workers' rights and welfare.
 - Production of biomass for energy purposes should not have negative impacts on the production area's food security.

- All applicable laws and international treaties should be complied with. The regulatory requirements include a declared full compatibility of production with relevant national legislation and agreements on recycling of materials.
- Environmental sustainability requirements are:
 - GHG emissions are reduced compared to fossil alternatives.
 - Agricultural production should conform to good agricultural practices
 - Traceability of the product chain is unambiguous.
 - Carbon stocks, ecosystems, biodiversity and recreational values should be ensured. Land area used for biomass production conforms to the Article 17.3. of the RED.

11.3 General remarks and recommendations for further activity

The risks towards any negative sustainability issues are mainly low following the Target Regions' Action Plans. The lower risk level is due to promotion of energy from side-products of forestry, namely wood chips. Regional renewable energy supply and promotion of energy efficient stove technology would furthermore likely cause significant positive effects on the Target Regions welfare in all aspects.

As the Action Plans consist mainly of intensifying the energy use of forest biomass, it is worthwhile to consider the deep interdependence of the wood fuel provision with the forestry and wood product industry in the regions. The use of regional biomass potential is one of the central objectives of the Bioregions project, so the role of forest industry must be appreciated in the regional development.

Greenhouse gas emissions reductions due to increased share of biomass based renewable energy are highly relevant to any action plan. Using the guidelines given in COM(2010)11, the effect of a bioenergy project within the EU on GHG emissions can be outlined in a somewhat harmonized manner with modest resources. Although the Commission report COM(2010)11 is not a standard or certification scheme, but a mere recommendation, the suggested requirements for bioenergy production in installations of over 1 MW (thermal or electric) should be kept in mind as further communications from the Commission are to be expected. In addition to recommending a prohibition of using similar land areas for biomass production as in the RED Article 17.3, the origin of the biomass is recommended to be documented. Two other issues which are addressed are the greenhouse gas emission reductions compared to EU's fossil energy mix and favouring of energy efficient conversion technologies.

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EN 14961-4:2011 Solid biofuels - Fuel specifications and classes - Part 4: Wood chips for non-industrial use

EN 14961-5:2011 Solid biofuels - Fuel specifications and classes - Part 5: Firewood for non-industrial use

EN 14961-6:2012 Fuel specifications and classes - Part 6: Non woody pellets for non-industrial use

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EN 15234-3: 2012 Fuel quality assurance - Part 3: Wood briquettes for non-industrial use

EN 15234-4: 2012 Fuel quality assurance - Part 4: Wood chips for non-industrial use

EN 15234-5: 2012 Fuel quality assurance - Part 5: Firewood for non-industrial use

EN 15234-6:2012 Fuel quality assurance - Part 6: Non-woody pellets for non-industrial use

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Annex 1:

List of issues and questions planned to be discussed with stakeholders during the Target Region visits:

1. Establishment of a long-term vision with clear objectives – current progress in planning the Target Region Action Plan

- Vision and target in 2020? How will the target of 1/3 of heat and electricity production covered by regional and sustainable energy sources, mainly biomass be achieved?
- Are the objectives and targets specific, measurable, achievable, realistic and scheduled?
- Involvement of different stakeholders in the region and cooperation with other regions and neighbouring and other countries in EU.
- Measures and policies to implement this Target Region Action Plan (investments, research and development, education, support incentives etc.?)

2. What will be plans for future development of the region?

- How is the social structure developing in the future?
- How energy consumption will develop in the region and in different sectors (households, wood processing industry, SME's)?
- How will the heat and electricity be produced and what is and will be the role of biomass?
- How are the renewable energy sources taken into account in your energy supply?
- Local investment plans for forest biomass use for energy and in industry?
- What is the influence of these plans to the region (e.g. to environment, employment, industry)?
- What is the role of bioenergy business in the region?

3. What are the regional, national, bilateral or EU incentives and how are renewable energy investments financed?

- Is some national or regional support for renewable heat and electricity production or investments available?
- Is EU support schemes e.g. structural fund used for renewable energy investments?
- What are the main requirements to get the support (e.g. CO₂ reduction, employment, profitability and new business opportunities)?
- Is there a need for foreign investments and what for purpose?

4. What are the future actions to implement biomass resources regionally based on available potential?

- How much of the biomass potential will be realised in 2020, 2030 and beyond – vision for the future?
- Are there any plans to use more agrobiomass and other non-conventional biomass resources?
- Are there any plans to grow energy crops e.g. short rotation forests or miscanthus?

- Is more straw available for bioenergy use and is there arable land available for energy crops?
- What are the plans to use own local biomass resources instead of exporting wood chips and pellets outside the region?
- Are there any plans to import biomass fuels from other regions?

5. Supply chains and business models for forest and road-side wood harvesting, transportation and storage

- How is roundwood harvested, transported and stored in the region?
- How are forest residues and small-diameter trees harvested (supply chain, operations)
- How is the harvesting of round wood, small-sized trees and forest residues integrated?
- How are wood chips (at stand, roadside or plant) produced and when?

6. Quality assurance and control of the biomass and biomass fuel quality.

- Are there any legal requirements for quality management of round wood and wood fuel production?
- How is the quality of round wood controlled and do companies have quality assurance manuals based on available standards (e.g. ISO 9000)
- How is the quality of wood chips controlled?
 - sampling procedures
 - measurements of major properties; e.g. moisture content, particle size, bulk density, and ash content
- How is the quality of wood pellets controlled?
 - sampling procedures
 - measurement of major properties; e.g. moisture content, bulk density, ash content, fines, mechanical durability, net calorific value and chemical composition.
- Is the trading value based on weight or energy content of the fuel on the solid fuel markets for district heating and households applications
- Are any fuel quality standards currently used (e.g. DIN, SIS)?
- Any plans to use European fuel specification standards EN 14961 and quality assurance EN 15234 series?

7. What are prevailing conditions of bioenergy production?

- Production according to the heat demand – peak load and duration curve.
- Seasonal variation of the heat load?
- How is the capacity during peak load guaranteed?
- Main problems in heat production (e.g. losses, fuel quality, boiler)
- What is the best measure to improve efficiency?
- How is the plants maintenance organised?

- Are there any plans to support a switch from old stove to new technology with higher efficiency and lower emissions in households?

8. How well is the sustainability taken into account in the region?

- What are, according to your or public opinions, the most important criteria for sustainability in your region?
- What legal requirements are there concerning sustainability?
- What legal requirements exist concerning environmental issues in biomass combustion (emission control, including also small-scale combustion of biomass)?
- Are the full chain greenhouse gas emissions reductions taken into account in the future bioenergy plan (compared into present situation)?
- Common agricultural policy (CAP) promotes sustainable agriculture. Are the local farms following the cross compliance rules of CAP?
- What are the plans to use forests – local forest policy?
- What certificates are used in the region in forest management?
- Is the origin of the biomass fuels known (e.g. from certified forests)?
- What kind of occupational health and safety issues are taken into account in biomass supply and bioenergy production?
- How is the ash from biomass combustion handled?
- How are the environmental, social and economic impacts followed?
- What kind of indicators will be used in the possible sustainability impact assessments (e.g. greenhouse gas emissions, employment)?

9. What kind of additional information and advice from Bioregions project is needed for your Action Plan?

Issues to be specified during the meeting.

- Action plan planning
- Best practices from other countries in planning and implementing an Action Plan (e.g. visit to Finland)
- Fuel quality issues (e.g. from trade centres' viewpoint)
- Sustainability issues
- Information connected to future investments (e.g. equipment for fuel supply, supply chain development, boilers, CHP plants, business models for implementing)