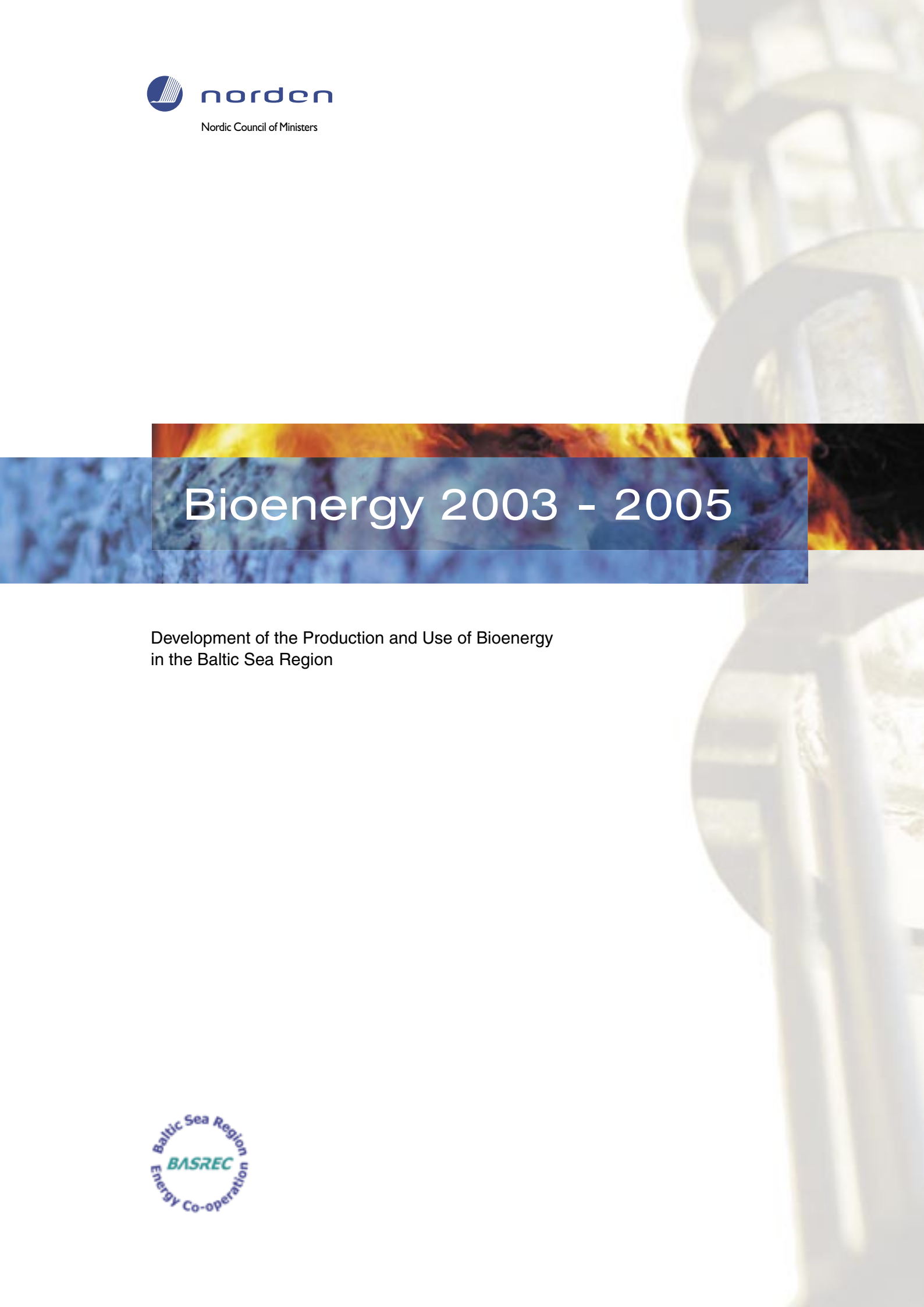




Bioenergy 2003 - 2005

Development of the Production and Use of Bioenergy
in the Baltic Sea Region

Bioenergy 2003 - 2005

Development of Production and Use of Bioenergy in
the Baltic Sea Region

Final Report - September 2005

Bioenergy 2003 - 2005

Development of Production and Use of Bioenergy in the Baltic Sea Region

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Nordic Council of Ministers

Store Strandstræde 18
DK-1255 Copenhagen K
Phone (+45) 3396 0200
Fax (+45) 3396 0202

Nordic Council

Store Strandstræde 18
DK-1255 Copenhagen K
Phone (+45) 3396 0400
Fax (+45) 3311 1870

www.norden.org

Nordic co-operation on energy

The Nordic Council of Ministers wishes to promote Nordic co-operation on energy e.g. by co-ordinating energy supply and consumption in accordance with sustainable developments, and by maintaining secure energy supply on a high level. Nordic co-operation on energy policy will concentrate on several main areas, such as a joint Nordic electricity market, a joint Nordic gas market, increasing efficiency in the energy sector, use of cleaner energy sources, Nordic co-operation on energy research and international co-operation.

Nordic co-operation

Nordic co-operation, one of the oldest and most wide-ranging regional partnerships in the world, involves Denmark, Finland, Iceland, Norway, Sweden, the Faroe Islands, Greenland and Åland. Co-operation reinforces the sense of Nordic community while respecting national differences and similarities, makes it possible to uphold Nordic interests in the world at large and promotes positive relations between neighbouring peoples.

Co-operation was formalised in 1952 when *the Nordic Council* was set up as a forum for parliamentarians and governments. The Helsinki Treaty of 1962 has formed the framework for Nordic partnership ever since. The *Nordic Council of Ministers* was set up in 1971 as the formal forum for co-operation between the governments of the Nordic countries and the political leadership of the autonomous areas, i.e. the Faroe Islands, Greenland and Åland.

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Preface

With this report the BASREC Working Group on Bioenergy, established in accordance with the decision of the BASREC Ministerial Meeting in Vilnius in November 2002, summarises its achievements in implementing its work as well as presents ideas for future activities to promote the development and use of bioenergy.

The Work Plan for the period 2003–2005 was elaborated in accordance with the Proposal presented to the Ministerial Meeting. The Working Group was established in June 2003 and has thus had about two years for implementing its work.

The direction of the work turned out to be very timely and very much in line with the proposals and priorities set out by the International Conference on Renewables held in Bonn in June 2004 as well as the recommendations by the EU Commission as regards renewable energy.

A key issue for the Working group and its four Actions have been how to connect to market players. Most bioenergy market players are small and medium-sized companies who have little time and resources for cooperative work such as this, even though they fully appreciate the results. Better contacts with the municipalities, plant owners and bioenergy producing companies would be one important task for the future work. The new database will help in that respect.

Taking into account the specific conditions in the Baltic Sea Region where district heating is a very common way of heat supply much of the emphasis of the work has been directed on the use of wood fuel for heat as well as on combined heat and power supply. The work laid down can form a basis also for practical application, inter alia in capacity building activities. During a new mandate, close co-operation also can be established with the work on energy efficiency as a systematic approach especially in district heating projects comprising production, distribution and end-use of energy in buildings can provide economically attractive solutions. Together with projects for fuel-switching from fossil fuels to bioenergy for energy production, such “system projects” may also form suitable climate projects and meet the requirements and priorities set out by the BASREC Testing Ground Facility for Joint Implementation projects in the Baltic Sea Region, in particular in Russia.

Most of the countries in the region have extremely good opportunities for an expansion of the use of bioenergy for heat and to some extent also electricity production. As was indicated already in the 2002 Proposal to the BASREC Ministers, close contacts with the forestry sector and with the agricultural sector are important for a sustainable production of bioenergy, including in the form of motor fuels. It will be even more impor-

tant for the ambitions and possibilities to meet the targets of renewables in the energy balances set up by the EU Commission and the Johannesburg Process. Bioenergy development, production and use can also be important for the social and economic development in rural areas. It has therefore been of great importance for the work that the Working Group has comprised members representing not only the energy sector but also the forestry and agricultural sector with good knowledge and experiences of the development in these sectors in the region.

The Working Group does also present ideas to promote the implementation of the findings – reflecting higher-level political visions and decisions. The Working Group is aware of *The Community Biomass Action Plan*, and would like to draw EU's attention to the conclusions in this report focusing on the conditions and needs in the Baltic Sea Region.

Stockholm / Tallinn, September 2005

Gudrun Knutsson,
Chairman of the BASREC
Working Group on Bioenergy

Ando Leppiman,
Co-Chairman of the BASREC
Working Group on Bioenergy

Executive Summary

“The European strategy for renewable energy sources identifies bioenergy as the most important renewable energy source for the future – a source of cleaner, more secure and sustainable power for Europe. As national programmes fund 90 % of the bioenergy research in Europe, coordinating them will improve outcomes” (The ERA-NET Bioenergy).

The use of biomass and waste in EU 25 was 65.8 Mtoe in 2002, of which Baltic Sea EU-countries contributed 55% (according to Eurostat). The WG supports regional, operational planning, not least for a naturally based product such as bioenergy. Optimal solutions must consider regional differences.

Background

BASREC – the Baltic Sea Region Energy Co-operation – was established at the meeting in Helsinki in October 1999 of the Ministers responsible for Energy in the Baltic Sea Region. Thus the co-operation embraces the five Nordic Countries as well as the Russian Federation, Estonia, Latvia, Lithuania, Poland, Germany and the EU Commission. Since 2000 the work has been implemented in working groups on electricity and gas markets, climate change and energy efficiency.

Bioenergy Working Group

Already in 1999 bioenergy and renewable fuels were especially mentioned as an important area for establishing a sustainable development in the energy sector in the Baltic Sea region. In 2002, an ad hoc working group was established with the task to elaborate a programme and recommendations for a bioenergy co-operation project during the years 2003–2005, and to present it to the BASREC Ministers at their meeting in Vilnius in November 2002. The proposal was approved by the Ministerial Meeting and the BASREC Working Group on Bioenergy (WG) was formally established in June 2003.

A more detailed programme and work plan had during spring 2003 been developed by the bioenergy group set up by the energy sector of the Nordic Council of Ministers (NCM), and the NCM allocated the financing for the work. The main emphasis was made on wood-fuel as forests are the dominating bioenergy source in the region. In some of the countries more than 50% of the area is forest land.

Project activities and results

The work plan for 2003–2005 included four main actions: Capacity building, Standards & Market Harmonisation, Joint Implementation, and Research & Development, – the same ones that were presented in the proposal in 2002. During the mandate of the Bioenergy Working Group the following has been achieved:

1. Capacity building (see Chapter 5.1)

A Manual for decision-makers in municipalities, heating companies etc. is under development, coordinated by the Tallinn University of Technology. The manual is to be presented in autumn 2005 and will be made available in English, Russian and Estonian. Seminars for introduction etc. are also planned.

2. Development of Standards for Market Harmonisation (see Chapter 5.2)

Nordtest, which from this year on merged with the Nordic Innovation Centre was assigned to implement this task. This work is considered to be very important for the development of trade and cooperation in the region both as regards wood fuels and for the combustion equipment. Close co-operation and co-ordination with the ongoing work on standards for solid biofuels within CEN is a must.

3. Joint Implementation (see Chapter 5.3)

The work has been implemented in co-operation with the BASREC Climate Group in the work on developing a sector specific baseline for climate projects based on bioenergy. The area chosen for this project was Archangelsk Region in Russia.

4. Research & Development (see Chapter 5.4)

The responsibility for this action was assigned the Nordic Energy Research. The project has listed and described 27 international scientific networks and programmes, and developed a database with 200 entries, covering diverse regional players in bioenergy. This project was implemented in early 2005. The fact sheets are available at www.nordicenergy.net and the database is made operational and can be found on the web address: www.nedatabase.info/bioenergy/

The Nordic Council of Ministers (NCM) has financed the work of the Bioenergy Working Group.

This report is also referring to several ongoing, connected projects as WOOD–EN–MAN (see Chapter 5.5.1), RecAsh (see Chapter 5.5.2), CoReWood (see Chapter 5.5.3), and BIODST–BSR (see Chapter 5.5.4), and partly financed by the NCM programme. All projects are focusing on the support of sustainable forestry management and a realisation of the energy policy within the Nordic–Baltic region, – and particularly to create a knowledge base for sustainable production of forest biomass for energy.

The Working Group has held several internal meetings for organising its work, and organised related events and local seminars. WG parties have made contributions at regional, EU and global level through participation and presentations at several events.

Future activities

The WG propose future activities based on the following: a) New projects should reflect higher–level political signals; b) Priority should be given to the possible need for a follow up of ongoing projects in “Bioenergy 2003–2005”; c) In proposals for new projects, it is important to emphasise those projects that will clearly benefit from a regional co–operation in the Baltic Sea region, and which require a regional approach or solution.

The WG finds that its own work (Actions 1–4) concerning increased expertise, standardisation, network development and joint implementation has broad support in the many resolutions and statements that are referred to in this report (see Chapter 2.2). The WG is referring to three key issues at the International Conference on Renewable Energies at Bonn in 2004:

- Policies for renewable energy market development
- Financing options for renewable energies
- Strengthening of human and institutional capacity

In order to follow up these higher–level aims, WG suggest that BASREC focus on the following issues in coming years (see Chapter 3):

- Strengthening Bioenergy Capacity Building
- Development of Standards
- Joint Implementation of Bioenergy Projects
- International Bioenergy–R&D Sector Co–operation through Networking
- Financing and marketing options (new).

The WG would like to reflect the EU’s ongoing work with a Biomass Action Plan, and would like to draw EU’s attention to the conclusions in this report focusing on the conditions and needs in the Baltic Sea Region.

The WG will consider making a change of priorities in the light of the proposals put forward within EU's plan. The WG does also want to look into the potential of future co-operation with the different sectors within the Baltic 21.

1. Background / Introduction

The Helsinki Communiqué in 1999 emphasised the importance of renewable energy sources in ensuring the security of supply, and recommended the further development of policies and technologies to support a more extensive utilisation. As biomass is a predominant regional renewable energy source, besides hydropower, it has the biggest growth potential in the Baltic Sea region. It was noted that in order to encourage national development of policies and technologies to enable energy savings, energy efficiency and utilization of renewables, a good information network between the Baltic Sea region countries was needed.

Bio2002Energy was initiated as an element of the Baltic Sea Region Energy Co-operation (BASREC), which was set up at the Helsinki conference of the CBSS energy ministers and the European Commission in 1999. The project *Bio2002Energy* was initiated as one of the tasks under the EU-Synergy project BASREC 2002 with the Nordic Council of Ministers (NCM) as the administrative body and the main financier of the project. The *Bio2002Energy* project should be seen as a first step in co-operation between the Baltic Sea Region countries in the field of bioenergy, concluded in several recommendations for further actions to attain a more extensive utilization of the big biomass resources of the Region.

The objectives of *Bio2002Energy* were to initiate activities that would contribute to an environmentally sound, sustainable and reliable supply of energy in the Nordic countries and the Baltic Sea region, to promote environmental objectives associated with greenhouse gas emissions and waste disposal, and also to increase the added value of agricultural and forestry resources. The aims of the project should primarily be reached by regional cooperation regarding production and use of bioenergy. The work for this project was carried out during January to October 2002 in a working group with members from the Nordic countries, Germany, Estonia, Latvia, Lithuania, Poland and Russia, the BASREC secretariat and the Nordic Council of Ministers.

A *Workshop on the future of bioenergy in the Baltic Sea Region* was arranged in co-operation between BASREC, the Nordic Council of Ministers, the SYNERGY Programme of the European Union, Baltic 21-Energy, the Barents Euro-Arctic Council working groups on energy, forestry and environment in Jyväskylä, Finland on 6–7 March 2002. The objectives of the workshop were:

- to exchange information and views on the preconditions for increased use of biomass in energy production,

- to look at the future priorities in the regional co-operation in this field, and
- to establish the basis of the work preparing recommendations to the Ministerial Meeting concerning the future activities of BASREC in the field of renewable energy sources.

The conclusions in the Bio2002Energy report was based on the results of three consultant studies describing the present situation regarding the use of bioenergy in the different countries (*“Development of the use of Bio-energy in the Baltic Sea Region, 2000/48pp*). References were also made to the results of working group meetings in Stockholm on 4 April 2002, in Helsinki on 11–12 June 2002, and in Eskilstuna on 1–2 October 2002. The report was produced as a joint activity of the working group, and all members were included with composing the report.

The report concluded that:

- Close co-operation and understanding can be created between decision-makers, companies and organizations within and between the countries as regards the policies and strategies for energy, forestry, agricultural and environmental development in order to fulfil the overall requirement of sustainability, and
- Common standards for fuels and equipment for an open and competitive market for biofuels for energy production and transports must be developed.

BASREC Ministerial Conference, Vilnius, November 2002. The Bio2002 Energy report with proposals and recommendations was presented to the BASREC Ministerial Meeting in Vilnius in November 2002 and approved for implementation during the new mandate period 2003–2005.

The Ministers of Energy of the member countries of the Council of the Baltic Sea States (CBSS) and the European Commission convened for the third time in Vilnius, on 20 November 2002. In the statement from the conference it was urged to reinforce the work to:

- a) Support for the national and regional initiatives to develop renewable energy sources and to raise the proportion of renewable energy in all countries,
- b) Demonstrate alternative development projects in areas where changes in energy production to the use of renewable sources might have positive impact on the local economy and employment situation and
- c) Present an annual report to the parliamentarians on the progress of the work of BASREC.

The Group of Senior Officials (GSEO) of the Baltic Sea Regional Energy Co-operation BASREC decided in its meeting in Berlin on March 2003 to ask the Nordic WG on Bioenergy to prepare a presentation to the BAS-

BASREC Working Plan 2003–2005 on renewable energy within May 2003. The Working Plan was accepted by GSEO in June 2003, and at that time, a detailed planning for new actions could start.

Bioenergy 2003–2005 Workplan. The overall objective of the project has been to support an increased use of renewable energy in a sustainable way in the Region and thereby enhancing especially the use of bioenergy. The work would comprise:

- Co–ordination and intensified support of the work within the field of bioenergy;
- Implementation of an open “Regional Forum for Bioenergy” in order to exchange and disseminate information and knowledge about local fuels, methods, actors, techniques and organisations
- To facilitate discussions and co–ordinate co–operation between all relevant public and private sectors, bodies and organisations representing besides the energy sector, for example agriculture and forestry, environment, transportation, financing, industry and trade;
- Surveying of obstacles for an increased use of bioenergy and looking for relevant solutions; and
- Reporting to the ministerial conference in 2005 and to other relevant meetings during the mandate period.

The Bioenergy 2003–2005 Process has been implemented through Four actions

- Action 1 – Strengthening Bioenergy Capacity Building;
- Action 2 – Development of Standards to Achieve Market Harmonisation in the Bioenergy Field;
- Action 3 – Joint Implementation of Bioenergy Projects;
- Action 4 – International Bioenergy – R&D Sector Co–operating through networking;

2. Bioenergy 2003–2005

2.1 Organisation and Financing

Co-ordination of the Bioenergy 2003–2005 process has been conducted through the BASREC WG on Bioenergy. Co-ordination of projects, meetings, presentations, proposals and reports has been executed by the chairmen and secretariat. The Working Group has due to the task been multi-sectorial consisting of members from the energy, agricultural and forestry sectors.

The members of the BASREC Working Group (WG) on Bioenergy are:

<i>Denmark:</i>	Jan Bünger, jbu@ens.dk; www.ens.dk Morten Gylling, gylling@foi.dk; www.foi.dk Morten Ingerslev, moi@kvl.dk
<i>Estonia:</i>	Ando Leppiman; ando.leppiman@mkkm.ee; co-chair Rauno Reinberg; rauno.reinberg@ekm.envir.ee
<i>Finland:</i>	Aimo Aalto; aimo.aalto@ktm.fi; www.ktm.fi
<i>Germany:</i>	Christina Wittek; christina.wittek@bmwa.bund.de Andreas Kleine; andreas.kleine@bmwa.bund.de Birger Kerckow; b.kerckow@fnr.de
<i>Iceland:</i>	Ragnar Baldursson; ragnar.baldursson@utn.stjr.is
<i>Lithuania:</i>	Giedre Vysniauskaite; g.vysniauskaite@ukmin.lt Laura Kasnauskaite; l.kasnauskaite@am.lt
<i>Latvia:</i>	Didzis Cinovskis; didzis.cinovskis@em.gov.lv
<i>Norge:</i>	Øyvind Leistad; oyvind.leistad@oed.dep.no; www.dep.no /oed Harald Birkeland; hbi@energi.no
<i>Poland:</i>	Tomazs Surma; tomasz.surma@mg.gov.pl Grzegorz Wisniewski; grewis@ibmer.waw.pl
<i>Russia:</i>	Alexander Podsevalov; zandr@mail.ru
<i>Sweden:</i>	Gudrun Knutsson, gudrun.knutsson@stem.se; www.stem.se; chair Sven Risberg; sven.risberg@stem.se; www.stem.se Lars Andersson; lars.andersson@svsst.svo.se; www.svo.se
<i>EU:</i>	Kyriakos Maniatis; kyriakos.maniatis@cec.eu.int Beatriz Yordi; beatriz.yordi@cec.eu.int

Assistants to the WG are the BASREC Head of Energy Unit Janis Andrew Folkmanis, janis.folkmanis@cbss.st; the Project manager for Nordic Regional Energy Co-operation Peter Molander, peter.molander

@projectum.fi; and Project assistant Kaire Kuldpere, kaire.kuldpere@enprima.com. Editor of the final report is Professor Gunnar Wilhelmsen, gunnar.wilhelmsen@nordicenergy.net.

For each action identified within the framework of the Bioenergy 2003–2005 process, concrete project proposals have been collected from interested parties and discussed in the Working Group. After approval of the group, applications have been presented to relevant programs and organizations. The main financing body has been the Nordic Council of Ministers. Co-financing and in kind contributions have also been given by countries (chairmanship, hosting of meetings and activities, etc) and administrative bodies involved in the different actions.

The main contracted bodies have been:

Action 1:

Strengthening Bioenergy Capacity Building: The Estonian Technical University, www.tut.ee

Action 2:

Development of Standards to Achieve market Harmonisation in the Bio-energy Field: The Nordic institution Nordic Innovation through Nordtest www.nordicinnovation.net

Action 3:

Joint Implementation of Bioenergy Projects: ECON Norway www.econ.no and Fridtjof Nansen-Institute through the BASREC Climate Group

Action 4:

Research, Development, Demonstration & Innovation Projects in Bio-energy: Nordic Energy Research www.nordicenergy.net

2.2 The Baltic Sea Region and the Surrounding World – The Working Group's views

Increased production and use of bioenergy

The Working Group (WG) note that the surrounding world generally says an unambiguous “yes” to increased production and use of bioenergy – covering a wide scope of aspects of environmental impact, both with respect to the nutrient balance as a result of biomass production and with respect to the environment during remodelling of biomass to energy products (air pollution, ash handling etc.)

Media images, international fora and political decisions are characterised by extensive goodwill towards the removal of barriers against and the stimulation of increased efforts for bioenergy. It is symptomatic that declarations of support and well-founded perceptions of increased production and use of bioenergy come from diverse political platforms and professional fora. Greater flexibility in the replacement of fossil fuels with

renewable energy is desired by the *energy* industry, while *environmental* authorities focus on greenhouse gases and bioenergy as a CO₂–neutral source of energy, *forestry* and *agriculture* desire a new source of income and new workplaces in country districts, and the *transport* sector is interested in a gradual replacement of petrochemical fuels.

Collaboration between the energy, forestry and agricultural sectors

The WG wishes to attach importance to collaboration between the energy, forestry and agricultural sectors.

The EU's new agricultural policy and the consequent challenges to agriculture in the new EU countries have created a new situation. Without readjustment, this situation may threaten sustainable development in rural areas.

The strategy should highlight how forest owners and farmers can capitalise on the current positive political climate supporting bioenergy. Production of wood fuel is widespread in the Baltic Sea region. It is a local product that can be locally used, and upgraded biofuels such as pellets can be exported. The production of wood fuel in forest regions is comparatively labour intensive and this creates jobs in the rural areas. The use of wood fuel in central plants is comparatively capital intensive and this creates industrial employment. The regional energy systems based on wood can therefore create a balanced job market and security of local supply. This is not least to be observed in North West Russia where the forest resources are considerable and of increasing importance for bioenergy production both for domestic use and for exports.

The new EU Member States receive support for rural development, and there are clear opportunities here if the various sectors work together.

Networking

The WG finds that the networking activities between different professions should continue to be a highly prioritised activity.

Many national and international organisations and fora have in the last decades expressed expert viewpoints on the necessity of increased production and use of bioenergy. This concern is noted and commented upon in this report's Action 4. Typical for bioenergy is the large number of networks, which reflects the diversity of the groups of interest, embracing technology, biology, economics, etc. An optimal exploitation of bioenergy requires joint solutions based on a diversity of professional knowledge, often in collaboration with – and sometimes in competition with – other industries that use the same biomass as raw material. Both established and new interest groups are engaged in a lobbying of the au-

thorities to make their views known, and also in gathering and coordination of professionals – not least scientists – for problem-orientated collaboration on new challenges.

Overlapping

The WG finds that there is considerable overlap in the northern region between a number of professional and to some extent geographically orientated organisations and institutions.

New organisational initiatives within BASREC should therefore initially take place within the current infrastructure. Global / regional organisations, such as the IEA, the EU, the Baltic Sea Region, the Nordic Council of Ministers and the Barents Euro-Arctic Council as well as the World Bank and EBRD, all have bioenergy on their agenda. It is in itself a challenge to co-ordinate ideas and decisions from the various fora. The WG wants to look into the potential of future co-operation with different sectors within Baltic 21. Renewable fuels are also included within the EU–Russia Dialogue and can play an important role in the future including for the goals of security of supply.

Focus on economy, trade and market

The WG finds that summaries and analyses of available biomass in a national or regional context are still emphasised in reports, while the focus now should to a larger extent be on technological exploitation, economics and the market.

In the same reports, the focus has often been on bioenergy's strengths and weaknesses, followed by lists of priorities for what should be done in order to reach the targets that have been set. Today's picture appears to a large degree to give the impression of impatience because of a lack of concrete initiatives and results. A typical example is the EU, which finds that, despite a well-defined and quantifiable target and political support for bioenergy, the desired goal is not achieved.

Information exchange and biomass action plan

The WG wants to emphasise the importance of information exchange between countries on various initiatives that have been planned or carried out for increased use of bioenergy. WG gives its support to the initiative of EU's Biomass Action Plan, and stresses the importance of prioritised proposals being followed up with a budget, a plan of action and designation of those responsible.

Information exchange will stimulate greater creativity with respect to new higher-level regional directives and to more national initiatives. The WG has taken note of the conclusions of the Communication from the Com-

mission to the Council and to the European Parliament (2004), that “the target in 2010 will not be achieved under current policies and measures. To achieve the target in 2010–130 Mtoe of biomass is needed, and that is 74 Mtoe more than in 2001. By the end of 2005, the Commission will bring forward a coordinated biomass plan with a clear approach to securing adequate supplies of biomass through European, national and regional / local actions across them all. A Biomass Action Plan with strong and targeted measures and actions in all three sectors (electricity, heat, and biofuels for transport) and a better coordination of EU policies”.

Regional planning

The WG supports regional planning.

At EU25 level, it is not possible to have one operational plan for all countries: it must be divided up, for example in regions, and this is the case not least for a biobased product such as bioenergy. Optimal solutions for increased production and use of bioenergy must take regional differences in climate, topography, ownership structure, type of biomass, expertise and technology, infrastructure and logistics etc. into account. A comparison of national plans would be a starting point for the carrying out of regional operative plans. Operative plans for the carrying out of concrete initiatives must reflect higher-level political visions.

BASREC WG Actions

The WG finds that its own work concerning increased expertise, standardisation, network development and joint implementation has broad support in the many resolutions and statements that are referred to.

2.3 Action 1 – 4 Results and Comments

The direction of the work turned out to be very timely and very much in line with the proposals and priorities set out by the International Conference on Renewables held in Bonn in June 2004 as well as the recommendations by the EU Commission as regards renewable energy.

A key issue for the Working group (WG) and its four Actions have been how to connect to market players. Most bioenergy market players are small and medium-sized companies who have little time and resources for cooperative work such as this, even though they fully appreciate the results. Better contacts with the municipalities would be one important expansion of the audience for the group.

The work plan for 2003–2005 included four main actions: Capacity building, Standards & Market Harmonisation, Joint Implementation, and

Research & Development, –the same ones that were presented in the proposal in 2002. The WG was established in June 2003 and had accordingly about 2 years for implementing its work. During the mandate of the Bioenergy WG the following has been achieved:

1. Capacity building (see Chapter 5.1)

A manual for decision-makers in municipalities, heating companies etc. is under development, coordinated by the Tallinn University of Technology, Estonia. The manual is to be presented in autumn 2005 and will be made available in English, Russian and Estonian. Seminars for introduction etc. are also planned.

2. Development of Standards for Market Harmonisation (see Chapter 5.2)

Nordtest, which from this year on merged with the Nordic Innovation Centre, was assigned to implement this task. This work is considered to be very important for the development of trade and cooperation in the region both as regards wood fuels and for the combustion equipment. Close co-operation and co-ordination with the ongoing work on standards for solid biofuels within CEN is a must.

3. Joint Implementation (see Chapter 5.3)

The work has been implemented in co-operation with the BASREC Climate Group in the work on developing a sector specific baseline for climate projects based on bioenergy. The area chosen for this project was Archangelsk Region in Russia. The project has developed a set of four Baseline Methodologies designed to cover a wide range of potential JI projects in the power and district heating sector.

4. Research & Development (see Chapter 5.4)

The responsibility for this action was assigned the Nordic Energy Research. The project has listed and described 27 international scientific networks and programmes, and developed a database with 200 entries, covering diverse regional players in bioenergy. This project was implemented in early 2005. The fact sheets are available at www.nordicenergy.net and the database is made operational and can be found on the web address: www.nedatabase.info/bioenergy/

In addition, the Working Group has held several internal meetings for organising its work, and organised related events and local seminars. Group parties have made contributions at regional, EU and global level through participation and presentations at several events.

This report is also referring to several ongoing, connected projects as WOOD–EN–MAN (see Chapter 5.5.1), RecAsh (see Chapter 5.5.2), CoReWood (see Chapter 5.5.3), and BIODST–BSR (see Chapter 5.5.4), and partly financed by this programme. All projects are focusing on the support of sustainable forestry management and a realisation of the energy policy within the Nordic–Baltic region, and in this particular case to create a knowledge base for sustainable production of forest biomass for energy.

3. Proposal for Future Activities in the Baltic Sea region

Taking into account the specific conditions in the Baltic Sea Region where district heating is a very common way of heat supply much of the emphasis of the work has been directed on the use of wood fuel for heat as well as on combined heat and power supply. The work laid down can form a basis also for practical application, inter alia in capacity building activities. During a new mandate close co-operation also can be established with the work on energy efficiency as a systematic approach especially in district heating projects comprising production, distribution and end-use of energy in buildings can provide economically attractive solutions. Together with projects for fuel-switching from fossil fuels to bio-energy for energy production, such "system projects" may also form suitable climate projects and meet the requirements and priorities set out by the BASREC Testing Ground Facility for Joint Implementation projects in the Baltic Sea Region.

The Working Group (WG) has discussed the possibilities for future activities based on the following:

1. New projects should reflect higher-level political signals, like those referred to earlier in the previous chapter.
2. Priority should be given to the possible need for continuation of ongoing projects / actions in "Bioenergy 2003–2005".
3. In proposals for new projects, it is important to emphasise those projects that will clearly benefit from a regional co-operation in the Baltic Sea region, and which require a regional approach / solution. At the same time, emphasis should be laid on projects based on the region's special strengths and weaknesses (e.g. division of labour), and any common features present (e.g. method studies, synergy).

1. Higher-level guidelines

Operative plans for the carrying out of concrete initiatives must reflect higher-level political visions. The WG finds that its own work (Actions 1–4) concerning increased expertise, standardisation, network development, and joint implementation has broad support in the many resolutions and statements that are referred to. The WG is referring to three key issues at the International Conference on Renewable Energies at Bonn in

2004, where the key question was how to make a global transition to a sustainable energy system in an active and timely manner:

- Policies for renewable energy market development
- Financing options for renewable energies
- Strengthening of human and institutional capacity

In order to follow up these higher-level aims, BASREC should in the future focus on the following:

Market development. In “Bioenergy 2003–2005”, attention is specially directed towards standardisation questions, precisely in order to drive market development, and thereby make easier commerce with biofuels between the different countries in the region (see Action 2). In order to further strengthen market development, WG wishes in the future to give priority to work concerning economics and technological exploitation, possibly at the cost of studies of resource availability. Emphasis should be on affordability and cost reduction, on innovative business and financing models and on cost-effective, consumer-friendly cost-recovery models, recognising that different renewable technologies offer different opportunities and face different constraints.

Financing options. The region needs more advanced policies by Export Credit Agencies, as these are crucial to increasing financing for renewable energies. Financial incentives as catalytic funding should also be considered. International Financial Institutions, including the World Bank and the Regional Development Banks, should significantly expand their investments in renewables and energy efficiency, and should establish clear objectives for renewable energies in their portfolios.

Capacity building. The WG supports the strengthening of human and institutional capacity building. This is documented in Action 1. The WG thinks that the best methods for knowledge transfer would be manuals, handbooks and courses/seminars, which would improve users’ understanding by condensing the best practice in the bioenergy area from each BASREC country.

2. Proposed future activities

Strengthening Bioenergy Capacity Building (2003–2005/Action 1)

The work with preparing a bioenergy manual/handbook in English, Russian and Estonian must be properly finished, and possibly be continued with manuals/handbooks covering new topics.

The project should be extended by assisting increased cooperation with Nordic Energy Research on the Nordic Graduate School of Biofuel Science and Technology, and with the Nordic Council of Ministers on the Energy Experts Programme.

Development of Standards (2003–2005/Action 2)

The work with the review of and information about the field of bioenergy standardisation in the Baltic Sea region should be continued, and hopefully also by coordinating national contributions directed towards CEN. Special training and information projects are needed to implement CEN Biofuels standards in Baltic countries and Russia. There is also a need for new standard development – i.e. storage of biofuels, ash classification and field test for biomass boiler measurements (300kW–4MW) – to enhance use of biofuels in the Baltic Sea region. The WG propose that The Nordic Innovation Centre should continue to play a leading role in future activities.

Joint Implementation of Bioenergy Projects (2003–2005/Action 3)

Future actions following from the work of Action 3 should comprise the application of the methodologies to specific bioenergy projects in Russia and the Baltic states.

International Bioenergy–R&D Sector Co-operation Through Networking (2003–2005–Action 4)

The basic work is finished, but there is still a need for closer interaction and communication between market actors, such as bioenergy producers, users and manufacturers of equipment, local consultants, project developers, project owners and public authorities. The work on the networks and the database must be *updated* (fact sheets, new actors etc.) and *marketed* in the region. WG propose that The Nordic Energy Research act as operating agent for this work.

Regional collaboration must be strengthened by both emphasising and giving priority to international collaboration within the national bioenergy programmes. The work carried out during the current period has shown that there are international bioenergy fora in which it is advantageous for countries in the Baltic Sea region to be members and accordingly enter into collaboration with other countries both in and outside the region. WG will propose that countries participating in BASREC – together with network representatives – should spend some time together to find common challenges within one or more of these networks. WG propose that The Nordic Energy Research act as operating agent to initiate this activity.

Financing and marketing options (new issue)

There is a need for innovative business and financing models taking into account regional differences in climate, topography, ownership structure,

type of biomass, expertise and technology, infrastructure and logistics. *A new Action 5 should register structure and comment upon the financing options that exist.* A further extension of this action will imply an equivalent set-up for bioenergy market development – cf. EUBIONET II (see Country report from Finland and www.eubionet.net), and IEA Task 40 “Sustainable International Bioenergy Trade” (www.fairbiotrade.org).

The WG agrees with the EU’s ongoing work with a Biomass Action Plan, and would like to draw EU’s attention to the conclusions in this report focusing on the premises, and needs in the Baltic Sea Region. The WG propose that new projects should reflect the higher-level political signals that we have referred to, and we expect that the EU Biomass Action Plan will consider our proposals and comments. The WG will consider making a change of priorities in the light of the proposals put forward within EU’s plan

The WG does also want to look into the potential of future co-operation with different sectors within Baltic 21.

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Appendices

5. Bioenergy Actions 2003–2005

5.1 Action 1 “Manual for the Improvement of Competitiveness of Biomass Fuels in Baltic Sea Regions”

Project administrative body:
Tallinn University of Technology,
Ehitajate tee 5
19086, Tallinn, ESTONIA
www.ttu.ee

Project manager:
Villu Vares/Tallinn University of Technology
Direct line: + 372 6203638
villu@staff.ttu.ee

Mandate

Overall goal of the project “*Manual for the improvement of competitiveness of biomass fuels in Baltic Sea Regions*” is knowledge transfer and capacity building in district heating sector in the Baltic Sea Region. The main activity of the project is publication of a general manual, which will be based on experiences of bio-energy projects in EU, Nordic and BASREC countries incl. Russia. This manual should provide help as an extra-learning material for the specialists from the municipalities, operational personnel of enterprises and for the wide range of beneficiaries to develop entrepreneurship.

As target groups of the project we see engineers, technicians in DH companies and industry where biomass fuels are used or planned to use; responsible persons on energy planning issues in municipalities, i.e. decision-makers; forestry specialists dealing with biomass fuels preparation and handling; energy specialists in consulting companies and students on energy, energy economy and forestry fields.

Project description / operation:

One of the best methods for knowledge transfer would be a manual or handbook, which will concentrate best practice in bio-energy area from each BASREC countries to support better understanding of users. The

aims of the project should primarily be reached by regional cooperation regarding production and use of bio-energy.

Content of the manual by chapters will be:

- Explanation of terms, bio-energy legislation and energy taxation policies and biomass fuels resources, availability and consumption in BASREC, characteristics of biomass fuels, standardization process of biomass fuels in BASREC countries.
- Biomass fuels (wood fuels, straw and other biofuels) production technologies (wood chips and pellet production, peat production technologies).
- Bio-energy production technologies (combustion technologies, multi-fuel power plants and boiler houses, fuel storages and conveyors), biomass fuel ash characteristics and handling systems, cleaning of heat surfaces of biomass fuels burning equipment.
- Biomass fuels utilization impacts (socio-economic impacts, environmental impact, economic, commercial and employment impacts, quality of life, education and legislation impacts, impact on project partners), technological impacts.
- Planning of energy systems running on biomass fuels (project funding and contracting, project dissemination, impact assessment), future trends and competitiveness of bio-energy.
- Annexes: Best practice in biomass fuel production, successful cases of energy production using biomass fuels (examples), environmental impacts assessment of boiler house converted to biomass fuel (examples), risk analysis of enlargement of biomass fuel boiler houses (examples).

Assumed content of the Manual is 150–200 pages, from this 20–25% should be the share of best practice examples.

Main output will be the manual (book and CD-ROM) for develop and implement bio-energy projects and thematic seminars. Compiled manual will have an electronic version what can spread by BASREC website. After the project we expect to induce the manual user's network where people will change new information of bio-energy sector and ask the aid for their concrete problems for example on operating of biomass boilers.

Project results:

The main results up to September 2005 are following:

- We have updated our database of literature sources concerning biofuel production, transportation, handling and combustion technologies. Most of collected information is in English, some books, reports and

information bulletins are in Finnish, Norwegian, Swedish and Russian.

- The questionnaire has been sent out to DH boiler house owners to get information on results of biofuel projects. After receiving filled questionnaires our experts visited the boiler house and during interview to clarify following issues:
 - Typical situation before biofuel project: efficiency, technical conditions, emissions, heat price
 - Structure of expenses and heat price before and after biotechnology installations
 - Planning mistakes: incorrect capacity, lack of local interest, too simplified technology, fuel availability
 - Find the reasons if some biofuel boilers have been shut down
 - If there been some accidents find out their reasons
 - Qualification of boiler operators – need for knowledge and experience
 - How risks of biofuel implementation have been reduced
- Detailed information on biofuel projects have been analysed and discussed on meetings in Tallinn University of Technology and Estonian Agricultural Academy. 12 best practice examples have been chosen for the Manual.
- The draft version in Estonian language has been completed and it contains 170 pages. More than half of illustrations are original photos or pictures. Preparation of English and Russian versions are ongoing and should be finalised in October 2005.

Proposals for future actions and how they can be addressed

Future actions could be connected with preparation of training courses Eastern BASREC countries and regions.

Project finalization date, reporting format

The project activities should be finalised in December 2005. Report should be describing the content of the Manual and get information on carried out dissemination activities.

5.2 Action 2 “Development of standards to achieve market harmonisation in the bioenergy field”

Project administrative body:

Nordic Innovation Centre

Holbergs gate 1, 0166 Oslo, Norway

Tel. +47 23 354566

www.nordicinnovation.net

Project manager:

Eija Alakangas, VTT Processes, Finland

Direct telephone: + 358 20 722 2550

eija.alakangas@vtt.fi

Mandate

Overall objective is to create a basis for increased trade of products and systems in the bioenergy field between countries in the Baltic Sea region, thereby enhancing the use of biofuels in the region.

The aim of the project is to establish contacts between relevant national organizations and Technical Committees within the CEN to prepare possible contributions to ongoing activities on solid biofuel standards and further to investigate the needs and possibilities for common test methods and rules regarding biofuels and biofuel machinery and systems.

The project will establish and operate a network for information exchange and communication between organisations from each country. It will also review of present status in different countries as regards standards and regulations in the bioenergy field. The project will carry out the initial study with contributions of network members. Based on this review, the forms for cooperation with CEN will be settled. Means of removing trade barriers in the Baltic Sea region should be analysed in contact of with relevant authorities in the different countries. Project consists of the following tasks: a) Establishment of network, b) Information structure, c) Collection of information, d) National standards review/state of art and e) Workshop.

Project description / operation

The work is concentrated on the analysis of existing standards and their suitability in the trade of solid biofuels. In addition, information on equipment standards for small-scale boilers and stoves were collected. A review of the current standards and future prospects is published in September 2005.

European standardisation organisation, CEN, is currently preparing 30 different technical specifications, which are presented in this report. These technical specifications have been drafted in co-operation with the leading bioenergy experts in Europe. They provide a good basis in the future for production, trading and use of solid biofuels. There are also CEN standards on equipment for the usage of biofuel. From the Baltic Sea Area only Denmark, Finland, Germany and Sweden have participated in the CEN work. It is essential that the knowledge of CEN standardisation work is transferred to the other Baltic Sea countries as well. This has been one of the major tasks in this project. Members of the project team have been participating in the CEN standardisation work.

There are also national standards in most countries and a survey, supported by interviews, was carried out to find information about existing standards and future needs in the Baltic Sea region. More than 170 standardisation contacts have been collected for information dissemination. A web-based questionnaire (available at <http://www.biomasse.teknologisk.dk/survey.htm>) has elaborated and has been sent to experts in different countries around the Baltic Sea. Needs of future standards have also been discussed in the meetings and in the workshop: *Standardisation of Solid biofuels – Tools for trading*, which was organised in Tallinn on 12 May 2005. The workshop was attended by 50 participants from Belarus, Denmark, Estonia, Finland, Latvia, Russia and Sweden. Second half-day workshop of standardisation was organised in Riga on 22 August 2005 with 17 Latvian participants. Several meetings have been organised with peat experts to draft Fuel Peat guidelines.

Project results

The CEN-standards and technical specifications can meet the major requirements of the standardisation needs for solid biofuels and small-scale equipment. The CEN technical specifications for solid biofuels are currently being finalised and more experience from their implementation is needed. The need for a special information and training project for the Baltic countries and Russia has been identified. The reason is that the Baltic States have not participated actively in the CEN work and Russia is not even a CEN member.

The following additional standards were found to be urgently needed:

- Standard for storage and handling of solid biofuels.
- Standard for classification of ash from biofuels for the use as fertilizer.
- Standard for requirements and measurements for testing of 300 kW – 4 MW biomass boilers
- Guideline for peat classification, sampling and analysis of properties

The growth in the use of biofuels that Europe has experienced during the past 10 – 15 years has implied a significant increase in the amount of biofuel handled. The size of the storages and transports as well as the number of locations where biofuel is handled and/or stored has risen markedly. The personnel operating these large amounts of biofuels work in a business with a very short history of experience. This assumption is confirmed by the fact that the market has seen a lot of fires in biofuel storages that could easily have been avoided by following simple rules for handling and storing. For this reason it is argued that a short standard or guideline for correct handling and storing of biofuels, based on existing (although rather limited) research, would prevent accidents and loss of biofuels through fires, and can furthermore prevent unnecessary deterioration of biofuel when stored.

Currently, there are several combustion equipment standards for stoves and boilers up to 300 kW, because boilers of this size can be measured in laboratory condition, – but there is a need for a simplified method for field measurements for boilers of 300 kW up to 4MW. The published equipment standards cover quite well the needs of quality assurance of small biomass fuel fired appliances. There is a need for a simple standard for larger than 300 kW biomass systems, which has to be tested on field. For large power plants there exists a well established standard (DIN 1942), which is originally developed for power plants using fossil fuels. This probably needs some modifications to become suitable also for biomass fuel fired plants.

Ash from combustion of biofuels can be used for fertilization to contribute to sustainable forest management. To facilitate such ash usage there is a need for a classification system for ash from biofuels including methods for analysis and limit values for heavy metals. (The use of ash in the building industry will not be covered).

In the Baltic Sea region peat is commonly used together with biofuels in order to improve the biofuel combustion properties. There is also a significant international trade with peat in the region. Peat reduces slagging problems, fouling and corrosion. Especially when using wood fuels like logging residues, the use of peat is important to avoid combustion problems and down-time. The percentage of peat is dependant on the type of biofuel. Typically 15–20% peat is used. *Guidelines on classification, handling, storage and testing of peat* are needed to facilitate optimizing of biofuel combustion. The classification system and test methods should be similar to the CEN standards for solid biofuels. A guideline for fuel peat has been drafted with the help of producers and users of biofuels and peat in Finland, Sweden, Estonia, Latvia and Lithuania and of peat associations. The intention is to publish the results as a Nordtest report at the end of year 2005.

Outcome of the project:

- 170 contacts registered for the project dissemination
- three newsletter published
- a survey of the current international and national standards published (126 standards identified),
- workshop organised in Tallinn, Estonia on 12 May 2005 with 50 participants from Belarus, Denmark, Estonia, Finland, Latvia, Russia and Sweden and in Riga on 22 August 2005 with 17 Latvian participants
- gaps in standardisation identified
- guidelines for fuel peat drafted.

Proposals for future actions and how they can be addressed

An information and training project in Baltic countries and Russia to spread knowledge on the CEN standards for biofuels and equipment is proposed.

Proposal for development of new standards

- Short standard or guideline for correct handling and storing of biofuels to prevent fires and minimize losses due to degradation.
- Classification system for ash from biofuel including methods for analysis and limit values for heavy metals
- Simple standard for field testing of 300 kW – 4 MW biomass boilers.

Such standards could preferably be developed by the Action 2 project team with the help of experts from industry.

Project finalization date, reporting format:

The project activities will end in December 2005. A final report of the main tasks will be submitted in the end of September 2005 summarizing the results of standardisation (*Review of the present status and future prospects of standards and regulations in the bioenergy field*). The “Fuel peat guidelines” will be published as a Nordtest method in December 2005. The report, presentations from the workshops, the newsletters and the peat guidelines will be published on the website of Nordic Innovation Centre at <http://www.nordicinnovation.net>

5.3 Action 3 “Development of Sector–Baseline for Energy Related Joint Implementation projects”

Project administrative body:

ECON Analysis,

PO Box 5, N-0051, Oslo, Norway

NO-0166 Oslo, Norway

www.econ.no

Project manager:

Mark Davis/ECON Analysis

Direct line: + 47 90 14 70 34

mark.davis@econ.no

Mandate

The project “*Development of a sector baseline for energy related JI-projects in the BSR*” involves the development of sector specific baseline for energy supply projects within the Testing Ground cooperation in the Baltic Sea Region. The project focuses on NW Russia particularly on renewable energy projects, including fuel switching from fossil fuels to bioenergy in electricity and heat production.

Its principal objective is to propose standard baseline approaches that can be used to establish a sound basis for estimating the emission reductions and likely carbon revenue streams that can be anticipated for projects certain sizes and types within the Testing Ground cooperation in the Baltic Sea Region, i.e. not only in NW Russia but with certain amendment and adaptation also in the Baltic states and Poland, as host countries and the Nordic countries and Germany as investor countries.

Project description / operation

The project entails the development of methodologies for determining baselines in these sectors, and application of these methodologies to case studies in the Archangelsk Region in NW Russia.

Baselines methodologies were developed taking into consideration the body of work that has been compiled on this topic for Clean Development Mechanism (CDM) projects, and in particular the consolidated baseline methodologies that were published by the CDM Executive Board in the course of 2004. In particular, the Combined Margin methodology for integrated electricity networks was adapted to the Russian context, where combined heat and power plants are common, and where new investment in generating capacity has been limited.

The methodologies also addressed the question of additionality, and how additionality can be shown. The CDM approach to additionality was

reviewed, and a similar, but less stringent, approach was put forward for JI projects.

Case studies for the application of the methodologies were selected in consultation with the Reference Group and Russian partners.

Project results

We have developed a set of four Baseline Methodologies, largely based on precedents set under the CDM. These methodologies are designed to cover a wide range of potential JI projects in the power and district heating sectors. The methodologies are for a) district heating projects, b) “brownfield” power projects, c) off-grid power projects and d) combined heat and power projects. In addition, we have adapted the consolidated methodology for grid-connected renewables (the “Combined Margin”) for application in countries such as Russia. The Combined Margin is used in several of the methodologies developed.

Each methodology follows the same structure:

- Firstly, there is the identification of the Baseline Scenario and additivity test, as illustrated in Figure A;
- Secondly, there is the identification of emission sources in the Baseline, and the quantification of these emissions where appropriate (not all emission sources are quantified);
- Thirdly, there is the identification of leakages (i.e. emissions due to the project but outside the project boundary), and quantification of these where appropriate;
- Fourthly, there is the estimation of project emissions and emission reductions.

A set of four case studies have been developed illustrating the application of these methodologies. The case studies have been drawn from the Arkhangelsk region of North West Russia. The Arkhangelsk Oblast is a useful case study area as it has a fairly self-contained electricity network (so allowing the Combined Margin to be determined for this region). In addition, the Oblast imports significant quantities of power from neighbouring regions (thereby illustrating the application of the method in a wide territory).

- *Combined Margin:* Power supply to the Arkhangelsk network is primarily sourced from a set of three CHP plants operated by the Arkhanergo. In addition, there are several industrial self-producers who also export to the network. The Oblast also imports power from the south, and sources this from the FOREM power market. The Combined Margin is a weighted average of the Operating Margin and the Build Margin. The Operating Margin must take account of imports

from FOREM, which is supplied by a mix of nuclear, hydro and thermal capacity. The emissions factor for FOREM was determined to be 0.74 t CO₂e/MWh. In determining the Operating Margin, it was decided to exclude independent CHP plants as these are primarily driven by their own consumption needs, and so can be considered as “must-run” plants. They also only account for 4 per cent of network supply. This resulting Operating Margin, including imports, was 0.74 t CO₂e/MWh – the same as for FOREM. There have been no new power plants built in Arkhangelsk in the last ten years, and so the Build Margin was based on new power plants built in Russia over the past five years. This is a mix of gas-fired combined cycle plant, hydro-power and two small renewable stations (geothermal and wind). The result was a Build Margin of 0.43 t CO₂e/MWh. Given the low demand growth in Arkhangelsk over the past five years, a low weighting of 15 per cent was allocated to the Build Margin, giving a Combined Margin of 0.68 t CO₂e/MWh.

- *District heating case study:* Heat is currently supplied to the Severoonezsk town through a district heating system fuelled by a set of oil-fired boilers. It is proposed to construct a biofuel-fired boiler house that will operate year round, and be supplemented by the existing oil-fired boilers in winter. The project will also reduce power consumption at the existing boiler house. The project reduces GHG emissions in the following ways:
 - i. Reduction in combustion of fuel oil at the existing boilers;
 - ii. Reduction in methane emissions from avoided disposal of wood wastes;
 - iii. Reduction in emissions from power supply to the network, arising from reduced electricity consumption in the heat production system.

The baseline emissions for (i) are determined as the emissions factor for oil combustion in the existing boilers (96 kg CO₂e per GJ of heat produced). The baseline emissions for (ii) are determined from a first order decay method for wood decomposition, resulting in an annual emission of 14 000 t CO₂e in year 1 and rising to 30 000 t CO₂e in year 10, before beginning to decline again. The emissions factor for (ii) is taken as the Combined Margin.
- *Combined heat and power case study:* The Kamenka settlement is currently supplied by heat from a set of coal-fired boilers, and obtains power from a set of diesel generators. Both heat and power supply is currently inadequate for the needs of the settlement. The project as proposed is to construct a new CHP plant at the nearby Mezen saw-mill, fuelled with wood wastes. The new CHP plant will completely

replace the diesel generators, and will displace most of the coal used for the Kamenka district heating system. The project will significantly improve service levels of both heat and power to Kamenka through an increase in heat and power production. Emissions in the baseline arise from:

- i. Reduction in combustion of coal at the existing boilers;
 - ii. Reduction in methane emissions from avoided disposal of wood wastes;
 - iii. Reduction in emissions from diesel power supply. The emissions factor for the existing coal boilers was determined as 139 kg CO₂e per GJ of heat produced, and the emissions factor for diesel power supply was identified as 1.02 kg CO₂e/kWh. In addition, the avoided methane emission from landfill was identified as initially 49,000 t CO₂e per year, rising to 68,000 t CO₂e/yr after 10 years before declining.
- *Off-grid power supply:* OblDES is the organisation in Arkhangelsk that currently supplies electricity to a number of isolated communities. The utility operates some 100 stations in 50 settlements, serving a population of close to 30 000. OblDES has considered a range of possible investment options, including the interconnection of several localities to the main grid. One such option was the interconnection of seven settlements in the Primorsky district, and connection to the main grid. This project was rejected by OblDES because the investment returns were too low. The baseline for the project is taken as continued use of the existing diesel generators, and the emissions factor for these is based on the standard emissions factors for diesel power generators. Given the mix of sizes in these settlements, the weighted average baseline emissions factor was determined as 1.23 kg CO₂e/kWh.

Proposals for future actions and how they can be addressed

Future actions following from this work could comprise the application of the methodologies to specific JI projects in Russia and the Baltic States.

Project finalization date, reporting format

The project activities ended in January 2005. A final report was submitted (*ECON Report: R-2004-114 R Electricity and district heating emission baseline methodologies*) and a decision on publishing this report under the Nordic Council's reporting series will be taken at the next meeting of the Climate Change Group.

5.4 Action 4 “International Bioenergy–R&D Sector Co-operating Through Networking”

Project administrative body:

Nordic Energy Research,
Holbergsgt 1
NO–0166 Oslo, Norway
www.nordicenergy.net

Project manager:

Mikael Forss/Nordic Energy Research
Direct line: + 47 23 35 33 94
mikael.forss@nordicenergy.net
Gunnar Wilhelmsen/Senior Adviser
Direct line: + 47 64 94 91 13
gunnar.wilhelmsen@nordicenergy.net

Mandate

(1) To provide and improve co-operation and information exchange between international bioenergy R&D programmes in the Baltic Sea region and the international bioenergy networks, to initiate and stimulate more active mutual information exchange and co-operation between existing networks and relevant interest groups in the Baltic Sea region, and to involve all interested countries and parties in the Baltic Sea region in existing activities.

(2) To register, structure and shortly describe the most relevant existing Nordic and international R&D networks and research programmes related to bioenergy production and use, to describe the potential and limitations of participating in international bioenergy research programmes and networks, to assess to what degree national requirements are met by the ongoing initiatives, and to evaluate and inform about the potential for international cooperation within existing scientific networks, in cooperation with national energy authorities and relevant research environments.

Project description / operation

1. In Action 4 we have attempted to distinguish between networks and databanks. Networks should have an active secretariat that advances contacts between individuals and/or institutions, while databanks refer to information banks in which one must to a large extent search actively for information. In Action 4, we have studied about 70 networks and databanks and made a selection based on the following criteria:

- Three or more countries participate in the network / programme. Bilateral agreements and national networks are not included.
- Bioenergy is the main issue in the network. Other new, biobased products can be included.
- Focusing on Europe / the Baltic Sea region; however, some important, global networks are included.
- Bioenergy databanks are listed under Links.

2. The database that has been developed in Action 4 is a structured grouping of persons and institutions that are engaged in the production and use of bioenergy, in other words an address register. The participants belong primarily to the Baltic Sea region, and are primarily affiliated with research institutions. Public authorities, organisations and industry with links to bioenergy are also represented. We have looked for persons with a genuine interest or responsibility for the production and use of bioenergy.

Each separate actor is identified with name, addresses (post, e-mail and home page), and telephone and fax numbers. Professional information concerning the person in question is also given, for example workplace, professional interests and specialty, affiliation and language. In order to strengthen collaboration in this region, it is essential to develop a system in which actors are easily visible and readily available. A database with persons showing interest in bioenergy is considered a useful tool in this respect. The aim is to:

- Identify and profile bioenergy actors in a regional network
- Arrange for a rational flow of information to and from the network
- Establish efficient contact between the various participants within the network

Nordic Energy Research started the process of testing the system by including about 100 participants from our address register and some Working Group representatives. From 10th December 2004, when the network was installed on Internet, anyone could apply to join.

Until 10th December 2004, the database was only an internal database for BASREC and the Nordic Council of Ministers (NCM), and was used for inviting to conferences and as a directory for direct contact between some of the participants in the network. All participants that Nordic Energy Research has registered in the network have been informed. They have been asked to check that the information given about them is accurate, and if necessary give additional information by e-mail at: info@nordicenergy.net.

Anyone who does not wish that information is put on the Internet, but only made available internally via BASREC and NCM, can make this reservation on the application form. We would, however, like to make

clear that there are checks in the system that will hinder others than BASREC and NCM from administering the mass sending of information.

At present there are about 160 participants in the database, but with a somewhat uneven distribution with respect to country. It will initially be a challenge to increase the figure somewhat, especially from countries in the region that are underrepresented today.

It is probable that the database will initially be used to a large extent as an internal database for BASREC and NCM. Later, one can expect an increased interest, both from individuals and organisations that wish to contribute to an upgraded communication and distribution of information in the region. If someone desires mass distribution to all or part of the address list, it will be the administrator who makes the final decision on by whom and if necessary how the database shall be used, as well as to what cost

The database is currently administered by Nordic Energy Research.

Project results

- Action 4 has listed and described 27 international bioenergy networks and programmes, and particularly scientific networks, in order to prepare for possible participation of new countries in the respective networks by describing the networks' potential and limitations. *This list clearly documents the uneven distribution of participating countries in the various networks and programmes.* The Nordic countries are over-represented compared to other countries in the Baltic Sea region. In the 27 networks and programmes, the countries participate as follows: Sweden 22, Finland 19, Denmark 16, Norway 15, (EC 8), Germany 7, Estonia, Latvia and Russia 5, Lithuania 4, Poland 2. The uneven distribution may be due partly to lack of information and partly to a lack of national programmes with accompanying financing that can enable international participation.
- Links to 15 databanks are listed in the report, with comments on the services offered by them.
- Action 4 has developed a new bioenergy database in which bioenergy actors in the Baltic Sea region are easily visible and readily available. The aim of the database is first to identify and profile actors in a regional network, and then to arrange for a rational flow of information to and from the network and an efficient contact between its various participants. The database, which is an advanced address register, has been made available on the Internet: www.nedatabase.info/bioenergy.

Proposals for future actions and how they can be addressed

At the follow-up seminar in Riga on 15th December 2004, the lack of participation in the networks from certain countries was explained:

- a) Partly by lack of information on the possibilities that exist, and
- b) Partly by lack of national bioenergy programmes with accompanying financing that would enable participation from these countries.

The networks of greatest interest for research institutions appeared to be the various Tasks under the IEA Bioenergy Agreement, as these are both oriented towards research and relatively specific concerning bioenergy theme.

Work on the networks must therefore be followed up with the help of a small secretariat, in order that:

- The different networks are marketed in the region, and especially in the countries that are underrepresented today.
- The fact sheets are continuously updated.
- The database is updated with new partners / applications, as well as new address information for partners already registered.
- The address database can be made available for others who desire contact with this target group.

Project finalization date, reporting format

As part of the agreement for the carrying out of Action 4, Nordic Energy Research arranged a seminar (Riga, 15th December 2004), at which the project leader with the help of fact sheets presented the networks that had been registered up to then. The fact sheets were distributed to the participants with a request for standpoints. The new bioenergy database, which was made available on the Internet on 10th December 2004, was demonstrated at the seminar.

The objective of the seminar was mainly to obtain the participants' and the region's reactions with respect to the possibility for and relevance of increased collaboration. In conclusion, a total of about 30 participants from the region were asked the following questions:

- Are any international bioenergy networks or programmes missing from the draft report, or should anyone be deleted?
- Have you noticed any errors in the fact sheets?
- Why do we have uneven country participation?

Great interest for the work under consideration was generally expressed during and after the seminar. Inclusion of three new networks and five

databanks was suggested, while none were proposed to be excluded. These corrections were noted and followed up.

The project activities ended in January 2005. A final report is available on Internet from Nordic Energy Research (www.nordicenergy.net). (*Nordic Energy Research: International Bioenergy –R&D Sector Co-operation Through Networking. Report no. 01/05, 46 pp.*)

5.5 Connected Projects

5.5.1 WOOD–EN–MAN

EU–FP5 R&D project: Wood for Energy –a contribution to the development of sustainable forest management (*WOOD–EN–MAN*)

Project administrative body:

Forest & Landscape, Denmark

Hørsholm Kongevej 11, DK–2970 Hørsholm

Tel: +45 35 28 15 03, Fax: +45 35 28 15 17

<http://www.sl.kvl.dk/>

Project manager:

Karsten Raulund Rasmussen/Forest & Landscape, Denmark

Direct line: + 45 35 28 16 66

krr@kvl.dk

Mandate

For the support of sustainable forestry management and a realisation of the energy policy within the Nordic–Baltic Region, WOOD–EN–MAN should create a knowledge base for sustainable production of forest biomass for energy, and give a knowledge–based input to the political process at national and north European levels. Focus is on the increased export of nutrients from the forest soils, possible use of wood ash to compensate for the nutrient export, and effects on biodiversity and insect pests, as well as forest management economy, and market and policy failures. More details can be found on the WOOD–EN–MAN homepage: <http://www.flec.kvl.dk/wood-en-man>.

Project description / operation

To reach the objectives of WOOD–EN–MAN and to structure the work, 11 work packages have been clustered into 5 key–topics: key–topic 1: Ecosystem nutrient vulnerability (WP1 and WP2), key–topic 2: Ecological consequences of wood ash recycling, key–topic 3: Biodiversity and

insect pests, key–topic 4: Economics and socioeconomics, key–topic 5: Management and policy (dissemination). More details can be found on the WOOD–EN–MAN homepage: <http://www.flec.kvl.dk/wood-en-man>.

Project result

A book with recommendations for sustainable production of forest biomass for energy, 2) web pages for information of end–users and nationally adjusted recommendations (<http://www.flec.kvl.dk/wood-en-man>), 3) a decision support tool (ENERTREE), 4) a database on wood ash properties, 5) end–user workshops and meetings, 6) scientific papers in international journals. The work is ongoing.

Proposals for future actions and how they can be addressed

1) The decision support tool, ENERTREE, is being developed with larger integration between economic and ecological topics, and inclusion of a number of new topics. This extension project is funded under the Nordic council of ministers. The project runs over two years, and funding have been obtained for the first year. In addition to what is planned within the extension project, we propose that ENERTREE could beneficially be extended with an applet evaluating alternatives based on different criteria set by the user, or it be developed further into a real multicriteria decision making software, based on pair wise comparisons between criterion values of alternatives (Analytic Hierarchy Process (AHP)). 2) The major obstacle for further analysis of the effects of intensive harvesting on soil fertility and site productivity is the lack of long–term data. We propose to establish a network of monitoring plots including controls within the region. Registrations of in the plots could e.g. take place every 10th year (productivity, soil conditions and vitality), 3) A common basis for comparable reporting to the LULUCF should be established. The work has been initiated in a project funded under Samnordisk Skogsforskning (SNS–94, <http://www.nordiskskogforskning.org/sns/forskningsprosjekter>) but needs further support. SNS–94 deals especially with biomass expansion factors (BEF) and a tool to estimate these. The tool could be further developed to comprehend other information needed in the LULUCF reporting.

Project finalization date, reporting format

Present finalisation date is 31st of June 2005. An application for a project prolongation until 31st of December 2005 has been sent to the EC. Reporting format: cf. project results.

5.5.2 RecAsh

Regular Recycling of Wood Ash to Prevent Waste Production RecAsh – EU Life Environment Demonstration Project

Project administrative body
Regional Forestry Board of Värmland – Örebro
P.O. Box 387, S–651 09 Karlstad, Sweden
www.svo.se/st

Project manager:
Lars Andersson, Regional Forestry Board of Värmland – Örebro
Tel +46 (0)54 14 56 27, fax +46 (0)54 14 56 99
Mobile +46 (0)70 647 01 15
lars.andersson@svsst.svo.se

Mandate

This project will primarily solve a waste problem. When a regular recycling of wood ash is established it will contribute to solve environmental problems related to climate, energy production, soil, acidification, and water issues. The *environmental gains* of a successful project will be:

- Prevention of waste – the wood ash would be returned to forest soils instead of being deposited in landfills
- Sustainable conditions for increased production of renewable energy (no waste, no CO₂ emission)
- Maintained nutrient balance and buffering capacity in forest soils (circulation closed, ash nutrients returned)
- Maintained quality of water in terms of acid alkalinity and low aluminium contents.

Project description / operation

The project will develop, analyse and demonstrate at least two regular ash–recycling systems, discuss various options with the potential market actors, distribute knowledge gathered about motives for ash recycling and technical and administrative solutions through a range of media (handbooks, workshops, field demonstrations, reports, web page ([www. re-cash.info](http://www.re-cash.info)) and information videos). Hopefully, the project will contribute to decreasing waste problems related to bio–energy production in the EU at large.

Project result

The project has nine main tasks with the following main expected deliverables and output:

1. Development of two complete full-scale ash-recycling systems
2. Production of handbooks of the ash recycling system
3. Ash classification study to support national actions for recommendations
4. Organise regional demonstrations of various technical options for ash treatment and spreading
5. Organise national seminars and demonstrations of ash recycling systems
6. Organise European seminars to introduce ash recycling from a European point of view
7. Education on complete ash-recycling systems for stakeholders and potential market actors
8. Dissemination of the project activities and results
9. Project management and reporting to the commission

Proposals for future actions and how they can be addressed

The EU– Life Environment Demonstration Project “RecAsh” will co-operate within the umbrella project CoReWood –Bioenergy to enable and promote synergetic co-operation, co-ordination of activities and knowledge sharing between RecAsh, WOOD–EN–MAN and Bio2003–2005 energy.

Project finalization date, reporting format

RecAsh 31/12/2006

5.5.3 CoreWood

CoReWOOD – Bioenergy
Co-operation between RecAsh, WOOD–EN–MAN and
Bio2003–2005energy

Project administrative body
Danish Centre for Forest, Landscape and Planning, KVL
Hørsholm Kongevej 11
DK–2970 Hørsholm, Denmark
www.sl.kvl.dk

Project manager

Morten Ingerslev, Danish Centre for Forest, Landscape and Planning,
KVL, Department of Applied Ecology
Hørsholm Kongevej 11
DK-2970 Hørsholm
Tel.: +45 45763200, fax: +45 45763233
e-mail: moi@kvl.dk

Mandate

The project will enable and promote synergetic co-operation, co-ordination of activities and knowledge sharing between RecAsh, WOOD-EN-MAN and Bio2003–2005energy.

Project description / operation

The RecAsh project will create better conditions for regular wood-ash-recycling and thus promote sustainable forest management strategies for production of biomass to energy purposes. The RecAsh project aim at removing barriers for recycling of wood ash by making a contribution to the implementation, development and enhancement of the community environmental policy and legislation, as well as to the development of innovative techniques and methods and establishment of demonstration areas for practical wood ash recycling. (www.recash.info)

The objective of WOOD-EN-MAN IS to develop operational management guidelines and national as well as regional (EU and Pan-European) policy recommendations for increased sustainable use of wood-based biomass from conventional forests for energy. The research and accumulated knowledge of WOOD-EN-MAN will be integrated and disseminated to end-users. (www.flec.kvl.dk/wood-en-man)

The main work within Bio2003–2005energy shall foster an increased utilisation of renewable energy sources in the Baltic Sea Region and thereby enhance especially the use of bioenergy. The targets would be to develop and improve capacity building for bioenergy production and use, to develop a regulatory scoreboard and an information network on different aspects on Bioenergy.

These three projects has got various different sub-aims but closely linked main aims. All three parties will clearly benefit from co-operation, co-ordination of activities and knowledge sharing.

Project result

The main results are:

- co-operation, co-ordination of activities and knowledge sharing between RecAsh, WOOD-EN-MAN and Bio2003–2005energy by participation and presentation of findings and project progress at common meetings, workshops, seminars and conferences, and
- publication of common findings and future perspectives in national public journals in native languages. The publications will provide a broad overview of the major findings.

Proposals for future actions and how they can be addressed

The Nordic and Baltic countries can benefit from promotion of synergetic co-operation, co-ordination of activities and knowledge sharing concerning the utilisation of bioenergy.

Project finalization date, reporting format

The project will end by December 31.2005. A short project overview report will be written for licensee, the Nordic Council of Ministers and common findings and future perspectives will be published in e.g. national public journals.

5.5.4 BIODST-BSR

A simple forest bioenergy decision support tool for the forest extension in the Nordic and Baltic countries (also: the ENERTREE extension project).

Project administrative body:

Forest & Landscape, Denmark

Hørsholm Kongevej 11

DK-2970 Hørsholm

Tel: +45 35 28 15 03, Fax: +45 35 28 15 17

<http://www.sl.kvl.dk/>

Project manager:

Inge Stupak Møller/Forest & Landscape, Denmark

Direct line: + 45 35 28 16 65

ism@kvl.dk

Mandate

Knowledge about economic, socio-economic, and ecological aspects of forest biomass use for energy should be integrated into a decision support tool (ENERTREE) especially for the forest extension.

Project description / operation

The starting point for the project is products from the EU project, WOOD-EN-MAN: an economic decision support model, a PC-tool for assessment of ecosystem vulnerability, and a wood ash database. The ENERTREE extension project should join these products into one tool (ENERTREE). A number of new aspects not included in the original WOOD-EN-MAN products should be added: comparison of optional harvesting systems, effects of subsidies, cost and revenues in connection with wood ash fertilisation, short term effects on the carbon stock, economical and ecological effects of stump harvesting, and incorporation of national guidelines. The work also includes improved adaptation of the model to the conditions in the involved countries.

Project result

A decision support tool (ENERTREE), popular articles on ENERTREE in relevant national journals and magazines, poster and presentations on ENERTREE at relevant conferences and meetings.

Proposals for future actions and how they can be addressed

1) A web-based version could be developed thereby creating direct access for internet-users, 2) The program is suitable for educational purposes, and could be used e.g. in a PhD-course on sustainable use of forest biomass for energy under NordForsk, 3) The program could be extended to comprise conditions in North-West Russia, by including Russian partners, 4) ENERTREE could beneficially be extended with an applet evaluating alternatives based on different criteria set by the user, or it could be developed further into a real multicriteria decision making software.

Project finalization date, reporting format

Present finalisation date for year 1 is 31st of Oct. 2005. An application has been submitted for financing year 2 (Nordic Council of Ministers: Adjacent Areas, NEJS-SG, and EK-E). Reporting format: Short report with project results attached.

6. The Baltic Sea region and the surrounding world

“The European strategy for renewable energy sources identifies bioenergy as the most important renewable energy source for the future – a source of cleaner, more secure and sustainable power for Europe. As national programmes fund 90 % of the bioenergy research in Europe, coordinating them will improve outcomes” (The ERA–NET Bioenergy).

6.1 International Conference on Renewable Energies, Bonn 2004

Ministers and Governmental Representatives from 154 countries gathered in Bonn, Germany, on 1–4 June 2004, *agreed* to build upon the results and agreements reached at the Earth Summit in Rio de Janeiro (1992), the Millennium Declaration and the Millennium Development Goals (2000), and the World Summit for Sustainable Development in Johannesburg (2002). They *reaffirmed* their commitment to substantially increase, with a sense of urgency, the global share of renewable energy in the total energy supply. The key question was how to make a global transition to a sustainable energy system in an active and timely manner, while allowing for the social and economic development of both industrial and developing countries. Three key issues were identified at the Conference:

- Policies for renewable energy market development
- Financing options for renewable energies
- Strengthening of human and institutional capacity.

Political Declaration (extract)

- The Representatives *view* enhanced international cooperation for capacity building and technology transfer, effective institutional arrangements at all levels, corporate responsibility, microfinance, public–private partnerships, and advanced policies by Export Credit Agencies as crucial to expanding finance for renewable energies. Financial incentives and higher shares of Official Development Assistance (ODA) as catalytic funding should also be considered. International Financial Institutions, including the World Bank and the Regional Development Banks, should significantly expand their

investments in renewables and energy efficiency and should establish clear objectives for renewable energies in their portfolios.

- The Representatives *support* the strengthening of human and institutional capacities for renewable energies.
- The Representatives *emphasise* the need for additional targeted research and development, especially by developed countries, including indigenous research and technology development in developing countries and economies in transition. Emphasis should be on affordability and cost reduction, on innovative business and financing models and on cost-effective, consumer-friendly cost-recovery models, recognising that different renewable technologies offer different opportunities and face different constraints.
- The Representatives *make a commitment* to work toward these objectives, individually and jointly, by undertaking the actions they have submitted for inclusion in the “International Action Programme” and through other voluntary measures.
- The Representatives *agree* to work within the “Global Policy Network” together with representatives from parliaments, local and regional authorities, academia, the private sector, international institutions, international industry associations, consumers, civil society, women’s groups, and relevant partnerships worldwide.

6.2 EU

The European Commission points out renewables

The European Commission calls for a stronger commitment of Member States to achieve the 2010 targets on renewable energy use. Only four of the EU Member States are on track to meet the targets for renewables. The Commission adopted in May 2004 a new Communication on “*The share of renewable energy in the EU*” –(COM(2004)366 final) – which evaluates the progress in the EU15 to achieve the 2010 target of 22% of electricity consumption from renewable energy sources and the overall target of a 12% share of renewable energy use for all purposes. By 2001 the share of renewable energy had reached 6%, compared with 40% for oil, 23% for natural gas, 15% for solid fuels and 16% for nuclear power. In view of the meagre results so far, *the Commission calls on Member States to ensure the fulfilment of the 2010 targets by the implementation of appropriate measures.*

According to the press release, the Communication adopted by the Commission served three purposes:

- Evaluation of the progress made by the EU15 towards achieving national targets for 2010 for electricity consumption from renewable energy sources;
- Assessment of the prospects of achieving the target of a 12% share of renewable energy in overall energy consumption in the EU15 by 2010, considering the adopted legislative measures; and
- Proposals for concrete actions by the EU25 at national and Community level in the context of the World Renewable Energy Conference to be held in Bonn in June 2004.

Building on this, the Communication looked towards the targets for 2020. It proposed a thorough assessment of the proposal for a 20% target for the EU25 in 2020, which has been put forward by stakeholders and by the European Parliament. A review will be carried out at the latest by 2005, with a view to opening a debate in order to set, in 2007, a target for the period after 2010.

With existing national policies and measures it is projected that the EU15 will achieve a share of only 18–19% of renewable energies as a share of total electricity consumption instead of the 2010 target of 22%. The analysis shows that only four Member States (Germany, Denmark, Spain and Finland) are on track to achieve their national targets. These countries have implemented attractive frameworks for renewable energies. However, several other Member States have recently adopted new legislative measures that could allow them to achieve their national targets.

Not only the electricity sector, but also transport and heating as well as energy efficiency measures are important in achieving the 12% target in overall energy consumption by 2010. Various legislative actions have been undertaken in order to facilitate this target, the most important of which are:

- To promote renewable electricity generation by increasing production from 14.0% in 1997 to 21.0% by 2010 for the EU25, corresponding to 22.1% for the EU15 (Directive 2001/77/EC).
- To promote biofuels for transport applications by replacing diesel and petrol by up to 5.75% by 2010 (Directive 2003/30 EC) with the accompanying detaxation of biofuels (Modification of the taxation of energy products and electricity directive 2003/96/EC).

At best, with full application of this legislation, it has been predicted that a 10% share can be achieved. Extra actions in the heat sector are still needed to reach 12%. The promotion of biofuels is now supported by tax exemptions in Germany, Austria, Spain, France, Italy, the UK and Sweden. However, efforts for the promotion of this sector must still be consolidated

The European Commission considers that the efforts made are well on track but not sufficient. Improved support schemes should be developed, with full respect to the Treaty rules. It has been estimated that investments of € 10 to 15 billion per year are necessary to achieve the 12% target in the EU15. These investments can be provided by the public sector, but will also have to be supported by the private sector. Therefore, the wind energy success in three Member States must be applied to the rest of the EU, including feed-in tariffs, green certificates, market based mechanisms, tax exemptions, etc.

Forestry Strategy (EU Forestry Strategy – Communication from the Commission to the Council and the European Parliament (COM2005 84 final))

The Commission is proposing to the European Council that it will develop an EU Action Plan for Sustainable Forest Management, which could provide a coherent framework for the implementation of forest-related actions and serve as an instrument of co-ordination between Community actions and the forest policies of the Member States. The list of actions to be taken at Community level and national levels should cover, but not be limited to, the following elements and domains: socio-economic issues; environmental issues; *use of wood as energy resource*, governance issues; horizontal activities (research, training, forest statistics, monitoring); and coordination, communication and co-operation. The international dimension of these issues should also be addressed.

The development of dedicated measures for carbon sequestration, including afforestation and reforestation, has been slower than expected. Wood can play an important role as a provider of biomass energy to offset fossil fuel emissions, in line with the EU directives on renewable resources, and as an environmentally friendly material. The use of forest biomass for energy purposes has not yet been developed to its full potential in the EU and it should be ensured that in doing so no undue distortions of competition are created. In the future, wood may also play an important role as carbon reservoir.

Bioenergy

The COM 2004/366 concluded that further efforts – in particular in the biomass sector – are needed in order to achieve the above-mentioned policy objective. If targets for both RES-e and biofuels market penetration are achieved, it will lead to a 10% general share of renewable energy in the EU. However, under current trends only 18–19% of the RES-e target will be achieved.

In 2001, total biomass production for energy purposes was 56 Mtoe. To achieve the RES 12% target 74 Mtoe more are needed by 2010. Each

sector has to contribute the following indicative additional amount of biomass energy: electricity 32 Mtoe, heat 24 Mtoe, and biofuels 18 Mtoe. This would lead to a total biomass accumulated energy production of 130 Mtoe in 2010.

This additional biomass production can only be achieved in the short term by strong and targeted measures and actions in all three sectors (electricity, heat, and biofuels for transport) and a better coordination of EU policies. “The Community Biomass Action Plan” shall ensure the achievement of this objective. By participating in this public enquiry (deadline: 31 March 2005), anyone could provide the EC with useful recommendations and contribute to the EU Biomass Action Plan. 262 stakeholders in total responded to the questionnaire; 251 of them originated from the EU–25, and 428 proposals were considered. The following 5 most important measures to boost bioenergy growth in the EU member states can roughly be formulated like this:

- Long-term stable bioenergy vision and regulatory mechanisms
- Preferential tax treatment of bioenergy products and applications
- Simplification of administrative procedures
- Increase awareness and dissemination activities, along with R&D
- Full and complete utilisation of all available bio-resources, of the reserves to increase biomass availability and respectively – to increase bioenergy applications

EU–Russia Energy Dialogue (Fifth Progress Report, November 2004, 8 pp.)

Close co-operation has enabled an agreement to be reached between the EU and Russia on the future accession of the Russian Federation to the World Trade Organisation, including in relation to certain energy trade issues.

Recognising the importance of sustainable development and in part building on the discussions held within the framework of the Energy Dialogue, the ratification of the Kyoto Protocol by the Russian Federation is welcomed. Ratification will permit the EU and the Russian Federation to engage in joint implementation projects and in emission trading. In the energy sector, it will encourage the additional efforts necessary to improve energy efficiency and to develop non-polluting energies, notably renewable energy sources.

In the Conclusions, the Parties recognise that the future priorities for the Dialogue should include continued efforts to encourage investments, to create closer collaboration in promoting energy savings, energy efficiency and renewable energy, to improve safety and security, and to renew emphasis on the work of electricity market integration. Furthermore, thematic groups involving experts from the Russian, Commission and Member states’ administrations will be developed.

6.3 OECD

Plant and animal waste could become viable alternatives to fossil fuels in providing energy and materials if governments changed strategies, according to a new OECD report. The report, “*OECD (2004): Biomass and agriculture: Sustainability, markets and policies*”, comprising a series of papers presented by international experts, argues that a significant shift could take place this century from a fossil fuel to a biomass-based economy. To aid this process it suggests creating carbon markets which would provide credits to biomass producers for replacing fossil fuels.

The report also reveals that:

- The prices of some *niche market bioproducts* such as plastics derived from arable crops are already competitive with certain petroleum-based plastics. The car industry, for example, is making increasing use of bioplastics.
- Around 7% of *heat generation* and 1% of total *electricity* in OECD countries is provided by agricultural bioenergy. In developing countries an estimated 25% of total energy demand is met by biomass, principally in the form of firewood and animal dung.
- Because bioethanol, produced from sugar and grains, can be used in existing engines with little modification, it is easier to exploit than other *alternative transportation fuels* such as hydrogen.
- The report calls for *international standards and codes* of practice to be established for biomass products to ensure that greenhouse gas emissions are reduced and environmental benefits are maximised. A better assessment of costs and benefits, taking into account economic, environmental and social aspects, is therefore needed. It adds that clear lines of communication should be established between the suppliers, processors and potential users.
- *Public education campaigns* about the biomass sector should be developed.

Instead of offering financial incentives or subsidies to stimulate the use of such organic material, known as “biomass”, governments should encourage *technical innovation* as a way of narrowing the price gap to oil and gas products. This would stimulate demand and boost the supply of bioproducts. Indeed, the recent volatility in oil prices has underlined the potential increased cost competitiveness of energy and raw materials produced from biomass.

The report considers that financial incentives for bioproducts, currently used in many countries, should be avoided as they distort markets and lead to a long-term dependency on subsidies. Agriculture as a whole is under pressure to reduce overall support levels and establish carefully targeted policies and market-based approaches. In a similar way, the report argues against subsidies favouring the use of fossil fuels.

According to the report, long-term strategies should be developed that recognise the potential of local resources and encourage the establishment of bio-refineries to recycle a range of farm by-products in addition to using grains, oilseeds and sugar. Such complexes would be capable of producing both energy and materials derived not only from annual crops but also grass, short rotation trees, cereal straws and other by-products.

6.4 EREC – European Renewable Energy Council

(Position Paper on the future of support systems for the promotion of electricity from renewable energy sources, 2005, 8 pp.)

With this Position Paper, EREC and its members, the European renewable energy industry, trade and research associations, wish to make their opinion public about the evaluation of the Directive on the Promotion of Electricity from Renewable Resources, adopted in 2001. In brief, the paper touches upon the following:

- Effective competition in the conventional power market is a precondition for harmonising support mechanisms for power from renewable energy sources
- It is too early to harmonise support mechanisms for renewables
- Setting mandatory renewables targets
- Removal of administrative barriers
- Give grid access priority to renewable energies
- Ensure technological diversity and raise public awareness

6.5 IEA – Bioenergy Implementing Agreement

(Strategy Plan 2003–2006, 4 pp.)

The objective is to provide platforms for international collaboration and information exchange in bioenergy research, development and demonstration. This includes the development of networks, dissemination of information, involvement of industry and encouragement of membership by countries with a strong bioenergy structure.

In the past 20 years, IEA Bioenergy has been at the forefront of world efforts to improve the production, harvesting and utilisation of biomass resources and to more efficiently use these and related wastes. From 2003, there are 20 Contracting Parties (Member Countries) to the IEA Bioenergy Agreement. Based on the needs and priorities of the Member Countries, its programme consists of 11 Tasks covering practically all aspects of Bioenergy. All Tasks are described on fact sheets in Action 4 of this Final Report.

The Strategic Plan 2003–2006 emphasises:

- The need to increase the strategic role of IEA Bioenergy
- The need to support and promote the strategy of the Renewable Energy Working Party
- The need for large-scale development of new or improved bioenergy technologies
- The increased support for greenhouse gas mitigation through the use of bioenergy technologies by Member Countries

This co-operation offers many benefits for research, industry, policy-makers and decision-makers, for all market participants, and especially for the private sector. IEA Bioenergy wants to increase membership with emphasis on countries with a significant bioenergy R&D infrastructure.

6.6 Nordic Council of Ministers (NCM)

The Nordic countries have a well-developed energy sector, in which the similarities and the differences between them permit an effective exploitation of the energy system.

The aim of Nordic co-operation on energy is to promote an effective, competitive, safe and sustainable supply of energy in an economic and environmentally responsible way. In the last few years the Nordic political co-operation on energy has focused on the three so-called core areas:

- Electricity issues concerning both the electricity and the gas markets
- Climate issues
- Regional co-operation with the Baltic Sea region and Northwest Russia.

The use of renewable energy and gas market issues are also central elements in energy policy both in the Nordic countries themselves and in the region as a whole. A new action plan for the Nordic Energy Co-operation will come into force by January 1 2006.

Nordic Energy Research is a Nordic institution under NCM to promote the flow of knowledge within the energy sphere between the Nordic countries and adjacent areas. Two projects out of 15 are related to bioenergy: “The Nordic Graduate School of Biofuel Science and Technology” and “Biohydrogen”. NCM is also offering a Scholarship Program to provide the national and regional authorities and organisations with trained expert staff.

6.7 Barents Euro–Arctic Council

Task Force on Bioenergy in the Barents Region of NW Russia (Final Report, April 2004, 52 pp.)

As a part of the collaboration within the Barents Euro–Arctic Council, it was decided to review and consider the possible increased use of bioenergy in the Barents region of Russia. The findings and the conclusions of the work, according to the mandate given by the Barents Energy Working Group, were presented in a Final Report in April 2004.

Positive prerequisites and conclusions for making a substantial use of bioenergy easier:

- There is a huge unused bioenergy potential in most areas of NW Russia, and some estimates indicate a potential of as much as 40 TWh/year or more at very low energy prices, based only on the use of pure biofuel from the wood industries.
- In 2000 only 3 % of the total primary energy supply was based on renewable energy sources, of which 1.6% was hydropower.
- Heating of the Russian building stock is predominantly done through the use of district heating systems. Estimates indicate in excess of 250,000 km of heating pipes throughout Russia. This makes fuel switching often relatively easy, and allows for a possible large-scale use of bioenergy.
- Reduced CO₂ emissions compared to the use of fossil fuels, and simultaneous reduction of other local emissions to air, with regional and local impacts.
- Reduced need for fossil fuel transport.
- Safer local energy supply.
- Reduction of waste and pollution to air, water and soil.
- There is a potential basis for production of technical equipment locally.
- High focus on export potential, in all sectors. For bioenergy the export of pellets and briquettes to European markets is a very possible option, and also a possible way to the establishment of a domestic bioenergy market in Russia.
- Creation of local employment related to harvesting, refining, production and export.
- Use of biofuel will improve local economies.

Possible initiatives and recommendations were listed in the following way:

- Running of courses and education.
- Collect and disseminate tailor-made information packages about bioenergy.

- Focus on research and development, and the need to coordinate actions with others.
- Focus on the introduction of predictable external conditions.
- Establish a type of funding mechanism for renewable sources, or increase fossil fuels tax.
- Energy reporting as a mandatory part of companies' Annual Reports.
- Compile contract templates and examples from case studies.
 - Make an implementation plan, and publish it as widely as possible.
 - Inform and communicate knowledge to decision-makers and agents.
 - Identification and implementation of pilot projects.
 - Establish a range of Governmental pilot projects making use of relatively large agglomerations of buildings.

6.8 The Baltic 21 Forest Sector

(Draft minutes of the 2005 Session of the BAL TIC 21 Forest Sector / February 2005, St. Petersburg, Russia)

At the meeting several ideas and issues were identified that should be prioritized in the future Forest Sector work. These were summarized in the following points:

- Sustainable private forestry
- Multiple use of forests
- Transparent timber flows in the Baltic 21 region
- Increase use of wood as a renewable and environmentally friendly resource.

For each theme a set of core actions have been developed were activities need to be carried out by member countries in cooperation with stakeholders. The four themes are introduced in the minutes, including core actions presenting information concerning foreseen activities.

In the new strategy of the Baltic 21 the sectoral involvement in *cross-sectoral* work within Baltic 21 should be strengthened. Baltic 21 will also focus more on demonstrating how sustainable development can be brought about in practice. A set of "Lighthouse Projects" will be initiated and carried out to ensure high visibility. The projects will be designed to engage as many participating countries and sectors as possible in proving the value-added of sustainable development. *The approach and some times the activities are very much touching bioenergy priorities* (Measures to support start up of businesses; Marketing of production/services; Exchange of experiences; Seminars; Training; Manuals; Harmonize sta-

tistics, national standards and measurement methods; Compare national legislation; Capacity building; Creation of network in the Baltic Sea region etc.)

7. Country Reports

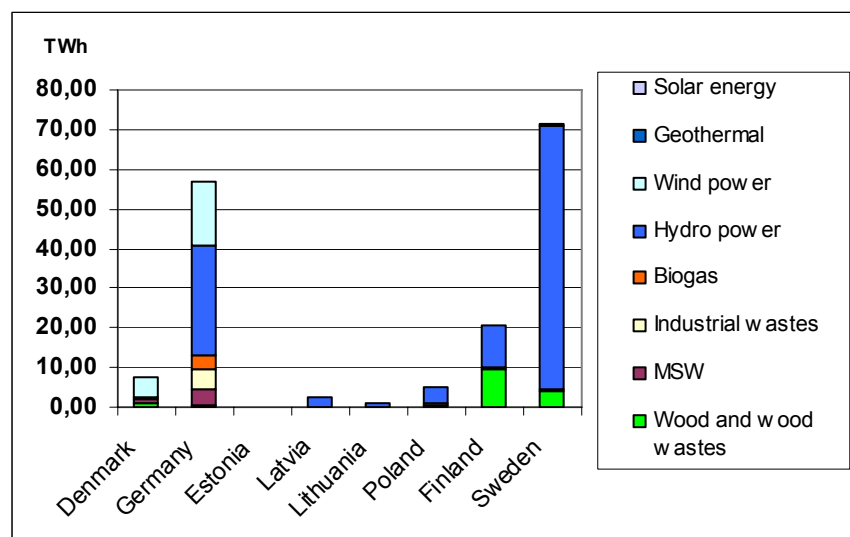
7.1 Introduction

Forest resources in Europe have been increasing during the last 50 years. Roundwood balance based on the difference between net annual increment and fellings is approximately 186 mill m³ per year, or 32% of the net annual increment (Karajalainen et al, 2004).

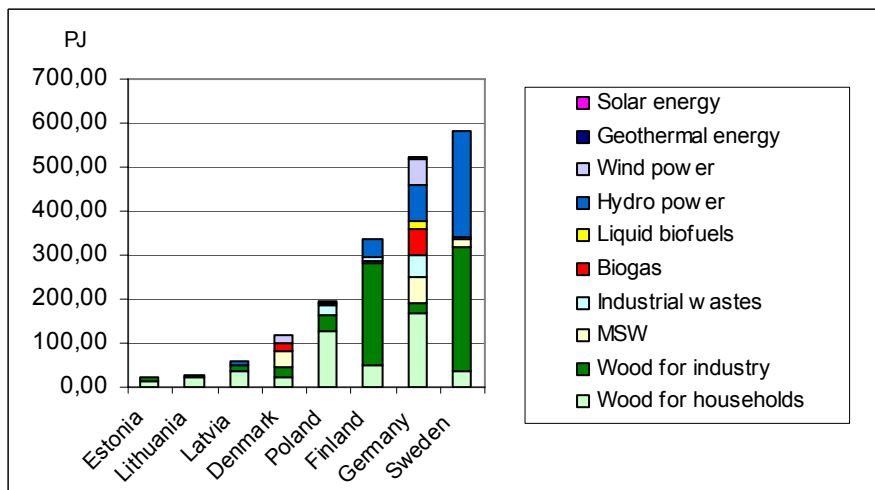
The potential sources of forest fuels are felling residues and stumps from current fellings and the roundwood balance, consisting of the stem wood balance, its crown mass and stump wood. The available forest fuel totals about 140 mill. m³ per year, which corresponds to about 280 TWh of energy or 24 Mtoe. This will be about 24 % of the current use of renewables in EU25. For comparison, available forest fuels equal to about 37 % of the current annual fellings.

The use of biomass and waste in EU 25 was 65.8 Mtoe in 2002, of which *Baltic Sea Region (BSR)* contributed 55% (36.1. Mtoe). Electricity production by RES-e in EU-25 was 427.8 TWh (14.2% total electricity production) in 2002, of which *BSR* contributed 38.5% (164.7 TWh).

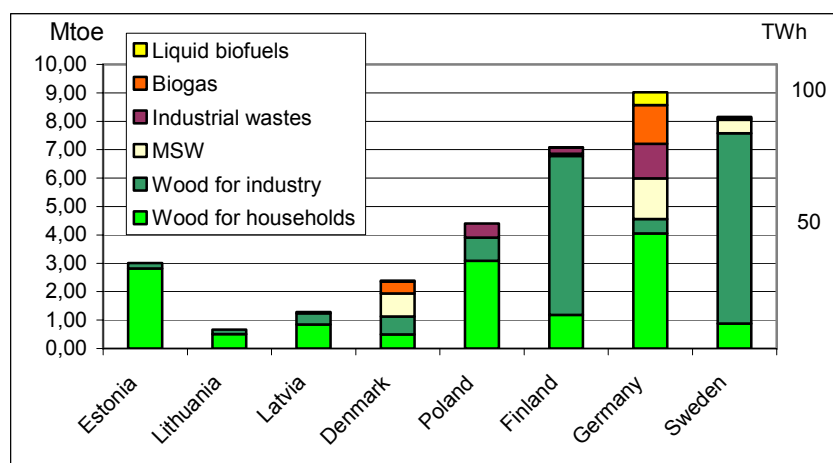
Gross electricity generation (TWh) 2002 – EU 25 (EUROSTAT, personal communication 2005)



RES in Baltic Sea Region 2002, PJ (npv) – EU-members (EUROSTAT, personal communication 2005)



Use of biomass and waste in Baltic Sea EU-countries, in 2002, Mtoe (EUROSTAT, personal communication 2005)



7.2 Denmark

National key figures (100 DKK=13.40 EUR)

Energy production based on renewable energy sources is an important pillar in the Danish energy supply. The utilisation of renewable energy contributes to security of supply and the management of environmental pollution.

Renewable energy, which includes biomass as well as wind-, solar- and wave energy and other renewable sources is greenhouse-neutral, i.e. it does not increase the concentration of greenhouse gases in the atmosphere. Biomass (including waste) is the single most important source of renewable energy in Denmark.

In Denmark biomass is mainly: Straw (from agriculture), wood (from forestry and waste wood from industry) and manure (pig/cattle farming). The biomass fraction of the solid waste is estimated to app. 80 %. Biomass currently accounts for approximately 80 % of renewable-energy consumption, mostly in the form of straw, wood and waste, while biogas accounts for less. Consumption of biomass for energy production in Denmark nearly tripled between 1980 and 2002. Biomass now accounts for nearly 10 % of the total energy production. 10–20% of the woody biomass used in Denmark for energy production is imported.

In particular, the use of biomass in centralised plants is facilitated by the political Biomass Agreement of 14 June 1993, according to which the centralized power (CHP) plants are to use 1.2 million tons of straw and 0.2 million tons of wood chips annually.

On 1 July 1997, a surcharge agreement was reached and the Biomass Agreement was further amended on 22 March 2000. The goal was to ensure a more flexible choice of biomass, including the possibility of using surplus wood (chips) from the December 1999 hurricane to produce electricity. The agreements is nearly (2005) fulfilled still lacking app. 250 000 tons/year.

A further increase in the utilization of biomass is expected, rising by 15–20 PJ from approximately 85 PJ in 2002 to 100–105 PJ between 2005 and 2006. This expectation is primarily due to the expected 100 % fulfilment of the Biomass Agreement in the coming years. At the same time, the consumption of biomass continues to rise as a source of energy for the supply of heat in district-heating plants and in smaller installations for households, enterprises and institutions.

Utilization of solid biomass, biogas and waste

Public district heating supply (cities & villages):

- approximately 120 biomass-based district heating plants (heat only) (of which approximately are half straw-based and the other half wood-based)
- approximately 10 straw or wood-chip-fired decentralised power plants (CHP) (biomass as main fuel)
- approximately 30 waste-incineration plants (of which 18 co-produce heat and electricity and 12 are heat alone)
- 6 centralised (big) power plants (CHP) which use biomass, among other fuels,
- approximately 30 district heating plants (CHP) using biogas as the main fuel

Private heat supply (enterprises, institutions):

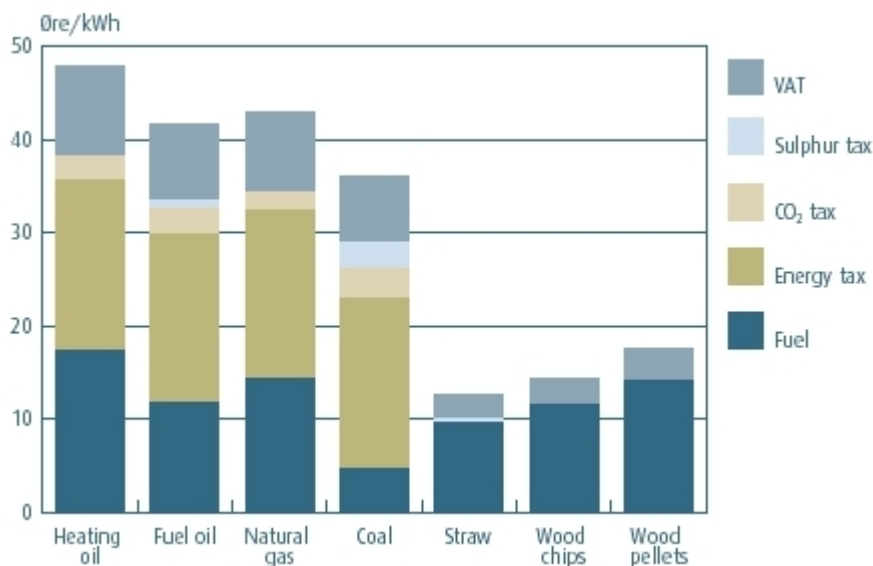
- 200 heat and co-generating heat and electricity plants, owned by and primarily delivering heat to greenhouses, the manufacturing industry, institutions etc.

Individual heat installations (houses, farms):

- 500 000 wood-burning stoves
- 70 000 wood-burning boilers
- 30 000 wood-pellet furnaces
- 9 000 straw furnaces.

The public framework for the promotion of the use of bioenergy comprises exception from various fuel taxes (district heating) as seen below (Danish øre (0.01 DDK) pr. kWh). For electricity production based on biomass there will still be an substantial element of public support in the form of an additional “green” reward pr. produced kWh on top of the core marketprice as specified in the Electricity Supply Act. Additional other public incentives for the promotion of the use of biomass are applied.

Fuel costs for district heating production (2002)



More than 80% of the total heat demand in Denmark is met by district heating from CHP-plants and likewise more than 50% of the total electricity demand is met by these plants.

Regional joint actions

Denmark is a member since 1973 of the IEA Bioenergy Implementing Agreement actually participating in 6 tasks. Denmark is for the time being considering to join the EU–ERA–net for R&D within biomass technologies and Denmark is very active regarding the standardisation of solid biomass efforts of the EU Commission. The trade of solid biomass (wood) across the border (import) has been growing significantly during the recent years due to the more extensive use of biomass in the Danish energy supply.

Future activities

Within biomass, Denmark will increasingly focus its R&D–efforts on the development of liquid biofuels to achieve to goals reflected in the EU Directive on biofuels. Furthermore, a possible broader biomass fuel band for CHP is expected to be investigated to ensure future cost effectiveness and fuel flexibility.

7.3 Estonia

National key figures

The utilization of renewable fuels has not been changed drastically within the period of 1999–2003. Renewables formed about 9.8% of the primary energy supply while the share of wood fuel still prevailed in 2003. The share of wood–based fuels consumption in gross inland consumption was 7.4% in 2003. Utilization of firewood, wood waste and chips has been practically constant compared to the year 2002. Main consumers of wood–based biofuels are still households but the share of heat generation is increasing rapidly. There were 863 wood–fired boilers in 2003. Compared with data from the year 2002, the number of wood–fired boilers has increased.

Since year 2003 there is data available also about woof briquette and pellets. The production of briquettes and pellets was 210,000 tonnes in 2003 of which 174,000 tonnes were exported, mainly to Scandinavian markets. In 2003 only small amounts of briquettes and pellets were used inland but the market is growing due to the knowledge transfer and logistic networks development.

Firewood, 1000 m ³ sol.vol.	Wood waste including wood chips, 1000 m ³ sol.vol.	Briquette and pellets, 1000 t	The use of wood-based bioenergy 2003/Estonia
1,646	2,027	210	Resources of energy
0	0	174	Exports
59	92	26	In stocks at the end of the year
1,587	1,935	10	Gross inland consumption
0	0	0	of which for electricity generation
118	1,097	3	of which for heat generation
1,468	838	7	Final consumption
1	236	0	of which for production of wood and wood products
1,420	580	7	of which for households

The Long-term National Fuel and Energy Sector Development Plan until 2015 sets clear targets for the future. In addition to the others, the Development Plan sets following strategic objectives:

- Ensure that by 2010 renewable electricity forms 5.1 per cent of the gross electricity consumption;
- Ensure that by 2020 electricity produced in combined heat and power production stations forms 20 per cent of the gross consumption;
- Develop measures that enable the use of renewable liquid fuels, particularly biodiesel, in the transport sector.

On the basis of the EU Directive 2001/77/EC, Estonia must ensure the renewables share in gross electricity consumption of 5.1%. To achieve the share mainly two types of sources have been looked for – wind energy and biomass in CHP's. Both of them should constitute equal share to achieve the target.

On the basis of the EU Directive 2003/30/EC, Estonia must also ensure that the indicative proportion of biofuel and other renewable fuels is 2 per cent of all the diesel fuels and petrol fuels on the market for transportation purposes by 2006 and 5.75% by 2011, as calculated according to the energy value of the fuels.

Currently from biofuels only one CHP in landfill gas is producing some 6 000 MWh of electricity per year. There are no CHP plants in wood-based biofuels. To stimulate the increased use of bioenergy in electricity sector the Electricity Market Act is distinguishing the feed-in tariff for electricity produced from renewable sources. The network operator shall purchase the electricity with the price of 0.81 EEK/kWh equals to 0.518 EUR/kWh. During the first quarter of 2005 some changes to the Electricity Market Act have been sent to the Parliament, mainly to support the CHP development and to regulate the renewables market better.

Regional joint action

Estonia is the member country of BASREC and until now this organisation have been the only frame for official cooperation in regional level

(including Russia as an important player in the region). As an EU member country the cooperation in bilateral and multilateral means is also on demand basis with other EU/EEA member countries.

The cooperation in NGO level and through different bilateral and regional support schemes is divided between several institutions, organisations and enterprises.

Future activities

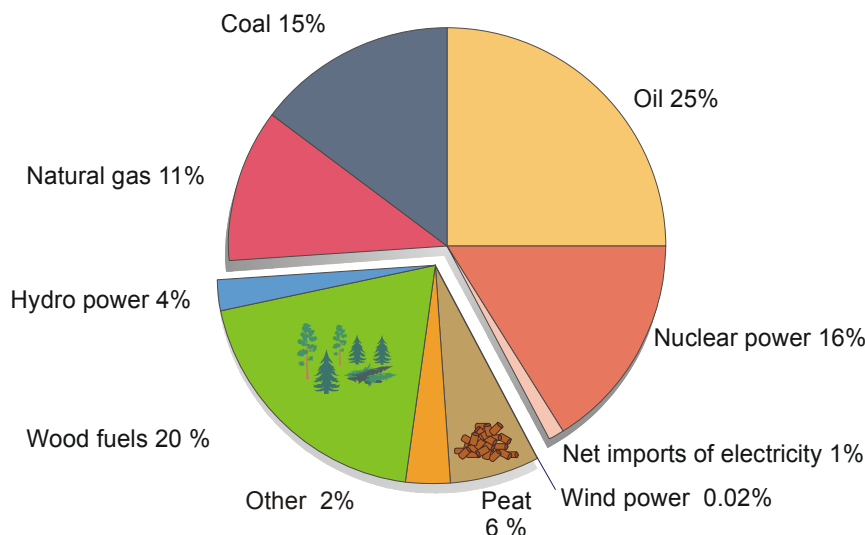
The BASREC Bioenergy frame has been useful tool for best practice imports and cooperation in official level and the continuation should be essential. As EU Commission sees the bioenergy as a potential source to solve the renewables target achievement and dependence of import fuels the Baltic Sea regional impacts should be reflected in the Commission outcome in a way or another.

In a regional level (and later on in EU/EEA level) the trading principles with biofuels as potential emission quotas should be worked out.

7.4 Finland

National key figures

The Finnish Action Plan for Renewable Energy was launched in 1999 and updated in 2002. The Action Plan has the vision of doubling utilisation of renewable energy sources by 2025, as compared to the situation in 2001 317 PJ (7.6 Mtoe), when their share was 23 per cent of the total energy consumption. By 2010, the use of renewable energy sources should be 30 per cent higher (100 PJ) than in the year 2001. The target for 2010 was confirmed in the Implementation Plan for National Climate Strategy in February 2003.

Primary energy sources in Finland in 2004 (total 411 TWh (1 480 PJ))

In the attempt to reach the targets, wood-based fuels and recovered fuels play a leading role in Finland. The increase in the use of renewable energy sources will be obtained almost entirely from bioenergy, and mainly from wood-based fuels.

In Finland peat has been defined as slowly renewing biomass fuel. It has a substantial share, around 6%, of the energy balance of Finland. As indigenous fuel, peat has a considerable effect on regional policy, and it increases employment and the security of energy supply. The National Climate Strategy aims to maintain peat as a competitive fuel for cogeneration of heat and power.

The National Climate Strategy, launched by the Finnish Government in 2001, highlights the targets and measures to meet the Kyoto commitments in Finland. By the years 2008–2012 emissions of greenhouse gases should be reduced to the level of 1990, when they were equivalent to around 76.5 million tons of carbon dioxide. In order to meet the target, it is necessary to implement an energy conservation programme and a programme promoting renewable energy sources. Together these two programmes may account for about half of the targeted emission reduction.

There are four operative nuclear power plants in Finland. In May 2002 the Parliament gave the go-ahead to the construction of a fifth nuclear power plant unit. The electrical output of the plant unit will be 1,600 MW, which will only be able to meet a part of the increased demand for electricity. Accordingly, the decision-in-principle on the additional nuclear power capacity did not reduce the importance of renewable energy, thus complying with the Strategy.

A new National Climate and Energy Strategy is now under preparation, and several ministries, Ministry of Trade and Industry, Ministry of the Environment, Ministry of Transport and Communications, Ministry of Agriculture and Forestry and Ministry of Finance are participating in

the preparation process. The new Strategy will be launched by the Government and it will be given to the Parliament in early Autumn 2005.

Implementation of the renewable energy targets calls for financial support measures. Technology R&D and implementation of new technologies are the main measures in aiming to economically competitive solutions for the open energy market. Also, taxation, investment aids, regulations and norms support the fulfilment of the target. In addition, the administrative barriers to the use of renewable energy will be removed, voluntary agreement schemes introduced, and information dissemination and the efficiency of education and training improved.

Regional joint action

Co-operation at the EU level is important. One example is an EIE programme project, EUBIONET II (www.eubionet.net), is co-ordinated by the Finnish partner, VTT. EUBIONET will analyse current and future biomass fuel market trends. Estimation on techno-economic potential of the biomass will be given until 2010 based on the existing studies and experts opinions. In forest biomass co-operation will be done also with forest industry stakeholders to find a proper balance between forest industry raw material and bioenergy use. Partners will analyse, select and describe the most suitable trading and business models for small and large-scale biofuel supply chains for heat and power production by taking into account the environmental aspects and sustainability. The project has partners from Sweden, Denmark, Germany and subcontractors from Estonia, Latvia and Poland. Russia is participating this action through AEBIOM (European bioenergy association).

Finland is also participating in several Interreg II EU-programme actions. E.g., VTT is co-ordinating ET-Bioenergy project (New bioenergy business concepts during emission trading in Baltic Sea region) with 8 partners from Finland, Poland, Germany and Estonia. Mikkeli Polytechnic is running another Interreg II project: Business opportunities for bioenergy companies in North-West Russia. Finnish Forest Research Institute has carried out several projects on wood energy utilisations.

Finland is also participating in the IEA Bioenergy Agreement and bioenergy ERA-net. VTT is co-ordinating a research co-operation Bioenergy Network of Excellence (Bioenergy Noe, www.bioenergy-noe.com), where Lund University from Sweden and ECBREC from Poland are also participating.

Future activities

From the Finnish point of view, bioenergy as a whole is understood to be an important field also in coming years in energy co-operation in the Baltic Sea Region and even wider.

7.5 Germany

National key figures

In 2004, 3.6 % of the primary energy demand of Germany was satisfied by renewable energies. Biomass, including the biogenous part of municipal waste, counted for two thirds of the energy contribution of all renewable energies together. 93% of “renewable” heat and 100% of “renewable” fuels were biomass based. 9,400 GWh electricity were produced, compared with 1,400 GWh in 1991. Heat production amounted to 58,000 GWh, and 1.1 million tons of liquid biofuels, mainly biodiesel, equivalent to 10,900 GWh, were consumed compared with 2 GWh in 1991. The estimated annual turnover in 2004 of biomass related industries was 3.5 billion €.

The potential contribution of biomass to the provision of energy in Germany depends on the time horizon and the assumptions made. A recent study commissioned by the Federal Ministry of Environment came to an estimate of 1,900 PJ by 2030, including 700 PJ from biomass residues and

1,200 PJ from energy crops cultivated on 4.4 million hectares agricultural land. This potential represents 13% of the current German primary energy demand and considers all sustainability criteria. On a more short-term perspective, the Federal Ministry of Consumer Protection considers a 3 % share of biomass from agriculture and forestry by 2010 as feasible. Whether this potential will be used for electricity, heat or transport fuels, depends on the political and economic framework.

The German energy policy seeks to accomplish three goals of equal priority, which are mutually competitive: environmental protection, secure energy supplies and economy. With regard to climate protection and renewable energies, Germany has ambitious objectives, both on a national level and in line with EU and international obligations. The six greenhouse gases of the Kyoto protocol must be reduced by 21% until 2008/2012, in comparison with 1990. By 2010, renewable energies shall double in relation to 2000 and contribute 12.5% to electricity production. By 2020, 10% of the primary energy consumption and 20% of the electricity shall be provided by renewable energies, and the long-term objective is to provide 50 % of all energies from renewable sources. There are no national targets for the individual renewable energy sources (RES), however, for transport fuels, the EU directive 2003/30/EC of 17 May 2003 stipulates a minimum share of biofuels in the market of 2% in 2005 and 5.75% in 2010.

To promote renewable energy sources and to increase the use of biomass, the most important public instruments/frameworks are the following:

Biofuels for transport: Since 1 January 2004, liquid biofuels have been exempted from the mineral oil tax until 31 Dec 2009, both as pure or blended fuels. This paves the way for biofuels besides biodiesel, such as bioethanol, ETBE or others. A strong consumption increase could already be observed.

Electricity: Since 1 August 2004, electricity from biomass has received guaranteed access to the grid and minimum purchase prices of up to 21.9 ct/kWh under the revised renewable energy directive (EEG). Prices depend on the capacity of the plant, biomass quality, technologies applied and whether also the heat is used. Prices are guaranteed for 20 years, with an annual price decrease of 1.5% for new installations, starting 1 Jan 2005. The biggest change in relation to the previous directive is the stronger incentive for primary biomass of up to 6 ct/kWh.

Heat: Biomass boilers are eligible for grants of 50–60 €/kW installed capacity. In 2003, hand fed boilers for wood logs were reintroduced into the programme. For bigger plants including biogas plants, credits with low interest rates, which are only partly repayable, are available. The programme will run until 2006; for 2004, 60 million € have been earmarked for bioenergy.

For the future, a “renewable heat act” is under consideration and is already being discussed on several levels. But as there is no bottleneck as for electricity, the practical implementation is complex.

Bioenergy research and development is mainly promoted by the Federal R&D programme renewable biological resources, which is under the responsibility of the Federal Ministry of Consumer Protection, Food and Agriculture and administered by the Fachagentur Nachwachsende Rohstoffe.

Regional joint action

The international relations of Germany in the area of bioenergy depend on the application area and on the technology development status. Regarding research and development and non-technical aspects, German universities, research institutes and companies participate in many projects of the research and energy programmes of the European Union. Many of these projects include also partners from BASREC countries. One example of an ongoing network is the EUBIONET II project (German partner Fachagentur Nachwachsende Rohstoffe), which deals also with export/import of biofuels. Germany is also about to join the Bioenergy Implementing Agreement of the International Energy Agency (IEA Bioenergy).

Concerning commercial activities, some industries, e.g. manufacturers of biodiesel and bioethanol plants, are probably more international than others, e.g. the wood log and pellet boiler manufacturers consisting main-

mainly of SME. The “Export Initiative” of the German Energy Agency (dena) is assisting German companies in developing export opportunities.

Future activities

From a German point of view, co-operation in the Baltic Sea Region is important for several reasons. Some countries are quite advanced with regard to large-scale bioenergy deployment. Others have a huge biomass potential which could contribute to satisfy German energy needs, but where also German technologies could help to secure domestic energy supply in a sustainable way. The targets of the Biomass Action Plan, which is currently under discussion on a European level, can only be achieved in a co-ordinated approach between all Member States. The Baltic Sea Region will play a key role for the success of the plan.

7.6 Latvia

A significant part of Latvia’s environment is the forest ecosystem. Latvia is one of the most wooded countries in all Europe, as forests cover approx. 40% of the total area. A remarkable amount of small trees, low value wood and wood waste, and fields overgrown with bushes are found in forests.

Wood biomass takes up first place in the choice of indigenous energy resources. The largest amount of wood fuel is used for firewood. Firewood is used in small boiler facilities for district heating and local heat supply and in stove heating for municipal purposes. Few companies in Latvia produce wood chips, wood briquettes, and wood granules from local wood resources. However, biggest part is produced for export.

The forecast of firewood consumption depends on the extent to which region will manage to change from the extensive to rational use of wood fuel. In the total fuel consumption the share of wood is quite substantial, reaching 25–30%. The biggest users of firewood are: households 39%, heat generation companies 25%. Firewood is used across all regions. Use of peat is decreasing.

The total annual surplus of straw in Latvia is approx. 340,000 t. The surplus of straw has a pronounced regional characteristic. The largest surplus of straw is found in Zemgale region.

Electricity production from waste is started in Getlini landfill near Riga, and in preparation is project near city Liepaja. There are 150 small hydro power stations and 22 wind farms with total installed electricity capacity approx. 45 MW.

7.7 Lithuania

National key figures

Public instruments/frameworks for stimulation to increase production and use of bioenergy

Main objectives of the national energy policy indicated in Law on Energy and the National Energy Strategy, among others include the use of RES, which by 2010 should account for 12% in the overall energy mix.

Electricity production from RES is based on appropriate legal and economic framework. Law on Electricity provides for promotion and priorities for electricity produced from RES, local and waste energy sources. Pursuant to the Law, the European Parliament and Council Directive 2001/77/EC and the Government of the Republic of Lithuania has approved the procedures for promotion of generation and sales of electricity from RES. The Procedures establishes general criteria, conditions and requirements for generation and sales of the electricity from RES. In 2003 it was established that by 2010 7% of overall electricity consumption should account for electricity generated from RES.

The Law on Biofuels and other related fuels, adopted 5 February 2004 provides for the promotion of the generation and usage of the biofuel. The Law implements the European Parliament and Council Directive 2003/30/EC of 8 May 2003 on the promotion of the use of biofuels and other renewable fuels for transport. The Law provides that by 31 December 2005 the national indicative targets for 2005 and 2010 for the minimum proportion of biofuels and other renewable fuels in road fuels, against reference values of at least 2% by energy content by 31 December 2005 and 5.75% by energy content by 2010.

The National Energy Efficiency Programme (the Programme has been implemented since 1992) and the main directions of its implementation, approved by the Government of the Republic of Lithuania, includes among others, the goals of efficiency of the use of energy resources and energy, reduction of the impact on environment, coordination of the measures of energy efficiency with the requirements of the EU directives and other international documents.

Production of biofuels and other related fuels from the raw materials of local origin is promoted through the programs funded from the state budget. The program for promotion of the production and use of biofuel 2004–2010 was approved by Order No 1056 of 26 August 2004 of the Republic of Lithuania. The purpose of the programme is to ensure the development of production and use of biofuel from local raw materials. The programme is to be implemented in 2004–2010.

Bioenergy potential and production

In 2003 local and renewable energy resources accounted 8% of all the resources.

The goal of the project „Enhancement of use of local and renewable energy resources – Lithuania“, funded by the Danish Energy Agency in 2003, was to revise the existing resources, establish actual indicative target for renewable energy resources by type and to propose measures for promoting the use of the resources. The calculations in this project reveal the current situation and production and development projections for the renewables by type are as follows:

Wood fuel: in 2003 wood fuel accounted for 7.82 TWh. Overall wood fuel potential for energy generation is 9.8 TWh. It is projected to increase the use of wood fuel for energy production by 9.5 TWh by 2010 and by 9.8 TWh by 2020.

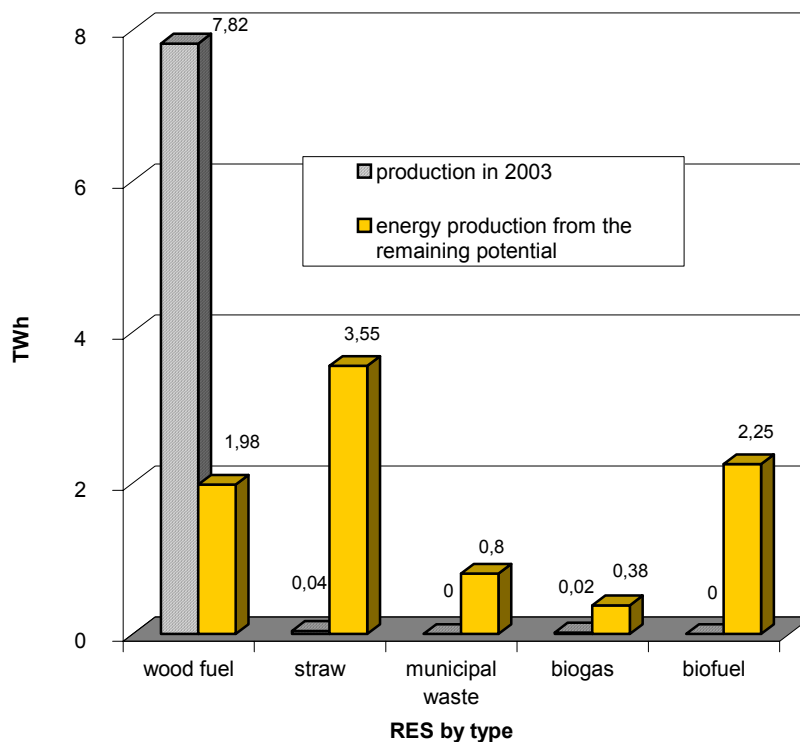
Straw: the annual yield of straw is 2.5 million tons. In 2003 energy from straw accounted for 0.04 TWh. The overall potential for energy production from straw is 3.59 TWh. It is projected to increase the energy production from straw by 0.5 TWh in 2010 and by 1.5 TWh by 2020.

Municipal waste: the annual yield of municipal waste is approximately 1 million tons. However, in 2003 the municipal waste was not used for energy production. The overall potential of energy production from the municipal waste is 0.8 TWh. It is projected that in 2020 the usage of municipal waste for energy production will account for 0.46 TWh.

Biogas: in 2003 energy production from biogas accounted for 0.02 TWh. The overall potential for energy production is 0.4 TWh. It is projected to increase the usage of biogas for energy by 0.14 TWh by 2010 and by 0.28 TWh by 2020.

Biofuel: main raw materials for biofuel production in Lithuania are grain and rape seeds. In 2003 biofuel for energy production was not used. The potential of the resources for energy production is 2.25 TWh. It is projected that the usage of biofuel for energy production in 2010 and 2020 will account for 0.72 TWh.

Fig.1. Energy production from RES



Regional joint action

The Governments of Sweden and Denmark and international funds assist in addressing issues of the usage of the RES.

Since 1993 wood fuel conversion was carried out in 15 boiler houses of industrial and heat companies. The loans of the Government of Sweden extended through the Energy Agency of Sweden (STEM) and the Swedish International Development Agency (SIDA) and the technical assistance of the Swedish companies enabled the conversion of the boilerhouses. The overall installed capacity of the boiler houses is 49.5 MW. The capacity of the installed boilers ranges from 0.5 MW to 8 MW. Heat transmission networks have been refurbished in some of the sites.

A boiler of 4 MW capacity has been installed in one boiler house of heat supply network while using the financial and technical assistance of the Government of Denmark extended through the Energy Agency of Denmark.

Companies of Denmark with the assistance of PHARE programme have implemented several projects and studies related to the usage of local and renewable energy resources and development of the unified system of training and certification of energy auditors in Lithuania.

The company "Kazlu Rudos metalas", as a result of co-operation with companies from Sweden and their experience shared, is producing and installing boilers burning wood fuel, peat and straw. The wood burning boilers produced by the company, are exported to Sweden. The company

„Umega“ produces boilers and exports them to Denmark and other countries.

Seminars and conferences on energy efficiency and the usage of local and renewable energy resources are held on permanent basis while using the experience of experts from Denmark and Sweden.

Future activities

Implementation of the projects on the usage of RES is of importance to Lithuania as the usage of RES will reduce fuel import and CO₂ and other emissions and create more jobs in the field.

In order to speed up the usage of local and renewable energy resources for energy production, it is necessary to invest more in energy production equipment and promote introduction of new technologies ensuring efficient usage of the resources and adapt the existing equipment to use local and renewable energy resources.

Introduction of new technologies to use local and renewable energy resources for energy production is possible with the assistance and experience of companies of other countries.

In co-operating with experts of other countries, science research activities related to the review and evaluation of the potential of the resources in different regions of the country could be implemented.

7.8 Norway

National key figures

Bioenergy is the third largest energy source in stationary energy supply in Norway, after electricity and heating oil (coal and coke used in industrial processes are left out). In 2003 the final end use of electricity was 112 TWh, heating oil 23 TWh and bioenergy 14.5 TWh. In 2003 the consumption of bioenergy was: 7.9 TWh in private households, 4.8 TWh in wood processing industry, 1.5 TWh in other industry and 0.3 TWh in others sectors. In addition, some bioenergy is used in district heating production.

Numbers from Statistics Norway shows that 72 per cent. of Norwegian households have the possibility to use biomass for heating and 18 per cent use fire wood as the main heating source. For comparison, 97 pct. have equipment for electric heating and 60 pct. use electricity as the main heating source. Electricity used for heating purposes accounts for more than 30 TWh pr. annum, or about to 25per cent of the Norwegian hydropower production. On the other hand, studies by the Norwegian energy agency Enova, shows that there is a theoretical potential for increasing the use of bioenergy to 35 TWh pr. annum at a cost of 6 € cents

pr. kWh. Under the present market conditions only a fraction of this potential will be realized.

Framework and key drivers for renewable energy and specifically bioenergy

Due to hydropower, Norway has a high share of renewable energy in the stationary energy supply. As the energy consumption still rises, electricity from renewable sources is however becoming a scarcer and more valuable energy carrier. Therefore, in order to maintain a high environmental standard and a reliable energy supply, Norway follows an ambitious policy in order to bring about a change in energy production and use. On important aspect of the policy is to increase the share of district heating and central heating, which makes it possible to utilize renewable energy sources suited for heating, for example bioenergy.

The policy is based on a large variety of actions. The most important ones are support for R&D activities by the Norwegian Research Council, bioenergy business development by Innovation Norway and market introduction by Enova. In addition, the legal framework is developed in order to facilitate and maintain the long term development of an environmental friendly and secure energy supply.

The most important R&D programme covering bioenergy is the RENERGI-programme (Clean Energy for the Future). Within RENERGI support is given both to fundamental and applied research activities. The programme for bioenergy business development run by Innovation Norway is targeted at increased biofuel production and heat sales by the agriculture and forestry sector.

Enova, which is the main support measure, has an overall target to decrease the energy consumption and increase the supply of environmental friendly energy sources by in sum 12 TWh within 2010. Therefore, Enova gives support to market introduction activities along the whole energy value chain. Bioenergy and heat projects are supported under three different sub-programmes: Heat production, Heat Distribution and Biofuel Production. In 2004 Enova supported heat and biofuel projects equivalent to 518 GWh.

District heating in Norway is regulated by the Energy Act and the Planning and Building Act. Besides requiring concession for all district heating systems above 10 MW, the regulations allow the municipalities to adopt local rules which require new buildings to connect to the district heat system where such systems exists. Further the Norwegian building codes requires all new building within an area of district heating to install water born heating systems. Norway is also about to implement the EU-directive on energy performance of buildings, which requires that the positive effects of renewable energy and district heating is taken into consideration in the building codes.

International cooperation

International cooperation is important in order to increasing the production and use of bioenergy in Norway. The bioenergy market will, among many other energy markets, become more efficient with international harmonisation and increased trade. The international market is also important when it comes to technology development. Therefore, Norway participates actively in a number of various international collaborations concerned with different aspects of bioenergy. The most important once are IEA Bioenergy and various EU-activities. Further, it has been important for Norway to support the bioenergy activity within BASREC in order to strengthen and develop the regional bioenergy market around the Baltic Sea. The substantial trade in bioenergy within the region should be further developed.

Norway participates actively in the Joint Implementation Testing Ground, which is established in the Baltic Sea Region and has signed the Testing Ground Agreement. This gives Norwegian undertakings the possibility to take part in joint implementation projects at a lower risk.

Through the programme for project funding in Russia, run by the Ministry of Foreign Affairs, Norwegian actors have taken an active role in developing energy agencies in North West Russia. Several bioenergy projects have also been funded through this programme.

As a part of the EEA-agreement, Norway has established the Norwegian Financial Mechanism, which is aimed at the ten new EU member countries. The budget for the Norwegian Financial Mechanism and the EEA Financial Mechanism is 1.17 billion Euros over the five-year period 2004–2009. Projects in a wide range of priority sectors such as protection of the environment, conservation of the European cultural heritage, health and childcare and development of human resources are financed through the mechanisms. Memorandums of Understanding (MoUs) have been sign between the Norwegian Financial Mechanism and the different countries, of which several have given priority to projects within the energy sector.

7.9 Poland

In the Accession Treaty Poland accepted the indicative target of share of electricity from renewable energy sources in the total gross consumption of electricity in the country amounting to 7.5% in 2010, which requires a considerable increase, as it attains about 2% at present. The Polish Government undertakes various activities to promote the development of RES in order to reach this target and achieve benefits which this development brings about. On 5 September 2000 the Polish Government adopted the document: *“The renewable energy development strategy”*, elaborated by the Ministry of Environment. This document, approved on 23 August

2001 by the Sejm, foresees that through achieving the strategic goal of RES utilization development policy, the share of energy from renewable sources in the energy balance will increase to 7.5% by the year 2010.

The government supports all activities aimed at increasing production of energy from renewable energy sources. This is reflected, inter alia, in the document “*Guidelines of the energy policy of Poland until the year 2020*”, adopted by the Council of Ministers in February 2000, which includes activities in the field of environmental protection and RES utilization development in the main tasks which should be undertaken in compliance with the country’s sustainable development rule, as well as in “*The Energy Policy of Poland until 2025*” adopted by the Council of Ministers on 4 January 2005, which replaces the former document and confirms that the continuation of energy policy with a special emphasis on RES utilization is fully justified.

The purpose of this Policy is to:

- ensure energy security of the country,
- increase the competitiveness of economy and its energy efficiency,
- protect the environment from the adverse effects of energy-related activities, concerning generation, transmission, and distribution of energy and fuels.

“*The Energy Policy of Poland until the year 2025*” clearly indicates the necessity to develop RES utilization. The whole chapter dedicated to renewable energy sources as well as the entire document, stress the importance of RES utilization. One of the basic strategic objectives of the State’s policy as regards renewable energy sources is the promotion of this energy’s development and attaining the 7.5% share of renewable energy in the primary energy balance. This should be carried out in such a way as to ensure that the utilization of particular sorts of renewable energy sources favours competition promoting most economically-effective sources, so as not to lead to an excessive energy price increase for consumers. This should be the fundamental principle for RES utilization. The share of electricity from RES in the total gross consumption of electricity in the country should attain 7.5% in 2010. This is in line with the indicative quantitative target stipulated for Poland in Directive 2001/77/EC of 27 September 2001 *on the promotion of electricity produced from renewable energy sources on the internal market*. In “*The Energy Policy of Poland until the year 2025*” the main focus is also on use of biomass for electricity and heat generation.

In Polish conditions the technologies using biomass will remain the fundamental line of development of RES, but use of biomass for energy purposes should not lead to shortages of timber in wood, cellulose, paper and wood-using industries. The use of biomass will have a substantial influence on the improvement of agricultural and forest management, and

should be an important element of agricultural policy. It is assumed that biomass obtained for energy generation will come largely from energy crops. It is also planned to use a wide range of biomass contained in various types of industrial and communal waste, not only from plant and animal production, to create new opportunities for dynamic development of local enterprise. However, intensive cultivation of energy crops must guarantee that the necessary intensive fertilization will not lead to deterioration of environmental conditions (water, land).

Moreover, the Policy assumes successive increase in bio-components share in the overall volume of liquid fuels brought into the Polish market. Actions in this respect will concentrate first of all on implementation of the Community regulations.

Energy Policy also defines concrete executive actions, which should be implemented until 2008:

- Elaboration of biomass balance with regard to its availability for energy purposes and as regards the distance from combustion sources – realized under the leadership of the minister responsible for agriculture in cooperation with the minister responsible for environment and the minister responsible for economy.
- Initiative for the inclusion of new EU Member States in the EU system of direct payments to all energy crops – realized under the leadership of the minister responsible for agriculture.
- Preparation of a proposal of a regulation ensuring implementation of Directive 2003/30/EC *on promotion of the use of bio-fuels and other renewable fuels for transport* – realized under the leadership of the minister responsible for agriculture in cooperation with the minister responsible for economy, the minister responsible for transportation, the minister responsible for environment and the minister responsible for education.

A basis for the legislative activities aimed at supporting the development of renewable energy is the Act of the 10th April, 1997 – *the Energy law* (JoL of 2003, No. 153, item 1504). Under the provisions of article 9a of the above mentioned Act, energy enterprises dealing with the sale of electricity to final consumers, are obliged to purchase electricity produced from RES or generate electricity in their own renewable energy sources, connected to the grid. The energy enterprises dealing with heat trading, transmission and distribution are obliged to purchase the offered heat generated in grid-connected renewable sources in the territory of the Republic of Poland in the volume which does not exceed the demand of the customers connected to the grid.

The Minister responsible for economy systematically assesses the functioning of the *Energy law* in area of use of energy from renewable energy sources, therein effectiveness of the regulations about obligation

to purchase electricity produced from these sources. This assessment results in introducing consecutive amendments to the Act – *Energy law* and to the ordinance of the Minister responsible for economy concerning obligatory purchase of energy from renewable energy sources. An evaluation of the functioning of the *Energy law* is carried out inter alia based on annual reports of the President of Energy Regulatory Authority on activity, current analysis of functioning of the *Energy law* provisions and executive ordinances compatibly to the incoming correspondence from producers of electricity from RES and also during many meetings on RES issues. The purpose of the ordinance of the Minister of Economy and Labour of 9 December 2004 *concerning the detailed scope of the obligation to purchase electricity and heat produced from renewable energy sources* (JoL No. 275, item 2656), being the realization of delegated legislation included in the act – *Energy law*, is to introduce and develop a support system utilizing market mechanisms and to settle its rules in the way favouring optimal development and competition.

The basic goal of amendment to the act *Energy law* and changes in ordinances was giving details for the support system for RES development utilizing market mechanisms and settling its rules in the way favouring optimal development and competition. While amending the ordinances, provisions causing disputes or with regard to which interpretation doubts were voiced by enterprises and the Energy Regulatory Authority were made precise. The amendment enables to count part of electricity produced in co-combustion of conventional fuels with biomass or biogas as energy produced in RES. This act caused a significant increase in interest in bioenergy in Poland, both among small entities and energy generators producing electricity in energy system plants.

The tables below show the data on RES share in energy balance.

	1999	2000	2001	2002	2003
	MW	MW	MW	MW	MW
	36.12	39.89	47.81	50.95	59.00
Wind energy	3.00	3.83	18.04	58.27	59.80
Biomass	7.07	9.10	12.83	15.81	20.10
Total	46.19	52.82	78.68	125.00	138.90

Percentage share of RES in consumption of primary energy	
Hydro energy	0.157
Geothermal energy	0.008
Wind energy	0.012
Liquid and gaseous fuels from biomass	0.08
Including:	
<i>Biogas</i>	<i>0.049</i>
<i>Liquid fuels (bio ethanol)</i>	<i>0.031</i>
Solid fuels from plant and animal production	4.284
Including:	
<i>Wood</i>	<i>3.392</i>
<i>Waste solid fuels from plant and animal production</i>	<i>0.892</i>
Total amount in %	4.541
Percentage share of energy and fuels from RES in electricity production	
Hydro energy	1.103
Wind energy	0.082
Biogas	0.063
Solid fuels from plant and animal production	0.262
Total amount in %	1.51
Percentage share of energy and fuels from RES in heat production	
Geothermal energy	0.002
Biogas	0.07
Solid fuels from plant and animal production	0.667
Total amount in %	0.739

In final energy consumption the share of renewable fuels from biomass amounted to 6.28%, out of which 1.20% was industry, 0.05% transport, and 5.03% small customers sector.

7.10 Russia

Biomass resources in the European part of Russia are estimated to 400 TWh per year:

- 265 TWh per year of unused wood that potentially could be taken from forests and used i.e. as woodchips for heating
- 109 TWh per year that is already used as firewood
- 58 TWh per year of agricultural residues, including straw and residues already used for energy purposes today
- 37 TWh per year of surplus wood residues from wood industries.

In northwest Russia, residues from sawmills and the pulp and paper industry could supply as much as 45–50 TWh/y in the oblasts Murmansk, Arkhangelsk, Kerelai, Volodga, Komi, Pskov, Novgrad and Leningrad.

In Russia's north-west regions, the forestry and pulp and paper industries are very important. The northwest produces 60 % of the country's paper, and the industry are big potential users of biofuels and suppliers of biomass to power generation companies and to local utilities. The pulp and paper industry in Russia relies on biofuels to meet only some 20–30% of its energy needs (Europe: 52%) (OECD 2003).

Vologda region

In the framework of the Federal target program “Energy efficient economy” the mini cogeneration heating plant (CHP) “Belyj ruchej (White stream)” in the settlement Delo in Vytegorsk district (Vologda region) is under construction now. Mini CHP is planned to produce heat and power using wood waste as a basic fuel. Diesel oil would be used as reserve fuel.

The budget as well as non-budget sources is used for financing of this project.

Engineering and geodetic survey of the building site as well as feasibility study have been completed now.

In July assembling of boilers owned by joint-stock company “Sevzapenergomontage” was started. Construction was to be finished in June 2004.

Mini CHP " Belyj ruchej" – Technical and economical data (100 Rubel = 2.90 EUR)

№	Data	Unit	Quantity
1.	Nominal plant capacity		
	– electrical power	MW	6
	– heating power	Gcal/h	26
2.	Average auxiliary self consumption:		
	– electrical energy	MW	1.29
	– heat	Gcal/h	1.46
3.	Annual energy output:		
	– electrical energy delivered to the grid of "RAO EES of Russia»)	MWh	39 817
	– heat energy (consumption for industrial process JSC "Belyj ruchej", municipal heat and hot water supply	Gkal	59 850
4.	Annual fuel consumption:		
	– wood waste	100 m3	199.47
	– diesel oil	ton	80
5.	Staff		100–120
6.	Energy cost price (market price level 2000) without VAT		
	– electrical energy	Rub/MWh	397.7
	– heating energy	Rub/Gcal/h	131.4

Arkhangelsk region

Effective energy supply of regions (in particular northern ones) based on the use of non-traditional renewable energy sources and domestic fuel

Building of energy facilities using biomass and domestic fuel including:

- Erection of mini CHP using wood waste in the settlement Novo–Lavela (Pineghsk district, Arkhangelsk region) with capacity 3 MW
 - Erection of mini CHP using peat in the settlement Lajsky (Primorsk district, Arkhangelsk region)
- Works are planning

Environmental perspectives of effective development in energy branch including resources saving and greenhouse emission reduction

- New buildings.
- Greenhouse emission reduction.
- Building of wood waste burning facilities for heat supply to settlement Puks (Plesetsk district, Arkhangelsk region) *Works are planning*

Technical reequipping and reconstruction and GHG emission reduction:

- Kargopol, Arkhangelsk region *Under construction*
 - Conversion of boiler plants to biofuel

Conversion of DKVR 6.5–13 boilers to biofuel in the settlement Tegra (Velsk district). Under construction

Erection of mini CHP using wood waste in the settlement Dvinsky (Verhnetoemsk district Arkhangelsk region) with capacity 1 MW. Under construction

Reconstruction of the boiler-plant in Njandoma by installation of the turbo generator

Reconstruction of the district heating system and conversion of boiler equipment to biofuel in the settlement Severooneghsk. Under planning

Republic of Karelia

In the frame of program FTP “The energy efficient economy”, in the part “The efficient energy coverage of the north and the corresponding regions by using of the non-traditional renewable energy sources and the local fuels”, the realization of first priority projects of the reconstruction and the building of heating plants on the local fuels have been carried out in the Republic of Karelia in 2003. The final reconstruction of the heating plant with power capacity 8 MW in Letnerechensky (Belomorsky district)

The initiation of the building of the heating plant with power capacity 2.5 MW in Ryaimelya (Pitkyarantsky district)

Performance of projecting phase for reconstruction of:

- The heating plant N 12 with power capacity 3 MW in the city Pudoz
- The heating plant Helelulja with power capacity 6 MW in the city Sortavala
- Performance of Feasibility study for the heating plant with power capacity 4.6 MW in the state farm Vidliza (Olonezky district) financed by federal budget.

Saint Petersburg and Leningrad Region

For realization of the projects the funds budgeted to support the energy efficient projects have been used. All the equipment was supplied by domestic companies and enterprises.

The introduction of such projects has led not only to economical use of the traditional energy resources, but also to social effects including the arrangement of new working places in the logistic chain of biofuel deliverance and biofuel production.

In the Leningrad region more than 30 heating plants have been converted to biofuel use by the application of equipments from Sweden, Finland, Holland, Denmark and Russia. Leningrad local government ratified a list of boiler-plants to convert to the use of biofuel.

All the questions concerning increase of the use of biofuel in the energy sector in North–West Russia were discussed on the Baltic Forum which took place in Saint Petersburg in December 2004. Furthermore, two thematic workshops devoted the possibilities to create an intern market of biopellets took place in Saint Petersburg in the end of 2004 with participation of all parties concerned. All these seminars were held under the supervision of the President's official Representative in the North–West Russia.

The regions of Novgorod and Pskov

The production of small biofuel burning boilers has been started in Velikij Novgorod. The biofuel burning boiler-plant is being constructed using Finnish technologies.

The Republic of Komi

8 organizations are involved in the FTP “Energy efficient Economy for 2002–2005 up to 2010”

All the enterprises included in FTP used their own financial resources.

Joint-stock company "Neusidler–Syktyvkar" (former Syktyvkar Forest Industrial complex) according to FTP took the following measures

In year 2002, 512 500 m³ of bark and wood waste was burned (90,700 tons of standard coal). Year 2003 the corresponding figures were 557,000 m³ of bark and wood waste and 101,500 tons of standard coal. All these measures allowed to save 5.9 millions m³ of natural gas and 220 t of mazout (about 10,2 millions rubles). Man-hour costs were about 27 millions rubles.

Kaliningrad region

Within the framework of the Federal Target program (FTP) and under the supervision of the Kaliningrad Region Administration the following projects are in progress:

- The building of the cogeneration power plant N 2,
- The conversion of the boiler plant in Nesterov to local fuel burning,
- Heat supply of the community housing in October district of Kaliningrad
- Reconstruction of the boiler plant of the Ceprus enterprise and use of the expander-generator plant on the cogeneration power plant N 1

Using of the local fuel in the Kaliningrad Region

The erection of the peat-burning municipal 5 MW boiler plant in Nesterov is almost completed.

Financial sources: federal budget (2.6 millions rubles) and regional budget (8.2 millions rubles)

The project implementation within the Federal Target program took place under supervision of Energy inspection department in respective regions of North–West Russia. The annual reports to the State Energy Inspections Department of Russian Federation have been required by the authorities.

7.11 Sweden

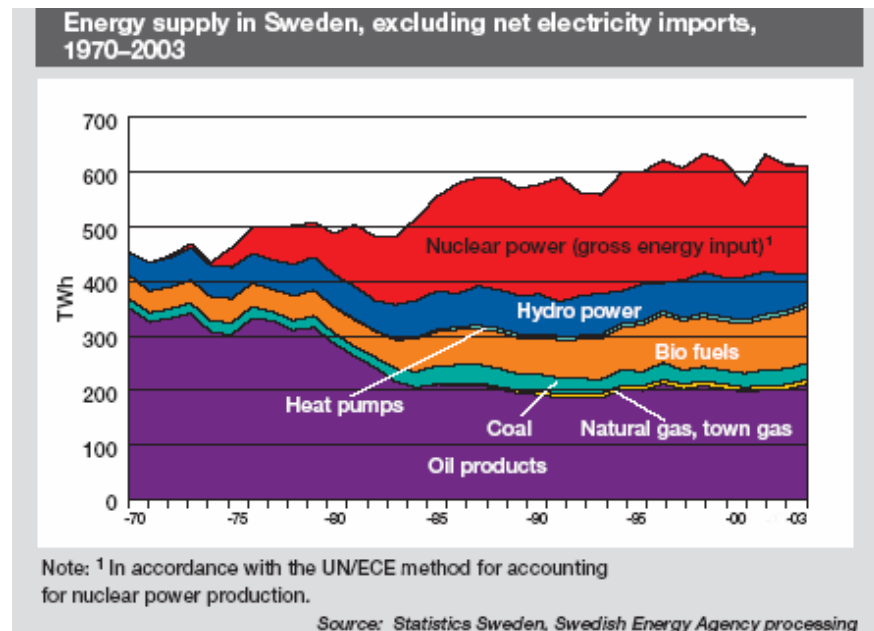
National Key Figures

Sweden is striving towards an ecologically and economically sustainable society, in which a sustainable energy system based on renewable energy sources is essential. Sweden's energy policy is to provide secure short- and long-term supplies of electricity or other energy on competitive basis. The country's energy policy is intended to create conditions for efficient use and cost-efficient supply of energy, with minimum adverse effect on health, environment and climate.

The energy potential from biofuels in Sweden is estimated to be around 125–175 TWh annually on a sustainable basis, excl. black liquors from the pulp and paper industry. The potential is higher than the actual level of supply.

Biofuels have got a significant share of Sweden's energy supply and the position has strengthened slowly over the last thirty years. Biofuels have a relative share of 17 % of the total energy supply at present stage. On the international scale this is a high proportion. During 2003 biofuels accounted for 103 TWh, which was an increment for 5 TWh compared to

the year before (2002). District heating accounted for 4 TWh of the total increment.



With the exception of a certain import contribution, biofuels used in the Swedish energy system are indigenous, consisting mainly of wood fuels, black and green liquors, peat, refuse and ethanol.

Of the total use of biofuels in 2003 (103 TWh), about 62 TWh were as final use in the industry, residential and service and transport sectors, with over 41 TWh being used for electricity and heat production. The final use of biofuels amounted to about 49 TWh in the industry sector, over 12 TWh in the residential and service sector and almost 1 TWh in the transport sector. Biofuels for conversion amounted to 35 TWh in the district heating sector and about 6 TWh for electricity production.

Frameworks and key drivers for renewable energy (RE) and specifically bioenergy

Overall incentives for implementation of bioenergy in the Swedish energy system are the climate issue and commitments under the Kyoto Protocol, as well as the European policy aiming at less dependence on imported, fossil fuels. The environmental quality objectives bill shall also be mentioned as an important driver on the policy level.

Sweden has four major policy tools for supporting RE; taxation, the certificate scheme, subsidies for wind power and the EU emission-trading scheme. The country has promoted renewable energy by a combination of energy taxation and environmental bonus schemes up to May 2003. Since then a major policy change has been implemented by introducing a tradable certificate scheme in order to achieve a cost-effective

and market-oriented promotion of renewables. Taxes have played an important role over the past 10 years and they will continue to do so in the future. Much of the rise of RE comes from increased biomass use due to the introduction of taxation more favourable to biomass in the early 1990's. Carbon-dioxide taxes on fossil fuels have been essential for the successful implementation of biofuels.

On the operational level a good infrastructure must be mentioned as a basis for bioenergy. State-of-the art can be summarized by the following factors; a large forest potential, a well developed forest products industry, relatively mature technology and integrated systems for production and distribution of biofuels, as well as a well developed market with professional end-users.

Regional joint action

Sweden is involved in several international and bilateral networks within the field of bioenergy R&D and dissemination. The most important platforms for collaboration are the ones at EU level and those at IEA level. Particularly worth mentioning are the activities within the frame of IEA Bioenergy and the coming activities within the frame of the newly established ERA-NET Bioenergy. IEA Bioenergy, with its 22 member countries, operates joint activities and networking in 12 topic areas covering practically all commercially interesting bioenergy feedstock, technologies and end-uses, as well as non-technological issues.

Most important *bilateral activities* concerning bioenergy in the Baltic area and North West Russia are the activities for investments in the district heating systems in the Baltic Countries, Russia and Poland during the period 1993–2003 within the framework of the Swedish Pilot Programme for Climate projects and a special allocation for Lithuania and Russia financed from the Swedish Baltic Billion Fund. Furthermore, a wood-fuel development project has been implemented in Lithuania (www.stem.no). A Russian–Swedish Bioenergy Information & Training Centre has been established at the Lisino Forest College in Leningrad Oblast in Russia. Branch offices to the Centre have already been established in Novgorod and Kaliningrad and are under way in NW Russia. Another ongoing project is the project on Research and Higher Education of Sustainable Production and Utilisation Chains for Bioenergy in Northwest Russia, co-ordinated by the Swedish Agricultural University and the Lisino Forest College. The agency is also engaged in a project on the establishment of a web-site on energy together with the Energy Efficiency centres in the Barents Region. Sida, the Swedish International Development Agency, has i.e. implemented a model forest project in the Pskov Region and a similar project is under way in Leningrad Oblast. Certain activities for promoting introduction of Swedish small-scale bio-

energy technology have also been supported by NUTEK in the Baltic Countries and in Russia.

The Swedish Energy Agency is assigned to implement the Swedish International Climate Investment Programme (SICLIP), which is a continuation on the previous pilot programme. Through the SICLIP–JI part of the programme Sweden is interested in purchasing emission Reductions Units from projects in the Baltic Sea Region and Russia. Priority is given to projects based on renewable fuels and energy efficiency. The Agency is also responsible for Sweden's participation in the Regional Testing Ground Facility (TGF) for JI projects in the Baltic Sea Region which priorities are similar to those of the SICLIP–JI programme.

Future activities

An energy policy with emphasis on stability will be a central issue in the long-term perspective. One can expect that the above-mentioned policy tools, combined with high price levels on fossil fuels, will continue to promote bioenergy over the years to come. Bioenergy is also selected as “high priority field” in the on-going strategically work at the Swedish Energy Agency. International collaboration within R&D and dissemination will become even more central for Sweden in the coming R&D programme.

For further information

Energy in Sweden 2004, Swedish Energy Agency, Eskilstuna 2004

<http://www.stem.se>

Forest statistics

<http://www.svo.se/fakta/stat/ssi/engelska/>

Wood fuel development project

http://www.svo.se/minskog/templates/svo_se_vanlig.asp?id=7198

IEA Bioenergy

<http://www.ieabioenergy.com>

8. Energy facts

The international standard unit for energy is the joule (J). However, this is a small unit (1 J=1 watt-second), and so for convenience the watt-hour (Wh) or kilowatt-hour are generally used. International comparisons and statistics often use the unit of toe (tonne of oil equivalent). In some applications, calories (cal) are still used.

All these units are impractically small for dealing with large energy quantities in national contexts. Instead, larger units are used through the additions of prefixes, such as Petajoule (PJ) or terawatt-hour (TWh).

Conversion between energy units

	GJ	MWh	toe	Mcal
GJ	1	0.28	0.02	239
MWh	3.6	1	0.086	860
toe	41.9	11.63	1	10,000
Mcal	0.0419	0.00116	0.0001	1

Prefixes used with energy units

factor	prefix
K = Kilo	10^3 = thousand
M = Mega	10^6 = million
G = Giga	10^9 = billion
T = Tera	10^{12} = trillion
P = Peta	10^{15} = thousand trillion