

North Karelia – Pioneer in wood energy

In 2004 the consumption of primary energy in North Karelia was approximately 10.4 TWh. Approximately 65% of the region's energy management is based on renewable energy sources, particularly the utilisation of forest industry by-products. This is what makes North Karelia a pioneer, both nationally and internationally.

Use of primary energy in North Karelia for 2004 and target calculation for 2015 (GWh)

Heating and power plants	2004	2015	2015-BTL*
Forest chips	283	800	1,480
Industrial wood sources	1,850	1,540	1,450
Black liquor	2,764	2,900	2,900
Recycled wood		20	20
Reed canarygrass and other energy plants		120	130
Biogas	10	48	48
Peat	650	600	650
Other energy sources	866	230	230
Oil	837	200	200
Other fossil fuels	29	30	30
Hydroelectric power production	951	860	860
Net import of electricity	311	185	75
Small properties			
Residential wood fuel	770	890	890
Wood pellet heating	5	120	120
Residential light fuel oil	530	200	200
Transport fuels	1,400	1,200	1,220
biofuels		90	92
produced in-region		9	66
Total	10,390	9,713	10,273

* 2015 BTL alternative, where liquid biofuel production capacity in North Karelia is equivalent to that of a 250 MW gasification plant.

The North Karelia Bioenergy Programme 2015 will generate jobs, competitiveness and economic welfare for the region. Realisation of the programme's measures is anticipated to increase the number of jobs in the bioenergy cluster to approximately 1,450 man-years and turnover to approximately 300 million euros by 2015. A majority of the growth will come from the export of technology and expertise. Positive economic development will also be realised in health care, agriculture and forestry.

The measures taken will also achieve more efficient, environmentally-friendly and self-sufficient energy production, by reducing, for example, greenhouse gas emissions. Energy production always results in local environmental impact, but with careful planning and execution these impacts can be minimised. The best way to reduce the environmental impacts of energy production is to avoid the unnecessary consumption of energy.

Areas of focus for 2007-2010

The three operational entities of the bioenergy programme—*sustainable energy production, increasing expertise, and export of technology and know-how*—require not only the region's own development resources, but also national regulatory instruments and resources. Key regional measures to be initiated at the beginning of the planning period are:

1. Enhancing the technology and expertise transfer process

- The objective is to establish an eventually permanent function, in which EU and client-funded projects are formed to promote the transfer of forest and energy industry technology and technological R&D. The objective is to initiate technology transfer research.
- The objective is also to productise renewable energy training as an internationally available training service, particularly in fields which support export for Finnish forest and energy technology manufacturers.

2. Providing energy consulting

- The objective is to develop an energy consulting system, including energy conservation and other renewable forms of energy, particularly for agricultural and forestry enterprises, households and SMEs.

3. Enhancing the biofuel procurement infrastructure

- The objective is to provide the region with optimal conditions for investments in bioenergy production by eliminating any uncertainty associated with investment (reports on raw material resources and improving their availability and information systems) and calculating bioenergy procurement costs (reports on the development of sea and rail transport, terminals and logistical systems).

4. Development of harvesting technologies and methods

- The objective is to improve R&D co-operation between bioenergy and fuel producers, machine and equipment manufacturers, research and education in order to keep harvesting technologies and methods at the forefront of global industry, including the management of energy tree harvesting.

5. Development of biofuel production

- The objective is to increase the degree of refinement and production environmental-friendliness and cost-effectiveness of biofuels being refined in the region as well as become a leading expert in the production of these fuels and control of raw material properties.

6. Development and productisation of new energy technologies and business approaches

- The objective is to create new and more effective renewable energy and energy-savings products, production methods, business concepts and related businesses based on the region's research and technological expertise.

7. Promotion of investments supporting sustainable energy production

- The objective is to increase the level of energy production that complies with the principles of sustainable development.



North Karelia Bioenergy Programme 2015

Summary

The North Karelia Bioenergy Programme 2015 includes a description of the region's bioenergy situation, objectives and measures to be realised by 2015 and an impact assessment. The programme measures are divided into three entities: 1) sustainable energy production; 2) enhancement of expertise; 3) export of technology and expertise. These entities are used to address critical regional issues, which include climate change, energy availability, preserving regional vitality and employment. In addition to renewable bioenergy, the programme also comprehends peat, which is a slowly renewable biomass fuel.

Create jobs and vitality

- Jobs in bioenergy expertise, energy delivery chains and machine/equipment manufacturing
- Sales of machines, equipment and expertise world-wide
- Response to regional restructuring
- Euros paid for energy stay in the region

Control climate change

- Reduce greenhouse gas emissions by increasing energy efficiency and the percentage of renewable energy sources used
- The use of bioenergy does not increase the rapidly rising volume of carbon dioxide in nature
- Halve the use of oil

Increase energy self-sufficiency

- Reduce dependency on imported energy and its prices with local and decentralised bioenergy
- Increase energy efficiency and avoid the unnecessary use of energy
- Effectively utilise the renewable natural resources found in North Karelia
- Produce nearly all electricity and heat and a portion of the transport fuel used in the region self-sufficiently

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Sustainable energy production

North Karelia’s principles of sustainable energy production for 2015:

- Energy conservation and efficient use of energy
- Increasing the share of renewable energy sources and improving self-sufficiency
- Expansion of bioenergy production potential
- Enhancing the degree of biofuel refinement and export outside the region

General targets to be achieved by 2015:

- Decrease the total consumption of energy
- Cut oil consumption by nearly half
- Reduce use of fossil energy sources by 40%
- Stop growth in electricity consumption
- Increase the degree of self-sufficiency for electrical production to 92% and the share of renewable energy sources to 85% of production

Measures:

- **Investment in sustainable energy production:** providing energy consulting to areas outside emissions trading , increasing the share of combined electricity and heat production, replacing oil with bioenergy, drafting of municipal energy reports, supporting investment in power and heating plants, and actively supporting the implementation of national control instruments.
- **Improving the availability of biofuels:** The objective of these measures as a whole is to expand the raw material potential available for bioenergy production and reduce procurement costs by, for example: improving the efficiency of energy tree harvesting; developing and maintaining the delivery logistics infrastructure; initiating stump removal and extensive thinning of peatland; developing energy wood markets; and improving the quality and moisture control of biofuels within the delivery chain.

Sector-based objectives and measures

	Objectives for 2015	Measures
Forest chips	<ul style="list-style-type: none">• Production 950–1 350 GWh/a• Usage 800–1 480 GWh/a	<ul style="list-style-type: none">• Improving availability of biofuels
Wood fuel and pellets	<ul style="list-style-type: none">• Wood fuel usage 890 GWh/a• Pellet usage 120 GWh/a	<ul style="list-style-type: none">• Improving availability of biofuels• Increasing pellet production• National regulatory instruments
Herbaceous biomass	<ul style="list-style-type: none">• Arable area 11,000 ha• Produce 120 GWh/a of energy• 2-4 farm-scale biodiesel facilities	<ul style="list-style-type: none">• Improvement of production• GIS reports• Developing usage applications• Opening biogas plants• National regulatory instruments
Biogas	<ul style="list-style-type: none">• Produce 50 GWh/a of energy• 2 centralised and 6–12 farm-sized biogas facilities• Initiate vehicular usage of biogas	<ul style="list-style-type: none">• GIS raw material reports• Starting investment• Opening biogas facilities
Households	<ul style="list-style-type: none">• Decrease oil consumption by over 60% and electricity consumption by over 15% from 2004 levels• Reduce residential heating and private vehicle emissions	<ul style="list-style-type: none">• Providing energy consulting• National regulatory instruments• Updating building stock and heating systems to be more energy efficient• More effectively taking environmental perspectives into consideration in planning
Heating enterprise	<ul style="list-style-type: none">• Increase the number of heating enterprises• Sell 70 GWh/a of energy	<ul style="list-style-type: none">• Implementation of micronetworks• Charting of adapted applications
Transport biofuels	<ul style="list-style-type: none">• Build a biofuel production facility with 250 MW capacity in the region	<ul style="list-style-type: none">• Initiating biodiesel production
Peat	<ul style="list-style-type: none">• Produce 430–2,800 GWh/a of energy	<ul style="list-style-type: none">• Researching peat reserves• Implementation of new technologies and methods• Charting of environmental risks

Enhancing in-region expertise

Enhancing expertise is a key long-term and medium-term development area, which will be used to lay the foundation for international competitiveness. In the development of expertise focus must be placed on areas which are natural for the region and in which the region already possesses significant expertise. In North Karelia this kind of expertise can be especially found in the production of wood energy and fuels, the manufacture of forestry machines and equipment as well as the manufacture of heat-retaining fireplaces.

In enhancing expertise every effort must also be made to expand into new and rapidly growing areas which are related to existing know-how, such as the production of next-generation liquid biofuels.

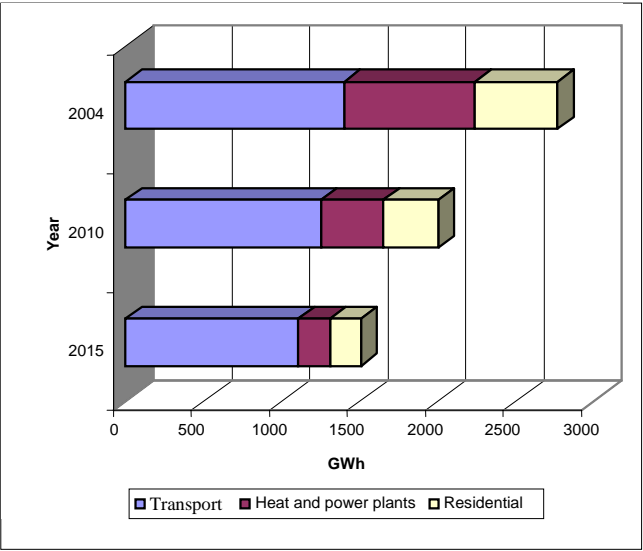
When choosing areas of expertise, one must also find fields in which the commercialisation of expertise can attract export-based production to the region. In addition to technological manufacturing, export products can also take the form of expertise-intensive consulting services and productised business models.

Research plays a key role in the enhancement of expertise. Indeed, the goal is to increase energy research and development to four times the 2004 level by 2015. This can be achieved by both increasing resources and directing existing research resources to the solution of energy-related issues. Key actors in this sector are the University of Joensuu, Finnish Forest Research Institute (Metla), North Karelia University of Applied Sciences and EFL.

The transfer of information and knowledge gained from research to the business sector is integral to the enhancement of expertise. In addition to the producers of information, intermediary organisations, such as the Joensuu Science Park, Forest Centre and ProAgria as well as educational organisations in the field, provide support to businesses in this endeavour.

Comprised of research, business and public organisations, the strong bioenergy cluster can achieve global leadership in its area of expertise, capable of meeting increasing international demand in the transfer of wood energy technologies.

- Measures:
- Organising the systematic transfer of expertise to serve, in particular, forest and energy technology manufacturers and bioenergy producers operating in the region. The transfer of expertise comprehends the acquisition and utilisation of foreign expertise in the region and the dissemination of research data to the region's businesses.
 - Making the region a world-leading and world-renowned producer, developer and provider of energy wood procurement information.
 - Making the region an international leader in forest chip, wood pellet, wood fuel and energy peat production expertise.
 - Applying chemistry and physics research in the production of liquid biofuels and increasing the region’s profile in its own fields of specialised expertise as a key national and internationally-renowned provider of research data and services as well as educator of experts.
 - Transferring wood energy expertise to educational organisations in the field and developing this expertise into an international educational service.



Target for reducing the use of oil-based fuels in North Karelia during 2004–2015

Export of technology and expertise

North Karelia is a major manufacturer and exporter of fireplaces and cut-to-length harvesters. In addition to this, the region has already been profiled as a research and development expert in the charting of forest energy resources and transfer of technologies.

The following are objectives set for the export of technology and expertise:

- Increasing the turnover of fireplace manufacturing 70% from 2004 levels by 2015.
- Increasing the turnover of forest technologies by a factor of 8 (to 140 million euros) from 2004 levels by 2015.
- Making the educational sector a world-leading wood energy educational cluster and provider of educational services.
- Productising of bioenergy business models into export products by regional companies
- Implementing bioenergy consulting as a business form
- Expanding the volume and geographical area of technological transfer projects
- Launching international bioenergy and forest machine educational schemes by 2010.

Measures

- Establishment of the Wenet Centre development unit, whose operational cornerstones are:
 - Defining the role of export businesses in the direction of Wenet Centre operations.
 - Close co-operation of the network with other regional bioenergy clusters.
 - Increasing international operations and enhancing the profile of the Wenet Centre brand in Europe.
- Productising educational services.
- Productising expertise into an international consulting product.
- Developing research and increasing international recognition.
- Improving the international field of operations and knowledge of select target countries.
- Networking with target region actors on R&D and technology transfer projects.
- Promoting focused support, which is based on specific business needs, is provided easily and includes co-operation with the R&D sector.
- Creating internationally competitive training packages, whose participants disseminate Finnish expertise as a "supplementary product" to the rest of the world.

