“DEVELOPMENT PLAN 2007–2013 FOR ENHANCING THE USE OF BIOMASS AND BIOENERGY”

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CONTENTS

INTRODUCTION

The European Commission's strategy for providing sustainable, competitive and safe energy shows that restraining climate change, guaranteeing the reliability of energy supply and enhancing competitiveness go hand in hand.

By increasing energy efficiency and developing renewable energy sources, several goals are fulfilled simultaneously: emissions are reduced, dependence on import is decreased, a more stable market and a stimulus for the development of European technology are achieved.

Bioenergy sources have a decisive role in achieving a 12% proportion of renewable energy sources in the European Union by 2010. In its Communication of 7 December 2005 "Biomass Action Plan" (COM 2005) 628, the European Commission called on Member States to draw up national biomass action plans. On the basis of the aforementioned, the Communication from the European Commission was discussed at the meeting of the Government of the Republic of Estonia on 13 April 2006, and by a decision on agenda item No 12, the Ministry of Agriculture was given the task to draw up a Development Plan for Enhancing the Use of Biomass and Bioenergy.

The Communication from the European Commission prescribes measures to encourage the production of energy and materials from wood, waste and agricultural crops. For this purpose, there is a plan to create market-based incentives and remove barriers to the development of the market. The Communication prescribes measures for enhancing the use of biomass in the heating industry, electric energy sector, transport and materials industry. In addition, cross-cutting measures are prescribed that foster financing and biomass supply, as well as research and the dissemination of information. The action plan presented in the Communication aims to reduce the insecurity of investors by evaluating the physical and economic availability of different biomass types, including wood and wood residues, waste and agricultural crops, and by determining priorities regarding the biomass types in use and ways of developing them, as well as by pointing out measures to be taken in order to enhance this. The action plan is also connected with consumer information campaigns about the benefits of biomass and bioenergy. The action plan is accompanied by a general assessment of impacts related to the implementation of the action plan. In addition to the Biomass Action Plan, the European Commission presented a European Union Strategy for Biofuels on 8 February 2006.

Many regions that benefit from the Structural and Cohesion Funds have a great opportunity for economic development and the creation or stabilisation of jobs with the help of biomass. This is particularly true for rural areas in Central and Eastern Europe. Low labour costs and a wide availability of resources may give these areas an advantage over others in the production of biomass.

Supporting the production of renewable and alternative energy sources is an important priority for the Structural and Cohesion Funds according to the proposal of the European Commission on Community strategic guidelines on cohesion. These funds may support the retraining of agricultural producers, acquiring equipment for biomass

producers, investments in the production facilities of biofuels and other materials, and the shift of electricity and district heating producers to biomass.

Through the rural development policy it is possible to support investments in agricultural enterprises or rural areas, as well as the deployment of unused biomass by forest owners. The European Commission has proposed strategic guidelines for rural development in the Community, where great attention is paid to renewable energy in general and primarily the supply chain of biomass. The European Commission encourages Member States to use these opportunities to develop and diversify the economy of rural areas through national rural development programmes.

The deployment of biomass in the production of energy and materials:

- helps ensure a reliable supply of energy;
- reduces dependence on imported energy and its price fluctuations;
- creates new market outputs for agricultural produce, making it possible to earn an alternative or additional income as compensation for decreasing direct aid;
- helps reduce pollution pressure on the environment, especially the environmental load of the energy sector;
- helps ensure the growth or stability of the gross domestic product;
- has a positive impact on trade balance;
- makes it possible to create new jobs or retain the existing ones (especially in rural areas);
- diversifies the nomenclature of agricultural produce and energy resources;
- helps disperse energy production;
- helps ensure the upkeep of agricultural and forest land.

Due to the lack of better alternatives, bioenergy must be promoted and developed regardless of its higher price. This is the price of environment protection and independence. Waiting for technological solutions that would solve all energy and environment problems cheaply does not guarantee a solution.

A question that remains to be solved is which method would be the most sustainable one for this, so as to avoid impairing the general development of the country. It is possible to raise taxes — then the "market will regulate itself" and bioenergy will become profitable. It is possible to choose to pay aids, to establish obligations and restrictions. In the first stage of this Development Plan, the objective is to evaluate different choices on the basis of analyses. For undertakings, the security of operation is very important, which is why it is useful to determine market rules for as long a period as possible. Here the dissemination of information and research and development together with impact assessment is what supports the development of the market.

This draft Development Plan was drawn up by a committee set up of officials from the State Chancellery and the ministries[1] pursuant to Order No 176 of 31 October 2006 of the Minister of Agriculture. The draft was sent for public consultation to the biomass and bioenergy work group that comprises the relevant officials, business operators, scientists and representatives of the third sector.

[1] hereinafter – the Development Plan Committee

The Development Plan, which was revised according to public opinion, was sent to the ministries and the State Chancellery for approval before presenting it to the Government of the Republic.

The time period intended for the Development Plan is 2007–2013, which overlaps with the period of the Financial Perspective of the European Union, making it easier to plan funds and actions.

1. DEFINITIONS

Bioenergy is part of renewable energy, which in turn is part of total energy. Bioenergy is energy produced from biomass — heat, electricity and biofuels.

Biomass is the biodegradable fraction of products, waste and residues originating in agricultural production (including vegetable and animal matter), the forest industry and production related to it, as well as the biodegradable fraction of industrial and household waste.

Biofuel is defined somewhat differently in the legislation of Estonia and that of the European Union.
According to Article 2(2) of Directive 2003/30/EC, the following types of liquid or gas fuels produced from biomass and used in transport shall be deemed as biofuels:

- **bioethanol** – ethanol produced from biomass and/or the organic fraction of waste;
- **biodiesel** – a methyl-ester of diesel quality produced from vegetable or animal oils;
- **biogas** – wood gas or liquid gas produced from biomass (also from the organic fraction of waste), the level of purity of which corresponds to the quality of natural gas;
- **biomethanol** – methanol produced from biomass;
- **biodimethylether** – dimethylether produced from biomass;
- **bio-ETBE** – ethyl-tertio-butyl-ether produced on the basis of bioethanol. The biofuel content in ETBE is considered to be 47%;
- **bio-MTBE** – methyl-tertio-butyl-ether produced on the basis of biomethanol. The biofuel content in MTBE is considered to be 36%;
- **synthetic biofuels** – synthetic hydrocarbons or mixtures of synthetic hydrocarbons produced from biomass;
- **biohydrogen** – hydrogen produced from biomass and/or from the organic fraction of waste;
- **pure vegetable oil** – crude or refined but chemically unmodified oil produced from oil plants through pressing, extraction or comparable procedures.

This list includes only transport biofuels; it does not involve biomass itself, including wood, burnable hay, etc.

Section 19(14) of the Alcohol, Tobacco and Fuel Excise Duty Act defines biofuel through the nomenclature codes of goods (see Annex 1).

For the purpose of this Development Plan, the definition of biofuel based on Directive 2003/30 is used.

The term ‘energy crops’ is defined through the terms ‘biomass’ and ‘biofuel’.

According to Article 88 of Council Regulation (EC) No 1782/2003 establishing common rules for direct support schemes under the common agricultural policy and establishing certain support schemes for farmers, **energy crops** are crops supplied essentially for the production of the following energy products:

- products considered biofuels;
- electric and thermal energy produced from biomass.

The list of crops considered energy crops may be determined by the Member State.

2. RELATION TO OTHER STRATEGY AND POLICY DOCUMENTS IN THE DOMAIN

The Development Plan for Enhancing the Use of Biomass and Bioenergy is a sector-specific development plan, the analyses of which help to make proposals concerning the modification of related development plans, in order to effectively regulate the relevant market.

The agricultural, environmental and energy policies of the European Union

Extension of the growing area of energy crops is supported with additional direct payments for cultivating energy crops as set out in Articles 88 to 92 of Council Regulation (EC) No 1782/2003, 29 September 2003, establishing common rules for direct support schemes under the common agricultural policy and establishing certain support schemes for farmers. Estonia implements the additional direct payments for energy crops since the year 2007.

Drawing on Directive 2003/30/EC, 8 May 2003, on the promotion of the use of biofuels or other renewable fuels for transport, Estonia aims to support achieving the EU indicative proportion of 2% of diesel and petrol fuels marketed for transport by the year 2006, and 5.75% by the year 2011, calculated on the basis of the energy content of fuels.

Pursuant to Directive 2001/77/EC on the promotion of electricity produced from renewable energy sources in the internal electricity market, adopted in 2001, 22% of the national gross consumption of electricity must be covered by electricity produced from renewable energy sources. It was agreed during the accession negotiations that Estonia undertakes to achieve a 5.1% proportion.

In 2004, the European Commission set out to present a biomass action plan to stress the need to apply a coordinated approach to biomass. The “Biomass Action Plan” was presented on 7 December 2005 and it prescribes measures to encourage the production of energy from wood, waste and agricultural crops, in order to eliminate factors that hinder the development of the relevant market. The action plan describes measures to promote the use of biomass in the heating industry, electric energy sector and transport. The objective that has been set is to reduce dependence on fossil fuels, limit greenhouse gas emissions and enliven economic activity in rural areas. The Communication from the European Commission “Biomass Action Plan” was followed by a “Strategy for Biofuels” (8 February 2006) COM (2006)34. Although most biofuels are still more expensive than fossil fuels, the Strategy for Biofuels sets the objective of seeking and finding solutions in the long term. Positions on the above-mentioned two documents were also developed by the Government of the Republic on its meeting of April 2006. Besides a generally supportive position, aspects related to a more flexible consideration of the local situation were presented and the setting of quantitative and fixed-term targets without prior thorough analysis was criticized.

This Development Plan supports the enhancement of the use of biomass and bioenergy, ensuring the competence needed in research and development, as well as market analysis and organization and the informing of market participants. For this purpose, the necessary surveys will be commissioned, an infrastructure required for

research and development will be created, statistics will be collected and analysed, international cooperation and the informing of consumers will be financed.

Sustainable development strategy "Sustainable Estonia 21"

"Sustainable Estonia 21" is a strategy for developing the Estonian state and society up to 2030. The strategy establishes an overall framework for the integration of the social, economic and environmental spheres in the long-term development of society and defines moving towards the so-called knowledge society as the general development trend of Estonia. The strategy specifies the following long-term development objectives: vitality of the Estonian cultural space (survival of ethnic traditions), an increase in wellbeing, a coherent society (without acute social conflicts), and ecological balance.

According to the Estonian National Strategy for Sustainable Development, trends that affect Estonia in the future include the expanded coverage of the consumer society and welfare society model, which will bring along the need to balance the negative aspects of the consumer society; the chapter on ecological balance in the strategy sets the objective of ensuring sustainability, which is seen as a contribution to global development, following the principle that there must be balance at all levels of the living environment, both in the circulation of matter and energy flows.

In general, the strategy supports increasing the percentage of the production of energy based on renewable natural resources, but the growing load on the natural environment and biodiversity is seen as a danger. Fossil or non-renewable natural resources should be used following the principle that their exploitation must be ensured until such time when it would be possible to replace them with another resource, for example a renewable one.

The Estonian energy sector should be reorganized, supporting energy-efficient activities and developing this as a priority. Environment-friendly modes of transport should be preferred. As the production of energy from renewable materials inevitably brings along problems related to the use of landscapes — the destruction of habitats, an additional load when gathering bioresources, noise, damaged landscape, etc., mechanisms must be developed that would enable to determine and compensate for the adverse environmental impact.

Estonian Environmental Strategy until the year 2010

Among practical solutions for organizing waste management, the Estonian Environmental Strategy also points out the use of waste for energy (burning waste to produce energy).

Both the Estonian Environmental Strategy and the National Waste Management Plan have the same objectives as the environmental action plans of the European Union and the Common Waste Management Strategy — upon waste recovery, the preference of the material contained in waste to energy recovery.

The primary objective of the Estonian Environmental Strategy until the year 2010 that was approved by a decision of the Riigikogu of 26 October 2005 is to provide a healthy environment that would satisfy people, as well as resources necessary for the

development of economy without significant damage to nature, preserving the diversity of landscapes and biota and taking into account the level of economic development.

One objective is to reduce the adverse environmental impact of the energy sector, enhance energy efficiency and expand the use of renewable energy sources, increase the proportion and mobility of public transport and develop electric and railway transport as a priority. One task in fulfilling this objective is to increase the proportion of biofuels in the consumption of petrol and diesel fuel to 2% by the year 2006 and to 5.75% by the year 2011.

Estonian Environmental Strategy until the year 2030

The objective of the "Estonian Environmental Strategy until the year 2030" is to define long-term development trends in keeping the natural environment in good state, at the same time taking into account connections between the sphere of environment and the economic and social sphere, as well as their influence on the surrounding natural environment and people.

The vision is that the shares of the service sector, health sector, creative sector and science-intensive production will be increased in the structure of Estonian economy. The pressure of economy on nature will be dispersed and decreased. Industry and the provision of services will be evenly distributed on the territory of the state and will be of low environment-intensity; environment-friendly transport will prevail. Resources will be used much more efficiently; this will be enhanced by the implementation of environment-friendly technologies. The energy- and material-intensity of production will be relatively low and the production of waste will be kept at a minimum. Production will be developed with the help of recovery of materials, not by increasing the use of natural resources. Local products and the use of local renewable resources will be preferred. The transit of raw material through Estonia corresponds to the geopolitical developments; both local and imported raw material will be given an added value here.

Agriculture will be dominated by organic farming and farm tourism; hobby farms will also be popular. Taking into account the needs of both nature and people, the territory of the whole country will have a well-planned settlement pattern joined together into a well-functioning network with the help of public transport that is based on cutting-edge technology.

In the year 2030, several raw materials that can be obtained nearby and new environment-friendly technologies will be used in parallel with for producing energy. The stability of energy supply will be ensured, alternatives will have been found for the current types of energy raw materials, new technologies will be in use, oil shale will be used more effectively and with less waste (with current technology, energy produced from the wind, sun and water will not be enough for Estonia). It is possible simply to switch from one energy producer (source) to another. Microenergy solutions and autonomous eco-houses are widely used where the small amount of energy that is needed is produced from renewable sources. Estonia is notable among the developed countries for low energy consumption per production unit. The load of the oil shale industry — both electric and oil industry — on the environment will be minimized and its side effects will have been eliminated.

As to the energy sector, the objective is to produce electricity in volumes that would meet the consumption need of Estonia, and to develop diverse and sustainable production technologies that would be based on different energy sources, have only a low load on the environment and make it possible to produce electricity also for export.

The aim is to develop an energy sector that would meet the needs of Estonia using different energy sources. Production methods that have as low a load on the environment as possible are preferred, but fossil energy sources may also be used. In case of developing production technologies with a low load on the environment and using them in an optimal production mode, electricity may also be produced for export. The aim is also to slow down and stabilize the growth of energy consumption, ensuring at the same time that people's needs are met — that is, to ensure the preservation of the volume of primary energy in conditions of increased consumption.

The Development Plan for Enhancing the Use of Biomass and Bioenergy will contribute to fulfilling the objectives of the Estonian Environmental Strategy by way of specific action.

Long-term Development Plan for the Fuel and Energy Sector until the year 2015

The Long-term Development Plan for the Fuel and Energy Sector until the year 2015 is a policy document that sets out objectives and courses of action to develop the energy sector in Estonia. The fuel and energy sector is a strategic infrastructure of the state that has to guarantee a consistent supply of quality fuels, electric energy and heating in Estonia with optimal prices. At the same time, the fuel and energy sector must be as efficient as possible and comply with safety and environmental requirements. The sustainable functioning of the fuel and energy sector is fundamental to the safety of the state.
The strategic objectives of the Estonian fuel and energy sector are to:

- provide fuel and energy supply with proper quality and optimal prices;
- ensure the local generating capacity necessary for covering the electricity consumption load on the mainland, as well as a supply of liquid fuel complying with law;
- increase the proportion of renewable electricity to 5.1% of gross consumption by the year 2010;
- increase the proportion of electricity produced at combined heat and power plants to 20% of gross consumption by the year 2020;
- ensure compliance with nationally enforced environmental requirements;
- enhance energy recovery in the heating, electricity and fuel sectors;
- develop measures to enable the use of renewable liquid fuels, especially biodiesel, in the transport sector;
- provide consistent availability of modern know-how and experts in all domains of the fuel and energy sector, in order to foster national technology development and enable the transfer of modern energy technology.

One of the objectives of the Development Plan for the Fuel and Energy Sector is to develop measures to enable the use of renewable liquid fuels, especially biodiesel, in the transport sector.

National Strategy 2007–2013 for the Use of Structural Instruments (currently being developed[2])

The Strategy for Structural Instruments will be drawn up as part of the "State Budget Strategy 2007–2010" and will be included in the Common Budget Strategy. According to the analysis of the strategy, the main environmental protection issue in Estonia is the reduction of the load of economic activity (including pollution caused by economic activity) on the environment and ensuring health safety, including ensuring the sustainable use of natural resources as well as preventing environmental emergencies and increasing the ability to react to them.

The energy-intensity of the Estonian gross domestic product and the relatively low efficiency of using primary energy show a great potential for a more effective energy recovery. The state should therefore pay greater attention to controlling the growth of energy consumption, as well as to the increase in efficiency and energy conservation from the part of consumers. In connection with the existence of support schemes for the development of renewable energy and a more efficient electricity production in the electricity sector, and with the obligation to invest in the development of energy infrastructure in case of coordinated energy prices, the limited resources can be directed mainly at actions supporting and enhancing the development of the energy sector.
In addition to solving these problems, Estonia also needs to ensure the preservation of a generally good condition of the environment, i.e. our current strength — the self-recoverability of areas with natural and close-to-natural landscapes and biological populations (including biodiversity), a generally clean natural environment and landscapes as cultural heritage.

Pursuant to Priority 4, "Lower environment-intensity", of the National Strategy 2007–2013 for the Use of Structural Instruments, the protection of the ambient air and the energy sector should be developed towards greater environment-friendliness.
The fulfilment of obligations undertaken in connection with the improvement of ambient air protection is ensured by the state primarily through the improvement of the technology of energy companies and implementation of incentives to obtain cleaning equipment (pollution permits and pollution fees).[3] The major part of investments necessary for the protection of the ambient air will be the responsibility of companies. In order to fulfil obligations to avoid climate change undertaken under the Kyoto Protocol, greenhouse gas emission trading and international joint projects will be used. In case of market failure, investment aid may be given for implementation of environment-friendly production technologies, co-generation of heat and power and obtaining cleaning equipment.

To enhance energy conservation, the plan is to support first and foremost the modernization of district heating and energy conservation by energy consumers. For this purpose, support will be provided for the auditing and reconstructing of apartment buildings, which currently constitute 70% of Estonia's dwelling stock. The structure of Estonian electricity production capacity will be made more rational to cover peak load and reduce the concentration of electricity production. For this there will be support for

[2] Text as of 9.1.2007
3 Pursuant to Directive 2001/80/EC on large combustion plants, emissions from large combustion plants into the air must be brought into compliance with the emission limit values laid down in the Directive by the year 2015.

the generation of combined heat and power capacities in areas with heat load, as well as for the construction of production equipment using renewable energy sources to produce electricity, and of peak load capacities.

In order to increase the proportion of renewable energy sources in heat production, ensure heat supply for heat consumers and do it for as low prices as possible, and to use energy resources in a sustainable way, support will be provided for the renovation of smaller district heating networks and the construction of power stations or switching them to renewable energy sources. To deploy new technologies and to diversify the energy resources used in Estonia, the construction of profitable demonstration equipment that contribute to distributed energy production for the generation of both electricity and heat will be supported with a view to stimulate their use without investment aids in the near future. To ensure the use of renewable fuels and hydrogen in the transport sector, an effort will be made to disseminate the relevant information extensively and to present positive working solutions (for example, switching a transport company to renewable fuels or hydrogen).

Estonian Rural Development Plan 2007–2013 (currently being developed)

The rural development policy of the European Union considers it most important to increase the competitiveness of agriculture and forestry and to preserve agricultural landscapes and environment, as well as to diversify rural life and increase its quality. The main objective of the Rural Development Plan is to help potentially competitive producers make their production more efficient while remaining environment-friendly. Here the priority actions are definitely long-term investments, for example in land improvement, livestock housing, diversification of agriculture (including the production of biomass and bioenergy) and local processing.

In the framework of measure 1.1.3 “Investments in bioenergy production” of the Rural Development Plan, investments are supported that are directed at the production of biomass and bioenergy in agricultural enterprises. In the framework of measure 1.2 “Giving added value to agricultural and forestry produce” of the Rural Development Plan, support is provided for investments into obtaining and implementing processing techniques, equipment and technologies, the aim of which is to produce biofuels from agricultural produce, non-wood forestry produce and the production waste of industry that processes agricultural and non-wood forestry produce. In the framework of measure 1.6 “Development of new products, processing techniques and technologies in the agricultural and food sector and forestry sector” of the Rural Development Plan, applied research and product development related to bioenergy crops and biofuels is supported. In the framework of measure 1.5 “Improvement of the economic value of forests and giving added value to forestry produce” of the Rural Development Plan, support is provided for investments by microenterprises of the industry processing forestry produce into tangible and intangible assets in order to obtain and deploy new products, processing techniques and technologies (including investments in the production of bioenergy), with a view to ensuring a more extensive supply and use of forestry produce, the production of innovative high-quality forestry products and yield with a higher added value (including bioenergy products), energy saving and environment-friendly management. In the framework of measure 2.7 “Establishment of energy coppices” of the Rural Development Plan, the growing of an energy coppice will be supported to foster increasing the volumes of bioenergy raw material, ensure a

good condition of the environment and contribute to alleviating climate change. The aid will cover a part of the costs of creating an energy coppice.

Estonian Forestry Development Plan until the year 2010

The Estonian Forestry Development Plan is based on the Sustainable Development Act and Forestry Act. The objective of the development plan is to maximize the contribution of the forest sector to national economy and the welfare of society in a sustainable way. The development plan expresses the interests of forest management, forest industry and environment protection in a balanced way. The development plan is based on the Estonian forestry policy that was formulated in the course of the Estonian Forestry Development Programme in 1995–1997 and was approved by the Riigikogu in 1997.

The Forestry Development Plan addresses the following issues in Estonian forestry:

- the purposeful use of forestland that is still in the ownership of the state and has so far not been restituted or privatized;
- setting goals for the State Forest Management Centre and assessment of results;
- preventing the spread of illegal forestry activities and the violation of the provisions of forestry law;
- defining the proportion and location of strictly protected forests;
- determining the volume of cutting that would ensure continuity;
- developing a support system for private forest owners.

The Forestry Development Plan indirectly addresses the use of renewable energy sources by finding that in the upcoming years, 2 million cubic metres of low-quality wood will be produced in a year in the process of forest management, for which there is currently no consumer. Nor has cutting waste been taken into use as a renewable and environment-friendly fuel. It is important to find solutions for a more efficient use of low-quality wood.

The Forestry Development Plan's objective related to the enhancement of the use of biomass is to increase the international competitiveness of the forest and wood industry as well as local consumption of the products, in order to ensure the maximum utilisation of wood produced in the process of forest management.

As actions increasing the use of biomass, the development plan foresees an analysis of the possibilities of increasing the use of wood as an energy medium in the National Long-term Development Plan for the Fuel and Energy Sector, which is being developed to promote wood as an environment-friendly source of heating.

National Waste Management Plan

The National Waste Management Plan (4 December 2002) is the first strategic document organizing and guiding national waste management in Estonia. The Waste Management Plan is part of Estonia's environmental policy and it is directly connected

with the Environmental Action Plan 2007–2013 drawn up on the basis of the Estonian Environmental Strategy, as well as with other national strategic documents.

The main objective of the Waste Management Plan is to bring waste management into order at all levels. The Waste Management Plan prescribes a systematic waste management, synchronizes objectives for the state as a whole, sets targets and gives tasks for counties, rural municipalities, business operators and the people.

The National Waste Management Plan gives an overview of all significant waste types and presents solutions and projects for fulfilling the main environmental objectives of waste management. Among other principles, the Waste Management Plan highlights as fundamental also the need to observe the so-called waste management hierarchy, according to which attention should be paid to waste-related activities in the following order: avoidance, reuse, recycling as material, other recirculation, including energy recovery or burning, environmentally safe landfill. Hence waste incineration that is in compliance with requirements is always preferred to the disposal of waste in landfills, while recycling as material is preferred to incineration, etc. Therefore, incineration should not always be considered the primary choice in the future if it is possible to recycle waste as material.

Describing the management alternatives of different types of waste, the Waste Management Plan analyses the use of wood waste as biomass so far, problems associated with it and objectives regarding its use in the future.

A significant problem in the management of wood waste is wood waste impregnated with chemicals or otherwise treated with hazardous substances (varnish, paint or other means of surface treatment) which are classified as hazardous waste, even though mass- and volume-wise the core of such waste is wood. Such waste cannot be burnt in ordinary combustion installations, as hazardous volatile (e.g. organic) compounds are produced.

The development plan presents the following management alternatives for wood waste:

- composting together with waste water sediment and other biodegradable waste;
- burning in order to produce energy (also in the form of briquette).

According to the Waste Management Plan, the objective is to stop direct depositing of wood waste in landfills and if economically and technically possible, also to recover already deposited wood waste. The trends (priorities) in reducing the production of wood waste and its recovery are the following:

- reduction of losses (i.e. waste: sawdust, surfaces) in wood processing and the use of the topmost technology in the sawmill and wood industry;
- processing of smallwood;
- composting of wood waste together with other biodegradable waste and waste water sediment;
- incineration of wood waste to produce energy, provided that the wood waste is not mixed with hazardous waste (so-called ‘clean’ wood waste is burnt). The incineration must comply with the requirements of Directive 2000/76/EC of 4 December 2000 on the incineration of waste;

- use of wood waste as a surface finish material when closing landfills or recultivating quarries, either independently or by mixing it with other materials.

The National Waste Management Plan approved in 2002 is being revised. The improved and updated National Waste Management Plan 2007–2013 is expected to be presented to the Government of the Republic for approval at the end of the year 2007.

Estonian research, development and innovation strategy "Knowledge-based Estonia 2007–2013"

The three main objectives of the currently prepared strategy are:

- competitive quality and increase in the volume of research and development,
- innovative business creating new value in global economy,
- an innovation-friendly society oriented to long-term development.

The Estonian research, development and innovation strategy provides a general framework for organising research and development in the years 2007–2013. In the framework of the Development Plan for Enhancing the Use of Biomass and Bioenergy, an analysis of the state of research and development and education in this field will be conducted and specific actions will be planned on the basis of the results. The application mechanism designed for the Development Plan for Enhancing the Use of Biomass and Bioenergy will ensure that there will be no doubling of the development plans.

Development Plan for Agricultural Sciences (currently being developed)

The Ministry of Agriculture is preparing the "Development Plan for Agricultural Sciences 2007–2013", which highlights the following ways of fulfilling its objectives: matching research and development with the development needs of the economy, commissioning the relevant research and development work, and the transfer of know-how and technology to the economy. Thus the "Development Plan 2007-2013 for Enhancing the Use of Biomass and Bioenergy" and the "Development Plan for Agricultural Sciences 2007–2013" complement each other, proceeding from the needs of the economy and a fast deployment of research results.

The need to draw up a Development Plan for Enhancing the Use of Biomass and Bioenergy is especially compelling since bioenergy has been produced in Estonia only for a short time, which is why producers lack experience on which to rely in their activities.

3. ANALYSIS OF THE CURRENT SITUATION AND PROBLEMS TO BE SOLVED IN THE DOMAIN

3.1 Short overview and SWOT analysis

In case of a more effective and intensive agricultural production in the present stage of development, work force will be released that might not find work in rural areas without state interference. (Although at the same time there may be unemployment in some regions, but in such cases this is structural, occurs in certain areas of specialisation, etc.). Taking into account the extent of the use of agricultural land in the last century (over 1.2 million ha), a part of the land is now unused and has become covered with brushwood by today. Considering the need and possibility to use these resources, the objective of the Development Plan is to find possibilities to solve, with the help of energy produced from renewable resources, the energy-political problem that has arisen — to diversify energy sources and find possible alternatives to fossil fuels. In addition, materials produced from renewable raw material may help reduce the environmental pressure caused by increasing consumption.

The current level of knowledge about the energy output of crops grown in Estonia, based on the local research and development that has so far been insufficient, does not grant potential business operators and investors a sufficient basis and certainty for taking business decisions. In addition to the suitability of the crops cultivated (soil and climate conditions, possible yield), further profitability studies are needed (comparison of investments and the possible outcomes in case of various alternative technologies). Possibilities offered by the national programme "Applied Agricultural Research and Development in 2004–2008" as well as other projects with joint financing via the Rural Development Foundation[4] can be used for commissioning research and development.

Society in general, as well as specific consumer sectors (drivers, private house owners etc.) should be prepared for the entry of alternative types of energy in the market. Consequently, various sources of information should be systematically worked through, all the data should be consolidated and systematized and information should be disseminated actively.

Given the importance of energy policy, an environment favourable to business operators should be created with the help of measures devised in the Development Plan. Since a shift to new technologies is risky and the first tries do not always have positive results, the state has to support and foster these activities at least during the establishment period (and also later if the activities are considered important enough at state level). Such enhancing actions include tax incentives, specific support measures and, if appropriate, certain enforcement by the state (e.g. a shift to biofuels in public transport).

On the basis of the foregoing, the following analysis has been drawn up on the production and use of biomass (see SWOT analysis in Annex 2), and the objectives and actions of the Development Plan have been devised.

[4] hereinafter abbreviated as MES (*Maaelu Edendamise Sihtasutus*)

The strength of the prerequisites for a more extensive production of biomass is the existence of land resources and labour force stemming from the intensification of traditional agricultural production. In addressing the possibilities of using wood as biomass and the use of waste from different technologies, our previous experience and significant use can be considered our strength. In addition to earlier experience, Estonian society has enough examples of willingness to accept the new and innovative. Our economy is in a significant growth phase and the sufficiently developed infrastructure offers possibilities for the rise of new enterprises.

Biomass is currently produced mostly from forest and waste resources. Almost no biomass is produced in the fields in the form of energy crops. Cereals straw is not used as raw material for energy; rape and cereals are mostly used for producing food and fodder; fibre is not produced. The necessary land resources should be available, but the production of field crops presupposes a reliable market to cover the required investments.

A weakness of the deployment of new and alternative energy sources is the lack of applied research, especially profitability studies, on which decisions could be based. As technologies are relatively expensive, it is difficult for investors to find funds for such risky investments. Taking into account our activities on the Community market, what strengthens the position of Estonian business operators is the limited capacity of the local market regarding sources of raw material as well as marketing opportunities, fostering closer integration with the Community market.

An external factor supporting the production of biomass is the price increase of import fuels, which has been one of the most crucial factors in accelerating inflation and makes the price of biomass competitive on the market.

External risks are the vulnerability of Estonia to fuel price changes on the world market due to the small size of the country, as well as the implementation of significant technological changes in more prosperous countries. Estonia needs to ensure a fast technology transfer.

Market regulators — law, aids, public procurements, standards, taxes and obligations — have to be analysed together and developed systematically. Consumers must be informed about the possibilities and properties of bioenergy. Investors and business operators must be provided with security of operation.

The implementation of the Development Plan must involve observation and analysis of market development, so as to ensure guided development of the market with the help of various market regulators.

3.2 Land resources

- Existing and potential competition in the use of land on the basis of the needs of different sectors (materials industry, energy sector, production of food and fodder)
- The mapped land resources do not give a unified overview of the usability of the land resources — the data of different authorities differ

Almost a half of Estonia's area is covered with forests and a quarter of the country's area is agricultural land (see Annex 3).

As most energy crops compete with food and fodder crops in their habitats, the predicted growth areas of these crops should definitely be taken into account when evaluating the growing potential (see Annex 4). As the area of agricultural land used for growing food and fodder crops is not expected to decrease in the decades to come, it could be predicted that energy crops will be cultivated on the remaining 300 000–400 000 hectares of agricultural land. It is questionable how much of this land can be used in reality (also in case of support), and what the expenses, production and profit will be. If cultivating energy crops does not turn out to be profitable (with support), this potential will not be realized. The turning of biomass into energy on this land depends on the price offered when marketing biomass, which has to cover production expenses and yield a reasonable profit. At the same time it is important that in case the processing industry develops a demand for raw material, it is possible to rely on the availability of land resources. As an alternative, the growing of crops in areas not registered as agricultural land can be considered, but in such cases a greater segmentation and lower quality of the land can be expected. In addition, the conditions of growing energy crops in nature reserves should be regulated more practically. How many units of energy can be produced in those areas depends in addition to the used crops also on the technologies for treating biomass so as to turn it into an energy medium. The rule here is that more effective technologies usually require a significantly larger investment in the phase of starting production. Thus it is especially important to develop long-term action plans and thereby create a sense of security for producers.

The estimation of forest reserves in Estonia in 2005, based on the statistical selection method, reveals that the area of forestland is 2.265 million hectares, which makes up 51.8% of the total area (not including the area of Lake Peipus), with forestless forestland comprising 3.3 percent (See Annex 3).

The major part of forestland belongs to private owners (35% to natural persons; 8% to legal persons). The state owns a total of 40% of all forestland, 37% of which is managed by the Ministry of the Environment. Due to failure to complete the land reform, the ownership of 17% of all forestland has not been determined (See Annex 5).

- Growing of energy crops should foster more extensive use of agricultural land.
- The use of forestland in the production of energy should increase.

3.3 Energy crop resources

- Energy crops are practically not cultivated.
- Problems related to growing and using energy crops are due to a not fully developed market and lack of experience.

In Estonia, primarily such species and varieties of energy crops should be chosen for the production of energy that yield the maximum usable biomass in our weather and soil conditions. However, the choice of crops should also be based on the potential environmental impact of crops: here the possible risk factors are an impact on the natural gene pool, as well as landscape changes. Since energy crops, just like any other field crops, yield most in case of sufficient availability of water and nutrients, growers should be informed about the fertilising and watering rates suitable for the crops in order to ensure stable soil fertility. As opposed to food and fodder crops, energy crops can be fertilised with waste water or waste sludge of water treatment plants, provided that their heavy metal content has been checked. Such a possibility definitely helps increase the economic profitability of energy crops as the costs of using ever more expensive mineral fertilisers can be replaced by the additional income received from utilizing waste matter.

The choice of a particular energy crop depends on its suitability for the habitat as well as the desired application. Even though it is basically possible to get energy for heat, electricity and transport from any kind of biomass, the difference in the cost price of the obtained product significantly influences the choice of crops. For many energy crops, cultivation technologies do not differ significantly from those used for the same species in conventional agriculture. The greatest difference usually lies in the choice of variety; for example, cereal varieties with high starch contents are suitable for producing bioethanol, whereas a high protein content of grains is preferred in the food industry. Due to a lack of demand, energy crops have not been bred or studied yet in Estonia. Another difference depending on the energy crop and its application may be the recommended fertilisation scheme (an excessive nitrogen content in stalks is not good for the combustion plant) or harvest time (the biomass necessary for the production of biogas is harvested in summer or several times during the growing season when the water content of the plants is high, as opposed to hay, which is gathered for burning in early spring). In addition, there is only minimum or no necessity for weed and pest control if herbaceous plants are grown for producing biogas.

We will hereby present a list of energy crop species that have so far been considered to have the greatest potential in Estonia based on research results; the list has been divided into groups on the basis of several common features.

Oil crops: rape, turnip rape, white mustard, camelina, oilseed hemp

Rape is very widely cultivated in Estonia and the production can be used both as food and as an energy medium. Problems include the limited growing area, a high need for herbicides and fertilisers, diseases. Turnip rape, white mustard and camelina compete for the same growing area and yield less, but what may be positive is the differences in their produce, which may have a favourable impact for example on the quality of biodiesel produced. The only oil crop not included in this group is oilseed hemp. This old field crop has not been studied or grown much in the recent decades; thus no diseases are known to threat this crop. The production potential of oilseed hemp in Estonia is not known at the moment. In cultivating any oil crops for the production of biodiesel, uses should be created for the by-products of production (oilcake, glycerol, etc.) in order to achieve additional added value. As in case of using any other energy crops, it is necessary to analyse the energy efficiency of the production chain in addition to its economic profitability when using oil crops for producing biodiesel (i.e. the ratio of the energy content of energy products produced from the integral production cycle to the amount of energy spent on production).

Fast growing tree species: willow, grey alder, birch, aspen

The selected tree species also grow naturally in Estonia and are characterised by a rapid increment of branches especially during the first years of growth. Cultivating such trees on short rotation arable lands (less than 15 years) is probably one of the most promising ways of supplying biomass in Estonia. What is important is the low cost price of planting material, which is the lowest for willows propagated vegetatively from cuttings, and the ability of self-recovery after harvest — both willows, alders, and young birches grow enough new shoots during the post-harvest vegetation period to ensure a high production of biomass from the same plantation after several rotations. The problem with cultivating crops of this group for biomass is the need for specialised harvesting machinery — a harvester that cuts twigs of different diameters growing closely together. Also, when establishing a plantation, one should keep in mind the costs of liquidating it later — for example, grey alder also spreads by growing basal shoots. Research conducted so far in Estonia shows that the most productive members of this group of energy crops are varieties of wicker and broad-leaved willow selected specifically for this purpose. So far, such experiments have been made in Estonia with willow clones selected as a result of selection tests conducted in Sweden. At the same time, willow usually needs a moist soil for growing, and beavers, hares and elks may be a threat to it. The biomass of all plants of this group is mainly suitable for burning, but it is also possible to produce bioethanol from cellulose. The production level of willow plantations realistically achieved in production conditions reaches 10–12 tonnes of dry matter per hectare in a year, which corresponds to about 25–30 cubic metres of forest wood increment. The maximum production results achieved in test plantations (even over 20 t/ha) imply a maximum growth potential in optimal site conditions, but are definitely not feasible in case of more extensive cultivation. In Sweden, the growing area of energy willows is up to 13 000–16 000 hectares.

Fast growing herbaceous crops: reed canary grass, fibre hemp, reed fescue, galega

This group includes mostly perennial species as the cost of starting to cultivate these crops is considerably lower. The only exception is fibre hemp, an old field crop with a very fast biomass growth, which has been neglected in recent decades. However, cultivating it is only possible with sufficiently fertile soil and fertilisation. Reed fescue as well as reed canary grass need a lot of moisture for growing; the need for fertilisers is lower in case of reed fescue. At the same time, in Finland reed canary grass is

considered the most promising energy crop, the growing area of which was about 11 000 hectares in 2005. The yield of reed canary grass is somewhat lower than that of willow, but its cultivation and harvest technology exists and is easily available. A disadvantage is the short optimal harvest time – the crop is harvested in early spring when the stalks have dried. If the weather limits the harvest period, there is a risk of considerable crop damage. The use of reed canary grass in the production of biogas may prove to be promising.

Galega is a species with a low need for fertilisers and an enormous growth potential. The cultivation and use of galega as energy grass is also relatively important. Studies by the Estonian Research Institute of Agriculture have shown that galega does not spread by itself as the plant needs a species-specific bacterium culture (*Rhizobium galegae*) in order to develop, with which seeds have to be treated immediately before sowing; therefore, galega cannot be considered an alien species invading nature. The elimination of older galega fields should not be a problem either if the agricultural technology developed by the Estonian Research Institute of Agriculture is applied.

Ethanol crops: wheat, rye, triticale, potato, sugar beet

When using any of these species in the production of liquid fuels, the yield may be of less stable quality and contain less proteins than that of crops cultivated for food or fodder. It should be noted that the cost price of ethanol produced from cereals is lower than that of ethanol produced from potatoes, primarily due to the high storing and transport prices of the latter. In addition to the production of liquid fuels, all these crops are also suitable for producing biogas. When producing cereals, the burning of straw can be used as an added value. The use of sugar beet as an energy crop is limited as Estonia does not have a production quota, so that producers here do not get the aid that producers get in countries with a quota.

Natural grass plants: cuttable biomass from permanent grasslands or (semi-)natural communities, wetlands

Biomass from lands where plants are cut in order to preserve nature is suitable for using primarily in small-scale production, either for producing biogas or for incineration. More extensive using is limited probably by the low yield as compared to field crops, as well as the resulting high transport costs. Gathering reed and reed mace from wetlands for producing energy is also limited by the parallel usability of both species as building material.

Possibilities of producing biogas from green vegetable mass have not been studied in Estonia so far. Such technology is rapidly developing in many European countries (especially in Germany, Austria). The production of biogas makes it possible to use the existing plant production technologies and preserve open landscape. A disadvantage is the need for large-scale investments.

Own production of cereals, which is approximately 600 000–760 000 tonnes a year, does not suffice for own consumption as fodder, human food and seeds as well as for industrial purposes, and an additional amount of cereals is imported every year. Although cereals cannot be regarded as biomass resources at the moment, cereals and primarily rye are sources of industrial raw material with the greatest potential, taking into account the land resources. The growing area of oil crops (mainly rape) is around 50 000 hectares a year. A yield of 70 000–80 000 tonnes does not suffice for producing biodiesel. The area covered by fodder crops and permanent grasslands is

used for producing fodder. Cultivating reed canary grass as an energy crop is not common in Estonia yet, but there is definitely potential for this.

The growing area of energy crops as a biomass source must increase considerably to meet the processing industry's need for raw material.

3.4 Forest resources

Problems include the unstable extent of forest use, sometimes insufficient increment and low profitability of developing biomass used for bioenergy.

More than half of Estonia's forest resources have naturally developed during the past 80 years through the forestation of lands no longer used in agriculture. Such forests now make up a major part of private forests. Up to 1991, these forests mainly belonged to collective and state farms where forest management was not as active as in forest holdings.

According to the cutting forecast for the years 2001–2010, the optimal annual cutting volume of growing forests (not including sanitary cutting and thicket tending) is 12.6 million cubic metres, i.e. 5.6 cubic metres per hectare, provided that all Estonia's forests have found themselves an owner. According to the Statistical Forest Inventory[5], Estonia's forestland covers 2.27 million hectares.

The allowed cutting volumes are fixed in forestry development plans for ten-year periods — in the Estonian Forestry Development Programme 1997–2001 the allowed annual cutting volume was 7.81 million m^3 and in the Estonian Forestry Development Plan 2001–2010 the allowed cutting volume was set at 13.1 million m^3, taking into account the relatively large proportion of mature forests.

According to statistical forest management, the actual cutting volume has been up to approx. 12 million m^3 since the year 2002. At the same time, increment is estimated to be 12.2 million m^3 a year.

In Estonia, wood is the biofuel with the greatest economic potential for producing both heat energy and electricity. According to the Long-term Development Plan for the Fuel and Energy Sector until the year 2015, the possible annual economic amount of primary energy is 5.72 TWh.

In the past two years, cutting volumes have shown a tendency to diminish (despite the highly favourable situation on the wood market) and the risk to exceed the increment limit during a longer period has decreased. Taking into account environmental aspects, the extent of cutting has been limited by the currently effective Forest Act, which prescribes setting out the rotation age, closing time and cutting area in forest management plans.

Most of the wood fuel resources are located in private forests. This is due to historical background — a major part of private forests has developed on fields that became

[5] *Statistiline metsade inventuur,* SMI

fallow after World War II. As a pioneer tree species, grey alder has retained a great importance there (See Annexes 7 and 8), being the main tree species used for producing energy. According to forecasts, a decrease in the volume of wood fuels used for heating can be expected if private forest owners start to replace grey alder with other tree species. An energy resource that has not been used so far is cutting waste, but its use is hindered by the lack of a favourable tax system.

The largest unused resource is grey alder, which has been cut in a volume of up to 0.5 million cubic metres a year according to the Statistical Forest Inventory[6], but which could actually be cut in a volume of up to 1.5–2 million cubic metres. Cutting waste (branches, stumps) is also used, but not much. In Finland and Sweden the use of cutting waste is considerably more developed. Taking into account all fuel wood sources (wood, cutting waste, waste from the forest industry), at least two times more wood could be used in the bioenergy sector than is done at present.

- Cutting volumes should be set on the basis of social-economic objectives, considering first and foremost the market mechanisms and the general competitiveness of forestry (by stimulating interest in investing in forestry and also in forestry products other than wood), ensuring a stable volume of forest use and decreasing dependence on exported raw material.
- Grey alder forests and cutting waste must be taken into use more extensively to ensure the optimal use of wood produced in the course of forest management.

3.5 Waste resources

Waste is currently not much used for producing energy — up to 30 000 tonnes (mostly liquid waste in AS Kunda Nordic Cement where it replaces fossil fuels).

The use of household waste for producing energy has been studied primarily in connection with applying it as a possible alternative fuel for replacing non-renewable energy media, especially in the development of combined heat and power plants. The burning of waste can basically be divided into two technical solutions: mass combustion and combined combustion (so-called RDF[7] fuel combustion). Mass combustion is the burning of mixed waste, including household waste, without special treatment. According to the accepted waste management hierarchy, Estonia, too, aims to develop the separate collection of waste, which enables to produce RDF fuel from recycling. This requires also entities that produce and combust RDF fuel. Naturally, both combustion possibilities can exist in parallel. Eesti Energia AS has proposed to establish a mass combustion plant on the territory of the Iru thermal power station, but this idea is still in its first stage. Given the limitations on depositing biodegradable waste set out in Directive 1999/31/EU on the landfill of waste, as well as developments in other countries (e.g. Finland) in recent years, it is very likely that a

[6] *Statistiline metsade inventuur*, SMI
[7] RDF (refuse derived fuel) — fuel with a fixed composition, piece size and density, produced from waste

mass combustion plant for waste will be established in the region of Tallinn in approximately 5–10 years.

The biggest project being prepared with respect to combined combustion is the creation of the so-called RDF combustion capacities in the cement furnace of Kunda Nordic Cement (up to 100 000 by the year 2010). Material suitable for producing RDF can be separated by the so-called mechanical-biological treatment of common waste, which results in the separation of materials with a high fuel value from the general waste mass. Which choices to apply and support by the state will be determined when updating the National Waste Management Plan.

Wood waste is already used as an energy source. Paper, carton, certain types of plastic and household waste can also be used for producing energy. However, it should be emphasized that waste incineration (also the co-incineration of RDF with some other fuel) must be in compliance with requirements set out in Directive 2000/76/EU on the incineration of waste and Regulation No 66 of 4 June 2004 of the Minister of the Environment "Requirements for the establishment, operating and closing of a waste incineration plants and a co-incineration plants".

According to the waste management hierarchy, the production of energy from waste (waste incineration) is preferred over depositing in landfills; therefore, this can be supported from the general environmental aid funds similarly to projects aimed at the recovery of other waste.

Waste should be recovered in the production of both energy and materials as much as possible.

3.6 Using biomass for producing electricity and heat

The main problems in using biomass for producing energy include:

- The limited availability of biomass;
- The low competitiveness of energy produced from unconventional biomass resources, as compared to other energy resources;
- Low-density areas in Estonia and the resulting relatively low heat load in urban areas;
- The sometimes huge losses in district heating networks (mainly the small ones);
- The low competitiveness of combined heat and power microplants, as compared to other ways of producing energy;
- The low awareness of consumers of the advantages of domestic renewable resources.

Energy efficiency is low in Estonia. This is mainly due to the fact that there are no large hydroelectric power stations and more than 90% of electric energy is produced in condensation power stations, the efficiency of which is about 30%. The efficiency rate of the energy sector is also reduced by losses in electricity and district heating networks, as well as the export of converted energy (electricity, shale oil and oil shale coke, peat briquette, wood chips). The energy-intensity of the gross domestic product (the ratio of primary energy supply to the GDP) has considerably decreased in

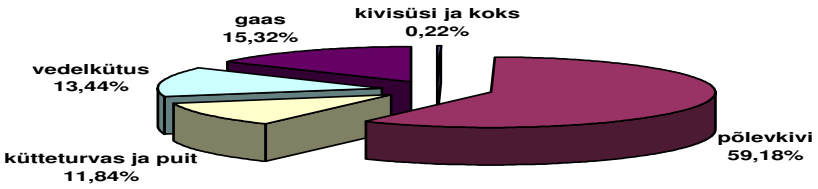
Estonia, remaining in 2005 for the first time below 1000 kgoe[8] per 1000 euros. However, according to the International Energy Agency, regarding this indicator of sustainable development, Estonia is still considerably behind the average level of the EU, as well as neighbouring countries with a comparable climate. This is primarily due to the low level of our GDP.

In Estonia's energy resources and the balance of primary energy, the proportion of domestic energy sources is high, based to a great extent on oil shale. This provides a considerable strategic independence in electricity supply (the proportion of imported energy sources is around 1/3 in Estonia, whereas the average figure for EU member states is 2/3). The main positive aspects of an extensive use of oil shale are a reliable supply of energy and low dependence on the world market. The negative side consists in huge environmental damage when mining and using of oil shale, as well as the low calorific value of oil shale.

The proportion of oil shale in the primary energy balance is greatly affected by the export volume of electric energy and shale oil — the more extensive the export of electricity and oil, the larger the proportion of oil shale in the primary energy balance. In 2005 Estonia exported 19.2% of the total production of electricity and more than 60% of shale oil production. The production of electric energy decreased about 1% as compared to the year 2005, whereas the production of shale oil increased about 5%.

The primary energy supply was 216 PJ in 2005, with oil shale comprising 60% and wood and peat together 12%.

Figure . Fuel primary energy supply, 2005

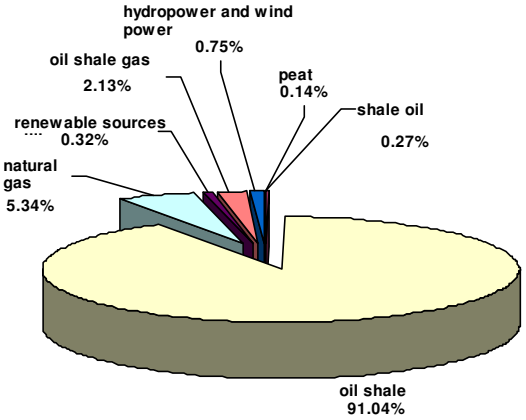


Source: Statistical Office

Less electricity was produced in 2005 than in 2004; electricity production from oil shale decreased 2.3% as compared to the previous year.

[8] Kilograms of oil equivalent

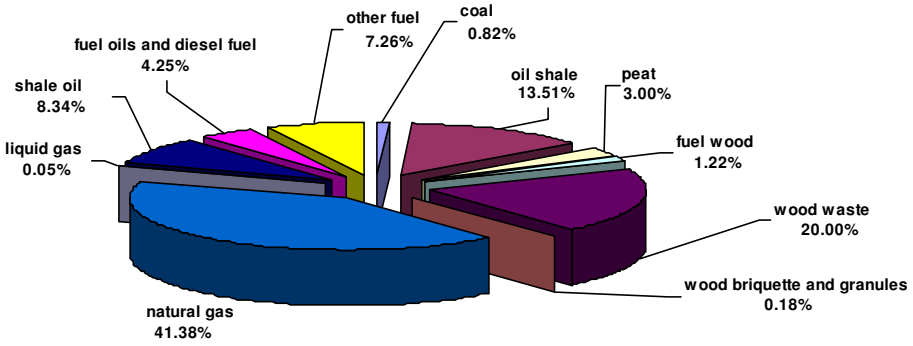
Figure . Use of fuels to produce electricity, 2005



Source: Statistical Office

In 2005, 41% of heat was produced from gas, 21% from wood fuels and 13% of liquid fuels. It is estimated that block heating relies on wood and peat briquette to the extent of approximately 75% and thereafter mostly on natural gas. Compared to the year 2004, the proportion of natural gas in the production of heat has decreased; however, the use of wood fuels for producing energy has witnessed the greatest increase – more than 10%.

Figure . Use of fuels to produce heat, 2005



Source: Statistical Office

In 2005, the use of renewable energy sources for producing electricity increased intensively. In 2005, 22 hydropower and 7 wind power stations provided electricity for

the network in Estonia, comprising almost 0.7% of the total production of electricity. Compared to the year 2004, the amount of electricity produced from wind grew seven times. By the end of the year, the full power of the installed hydropower and wind power stations amounted to 36.2 MW; considering the projects that are being developed, the installed full power may reach 60 MW or more by the end of 2006.

As to the application of renewable fuels, no radical changes have occurred in 1999–2005. In 2005, renewable energy sources comprised about 12% of the primary energy supply, with wood fuels retaining the lead position. Since 2003, the production of wood briquette and granules is also reflected in statistics. In 2005, 237 000 tonnes of wood briquette and granules were produced and 230 000 tonnes were exported.

Table . Production of wood and peat fuels

FUEL	1999	2000	2001	2002	2003	2004	2005
Fuel wood, '000 cubic metres	1653	1592	1592	1571	1605	1584	1573
Wood chips and waste, '000 cubic metres	1418	1401	1672	1751	1970	2131	2000
Wood briquette and granules, '000 t	-	-	-	-	210	209	237

Source: Statistical Office

In 2005, the number of boilers using wood fuels as the main fuel was 752, with a total capacity of 836 MW. Compared to the year 2004, both the number of boilers and the total capacity have increased (see Annexes 9, 10, 11).

The advantages of combined heat and power production have been known already for more than 70 years. With the help of combined heat and power plants established in Estonia, the cities of Tallinn, Narva, Ahtme, Jõhvi, Kohtla-Järve, Kiviõli and Sillamäe have been provided with heating to a smaller or greater extent.

Yet, after the construction of the Iru power station only combined heat and power plants with low-capacity gas engines have been established in Sillamäe, Tartu, Kunda, Tallinn, Narva and Põlva, mainly for industries and companies. As to combined heat and power production from renewable energy resources, only the biogas-based gas engine of Terts Ltd is operating at the moment.

In 2005, 16 power stations applying combined heat and power production technology operated in Estonia and 10% of electric energy was produced this way.

There are different opinions about the potential of combined heat and power production in Estonia; an electric capacity of 130–250 MWe or even more has been suggested. Various figures have also been suggested for separate cities; for example, 15 MWe to 70 MWe for the city of Pärnu alone.

Combined heat and power plants of various capacities can be built, also such that would temporarily produce only electricity, for example in summer when there is practically no heating load. In addition, capacity depends considerably on the choice of fuel and technology. For example, in case of a solution with gas engines and gas

turbines, more electricity could be produced with the same amount of heat than in case of a solution with a classic steam turbine.

Table . Combined heat and power plants in Estonia that operate on biofuel and can be used for district heating

CHP plant	Electrical capacity	Heating capacity
	MWe	MWs
Tallinn	25	50 (70)[9]
Tartu 1	20	60
Tartu 2[10]	2.5	10
Ahtme	20	60
Pärnu 1	15	40
Pärnu 2	6	18
Viljandi	2.5	10
Kuressaare	3	12
Võru	2	8
Haapsalu	2	8
Paide	2	8
Rakvere	2	8
Keila	1,5	6
Valga	1.5	6
Jõgeva	1.5	6
Total	106.5	260 (330)

Source: Yearbook of Estonian Energy Sector 2003

[9] Heating capacity 70 MWs is related to the implementation of the so-called smoke washer or eco-condensation.
[10] Different versions for Tartu and Pärnu relate to the separately located heating networks and owners.

The use of biomass to produce energy will develop until the year 2013 as follows:

- Owing to measures and aid implemented in the Rural Development Plan 2007–2013, the availability of biomass (mainly cutting waste and unconventional biomass) will increase considerably.
- Owing to support measures foreseen in the Electricity Market Act and the measures of the National Strategy 2007–2013 for the Use of Structural Instruments, the price of energy produced from unconventional biomass resources will become more competitive as compared to other energy products.
- The proportion of biomass for producing energy will increase to 3% of national gross consumption.
- The proportion of biomass for producing heat will increase.
- The competitiveness of combined heat and power microplants has increased compared to other ways of energy production, owing to the relevant research and development activities in Estonia and in the European Union.
- Consumers are thoroughly informed of the advantages of using domestic renewable resources in block heating.

3.7 Production of biofuels (transport fuels) and using them in the transport sector

The main problems related to the production and use of biofuels in Estonia are:

- There is a lack of information on the effectiveness and impact of using biofuels.
- Motor vehicle producers have a cautious attitude towards using biofuels.
- Low competitiveness of biofuel or fuel containing biofuel.
- Selling biofuel requires additional investments from fuel sellers.
- Statistics related to biofuel need updating.
- There is a need for various European standards on biofuels.
- It is difficult for biofuel producers to get investment aid.
- There is a lack of second-generation biofuel development activities.

Estonia imports all the petrol and diesel fuel used in transport. According to the Statistical Office, the consumption of petrol has remained at the same level as last year. As a result of an increasing number of vehicles with diesel engines, the consumption of diesel fuel went up almost 7%. About two-thirds of the petrol was consumed by households. As to diesel fuel, 70% was consumed by the transport sector, 9% by the agricultural sector, 6% by industry, 9% by private households.
In 2005, petrol and diesel fuel were consumed as follows:
petrol – 290 000 tonnes;
diesel fuel and light fuel oil – 578 000 tonnes.

In the chapter on the overview of the fuel and energy sector in the "Long-term Development Plan for the Fuel and Energy Sector until the year 2015" approved with Government Decision of 15 December 2004 it is noted that on the basis of Directive 2003/30/EC, Estonia's goal is to ensure that by the year 2006 the indicative proportion of biofuels and other renewable fuels is 2% of diesel and petrol fuels on the market for using in transport, and 5.75% by the year 2011, as calculated on the basis of the energy content of the fuels.

The annual statistics publication "Energy Balance 2005" does not distinguish between the consumption of diesel fuel and light fuel oil. Taking into account the Tax and Customs Board's data on fuel sales, it can be assumed that diesel fuel comprised about 83% of the total consumption of diesel fuel and light fuel oil, i.e. 480 000 tonnes. According to available information, no pure biofuel or biofuel mixed with fossil fuel has been sold in Estonia in 2005.

Pursuant to the Alcohol, Tobacco and Fuel Excise Duty Act, biofuel is exempt from excise duty after issue of a permit by the European Commission until the expiry of the said permit. A permit for applying excise duty exemption to biofuel was obtained from the European Commission by a letter signed on 27 July 2005. The permit concerning the excise duty exemption of biofuels is valid for six years.

The right to produce excise duty free biofuel, to transport it into Estonia and to allow it on the market is granted with the biofuel permit issued pursuant to the Alcohol, Tobacco and Fuel Excise Duty Act.

As of 1.11.2006, ten biofuel permits have been issued, nine of which are permits to produce liquid biofuel and one to produce solid biofuel. Information on the permits is available on the website of the Tax and Customs Board: http://www.emta.ee.

According to reports presented by biofuel permit owners, no excise duty free biofuels were consumed in Estonia in 2005, as a result of which no state aid was granted last year under this measure. In 2005, 889 073 litres of biofuel (CN 1514 19 10) were produced in Estonia. As of 1 October 2006, 4 908 tonnes of biofuel have been produced. 85% of the biofuel has been exported.

Regulation No 97 of 11 June 2003 of the Minister of Economic Affairs and Communications "Requirements for liquid fuels" sets out requirements for fuels, which prescribe that fuel used in transport must comply with the requirements of the standards EVS-EN 228:2004 (petrol), EVS-EN 590:2004 (diesel fuel) and EVS-EN 14214:2004 (fatty acid methyl esters for diesel engines). According to the petrol and diesel fuel standards, the maximum permitted level of biofuel in them is 5% by volume. Pursuant to Directive 2003/30/EC on the promotion of the use of biofuels or other renewable fuels for transport, it is possible without problems to use a mixture with a low biofuel content in cars currently in use in Europe, and selling fuel complying with the above-mentioned standards does not require adding a separate marking.

The production and use of biofuels will develop until the year 2013 as follows:

- The use of biofuels in transport comprises 6% of the total consumption of petrol and diesel fuel.
- Local governments and state authorities set an example in using biofuels.
- At least 50% of the raw material needed for the production of biofuel is produced in Estonia, following the principles of preserving the environment.

3.8 Uses of biomass in producing materials

- In Estonia, biomass is not yet used to produce fibre, composite materials, etc.
- No analyses have been made on the profitability of the uses of biomass in materials industry.

The most common uses of biomass in Estonia are related to wood processing and the production of wood products, but also the production of paper pulp, paper, and paper products, and energy uses. Mechanical processing of wood is a modern and highly competitive industry in Estonia. With the development of sawmills, after-treatment of sawn wood has constantly increased.

Investments made in the past ten years make it possible to mechanically process all the saw logs felled in Estonia locally. Estonia has no modern cellulose industry, while a mechanical aspen pulp plant was opened in Kunda. Sawmills are the main consumers of wood in Estonia: in 2005 they produced 1.9 million cubic metres of sawn wood, using 4 million cubic metres of saw logs. Wooden boards, cellulose, and plywood industries currently use a total of 0.7 million cubic metres of wood; after the Kunda plant starts to operate at full capacity, 1.1 million cubic metres will be needed. The local wood use in Estonia is a total of 8.6 million cubic metres. 1.9 million cubic metres of roundwood (mainly saw logs) were imported to and 1.8 million cubic metres (mostly pulpwood) were exported from Estonia. 534 000 cubic metres of roundwood were imported to Estonia in the first calendar quarter of 2006, while export remained under 300 000 cubic metres (see Annex 6).

There are so far no profitability analyses on the production and use of biomass resources in different domains (the use of biomass in materials, chemical, and energy industries) and no recommendations for biomass producers to grow the raw material needed for more profitable products. Studies comparing the life cycle of products made from various raw materials are also inadequate. More attention than before should be paid to the development of new products made from biomass, as well as to introducing new technologies.

In other Member States of the European Union, flax and hemp fibre is used in the textile industry and for producing insulation and composite materials. Hemp is also used as a raw material for paper industry. Flax and hemp are practically not cultivated in Estonia at the moment, as the first-stage processing of fibre disappeared during the restructuring of the economy. Yet the cultivation and processing of hemp has potential also in Estonia.

The production of bioplastics, the raw materials for which are starch and sugars obtained from various field crops, is becoming increasingly common in the European Union. Considering the rising price of oil and the public interest in preserving the environment, bioplastics production should be launched in Estonia sooner or later.

With increasing support to enhance the use of biomass, there is a risk that the price of raw material will rise and the competitiveness of traditional materials producers will decrease. Competition will toughen between the materials industry and the energy industry also in obtaining raw material. It is important to preserve balance between them.

- In the framework of the Development Plan, research and projects will be supported that analyze the profitability of biomass resources for using in the materials, chemical, and energy industries, and compare the payback period of biomass products used for different purposes.
- Activities enhancing a wider use of biomass as a renewable raw material will be supported.

3.9 Research and development related to biomass and bioenergy

- Due to the project-based structure of research and development in Estonia, it has so far not been possible to consolidate and purposefully develop the field of renewable energy.
- The existing information is of inconsistent quality and there are many gaps.
- Individual scientists or groups of scientists have had neither the opportunity nor the need to work long-term on complex topics of application in the field of bioenergy.

Bioenergy is studied in Estonia mostly at the Estonian University of Life Sciences and Tallinn University of Technology, and to a smaller extent at the University of Tartu, Estonian Research Institute of Agriculture and Jõgeva Plant Breeding Institute, etc.

A Centre of Renewable Energy has been established at the Estonian University of Life Sciences where primarily the suitability of different crops for producing bioenergy is studied, a list and characteristics of suitable woody and herbaceous plants have been compiled and initial analyses of economic profitability have been made.

At the Tallinn University of Technology, research in energy is focused on oil shale energy and this receives the bulk of research aid. The general energetic balance and the possibilities of using bioenergy to achieve this balance have also been studied to some extent. At the University of Technology, the burning-related characteristics of different substances as well as the construction of boilers have been studied in order to find a suitable technological solution for biomass. In the framework of the topic “Renewable energy resources in Estonia and expanding their use in the energy sector” (TUT) that is subject to targeted financing, theoretical and technical bioenergy resources, characteristics of new biofuels and possibilities of using them to produce heat and energy are addressed. Under this topic, several thermotechnical tests of larger biofuel boilers and measurements of emissions have been carried out, during which emission factors characteristic of biofuels have been determined. Regional and

national development plans for the energy sector have been drawn up where the optimal use of local biofuel resources for producing energy is addressed. In the framework of the topics “Optimizing the conversion processes of high-molecular organic substances: the chemical composition, characteristics and refining of products” (2001–2005) and “Fundamentals of combined thermochemical treatment of fossil and renewable fuels and organic waste” (2006–2008), both of which are subject to targeted financing, the principles of liquidizing wood, wood bark, willow coppice, reed, thorns, reed mace etc. have been and are studied. In other parts of the world, biomass is also used for producing fuel oil.

At the University of Tartu, the bioproduction of wetlands, fermentation processes and environmental technologies have been studied.

The Estonian Research Institute of Agriculture is active in research and development related to agricultural technology, construction and energy (farming technology, agricultural energy, including renewable energy sources).

The field of activity of the Jõgeva Plant Breeding Institute is the breeding of agricultural crops and seed growing, i.e. crops that can be used also in the bioenergy sector in the future. At the moment, issues regarding the breeding of some grass plants suitable for producing bioenergy, as well as agricultural technology and plant protection are addressed.

So far, it has been possible to finance topics related to bioenergy in the framework of the national programme of applied research pursuant to general principles. No bioenergy-related project applications were presented in 2006 in the framework of the national programme “Applied Agricultural Research and Development 2004–2008”. The programme is aimed at a more intensive supplying of agricultural producers with new environment-friendly technologies and production techniques suitable in the conditions of Estonia, as well as other information necessary to stay competitive on the market. It is basically possible to present bioenergy-related projects in the sub-domain of “Activities supporting agriculture”, where the distribution of funds invested is up to 10% of the whole budget of the programme, which means that it is extremely limited. For example, applications filed in this field in 2006 exceeded the financial possibilities 12 times: 10 projects were presented; the amount requested for the year 2006 was in total EEK 9 628 215; in 2006 the programme budget allowed for a total of EEK 775 000 divided between the best two projects of the competition, which, however, were not connected with bioenergy.

<u>The infrastructure of research and development</u>
Estonian universities have a general infrastructure for basic research in the field of bioenergy (chemistry labs, greenhouses, etc.). In addition to the general infrastructure, the Estonian University of Life Sciences also has test plantations of different woody and herbaceous plants and also some special technology for cultivating energy crops (not enough, however). There are also laboratory equipment and research methodologies for determining the productivity and energy content of plants.

For activities in the field of bioenergy, the Estonian University of Life Sciences has plantations and harvesting technology under testing; the Jõgeva Plant Breeding Institute has test technology for studying field crops and grass plants. The Tallinn University of Technology has the necessary infrastructure for studying boilers.

With the help of competence centres that develop on the basis of infrastructure, conditions are created for cooperation between various research establishments and study groups. Objects of infrastructure are developed at leading establishments of the field (technologies for production and cultivation of biomass and the base of research areas related to biogas at the Estonian University of Life Sciences, and the core technology for incinerating biomass will be developed at the Tallinn University of Technology) and will be available for use by specialists from all research establishments.

There are only a few experts (including scientists) in the field of bioenergy in Estonia; the number of scientists with a Doctoral level degree is estimated to be 3 to 5. The Development Plan foresees considerable increasing of the human potential active in this field, including thematic education at universities. Beforehand it will be analysed whether there is a need to develop a special curriculum.

For the national development activities and granted aids to be effective, it is important to decide which types of bioenergy are the most optimal in the local conditions. For this purpose it is necessary to ensure the existence of know-how for all types of bioenergy production (biogas, liquid biofuels, producing heat and energy from biomass). So far, different areas of bioenergy have been studied in different research establishments. Research, development and education in the field have not been mapped in detail so as to enable an estimation of the existing competence.

The European Union's Seventh Framework Programme for Research and Development

The objective of the European Union's framework programmes has been to foster research and development with the help of funding. So far, framework programmes have been drawn up for five years and the Framework Programme FP 6 will end in 2006. The 7th Framework Programme is drawn up for seven years and will end in 2013. A priority of this framework programme is the enhancement of the Lisbon Strategy.

The European Commission's proposal for a framework programme was published for the first time on 6 April 2005 and it foresees carrying out the framework programme as four special programmes on the basis of the four main objectives of European research policy. The first special programme is "Cooperation", in the framework of which support is provided among others for research related to agriculture, biotechnology, materials, new production technologies, energy, environment and transport.

The European Commission's proposal for the 7th Framework Programme pays great attention to the development of biomass production. Some of the central measures in the 7th Framework Programme have been brought out in the Communication from the Commission "Biomass Action Plan" where research areas considered especially important were presented:

- development of an industry-led "biofuel technology platform";
- the "bio-refinery" concept;
- research into second-generation biofuels.

Development Strategy of Energy Related Technologies

On the basis of the Long-term Development Plan for the Fuel and Energy Sector until the year 2015, a Development Strategy of Energy Related Technologies should be drawn up under the leadership of the Ministry of Economic Affairs and Communications and the Ministry of Education and Research and with the participation of the Research and Development Council of the Republic of Estonia.

The Estonian Development Strategy of Energy Related Technologies is drawn up based on the following:

- the need to support systematically national research, development and innovation related to energy technology;
- the need to provide an input for the development of the National Strategy 2007–2013 for the Use of Structural Instruments";
- the initiative of the Estonian Employers' Confederation to consider energy technology as a national priority in technology development;
- increasing the competitiveness of Estonian enterprises and research, development and education establishments in the programmes of the European Union, including technology platforms.

The Ministry of Economic Affairs and Communications has started to draw up a development strategy and concluded a contract with the Finnish management consultation company Oy SWOT Consulting for conducting applied research on the "Estonian Development Strategy of Energy Related Technologies". The study analyses challenges related to energy technology in Estonia, taking into account global development trends.

The commissioned applied research and the Estonian Development Strategy of Energy Related Technologies drawn up on the basis of it will be an input for creating and implementing the national research and development programme on energy technology (according to the Research and Development Strategy 2007–2013).

- Research, development and education must provide the competence needed for developing the market, and for business.
- The planning and creation of the required infrastructure must provide a basis necessary for research, development and education.

3.10 Information about biomass and bioenergy

- At the moment, it is very difficult to analyse the production of biomass and bioenergy because the statistical source data is inadequate.
- Information concerning the field is not collected, analysed and disseminated systematically.
- The knowledge of all market participants needs improvement.

Statistical data

To have a clear overview of the development of the field and to allow for planning the necessary development activities, the required statistical data must be made available. National statistical surveys are complemented with the indicators of biomass and bioenergy production. Data is required on biomass production broken down by type (arable crops, forest, waste) and on biomass use broken down by fields (electric power, heat, transport fuel and materials production) and on the resources channelled into the development of the area to assess the efficiency of the actions. It is also necessary to know the current prices on the biomass and bioenergy market.

Dissemination of information

The knowledge of all market participants — the public sector, researchers, entrepreneurs and consumers — can be improved. For that purpose, information about the field must be systematically collected, analysed, processed and disseminated. The main actions concerned are the creation of a homepage presenting the field information, through which regularly updated know-how can be communicated, and organisation of events (exhibitions, seminars, study trips). Prizes to recognise the best undertakings (both among biomass producers and its users) are awarded each year to promote the production of biomass and bioenergy.

The collection Biomass User Handbook[11], has been published concerning biofuels, which among other things gives an overview of the practical experience in applying modern biofuel combustion technologies in Estonia and in other countries located by the Baltic Sea.

Counselling

There are 117 attested agricultural advisers in Estonia, of whom 71 work at advisory centres. Nearly a thousand agricultural holdings have used the advisory service to date, while the number of potential users is considerably higher.

At the moment, there are no attested or professional agricultural advisers on biomass use in Estonia. The new professional standard of agricultural advisers provides for a possibility of attesting the profession also in the field of biomass use.

The opportunities related to biomass and bioenergy are considerably greater than we currently use; therefore, it is important that provision of information be in conformity with the needs, of high quality, comprehensible, available and timely.

- Statistical data must allow for analysing the developments in the field.
- The dissemination of know-how and information must reduce the insecurity of market participants.

[11] Villu Vares, Ülo Kask, Peeter Muiste, Tõnu Pihu, Sulev Soosaar. Tallinn University of Technology, 2005

3.11 International cooperation on biomass and bioenergy

> The contact of officials, researchers and entrepreneurs with their colleagues in other countries must become closer to achieve a more active cooperation for sharing experience and for joint projects.

As regards international cooperation, it is important to found it on an as wide as possible basis, covering research, organisation of events and potential joint projects. This above all applies to possible projects for producing bioenergy, taking into account that because of their high cost it is more reasonable to share the costs and the added value arising from the projects between several partners.

The homepage on renewable energy to be created must reflect the development of the field in Estonia not only in the Estonian language, but also in English.

In May 2006, the Ministers of Agriculture of the Baltic States signed a memorandum of understanding. Based on the memorandum, the Republic of Estonia Ministry of Agriculture will develop, maintain and update an online (web-based) database on renewable energy. The Republic of Latvia Ministry of Agriculture will organise an international conference on renewable energy in spring 2007, while the Republic of Lithuania Ministry of Agriculture organised a symposium on the situation of research in the area of renewable energy in the Baltic States in October 2006.

One of the goals of Estonian research is to integrate into the international research system and apply positive research results quickly in practice, thus increasing the competitiveness of the economy. International cooperation on bioenergy also has an important part in this.

The Baltic Sea Region Energy Cooperation — BASREC

The BASREC is a cooperation forum between the governments of the Baltic Sea region (Denmark, Estonia, Finland, Germany, Iceland, Latvia, Lithuania, Norway, Poland, Russia, Sweden), private sector and the European Commission, where projects and policies of regional and wider relevance are developed and implemented. Estonia is represented by the Ministry of Economic Affairs and Communications in the BASREC Group of Senior Energy Officials and working groups.

The BASREC was established in Helsinki in 1999, where at the meeting of the European Commission and the Energy Ministers of the relevant states, it was decided to establish an energy cooperation programme of the Baltic Sea region, whose goals had been defined in the Stavanger Communiqué of 1998. The mandate for the activity period 2006–2008 was signed at the BASREC ministerial conference in Reykjavik, Iceland, on 28 October 2005.

The BASREC Bioenergy Working Group was founded to enhance the use of solid biofuels to cover the energy consumption in countries located by the Baltic Sea and having a great biofuel potential. During the period 2003–2005, four activity areas were tackled, these being the improvement of the knowledge of bioenergy and development of standards for establishing a single market, contribution to the joint implementation testing ground of climate change, and support for research and development of

biofuels. The activities of the BASREC also comprise investment opportunities, energy market developments on the regional and international levels, the implementation of the Northern Dimension policies, the dialogue between Russia and the EU on energy, etc. The BASREC Bioenergy Working Group has received from the Group of Senior Energy Officials a mandate for continuing its activities also during the new period. According to the activity plan of the Working Group, five actions will be taken up: the first three continue the actions of the previous period — upgrading of the knowledge of bioenergy and development of the standards for the establishment of a single market, as well as support for the research and development of biofuels. In addition, there are two new projects shared with Baltic 21: some of the BASREC member states are participants in the project application *Eco-Region project* to the Interreg programme, within the framework of which it is planned to organise conferences and seminars for introducing best practices in the countries by the Baltic States; besides that, in 2007, preparations will begin for the strategic project *Bioenergy programme* to Interreg, in the framework of which project application rounds related to bioenergy will be organised, bioenergy legislation and member state bioenergy development plans will be harmonised and cooperation on bioenergy on various levels will be developed between the members of the BASREC.

International cooperation must supply researchers, officials and entrepreneurs with the necessary information and synergy arising from cooperation.

3.12 Law governing biomass production and use in Estonia

- The terminological approach to biomass, biofuels and bioenergy in legislation is ambiguous.
- Regulation of trading in CO_2 does not influence the market enough.

The expansion of the growing area of energy crops is supported by Council Regulation (EC) No 1782/2003, 29 September 2003, establishing common rules for direct support schemes under the common agricultural policy and establishing certain support schemes for farmers, with additional direct support to growing energy crops, as provided in Articles 88–92. Estonia applies complementary national direct payments for energy crops since 2007.

Production of energy crops and other biomass is also supported by the rural development plan prepared under Council Regulation (EC) No 1968/2005 and the support implemented within that framework.

Public procurement

The new draft Public Procurement Act, currently in the legislative proceeding of the *Riigikogu*, creates bases for using environmentally friendly indicators and criteria in public procurement. Subsection 3 (6) of the draft Act provides that if possible, the procurer must prefer environmentally sustainable solutions.

As the result of the activities of the working group formed on the basis of Minister of the Environment Directive No 609 of 18 May 2006 “Action plan for promoting environmentally friendly / green public procurement and formation of a working group for its implementation” it is planned to specify the principles of organising green public procurement of the state and local governments and design opportunities for making

available environmental indicators and the necessary public information to buyers as defined in the Public Procurement Act, so that they could use it when preparing public procurement documents and when selecting the winning tender in the following areas:

- commissioning of sustainable information technology solutions (including document management) as well as communication and information technology procurements;
- procurements for the construction and renovation of energy saving buildings and heating systems;
- electric power saving schemes and procurements for efficient lighting fittings;
- procurements for electric power generated from renewable resources;
- procurements for furniture, construction materials (including certified wood), etc. of administrative agencies;
- procurements for paper and other office supplies;
- procurements for environmentally friendly transport (including electric cars, lower level of hazardous substances in exhaust gases, use of biofuels);
- procurements for environmentally friendly public transport;
- procurements for organic food in the canteens of administrative agencies (including lease agreements);
- to also set as a goal consideration of horizontal measures indicating the technical capacity for meeting the environmental conditions of companies in procurements (including eco-labels, EMAS, quality management, documenting, employee qualification and training in the field of the environment, and other indicators).

The Ministry of Finance has planned to handle the topic of environmentally friendly public procurement in every public procurement training; a part focussing on the topic will also be included in the public procurement instructions to be prepared.

Heat production

According to § 19 (4) of the Environmental Charges Act, all individuals or institutions engaging in the production of heat by boiler units shall pay CO_2 charge.

Power production

According to the Power Market Act, renewable energy resources, which are used for producing power that is subject to the purchase obligation, include water, wind, sun, wave, tides, land heat, landfill gas, gas released upon treatment of waste water, biogas and biomass. For the purposes of the Power Market Act, biomass is the biodegradable part of the products, waste and residue of agriculture (including vegetable substances and animal substances) and forestry as well as the associated industry, and the biodegradable components of industrial and municipal waste. Under the obligation to purchase power generated from renewable resources, a network operator must purchase the power generated this way for a price of 0.47–0.81 EEK/kWh.

An amendment Act has also been submitted for the amendment of the Power Market Act[12], which besides the obligation to purchase power generated from renewable resources and in the combined production regime of power and heat provides for a scheme prescribing support for a power unit generated this way (0.16–0.50

[12] Text as of 9.1.2007

EEK/kWh), if the power is marketed by the producer itself. The entry into force of the Act should influence above all the development of the Estonian power system, stimulating the construction of combined production facilities (particularly to replace the existing boiler houses). This would ensure a more efficient use of power sources and help disperse power production in Estonia, which is an extremely critical criterion from the point of view of security of supply.

The new support scheme presented in the draft Act gives the producers using renewable resources and combined production regime an opportunity to trade on the market themselves, which should ensure a considerably higher income than the present purchase obligation if the producer's sales activities are successful.

Transport fuels

According to the Alcohol, Tobacco and Fuel Excise Duty Acts, biofuel is released from excise duty after the European Commission issues a permit until the expiry of the permit. Biofuel, whose first four CN code nomenclature numbers are 4401 or 4402, is released from excise duty unconditionally. In order to apply the exemption from excise duty to biofuel, a relevant permit was received from the European Commission with a letter signed on 27 July 2005. The number of the permit concerning the exemption of biofuel from excise duty is 314/2005 and its term of validity is six years.

Pursuant to the Liquid Fuels Act, the fuel used in transport must comply with the requirements of standards EVS-EN 228:2004, EVS-EN 590:2004 and EVS-EN 14214:2004. The environmental requirements imposed on liquid fuels have been provided in Minister of the Environment Regulation No 38 of 19 May 2005.

To shape the market, it is important to have an integral overview of law as a market regulator and to supplement regulation based on analysis.

4. VISION, OBJECTIVES, MEASURES, ACTIONS

The vision of the development plan is to ensure the efficient and sustainable use of Estonian land resource and biomass based on ecological, economic, social and cultural principles. This would include the optimum use of biomass in materials industry and energy production. Proceeding from the biomass resource available today, upon the implementation of the development plan, it would be possible to produce 100% of heat, 15% of transport fuels and 6% of power from biomass in 2025.

The development plan is intended to be implemented in two stages:

In stage I (2007–2008), surveys will commence to analyse the market, resources, technologies, market organisation measures and other factors affecting the use of biomass. Communication of information will also begin while international cooperation will be continued.

The strategic environmental assessment of the measures to be implemented in stage II will also be carried out in stage I.

In stage II (2009–2013), all reasonable, well justified market organisation measures under the analyses and surveys made in stage I — support, charges, standards, availability of know-how, etc. — will be implemented to promote biomass use.

One year has been planned for an analysis covering all aspects in stage I. The surveys started in 2007 must be completed by spring 2008, so that it would be possible to implement stage II of the development plan starting from 2009, which will start with the state budget planning in spring 2008. The development plan commission must first approve the analyses.

The development plan will be implemented as a result of the analyses and surveys carried out in stage I.

The main objective of the development plan is to create favourable conditions for the development of domestic biomass and bioenergy production, in order to reduce Estonia's dependence on imported resources and fossil fuels, decrease the pressure on the environment, use the land resource efficiently and sustainably and enhance employment in rural areas.

Indicator	Explanation	Initial level and year	Target level and year
Greenhouse gas emissions from agriculture	CO_2 eq Gg (Source: Eurostat)	702 (2006)	702 (2013)
Use of bioenergy	TJ (Source: Centre of Forest Protection and Silviculture)	9860 (2005)	x[13] (2013)
Area of arable land	Arable land receiving single	844 000	877 000 ha

[13] Will be specified based on the analyses of 2007 (biogas and biofuels will be added to the present use of wood fuels)

used	area payments (Source: PRIA)	(2006)	(2013)
Area under energy crops	Arable land receiving aid for energy crops (Source: Statistical Office)	0 ha (2006)	100 000 ha (2013)
Share of power produced in biomass-based combined regime in domestic power consumption	(Source: Statistical Office)	0.2% (2005)	3% (2013)
Share of district heat produced from renewable resources in total district heat	(Source: Statistical Office)	21% (2005)	33% (2013)
Share of biofuels in consumption	Transport (Source: Tax and Customs Board)	0% (2006)	6% (2013)

The indicators are measured on the basis of statistics and surveys.

In order to achieve the main objective, the activities are implemented through three subordinate objectives.

OBJECTIVE 1
To ensure the research and development necessary for promoting the use of biomass and bioenergy

Indicators:

1. The surveys and analyses required for implementing the development plan have been commissioned. The results necessary for implementing stage II of the development plan will be achieved by March 2008.
2. The research and development concerning biomass and bioenergy and the situation of studies have been analysed and the necessary proposals have been made for implementing the measures by March 2008. The availability of relevant specialists and infrastructure has been ensured (the precise indicators will be identified on the basis of a survey to be conducted by 2008); each year, at least three students, teachers or researchers in the field will actively participate in the mobility schemes, ensuring the sustainability of the branch and the field of study concerned;
3. The statistical data sheets have been filled in and the relevant statistics have been collected, price information will be available for those interested on the homepage.

The objective will be achieved through taking the following measures and actions:

Measure 1. Research and development for establishing the infrastructure needed for promoting the use of biomass and bioenergy, for innovation and the transfer of technology and know-how

Action: the following surveys will be commissioned for implementing the development plan:

- assessment of the land resource;
- assessment of biomass resource (physical and economic availability of various types of biomass);
- surveys of energy crops (agricultural technology, varieties; cost-effectiveness);
- technology studies and possibilities for use (biogas, combustion, combined production, fuel production, production of materials, assessment of the lifecycle of biomass products);
- transport biofuel types that are cost-effective in Estonia and the preconditions necessary for their introduction;
- analysis of the market regulation in the field (law, charges, public procurement, support).

Measure 2. Creation of preconditions for international and interdisciplinary research and development towards the promotion of the use of biomass and bioenergy

Actions:
Action 1: analysis of the research and development and the situation of studies in the field of biomass and bioenergy (in research areas involving the use of biomass and bioenergy, including energy production and electrical engineering as well as crop husbandry, land improvement, plant production).

Action 2: depending on the possible need for specialists, development of a sectoral curriculum or provision of opportunities for training top specialists in foreign universities.

Action 3: the creation of infrastructure needed for sectoral research, development and training is supported within the framework of upgrading general infrastructure.

Action 4: targeted scholarships are used to motivate young people to study abroad and to support their research at home.

The development plan allows for analysing the present competence as well as for planning additional necessary resources and activities. The development plan enhances deeper inter-institutional integration. When developing the infrastructure further, the possibilities of integration into the international infrastructure will be taken into account. At the initiative of the Standing Committee on Agricultural Research, formed by the European Commission, stocktaking of the existing infrastructure will be carried out, in the course of which the most important research facilities will be mapped in order to develop research cooperation on their basis between the member states.

Measure 3. Planning of the need for data, collection of data, analysis and publication

Actions:
Action 1: supplementation of the statistical data sheet depending on the statistics necessary.

Action 2: the Estonian Institute of Economic Research will collect and publish biomass and bionenergy prices.

OBJECTIVE 2
To increase the awareness of consumers, investors, entrepreneurs and policy-makers regulating the market

Indicators:

1. the homepage has been created, the information is available, entrepreneurs are recognised, the awareness of entrepreneurs and consumers has increased;
2. cooperation is in progress, as a result of which the approved joint projects will be implemented, which will improve the awareness of entrepreneurs and policy-makers for the efficient implementation of effective policies.

The objective will be achieved through taking the following measures and actions:

Measure 4. Communication of information

Actions:
Action 1: exhibitions, seminars, conferences and study trips, counselling activities and additional training will be organised.

Action 2: field information will be collected, analysed, developed and published on a regular basis on a separate homepage, which is administered by the RDF. The service must include mediation of international information. In addition, publications, articles and broadcasts will be compiled for publishing.

Action 3: undertakings having a positive effect on the development of the market will be recognised each year.

Measure 5. International cooperation

Actions:
Action 1: participation in international projects and events.

As the initiatives of events and projects will be developed on a current basis both on the level of Estonia and the European Union, the relevant activities cannot be planned precisely. Yet it will be necessary to allocate funds to finance them; the Development Plan Commission will decide on their use concerning each project and event.

Action 2: participation in international cooperation.

Cooperation on the level of ministries and administrative agencies — NB8, Basrec, Baltic21, etc.

OBJECTIVE 3
To ensure the implementation of instruments required for market organisation

Indicators:

1. An EVS technical committee of bioenergy and biomass has been created and operates; the standards have been published in the official bulletin *EVS Teataja*.
2. The impact of charges has been analysed and if necessary planned, and proposals have been made for amending legislation.
3. The impact of support has been analysed, additional need for support has been planned and implemented, if necessary, within the limits of the allocated budget resources.
4. The possibilities of public procurement have been analysed, public procurement is used to motivate biomass and bioenergy consumption.
5. The impact of setting possible obligatory proportions has been analysed and proposals have been made for implementing the measure.

The objective will be achieved through taking the following measures and actions:

Measure 6. Standardisation

Action: the EVS Technical Committee for Biomass and Bioenergy will be established at the Estonian Centre for Standardisation.

The following measures will be implemented in stage II of the development plan according to the results of the analyses made in stage I.

Measure 7. Fiscal instruments

Action: the impact of the existing measures on the development of the field will be analysed along with the support measures of other countries, and the necessary supplementary measures will be taken in due course, if necessary.

At the moment, the measure has been implemented through exemption from excise duty of biofuels. Starting from 2007, direct support to energy crop growers will be added within the framework of the common agricultural policy and various aids under the rural development plan. At the same time, it must be taken into account that less funds will be credited to the state budget in Estonia when using biofuels and the measure of exempting biofuel from excise duty has brought about expenditure on the tax administrator for administrating the benefit. There is currently no research available proving that it would be necessary to facilitate the use of biofuels in Estonia or that it would be useful, taking into account all the aspects.

Measure 8. Public procurement for biomass, consumption technologies and bioenergy

Action: suitable measures will be taken, depending on the analysis of public procurement.

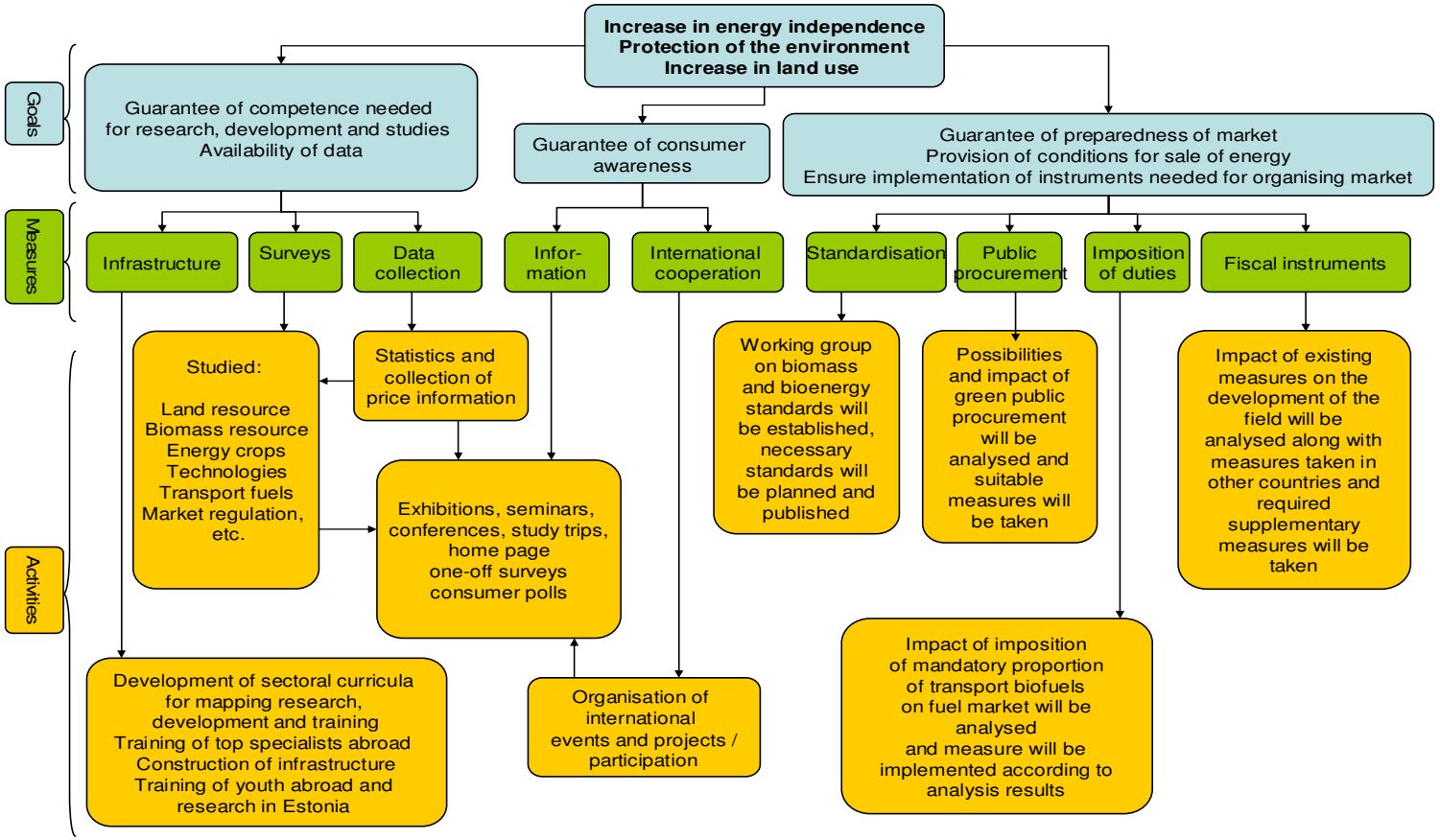
When analysing the possibilities for contributing to the extension of biomass use by the state and local governments, issues concerning the energy efficiency requirements for public procurement must be assessed along with the impact of the mandatory use of renewable energy by the state and local governments and the imposition of the potential obligation to acquire vehicles consuming biofuels.

Measure 9. Imposition of obligations

Action: the impact of imposing the mandatory proportion of transport biofuels on the fuel market will be analysed and the measure will be implemented starting from 2008, if suitable.

When analysing the possibilities of using biomass as raw material for transport fuels, the impact of the imposition of the requirement for the mandatory proportion of marketing transport biofuels on the fuel market must be analysed together with the impact of the imposition of the possible mandatory obligation to use biofuels on public transport companies and large transport companies.

DEVELOPMENT PLAN STRUCTURE



5. COST ESTIMATION

Table. Cost of measures in Estonian kroons

MAIN OBJECTIVE: to reduce pressure on the natural environment, decrease Estonia's dependence on imported resources, ensure maintenance of arable land and create favourable conditions for the development of domestic biomass and bioenergy production									
OBJECTIVE 1: TO ENSURE RESEARCH AND DEVELOPMENT REQUIRED FOR THE PROMOTION OF THE USE OF BIOMASS AND BIOENERGY									
MEASURE 1: research and development for establishing the infrastructure needed for promoting the use of biomass and bioenergy, for innovation and the transfer of technology and know-how									
Action	*Implementation time*	*Cost*							
		2007	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*Financed by / source*
Analysis of land resource division will be prepared	2007–2008	100 000	100 000	0	0	0	0	0	RDF / SB
Assessment of biomass resource (physical and economic availability of various types of biomass)	2007–2008	700 000	1 000 000	According to analysis	According to analysis	According to analysis	According to analysis	According to analysis	SRF, MA / SB
Surveys and analyses of energy crops (agricultural technology, varieties; cost-effectiveness)	2007–2013	1 000 000	1 000 000	According to analysis	According to analysis	According to analysis	According to analysis	According to analysis	RDF, MA / SB
Technology studies and possibilities for use (biogas, combustion, combined production, fuel production, production of materials, assessment of the lifecycle of biomass products)	2007–2013	2 500 000	2 500 000	According to analysis	According to analysis	According to analysis	According to analysis	According to analysis	RDF, MA, MEC / SB
Cost-effective transport biofuels in Estonia and the preconditions necessary for their use and setting the objective pursuant to the directive by 2010	2007	100 000	0	0	0	0	0	0	MEC / SB

Analysis of the market regulation in the field (law, support, charges, public procurement).	2007–2008	500 000	100 000	According to analysis	According to analysis	According to analysis	According to analysis	According to analysis	RDF / SB
Total cost of the measure		4 900 000	4 700 000	0	0	0	0	0	
MEASURE 2: creation of preconditions for international and interdisciplinary research and development towards the promotion of the use of biomass and bioenergy									
Action	*Implementation time*	*Cost*							
		2007	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*Financed by / source*
Analysis of the research and development and the situation of studies in the field of biomass and bioenergy (in research areas comprising the use of biomass and bioenergy, including energy production and electrical engineering as well as crop husbandry, land improvement, plant production)	2007		50 000						MER / SF
Depending on the possible need for specialists, development of a sectoral curriculum or provision of opportunities for training top specialists in foreign universities	2008–2013		According to analysis	According to analysis	According to analysis	According to analysis	According to analysis	According to analysis	MER
The creation of infrastructure needed for sectoral research, development and teaching is supported within the framework of upgrading general infrastructure	2008–2013		According to analysis	According to analysis	According to analysis	According to analysis	According to analysis	According to analysis	MER, RDA

Targeted scholarships are used to motivate young people to study abroad and to support their research at home	2008–2013		According to analysis	According to analysis	According to analysis	According to analysis	According to analysis	According to analysis	RDA
Total cost of the measure		0	50 000	0	0	0	0	0	
MEASURE 3: planning of the need for data, collection of data, analysis and publication									
Action	*Implementation time*	*Cost*							
		2007	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*Financed by / source*
Complementation of statistical report forms and regular collection of statistics	2007–2013	Operating costs of the agency	Operating costs of the agency	Operating costs of the agency	Operating costs of the agency	Operating costs of the agency	Operating costs of the agency	Operating costs of the agency	Enterprise Estonia / SB
Collection of price information	2007–2013	50 000	50 000	According to analysis	According to analysis	According to analysis	According to analysis	According to analysis	RDF / SB
Total cost of the measure		50 000	50 000	0	0	0	0	0	
OBJECTIVE 2: TO INCREASE THE AWARENESS OF CONSUMERS, INVESTORS, ENTREPRENEURS AND POLICY-MAKERS REGULATING THE MARKET									
MEASURE 4: Communication of information									
Action	*Implementation time*	*Cost*							
		2007	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*Financed by / source*
Local and international exhibitions, seminars, conferences and study trips will be organised	2007–2013	750 000	1 000 000	1 250 000	1 250 000	According to analysis	According to analysis	According to analysis	MES, PM / RE
Field information is regularly collected, analysed, designed and published on a separate homepage, necessary agreements are entered into to communicate international information, articles and broadcasts are prepared	2007–2013	1 000 000	1 000 000	1 000 000	1 000 000	According to analysis	According to analysis	According to analysis	RDF, MA / SB

Undertakings having a positive effect on the development of the market are recognised each year.	2007–2013	100 000	100 000	100 000	100 000	According to analysis	According to analysis	According to analysis	RDF / SB
Total cost of the measure		1 850 000	2 100 000	2 350 000	2 350 000	0	0	0	
MEASURE 5: international cooperation									
Action	*Implementation time*	*Cost*							
		2007	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*Financed by / source*
Participation in international projects and events	2007–2013	2 000 000	2 500 000	2 500 000	2 500 000	According to analysis	According to analysis	According to analysis	RDF / SB
Participation in international cooperation (NB8, Basrec, Baltic21, etc.)	2007–2013	600 000	600 000	750 000	750 000	According to analysis	According to analysis	According to analysis	MA, MEC, ME, MER / SB, INTERREG
Total cost of the measure		2 600 000	3 100 000	3 250 000	3 250 000	0	0	0	
OBJECTIVE 3: TO ENSURE THE IMPLEMENTATION OF THE INSTRUMENTS REQUIRED FOR ORGANISING THE MARKET									
MEASURE 6: standardisation									
Action	*Implementation time*	*Cost*							
		2007	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*Financed by / source*
The EVS Technical Committee of Biomass and Bioenergy will be established at the Estonian Centre for Standardisation, with the task of participating in the European standardisation process and organising the transposition of necessary standards.	2007–2013	100 000	According to analysis	According to analysis	According to analysis	According to analysis	According to analysis	According to analysis	MEC / SB, entrepreneurs
Total cost of the measure		100 000	0	0	0	0	0	0	

MEASURE 7: fiscal instruments									
Action	*Implementation time*	*Cost*							
		2007	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*Financed by / source*
The impact of the existing measures on the development of the field will be analysed along with the support measures of other countries, and the necessary supplementary measures will be taken in due course, if necessary.	2007–2013	Costs covered under surveys (E1-M1-T6)	According to analysis	According to analysis	According to analysis	According to analysis	According to analysis	According to analysis	MA / SB
Total cost of the measure		0	0	0	0	0	0	0	
MEASURE 8: public procurement for biomass, consumption technologies and bioenergy									
Action	*Implementation time*	*Cost*							
		2007	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*Financed by / source*
Possibilities and impact of green public procurement are analysed and suitable measures are taken in due course	2007–2013	Costs covered under surveys (E1-M1-T6)	According to analysis	According to analysis	According to analysis	According to analysis	According to analysis	According to analysis	MA / SB
Total cost of the measure		0	0	0	0	0	0	0	
MEASURE 9: imposition of obligations									
Action	*Implementation time*	*Cost*							
		2007	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*Financed by / source*
The impact of imposing the mandatory proportion of transport biofuels on the fuel market will be analysed and the measure will be implemented starting from	2007	Costs covered under surveys (E1-M1-T5)	According to analysis	According to analysis	According to analysis	According to analysis	According to analysis	According to analysis	MEC / SB

2008, if suitable.									
Total cost of the measure		0	0	0	0	0	0	0	
Total cost of the development plan		9 500 000	10000 000	5 600 000	5 600 000	0	0	0	

RDF – Rural Development Foundation, MA – Ministry of Agriculture, MEC – Ministry of Economic Affairs and Communications, ME – Ministry of the Environment, MF – Ministry of Finance, MER – Ministry of Education and Research, SB – state budget, SF – Structural Funds, RDA – research and development agencies, INTERREG – European Community initiative

Measures such as charge incentives for biofuels and supplementary support for growing energy crops as well as various investment aids in the field will be applied based on other development plans and legislation.

6. ACTIONS CARRIED OUT FOR SUPPLEMENTATION, IMPLEMENTATION, ASSESSMENT OF AND REPORTING ON THE DEVELOPMENT PLAN

Preparation of the development plan

In order to prepare the development plan and coordinate its implementation, assessment, supplementation and reporting on it, the Minister of Agriculture formed a Development Plan Commission, chaired by the Assistant Minister of the Ministry of Agriculture. In his absence, the duties of the Chair of the Commission are performed by Secretary General for Agricultural and Trade Policies of the Ministry of Agriculture. The Commission comprises the representatives of the Ministry of Agriculture, Ministry of Finance, Ministry of Economic Affairs and Communications, Ministry of the Environment, Ministry of Education and Research, and State Chancellery.

The duties of the Development Plan Commission are:

- to draft the development plan and its implementation plan;
- to submit a report on the implementation of the development plan and on the achievement of the objectives presented in the development plan and implementation plan as well as on the efficiency of the measures, and if necessary, to make proposals for the supplementation of the development plan by 1 November each year;
- to submit the final report on the implementation of the development plan within five months of the final implementation of the development plan.

If necessary, the Chairman of the Development Plan Commission may invite experts to the Commission sitting. The records of the Development Plan Commission are managed by the Plant Products Bureau of the Agricultural Market Regulation Department of the Ministry of Agriculture.

Relevant institutions were engaged in the preparation of the development plan. The draft development plan has been introduced in and opinions have been requested at least from the following institutions:
Academy of Sciences
Tallinn University of Technology
Estonian University of Life Sciences
University of Tartu
Estonian Research Institute of Agriculture
Jõgeva Plant Breeding Institute
Estonian Chamber of Industry and Commerce
Estonian Chamber of Agriculture and Commerce
Central Union of Estonian Agricultural Producers
Estonian Farmers' Federation
Estonian Council of Environmental NGOs
Estonian Biomass Association
Estonian Oil Association
Estonian Private Forest Union
Union of Biodiesel Producers
Union of Estonian Automobile Enterprises
Estonian Power and Heat Association
Estonian Young Farmers

Estonian Investors' Union
Rural Affairs Committee of the *Riigikogu*
Environment Committee of the *Riigikogu*
Economic Affairs Committee of the *Riigikogu*
Statistical Office
Estonian Centre for Standardisation
Rural Development Foundation
Enterprise Estonia
Environmental Investment Centre
Credit and Export Guarantee Fund KredEx
Estonian Agricultural Registers and Information Board
State Forest Management Centre
Tax and Customs Board

Implementation of the development plan
The development plan will be implemented pursuant to the implementation plan.
The implementation authorities of the development plan will be the Ministries and RDF.

Commissioning surveys and analyses
The RDF will prepare the initial tasks and methods of the surveys and analyses required for implementing stage II of the development plan by involving the relevant institutions, and will submit the development plan to the Commission for making proposals. The RDF will commission the surveys and analyses in line with the proposals of the Development Plan Commission. The Ministries will commission additional surveys.

The Ministry of Education and Research will arrange an analysis of research and development and the situation of studies concerning biomass and bioenergy in Estonia by 2008. If the analysis reveals the existence of sectoral competence and the need to create a separate curriculum, the Ministry of Education and Research will suggest that institute(s) of higher education prepare a renewable energy curriculum. The Ministry of Education and Research will organise the evaluation of this branch provided that there is competence. The Ministry of Education and Research will make it possible for youth to study abroad and will facilitate the research work of scientists through mobility schemes.

Within the framework of upgrading general infrastructure, the Ministry of Education and Research will support the creation of infrastructure needed for sectoral research, development and studies.

The members of the Development Plan Commission will arrange the supplementation of statistical reporting forms. The Statistical Office will collect statistical data.

In order to collect price information, the RDF will enter into an agreement with the Estonian Institute of Economic Research.

Events (exhibitions, seminars, conferences, study trips) will be organised or commissioned by the RDF and Ministries, requesting the relevant proposals from the members of the Development Plan Commission and the working group.

The RDF will organise the administration of the homepage containing information relevant to the sector (collection, processing, analysis, design and publishing of the necessary information). In addition, articles and programmes will be prepared on a regular basis for communicating important information, and they will be published everywhere in media.

The best entrepreneurs and researchers in the field will be recognised by awarding to them a prize issued annually, which will be decided on by the Development Plan Commission. The RDF will organise the awarding of the prize.

The RDF will arrange the organisation of international events and financing of projects, requesting the relevant proposals from the Development Plan Commission and the representatives of the institutions concerned. The Ministries will organise international cooperation between agencies.

For organising standardisation, an EVS Technical Committee on Biomass and Bioenergy will be established by the Estonian Centre for Standardisation. The Ministry of Economic Affairs and Communications will support the establishment and activities of the Committee.

According to the proposals of the Development Plan Commission, the RDF will order an analysis on the implementation of fiscal instruments suitable for promoting the use of biomass and bioenergy, including the impact of the existing support mechanisms and charges as well as the impact of an ecological taxation reform. According to the results of the analyses, in 2008, the Development Plan Commission will make proposals for the amendment of legislation.

At the initiative of the Ministry of the Environment, the Development Plan Commission will analyse the possibilities of the state and local governments to contribute to the expansion of biomass use by public procurement, and in 2008, will make proposals for amending legislation accordingly.

The Ministry of Economic Affairs and Communications will analyse the impact of the imposition of the mandatory proportions of transport biofuels on the fuel market and a suitable technical solution will be applied starting from 2008.

The implementation of stage I of the development plan will be accompanied by the strategic assessment of the environmental impact of the development plan. The assessment will by commissioned by the RDF.

Assessment and supplementation of and reporting on the development plan

The Development Plan Commission will prepare the summary analysis required for the implementation of stage II of the development plan or commission its preparation in 2008. Proposals concerning the implementation of stage II of the development plan will be submitted to the Government of the Republic by no later than 1 November 2008.

The achievement of the goals set in the development plan and implementation of the measures will be assessed on the basis of relevant indicators.

The Development Plan Commission will organise the assessment of the development plan. To do that, the institutions related to the implementation of the development plan will submit to the Development Plan Commission a summary based on their fields by 1 October of every following year. The summaries submitted will serve as the basis for the report on the implementation of the development plan, coordinated by the Ministry of Agriculture. The report will be submitted to the Government of the Republic by 1 November each year at the latest.

The Ministry of Agriculture will submit to the Government of the Republic the final report by no later than on 31 May 2014.

Ester Tuiksoo
Minister

Ants Noot
Secretary General

ANNEX 1

Subsection 19 (14) of the Alcohol, Tobacco and Fuel Excise Duty Act determines biofuel through the CN codes. Biofuel is a fuel:

- for which the first four digits of the CN code are 1507–1518 (i.e. animal and plant oils and fats and their fractions);
- which is produced from biomass and for which the eight digits of the CN code are 3824 90 55 or 3824 90 80–3824 90 99 (i.e. the mixture of glycerol monostearates, distearates and tristearates (fat emulsifiers);
- a mixture of amines derived from dimerised fatty acids, with an average molecular weight of 520 to 550 3-(1-ethyle-1-methylpropyl)isoxazol-5-ylamine, solution in toluene, etc.);
- for which the eight digits of the CN code are 2207 20 00 (i.e. denaturated ethyl and other alcohol of any alcohol concentration) or 2905 11 00 (i.e. methanol) and which are not of synthetic origin;
- which is produced from biomass, including fuel for which the first four digits of the CN code are 4401 or 4402 (i.e. firewood in the form of logs, quarters, branches, bundles of brushwood or other; chippings and splinters; sawdust and wood waste, agglomerated as chumps, briquette, pellets, etc. or not agglomerated).

CN code	Fuel type
1507	Soya-bean oil and its fractions, whether or not refined, but not chemically modified
1508	Groundnut oil and its fractions, whether or not refined, but not chemically modified
1509	Olive oil and its fractions, whether or not refined, but not chemically modified
1510	Other oils and their fractions, obtained solely from olives, whether or not refined, but not chemically modified, including blends of these oils or fractions with oils or fractions of heading 1509
1511	Palm oil and its fractions, whether or not refined, but not chemically modified
1512	Sunflower-seed, safflower or cotton-seed oil and fractions thereof, whether or not refined, but not chemically modified
1513	Coconut (copra), palm kernel or babassu oil and fractions thereof, whether or not refined, but not chemically modified
1514	Rape, colza or mustard oil and fractions thereof, whether or not refined, but not chemically modified
1515	Other fixed vegetable fats and oils (including jojoba oil) and their fractions, whether or not refined, but not chemically modified
1516	Animal or vegetable fats and oils and their fractions, partly or wholly hydrogenated, inter-esterified, re-esterified or elaidinised, whether or not refined, but not further prepared
1517	Margarine; edible mixtures or preparations of animal or vegetable fats or oils or of fractions of different fats or oils of this chapter, other than edible fats or oils or their fractions of heading 1516
1518	Animal or vegetable fats and oils and their fractions, boiled, oxidised, dehydrated, sulphurised, blown, polymerised by heat in vacuum or in inert gas or otherwise chemically modified, excluding those of heading 1516; inedible mixtures or preparations of animal or vegetable fats or oils or of fractions of different fats or oils of this chapter, not elsewhere specified or included
2207 20	Ethyl alcohol and other spirits, denatured, of any strength
2905 11	Methanol (methyl alcohol)
3824 90 55	Mixtures of mono-, di- and tri-, fatty acid esters of glycerol (emulsifiers for fats)
3824 90 80	Mixture of amines derived from dimerised fatty acids, of an average molecular weight of 520 or more but not exceeding 550
3824 90 85	3-(1-Ethyl-1-methylpropyl)isoxazol-5-ylamine, in the form of a solution in toluene
3824 90 99	Other
4401	Fuel wood, in logs, in billets, in twigs, in faggots or in similar forms; wood in chips or particles; sawdust and wood waste and scrap, whether or not agglomerated in logs, briquettes, pellets or similar forms
4402	Wood charcoal (including shell or nut charcoal), whether or not agglomerated

ANNEX 2
SWOT

STRENGTHS

1. Existence of land resource
   Of the 1.2 million hectares of registered arable land, 0.85 million hectares are used.
2. Existence of workforce
   In addition to the workforce available in rural areas, additional workforce will become available as a result of the efficiency and intensity of agricultural production.
3. Large-scale use of biomass
   In Estonia, the share of biomass in the energy balance is approximately 12% depending on the year. The main resources used are timber and wood waste. The technologies and the research and development basis used for producing energy from fuel wood are on a good level.
4. Preparedness of society for technological and innovative developments
5. Networks and infrastructure
   The Estonian energy networks comply with modern requirements and cover a large part of the territory. The energy production infrastructure has been modernised to a great extent.

WEAKNESSES

1. Economic efficiency of the use of non-conventional biomass
   The economic efficiency of using biomass has not been studied to a sufficient extent, determination of the possible price level is a significant difficulty.
2. High investment costs
   As a result of the high price of bioenergy technology, the possibilities for making large-scale strategic investments are limited. The payback period of investments in production of bioenergy is often ten years or more, which decreases interest in making such investments.
3. Aging research potential
   The local research potential is aging due to insufficient addition of young researchers. In some areas related to bioenergy, the average age of academic personnel is 50 years and more.
4. Low energy price
   Thanks to higher energy prices in the neighbouring countries, there is much pressure on the export of energy products, including biomass and biofuels.
5. Low awareness of society
   The general awareness of society of the possibilities of using biomass and biofuel and cost-effectiveness is low. Purposeful and comprehensive information campaigns have not been carried out.

OPPORTUNITIES

1. Increase in fuel prices on the world market
   The estimated price increases of imported fuels motivate the development of alternative fuel production / search for opportunities.
2. Resources
   The use of biomass allows for covering the majority of Estonia’s energy need with domestic energy resources.
3. Funds derived from emissions trading

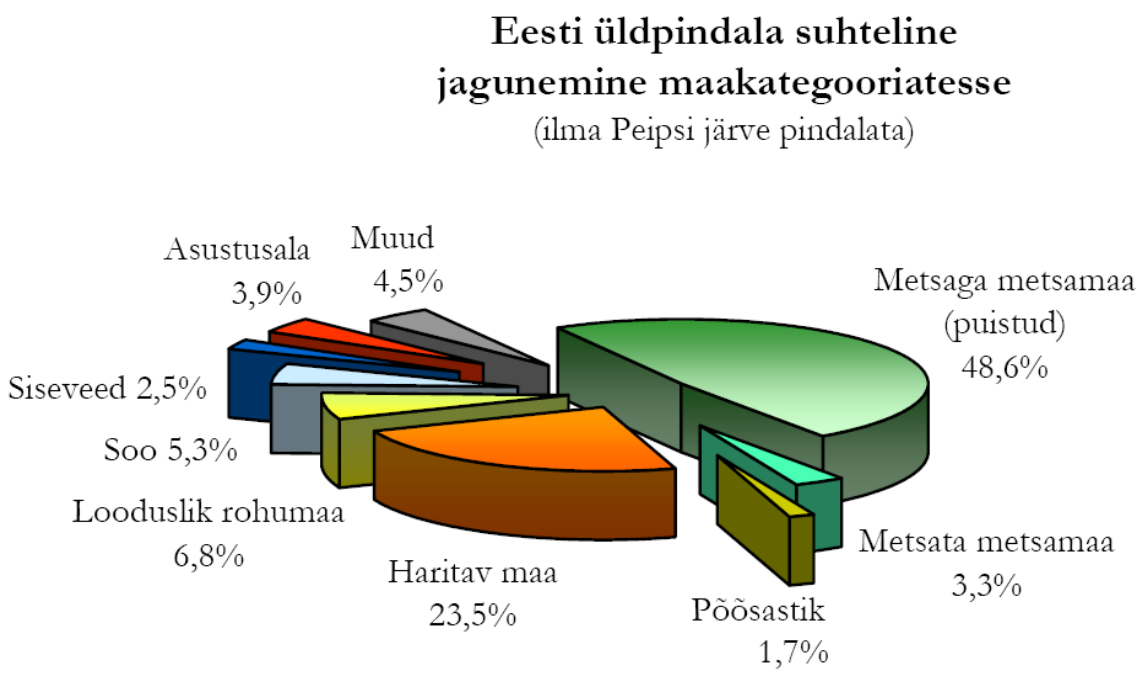
The channelling of the funds derived from emissions trading into the development of energy production from renewable sources allows for achieving several objectives — security of supply, clean environment and sale of additional emissions trading quota.

4. Reduction of energy dependence
   The transfer to bioenergy produced from local raw materials will considerably help increase the share of local fuels in the energy balance and decrease the dependence of the energy produced on the world market prices of the resources.

THREATS

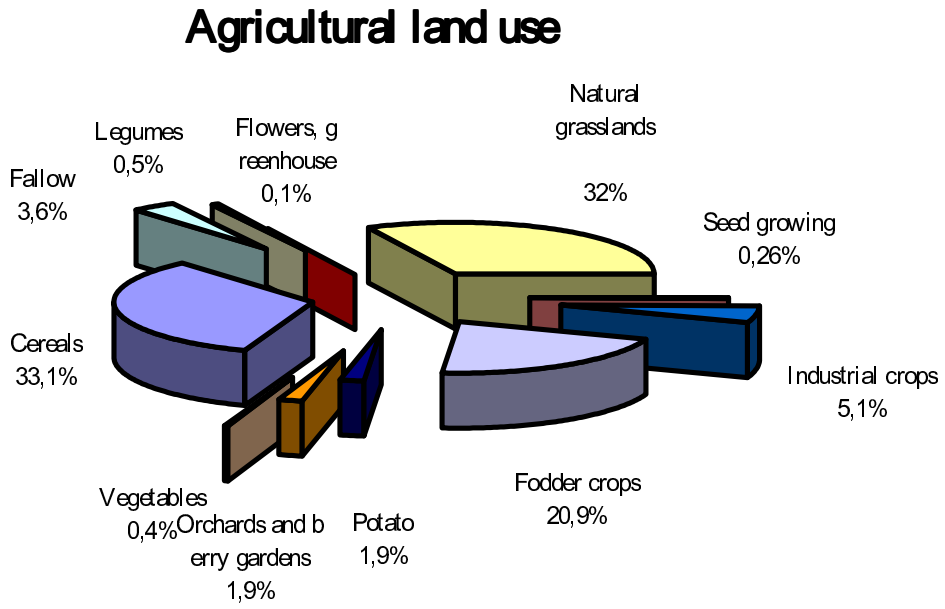
1. Low world market prices of resources
   The occasionally low prices of solid, liquid and gas fuels may give an undesired signal to the market and by that increase the share of imported fuel.
2. Opening up of energy markets
   After the energy markets have been opened up, the sales prices of energy will be market based and may give undesired short-term signals for making investment decisions.
3. Wrong and incompetent administrative and political decisions
   Incorrect planning and development may lead to economically inefficient use.
4. More rapid development of competing markets
   The decisions adopted by the neighbouring countries and funds channelled into bioenergy production, including a considerably greater technological and financial potential may result in an increasing export of biomass and biofuels under the conditions of the EU internal market.

ANNEX 3
Division of the total area of Estonia into land categories (%)



Source: Centre of Forest Protection and Silviculture

ANNEX 4
Use of arable land

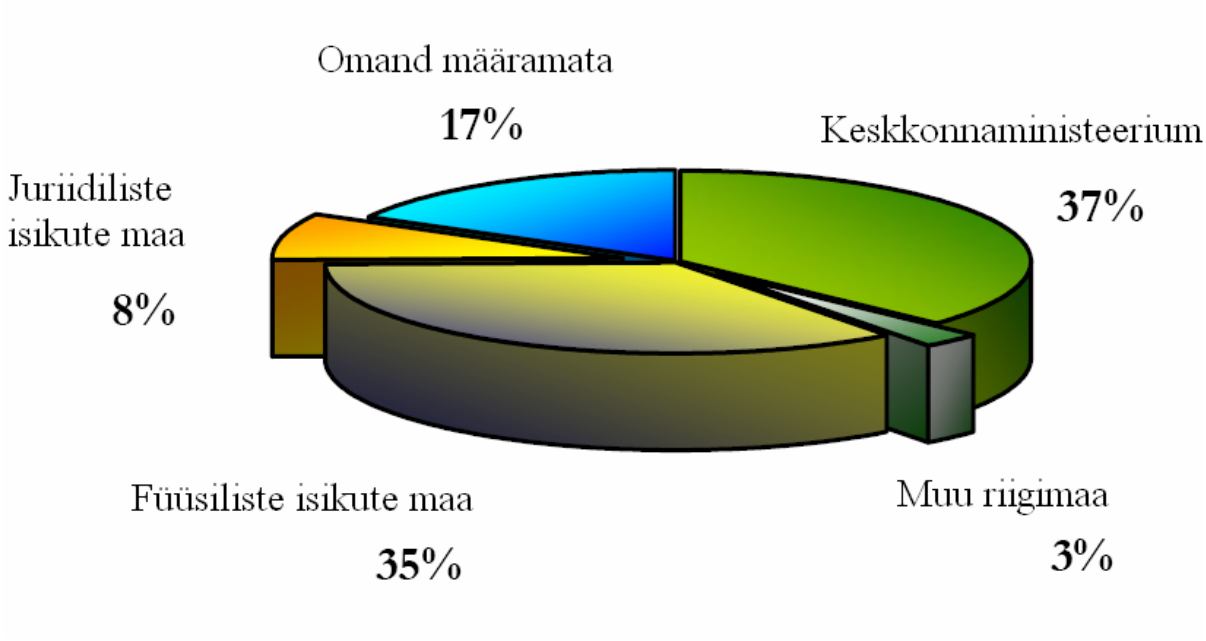


Source: Ministry of Agriculture, PRIA

	2005	2006	2007	2008	2009	2010	2013
Cereals	277.3	280.0	280.0	272.0	270.0	270.0	270.0
Legume vegetables	4.2	4.0	5.0	5.0	6.0	6.0	6.0
Industrial crops	42.7	49.1	56.2	57.2	58.2	60.2	60.2
Potato	15.8	16.5	17.0	18.0	18.0	18.0	18.0
Vegetables	3.4	3.4	3.4	3.5	3.5	3.6	3.7
Fodder crops	174.9	175.4	175.4	180.4	185.5	185.5	186.0
Seed growing	2.2	2.0	2.0	2.0	2.0	2.0	2.0
Flowers, greenhouses	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Fallow	30.0	30.0	30.0	30.0	30.0	44.0	44.0
Arable land	551.1	560.9	569.5	568.6	573.7	589.8	590.4
Orchards and berry gardens	15.6	15.0	15.5	15.8	16.0	16.2	17.0
Natural grasslands or permanent grasslands	270.0	270.0	270.0	270.0	270.0	270.0	270.0
Total use of agricultural land	836.7	845.9	855.0	854.4	859.7	876.0	877.4
including arable crops	324.2	333.1	341.2	334.2	334.2	336.2	336.2

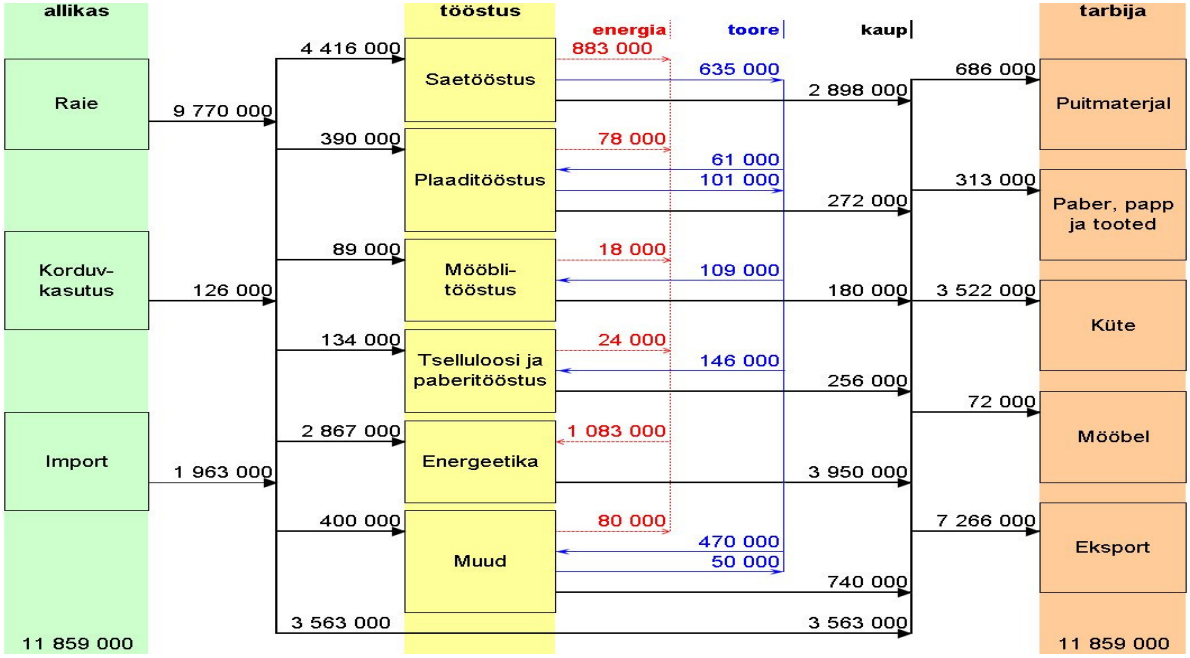
Source: Ministry of Agriculture, PRIA

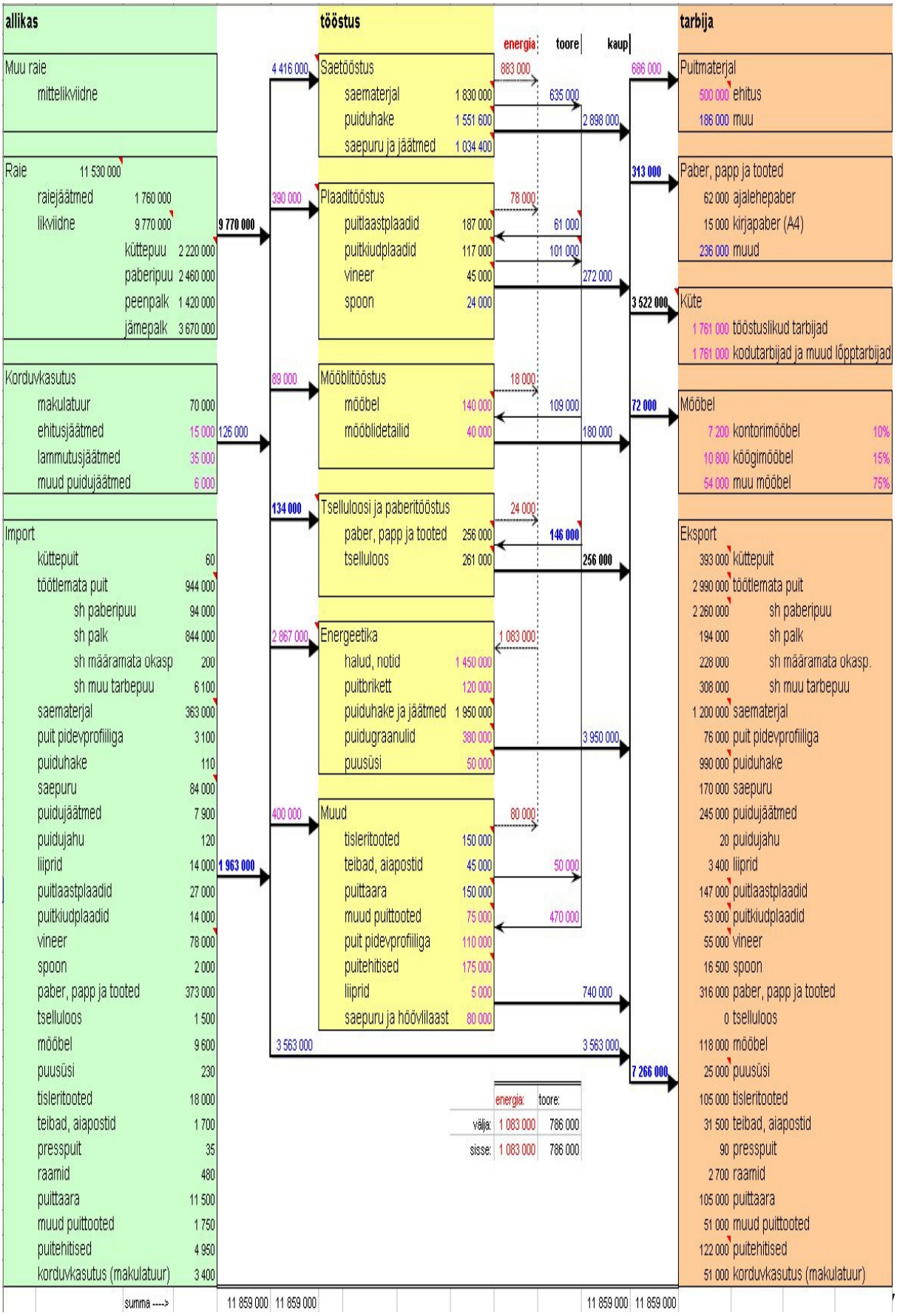
ANNEX 5
Division of forestland by form of ownership (%)



Source: Centre of Forest Protection and Silviculture

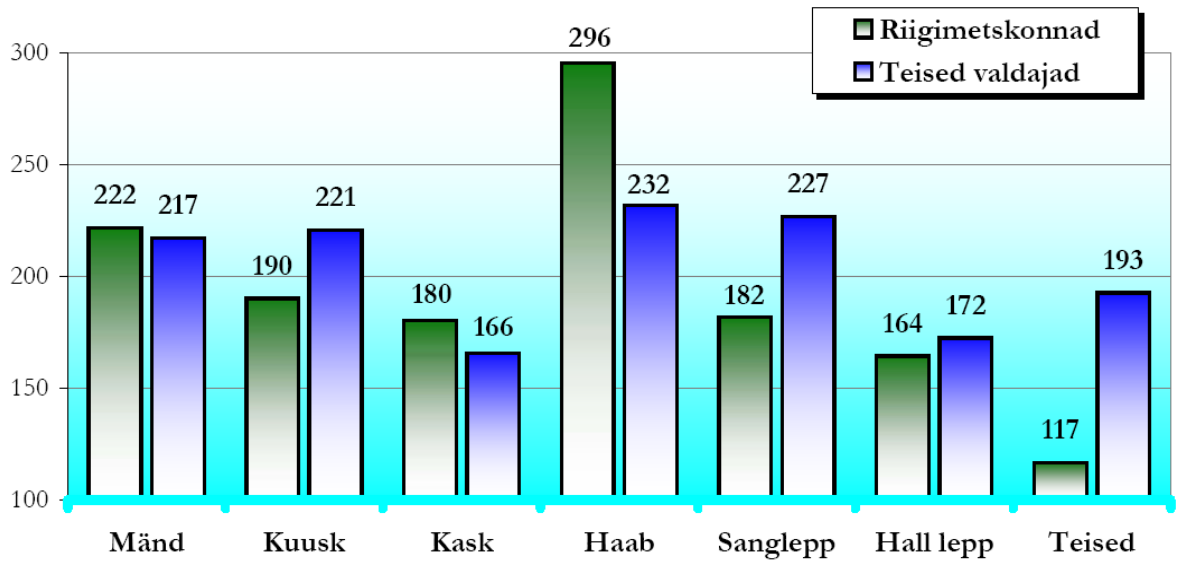
ANNEX 6
Timber use balance (cubic metres)





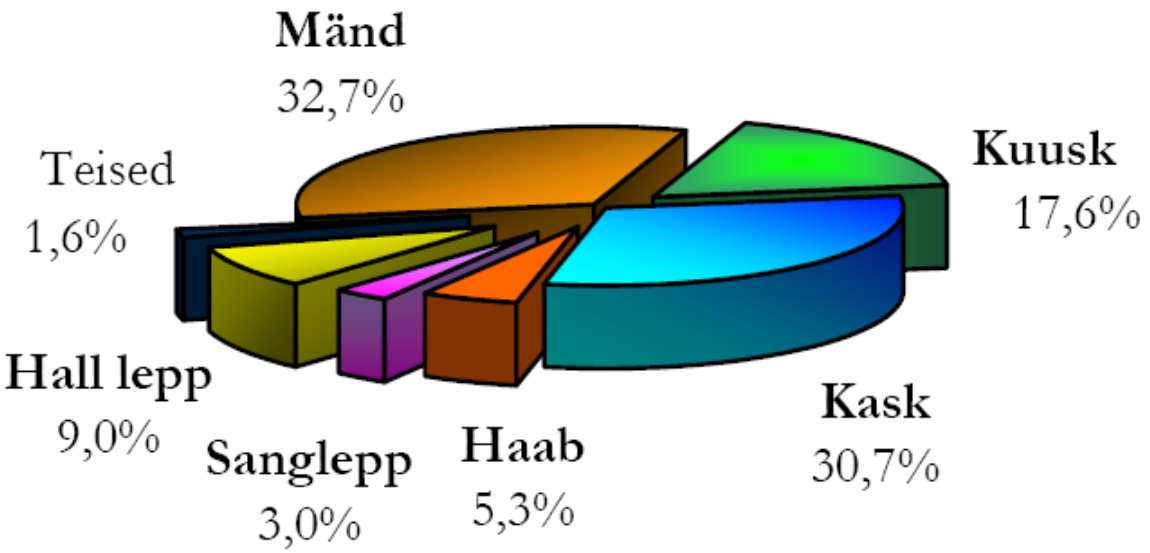
Source: Estonian Forest Industries Association

ANNEX 7
Average yield of managed forestland (cubic metres / ha)



Source: Centre of Forest Protection and Silviculture

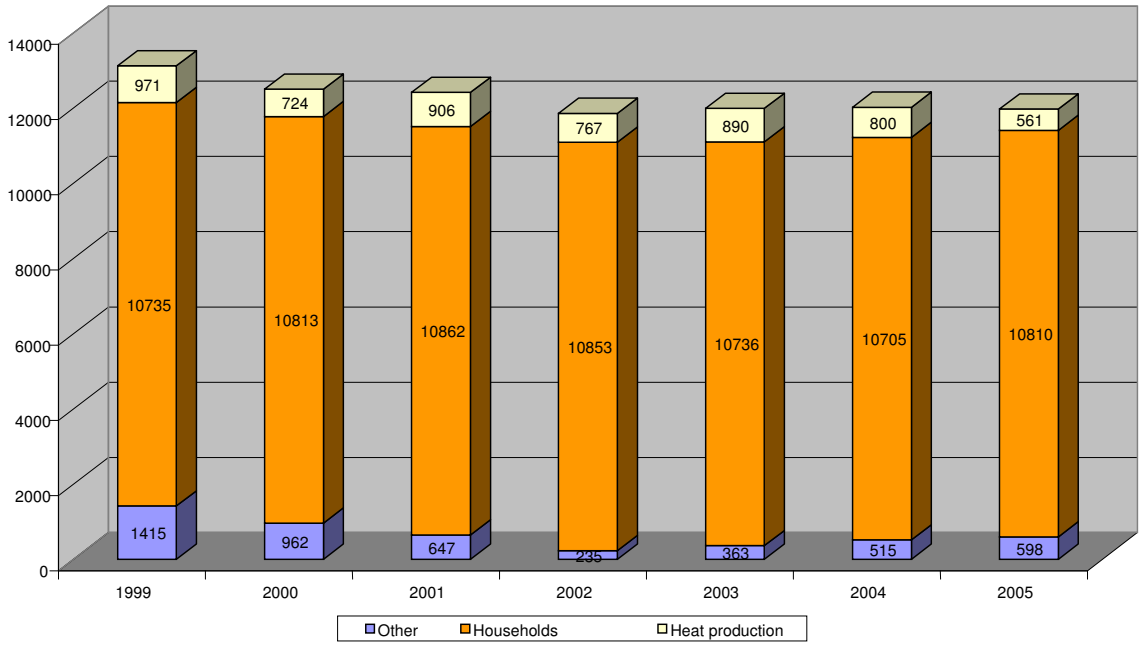
ANNEX 8
Forestland area by majority tree species (%)



Source: Centre of Forest Protection and Silviculture

ANNEX 9

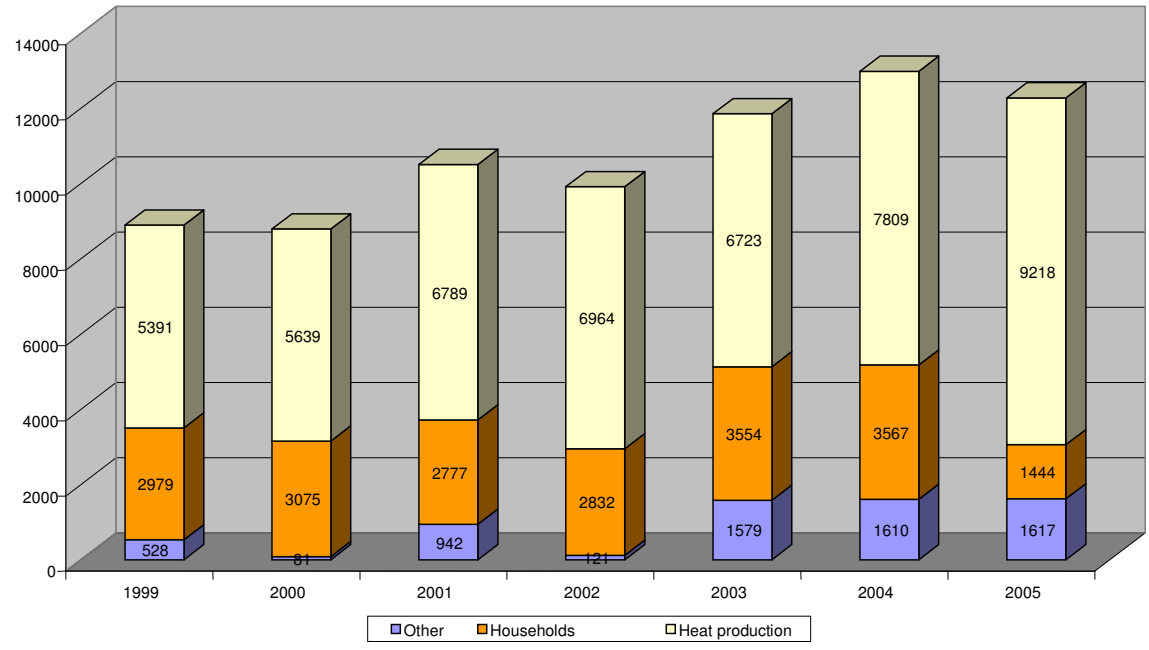
Use of billets, TJ



Source: Centre of Forest Protection and Silviculture

ANNEX 10

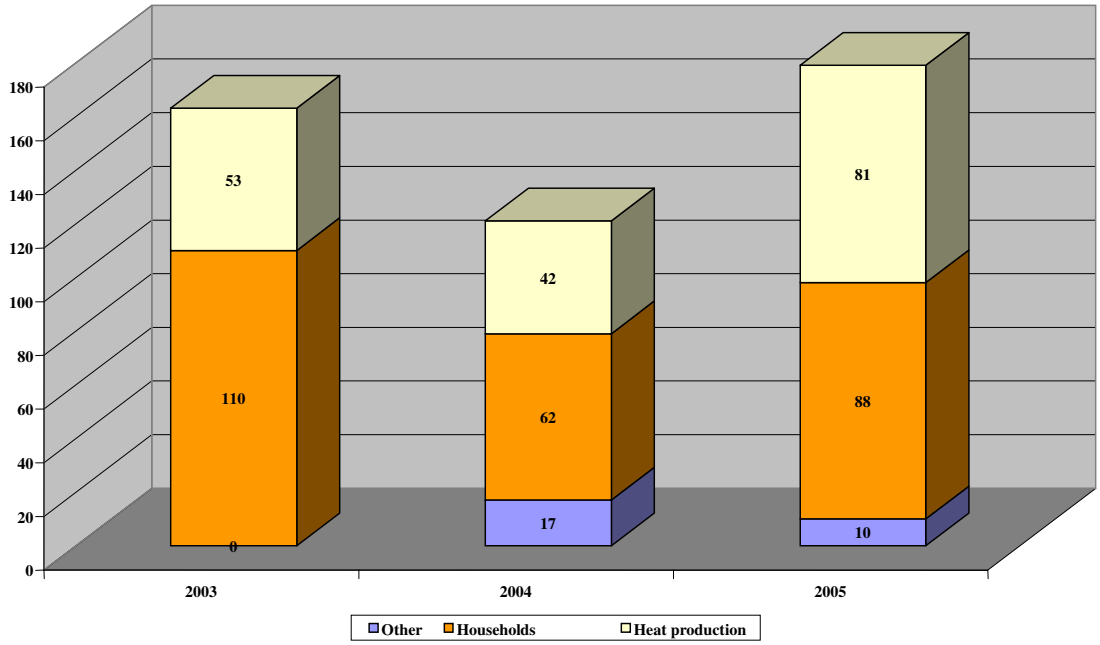
Use of wood chips and waste, TJ



Source: Centre of Forest Protection and Silviculture

ANNEX 11

Use of wood briquettes and pellets, TJ



Source: Centre of Forest Protection and Silviculture

ANNEX 12
Estonian combined heat and power producers

No	Power station / technology	Year of construction	Combined production capacity
			MW_e/MW_{th}
1	Baltic Power Station, steam turbine	1959–1966	215/160[14]
2	Iru Power Station, steam turbines	1980–1982	190/320
3	Kohtla-Järve Power Station, steam turbines	1954–1958	27/70
4	Ahtme Power Station, steam turbines	1953–1955	20/37
5	Fortum Termest AS, Kohtla-Järve Power Station, steam turbine	turbine 1997	8/22
6	Kiviõli Power Station, steam turbines	1956	10/40
7	Tootsi Power Station, steam turbines	1955, 1985	5/14
8	Sangla Power Station, steam turbines	turbine 1998	2.5/9
9	Horizon Power Station (in Kehra), steam turbines	1960	8.5/45
10	Kunda Power Station, gas engine	1998–1999	3.1/3.4
11	Silmet Power Station, gas engine	2003–2004	6/7
12	Grüne Fee Power Station, 2 gas engines	1997–1998	2/2.4
13	Narva Vesi Power Station, gas engine	1999	0.5/0.7
14	Põlva Power Station, gas engines	1999	0.92/1.25
15	Kristiine Power Station, gas engine	2000	0.5/0.7
16	Baltic Ship Repair Plant, 2 gas engines	2003	2.2/2.48
17	Terts Ltd. biogas engine	1994	0.84/1
	Total		**502/736**

Source: Estonian power management development plan 2005–2015

[14] The reconstructed 11th energy block with the given parameters was included in the capacity balance on 1.6.2005.