Renewable Energy Policy review Estonia

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Status of Renewable Energy Development and Review of Existing Framework Conditions for RES in Estonia

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ESTONIA

1. GENERAL INFORMATION

1.2 Population and geography

Estonia is located in North-Western part of the flat East-European plain, remaining entirely within the drainage area of the Baltic Sea. It lies between latitudes 57.30 N and 59.49 N and 21.46 E and 28.13 E. To the west and north, it has long coastline on the Baltic Sea, which is characterized by numerous bays, peninsulas, and straits between islands. The total area of Estonia is 45 216 km^2 including the two largest islands, Saaremaa and Hiiumaa. The area is comparable with that of Denmark and The Netherlands. Estonia is a low country, and its highest point reaches a mere 318 meters.

Agricultural lands cover 25% of the territory. Forest and wooded areas make up about 47.9% (in 2001) of the territory. Towns and urban areas cover only 2.4% of the territory, roads and infrastructure 0.9%.

Figure 1 Map of Estonia

Estonia is one of the smallest and least populated countries in Europe – its total population is 1 358 644 inhabitants (Statistical Yearbook of Estonia 2002). The population density in Estonia is 31.8 inhabitants per km^2. Nearly 70% live in urban areas and 49% in five largest cities: Tallinn (415300), Tartu (101 000), Narva (74600), Kohtla-Järve (52600) and Pärnu (52000).

Estonia has been a member of the World Trade Organisation since 13 November 1999. On 29 March 2004 Estonia was accepted as a member of the North Atlantic Treaty Organisation. Estonia is a member state of the European Union since 1 May 2004.

Table 1.1 Estonian Counties and their area and population

County	Population	Area km^2	Density of population inh/km^2	Capital
HARJU County	522,252	4333.13	120.5	Tallinn
HIIU County	103,48	1023.26	10.1	Kärdla
IDA-VIRU County	176,181	3364.05	52.4	Jõhvi
JÕGEVA County	37,886	2603.83	14.6	Jõgeva
JÄRVA County	38,408	2622.79	14.6	Paide
LÄÄNE County	28,232	2383.12	11.8	Haapsalu
LÄÄNE-VIRU County	67,052	3464.58	19.4	Rakvere
PÕLVA County	32,121	2164.77	14.8	Põlva

County	Population	Area km^2	Density of population inh/km^2	Capital
PÄRNU County	90,127	4806.68	18.8	Pärnu
RAPLA County	37,270	2979.71	12.5	Rapla
SAARE County	35,584	2922.19	12.2	Kuressaare
TARTU County	148,992	2992.74	49.8	Tartu
VALGA County	35,242	2043.53	17.2	Valga
VILJANDI County	57,148	3422.49	16.7	Viljandi
VÕRU County	39,202	2305.44	17	Võru

Source: Statistical Office of Estonia (www.stat.ee)

1.3 Political system and economy

Estonia is a democratic parliamentary republic. The people exercise the supreme power through citizens who have the right to vote by electing the *Riigikogu* (the Parliament of the Republic of Estonia) and by participating in referendums. The *Riigikogu* is comprised of one hundred and one members. Executive power rests with the Government. The head of State of Estonia is the President of the Republic.

The lowest administrative unit in Estonia is urban or rural municipality (*vald)*. The major territorial unit is called county (*maakond)*. There are 15 counties (see Table 1.1) in Estonia and 241 local municipalities, which include 39 towns and 202 rural municipalities.

The municipality councils are the decision-making and supervisory bodies of local government's. The councils make basic decisions on matters affecting their respective jurisdiction. They set local regulations, pass budgets and inspect their execution, set local taxes and charges (on the grounds of existing national legislation) and adopt resolutions on matters of property rights. The local municipality and town governments are responsible for resolving and regulating local issues independently and in accordance with the law. State interests in regions are represented by county governments.

Estonia's transition from planned to market economy started in the early 1990s, with major reforms launched after the monetary reform in 1992. Estonia has been determined and decisive in implementing necessary reforms. Successful reforms have resulted in achieving early macroeconomic stabilisation and the creation of a favourable environment for economic development. Estonia has achieved a high level of commercial and financial integration with the European and global economy.

Several shocks and radical reforms in liberalising the economy had a great impact on the real economy sector. Estonia suffered a deep fall in GDP up to the mid-1990s, as did most transition countries. Estonian GDP fell by one-third in the four years between 1990 and 1994. As a result of appropriate policy choices and their implementation the general economic situation stabilised by the beginning of 1994, with the increase in efficiency and macroeconomic stabilisation creating a favourable environment for economic growth in the coming years. The downward trend in economic activity stopped in 1995. Analogously with the last couple of years, a relatively fast economy growth continued in 2002. GDP increased in respect to 1996 17% (at 2000 constant prices). However, the Estonian GDP per capita is still very low, compared both with the European Union (EU) average and the respective indicator of all older member states and even some accession countries (in 2001, Estonian GDP per capita at purchasing power standard (PPS) was only 40% of the EU average[1]).

2. RENEWABLE ENERGY POLICY

2.1 Energy and Renewable Energy Country Profile

Table 2.1 Main Energy Figures in 2002

Population	1.36	Millions
Area	45217	km^2
Total Primary Energy Supply (TPES)	194	PJ (4.37 Mtoe)
TPES of Renewables	22	PJ (0.11 Mtoe)
Share of RES in TPES	11.34	%
Electricity Production	8.527	TWh
Electricity Consumption	5.686	TWh
Electricity Exports	1.1	TWh
Electricity Imports	0.412	TWh

[1] Laur, A. and Tenno, K. Main Features of Economic and Energy Sector Developments in 2002. Estonian Energy 2002. Ministry of Economic Affairs and Communications, Tallinn 2003.

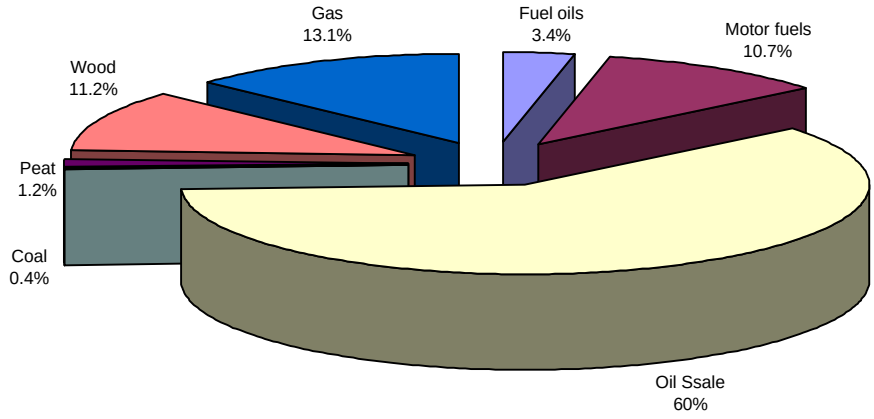

Figure 2 Total Primary Energy Supply in Estonia, 2002

Source: Energy Balance 2002, Statistical Office of Estonia, 2003

Domestic energy production in Estonia accounts for 67% of total energy supplies. Imported fuels (natural gas, fuel oils, coal, motor fuels, Russian oil shale, liquid gas) made up only 33% of the fuels utilized in 2002. Oil shale is the largest source of primary energy in Estonia, representing 60% of Estonia's TPES in 2002 and Estonian oil shale accounts for about 70% (Source: Statistical Office of Estonia, www.stat.ee) of overall world oil shale production. Natural gas meets about 13.1% of primary energy demand.

Analysis of the structure of primary energy supply indicates that the share of oil shale has risen by one percent when compared to the previous year (to 60%), the shares of other local fuels - wood and peat - have not changed, contributing 11.2% and 1.2% respectively. Amongst imported fuels, the share of coal has considerably fallen and that of natural gas, which had been rising in recent years, has fallen slightly (0.4% and 13.1%). The share of heavy fuel oil has continued to fall (to 1.2%). The consumption of natural gas has diminished both in energy production (by 16.2%), and particularly as a raw material for chemical industry (nearly 4 times) (Source: Estonian Energy 2002. Department of Economic Affairs and Communications Estonia).

The share of renewable energy sources reached 11.2%, wood fuels formed the main part of it, the part of other sources remained on the level of 0.1%. In 2002, from the energy of primary fuels (194 PJ or 35.9 TWh) 43% was used for the electricity production, 23% for heat production, 14% for the production of secondary fuels, 4% as raw material in industry and 16% for immediate final consumption[2].

The efficiency of primary energy utilisation (the ratio of final energy consumption to the primary energy used) is relatively low in Estonia, making 54% in 2002. This index is lower than in neighbouring countries mainly therefore, that Estonia does not have large hydro electric plants and over 90% electrical energy is produced by oil shale burning thermal power plants efficiency of which is approximately 30% (Energy Balance 2002). Efficiency index of energy sector is reduced also by high losses in electricity and district heating networks and by the export of converted energy (electricity, shale oil and shale coke, peat briquettes and wood chips).

The peculiarities of Estonia in the reserves and utilisation of primary energy could be summarised as follows:

Share of domestic energy sources in energy reserves and balance of primary energy is high, basing mainly on the oil shale. It gives considerable strategic independence in electricity supply (we have the share of imported energy sources about 1/3, in states of European Union about 2/3 in average)[3]

- Reserve of the biomass is the biggest among the renewable energy sources, from which wood fuels are mainly used so far; wind energy is perspective resource in future.
- Supply of fuels and energy as a whole satisfies customers basic needs and there should be no fear of rapid exhaust of domestic energy sources.
- Supply of natural gas originates from one country only.

For safeguarding national service reliability and economic growth it is necessary:

- To continue the preferred utilisation of domestic energy sources. It is essential to reduce thereby the share of fossil fuels in energy balance, increasing attention to the utilisation of renewable energy sources (keeping to the

[2] *Energy Balance 2002.* Statistical Office of Estonia, Tallinn 2003

3 Long- term Development Plan for the Estonian Fuel and Energy Sector up to 2015 (with a vision to 2030), Tallinn 2002 (draft version)

economical rationality).

- To import fuels at least from two different countries if possible to diversify the sources of imported fuels.

2.2 Status of Resource Exploitation

National definition of RES

According to the Electricity Market Act[4] renewable energy sources are hydro[5], wind, solar, wave, tidal and geothermal energy sources, landfill gas, sewage treatment plant gas, biogases and biomass. In the Act, the biomass is defined as the biodegradable fraction of products, waste and residues from agriculture (including vegetal and animal substances), forestry and related industries, as well as the biodegradable fraction of industrial and municipal waste.

In the Electricity Market Act, there are provided some measures (purchase obligation with a fixed feed-in tariff) supporting RES-e:

- A network operator is obliged to buy electricity produced from renewables within the network, which he owns or processes.
- A network operator pays the price for renewables based electricity that equals the product of the coefficient 1.8 and weighted average price of the electricity sold in the previous calendar year by the producer processing over 500 MW capacity (AS Narva Power Plants is the only producer today who satisfies these conditions).
- The wind energy based electricity shall be eligible for this feed-in tariff during 12 years. All support schemes to renewable energy will be terminated at the end of year 2015 which means that only wind power plants that start operation at the beginning of 2004 will obtain maximum support.
- The act defines the balance-sharing obligation of all electricity market players and stipulates that a market player has to enter into an open delivery contract with a respective seller. A market player that generates electricity from wind is not obliged to pay for the open delivery contract that he enters into with the network operator.
- Therefore, electricity generated by renewable resources (wind) can receive some financial support until end of year 2015.

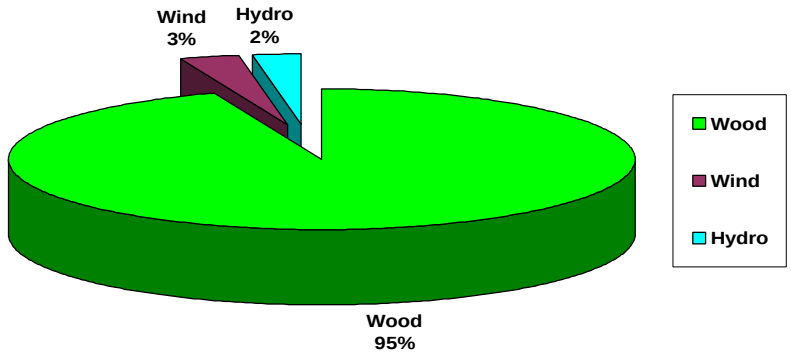

Figure 3 Structure of RES exploitation in Estonia

In 2002 in Estonia the RES provided 7 GWh of electric energy and 1715 GWh (476.4 TJ) of heat. The share of RES in primary energy balance did not exceed 11.2 %. Vast majority of this energy – 99.9% was produced at energy installations using biomass as a source of energy (see Table 2.2). The share of RES-e in total electricity was about 0.1% and came from hydro, wind, and biogas (landfill gas) installations.[6]

Table 2.2 Renewable energy in Estonia in 2002

Source of energy	Items	Number of installations	Installed capacity MW	Electricity production GWh	Heat production GWh
Biomass	Wood boilers	792	768	-	1715
	CHP on landfill gas*	1	0.84 MW_{el}/1.01 MW_{th}	0.526	1.044
Wind	Wind turbines connected to the grid	7	2.2	0.325	-
Hydro	Hydro plants	18	3.454	19	-
TOTAL		818	775	19.8	1716

* started work only in December 2002

[4] *Electricity Market Act.* (2003). Riigi Teataja (State Gazette) RTI 10 03. 2003, 25, 153.
[5] In Estonia the largest Hydro power plant is 1.1 MW, it means we have only small scale HPPs
[6] Source: Energy Balance 2002, Statistical Office of Tallinn, 2003

Renewable energy sources

From the renewable energy sources in Estonia bio-fuels (Table 2.5) and wind have the highest potential. Practically applicable reserve of hydro energy is about 30 MW. Attention should also to be pointed to energy from waste in light of implementation of the directive 2000/76/EÜ. Utilisation of renewable energy carriers is in coming years bounded to small-scale power mainly.

Biomass

Estonia is rich in forests (about 47.9% of whole territory is coved by forests) and has a high potential for energy production from wood-based fuels - firewood, wood by-products (e.g., wood chips, pellets, granules, briquettes), forest residues, waste wood (including sawdust, shavings, edgings, etc).

Table 2.3 Forest resources and utilization in Estonia in 2001

Area covered by forests	2 Million ha (47.9% of total territory)
Areas most rich in forests	Lääne-Viru, Ida-Viru, Võru, Hiiumaa counties
Total stock of wood, million m^3	400
Net annual increment of the wood biomass, million m^3/year*	12-13
Felling volume of wood, million m^3	up to 13
Production of wood-based fuels (thousand m^3)	3264

Source: Statistical Yearbook of Estonian 2002; Statistical Office of Estonia, 2003

Forest resources and their utilization in Estonia are presented in Table 2.3. Although in official statistics the felling volumes correspond to growth rates, some experts have expressed an opinion that recommended felling volume has already been exceeded in Estonia.

The wood processing industry is well developed in Estonia. Waste wood derived from wood processing processes can be effectively collected. For example, about 95% of waste wood is used for energy production. Several enterprises are producing wood chips, wood briquettes (20 000 tons in 2002) and pellets (100 000 tons in 2002). The market for wood chips, briquettes and pellets is well developed and operates on a combination of contracts and demand-supply basis, with the price being set by the market. The lower price in the Baltic States makes the export of wood products attractive. Wood products from Estonia are an important export item to Denmark and Sweden. Similarly, in Latvia the largest part of wood products is exported to Sweden. As exports increase, local wood fuel users are concerned that they cannot offer as high a price as exporters of wood fuel products can receive from abroad.


Pellets


Shavings


Briquettes

Due to the extensive use of firewood resources in Estonia, alternative options have been considered, such as using of brushwood and cultivating fast-growing energy trees in areas not suitable for agriculture. The biomass reserves of brushwood have not yet been thoroughly investigated. A few experiments on growing energy forests were performed in Estonia.

The potential for energy production from forest residues is still not efficiently utilized in Estonia. For example, the use of forest residues accounts for only 10% of energy production from wood-based fuels. Among the reasons for this are that residues are picked up manually due to small area of clear-cuts, as defined by environmental regulations. Thus the use of heavy equipment is not suitable for the pick-up of residues

Present situation

In Estonia wood-based fuels are mainly used for heat generation in centralized heating systems having boiler houses utilizing mainly firewood and waste wood. Another large group of users are households that use mainly firewood. So far, the use of wood-based fuels for energy production in combined heat and power (CHP) plants has been limited mostly due to an unbalanced demand for heat during the year. An overview on energy production from wood-based fuels in boiler houses and households is presented in Table 2.4.

Table 2.4 Production of energy from wood-based fuel in Estonia in 2002

Production of heat in households, TJ	N/A
Number of wood fired boiler houses	792
Capacity of wood fired boiler houses, MW	768
Production of heat in boiler houses, TJ	6174
Total production of heat from wood-based fuels, TJ	21782
Share of energy produced from wood-based fuels of the total primary energy supply, %	11.2

Source: Energy Balance 2002; Statistical Office of Estonia, 2003

Future perspectives

In general, energy production from wood-based fuels has a good potential in Estonia. Extended use of wood-based fuels for energy production will largely depend on support schemes established by the Government.

It is envisaged that the full potential of wood-based fuels can be realized best by increasing the use of forest residues, waste wood and brushwood. Further harvesting of wood for energy production cannot be considered sustainable. The efficiency of the utilization of forest residues, waste wood and brushwood can be improved by increasing the efficiency of the collection process. Furthermore, the competitiveness of the market price of wood-based fuels and transportation costs are factors that will influence the use of wood-based fuels. If the market price is too low and transportation costs are too high then, for example, forest residues are mainly left lying on the ground or burned in forest.

Table 2.5 Theoretical and economic potential of the resources of renewable fuels usable in 2003–2008 for electricity and heat production

Renewable fuel	**Theoretical potential**		**Economic potential**	
	PJ	**TWh**	**PJ**	**TWh**
Wood	52.13	14.48	20.60 *	5.72 [7]
Straw	5.46	1.52	NA	NA
Energy plants	40.50	11.25	NA	NA
Reed	1.98	0.55	NA	NA
Bio-gas	1.44	0.4	0.11	0.03
Food waste	0.36	0.1	-	-
Total	**101.87**	**28.30**	**20.71**	**5.75**

NA – no data available

Source: Long-term Development Plan for the Estonian Fuel and Energy Sector up to 2015 (with a vision to 2030), Tallinn 2002 (draft).

Wind energy

Most prospective areas for wind energy utilisation are West-Estonian islands and coast areas on North-West and South-West Estonia, also the areas of North-Estonian coast and coast of Lake Peipsi. Taking into consideration the present state of the electrical system it is possible to install wind generators with the total capacity of 90–100 MW, what would deteriorate power system operation quality (without any influence on the operation the absorptive ability is 30–50 MW). Technically it could be possible to install wind generators with the total capacity of 400–500 MW, but this requires corresponding investments into electrical networks and power plants to provide transmission, control and required reserves. In addition to the electrical networks the utilisation of wind energy in Estonia is limited also by relatively low electrical load, large unit capacity of existing power plants and by their poor manoeuvrability. The problem is cushioned to some extent by the strong electrical connections to Russia and Latvia, which can be used to smooth the irregularities of wind energy.

Present situation

In 1997 the first modern wind generator started working at Tahkuna peninsula in Hiiumaa Island. The owner of the wind generator is the Centre of the Hiiumaa Biosphere Reserve. The wind generator operates at its maximum capacity at the wind speed of 14 m/s and the average annual electricity production reaches up to 300 MWh, which is about 1% of the final electricity consumption of Hiiumaa.

In October 2002 the first Estonian advanced wind park – Virtsu Wind Park was commissioned. This project was supported by German Ministry of Economy and Technology and Estonian Regional Development Foundation. The Virtsu Wind Park is the common project of OÜ Roheline Ring, AS Eesti Energia and German wind generators producer Enercon GmbH. The total capacity of the three wind generators is 4.8 MW_{el} and with this amount of energy ca 500 of households could be supplied with electricity.

[7] This reserve could be utilised for electricity and heat co-production if to install the necessary equipment into the boiler-houses using at present wood combustion.

The towers in Virtsu Wind Park are 63 meters high, rotor diameter with blades is 44 meters and the length of blades about 19 meters. The electricity produced in Virtsu Wind Park is sold to the Green Energy system of the AS Eesti Energia, where every private and/or legal person can support the production of green energy by purchasing the corresponding certificate.

Table 2.6 Currently operating modern Wind Turbine Generators in Estonia

Location	Owner	Technology	Capacity, kW	Production, GWh/a
Tahkuna, Hiiumaa	The Hiiumaa Biosphere Reserve Centre	Genwind-150	150	0.325
Mõntu, Saaremaa	OÜ Meritreid	Vestas-27	250	0.6
Virtsu, Läänemaa	OÜ Roheline Ring ja AS Eesti Energia	Enercon E-40	1800	4,8
			2200	**5.725**

Figure 4 Tahkuna windmill in Hiiumaa, 150 kW

Figure 5 Virtsu Windpark, total capacity of 1800 kW (3x600 kW)

Future perspectives

In Estonia the electricity production from wind energy is developing steadily. Several new projects for the construction of wind parks are under preparation. AS Eesti Energia has received a large number of applications to connect the new wind generators to the grid (examples are presented in Table 2.7). All projects have been publicly discussed in local communities. Taking into account the current trends, it is anticipated that in Estonia ~50 new wind turbine generators (WTG) will be erected by 2010 with a total capacity ~50–100 MW (compared to about 2 MW in 2002). Estimations indicate a good potential for wind energy development, nevertheless the potential can be realized only if economic incentives are sufficient.

Table 2.7 New projects for WTGs construction in Estonia

Project/ investor	Site	Capacity, kW
Pakri Wind Park (EU support)	Pakri peninsula	8 x 2500
OÜ Meritreid	Sõrve peninsula	230
OÜ Meritreid	Coast of the Lake Peipsi	150
OÜ ”Roheline Ring”**	Virtsu peninsula	5 units (including one 1.8 MW unit)

Hydro Power

Most of Estonian 7308 rivers and streams are shorter than 10 km, flow of less than 50 rivers exceed 2 m^3/s and only 14 rivers have flow over 10 m^3/s; terrain mode is relatively flat. Nevertheless there are several hundred of sites suitable for making use of waterpower. Many of them have been in use earlier. The technical hydropower resource of Estonian water-streams is estimated to be about 25…35 MW (excluding the border river Narva) with total annual output potential of 0.2…0.4 TWh.

Before the Second World War there were 921 hydro turbines and water wheels in operation with total capacity over 27.5 MW. Their production covered about 28% of the total electricity consumption. During the war most of hydropower facilities were destroyed.

After the restoration of independence a new rise in utilization of the hydro resource of rivers began. In the year 2002 there were 18 small-scale hydropower plants in operation with total capacity of 3454 MW and with total annual production of 19000 MWh in Estonia. In March 2004 already over 20 mini hydropower plants and a number of micro plants (with the unit capacity under 10 kW) with total capacity of 5.4 MW and with total annual production of 30000 MWh in average were connected to Estonian distribution networks. The most powerful and up-to-date of them is the Linnamäe plant with the capacity of 1125 kW on Jägala River, commissioned in 2002.

In the near future restoration of 28 more powerful former hydropower plants and water mills with total capacity of 5,6 MW and with total annual production of 34000 MWh is planned. Aside of them there are 5 former hydropower plants with total capacity of nearly 0.5 MW and with total annual production of 3000 MWh, which are worth to restore. The average rate of commissioning of hydropower has been latterly about 0.4-0.5 MW per year.

Several hydropower enterprises are acting in Estonia at present; interest to hydropower production has been shown also by Eesti Energia AS, local authorities and a number of private entrepreneurs (source: P. Raesaar Water Power in Estonia. Tallinn, 1999).

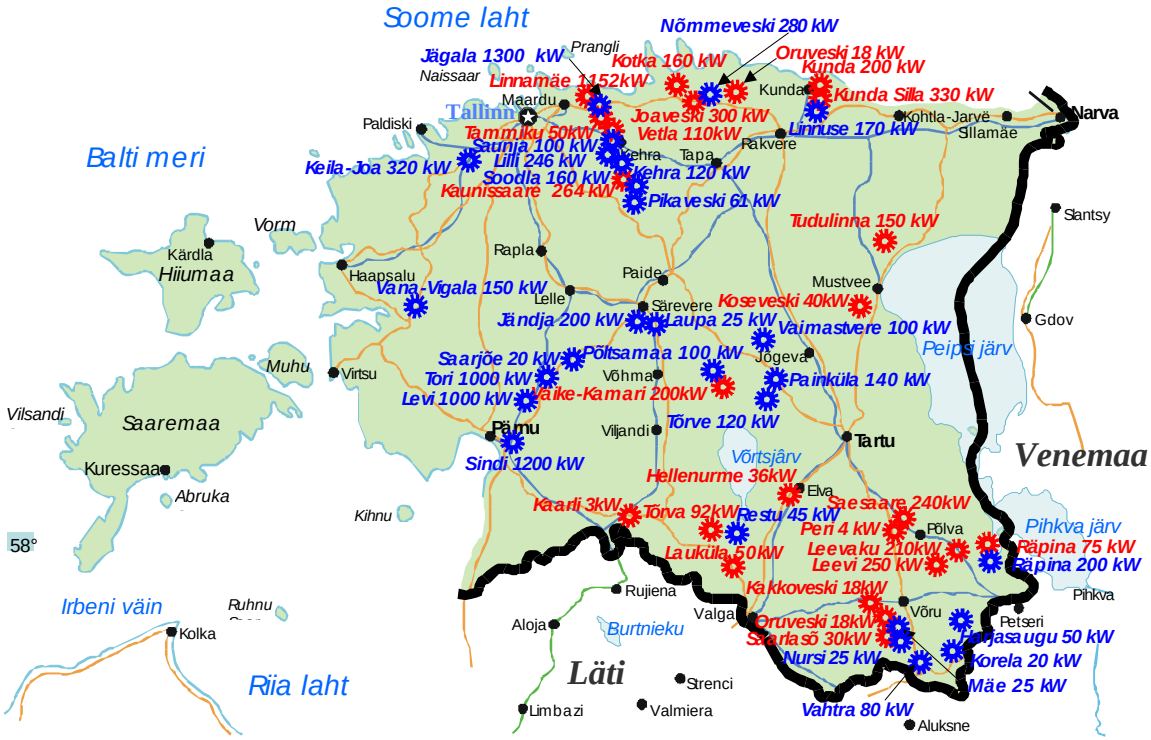

Figure 6 Hydropower plants operating (red ones) and planned in the near future (blue ones) in Estonia

Landfill gas

Waste can be used as a source of energy either through methane (CH4) containing gas produced **from biodegradable** fractions of waste, which later is burned for energy generation, or by direct incineration (e.g., household waste). According to the Directive 2001/77/EC, only landfill gas, sewage treatment plant gas and biogas obtained from organically degradable waste is considered a renewable energy source. Incineration of non-separated municipal waste should not be promoted under the future support systems for RES. Therefore energy production by household waste incineration is not covered in this study.

Production of gas (consisting of 50-65% or more methane) occurs during digestion processes and can be collected in landfills, sewage treatment plants and farms. In order to produce biogas, collection of a separate biodegradable fraction must be ensured which is further treated in specially designed reactors.

Collection of landfill gas should first of all be considered as an environmental protection measure to reduce emissions to the atmosphere. Energy (electricity and/or heat) production from landfill gas is an additional benefit. In Estonia there is only one landfill “Pääsküla” where the landfill gas is collected for heat production in a boiler plant, which provides heat to 1000 flats. The annual landfill gas production is 2.8 to 3.2 million m3 and annually about 15 GWh (54–65 TJ) of heat is produced. In December of 2001 electricity generation was also started.

2.3 RE Policy Outlook

The fuel and energy sector is an important part of the infrastructure of the state, which has to function and develop in the manner providing Estonian uninterrupted supply with proper fuel, electrical energy and heat at the prices as low as possible. Thereby the energy sector has to be as efficient as possible and comply with safety and environmental requirements.

The energy policy in Estonia is based on the:

1) Long-term Development Plan for the Estonian Fuel and Energy Sector (1998)[8];
2) National Energy Conservation Programme and Action Plan for Energy Conservation;
3) National Environmental Strategy (1997).

The Long-term National Development Plan for the Fuel and Energy Sector (hereinafter the Plan) is a document, which was approved by the Parliament (*Riigikogu*) in 1998 as a national level plan for the energy sector (RT I 1998, 19, 295). There the targets are set for development of the fuel and energy sector up to the year 2005 and principal development trends given till 2018. As the environmental impact from energy sector cannot be reduced to the required level without restructuring the use of energy sources, the major part of energy demand increase is projected to be met by natural gas resulting in doubling its share in primary energy supply in 10 – 15 years. Regarding the sustainable use of local resources, the wider deployment of renewable sources is planned, especially in the form of electricity and heat co-generation based on these fuels. **The Plan sets a target to increase the share of renewables and peat in the primary energy supply by 2/3 to the year 2010 against 1996.** It was also provided that to implement the Plan, a *Target Programme Economically Feasible Implementation of Peat, Biofuels and Other Renewables in Energy Production* shall be developed. Up to now, the programme has not been presented to the Parliament. As to renewable fuels, in the draft of the programme the share of 13-15% was predicted for year 2010, and 20-25% for 2025.

For updating the energy policy goals of Estonia, the Ministry of Economic Affairs and Communications has started the process of drafting new Long-*term Development Plan of the Energy and Fuel Sector*. The draft plan should be presented to the Government in June 2004. As to renewable sources, in the preliminary draft the following indicators have been proposed for the year 2010: the share of renewables in total primary energy supply 11-13% and in electricity production 5.1%.

As to international agreements, Estonia signed *The Energy Charter Treaty* (ECT) in 1994. The ECT together with the *Protocol of Energy Charter on the More Efficient Energy Use and the Related Environmental Aspects* were ratified by the Parliament of Estonia in February 1998 and entered into force on 2 August 1998. In December 1998 Estonia signed the *Kyoto Protocol of the United Nations Framework Convention on Climate Change*. The *Kyoto Protocol* was ratified by the Parliament in September 2002.

At the beginning of year 2000, a new *National Energy Conservation Programme* was approved by the Government. The main objective of the programme is to propose concrete measures to ensure the achieving of the relevant objectives set by the *Long-term National Development* Plan *for the Fuel and Energy Sector*. General targets of the program include among others the reduction of environmental impacts of the fuel and energy sectors. One of the main goals of the programme is to ensure the CO_2 emission level to be kept lower than limits fixed in Kyoto Protocol (in 2008 – 2012 the emission level has to be at the level 8% lower than in 1990).

This document was followed by the *Implementation Plan for the Energy Conservation Target Programme* (IPECTP), which was approved by the Government in March 2001. Both the programme and the implementation plan cover the period 2001-2005. In the Programme there is a provision ensuring the decrease of the emission of carbon dioxide by 8% as compared with the year 1990, i.e. according to the Kyoto Protocol, by increasing the efficiency of energy production and transportation by using environmentally friendly fuels and by reducing energy consumption in all sectors and households.

The IPECTP includes a project *Development and implementation of programme on economically feasible exploitation of biomass, other renewable* energy *sources and peat in energy production*. The project was planned for the period of 2001 – 2005 with the total financing of 2.9 MEEK (0.185 MEUR) from state budget. The target groups are the following: Ministry of Economic Affairs and Communication, Ministry of Environmental Affairs, counties, local governments, energy companies and users of local heating.

In the accompanying explanation to the project, it is pointed out that the experience gained in 1990s in expanding the use of biofuels and peat has indicated that the success of respective projects directly depends on how well such projects are planned and prepared. Since in exploiting renewable energy sources and peat is linked to regional development, regional employment, pricing policy of fuels and energy and financing opportunities, the preparation and launch of a national programme dealing with these issues is vitally important.

In the framework of the project, economically viable conditions of using renewable energy sources and peat are planned to be analysed, environmental and regional aspects of corresponding projects would be assessed. Also, the national programme should enable to outline the assessment to the potential of economic viability of exploiting peat and renewable energy sources both regionally and nationally.

The national programme on economically viable use of renewable energy sources and peat would be the basis for applying for international aid for financing respective pilot projects through co-operation projects including European Union and Baltic Sea countries.

[8] As the new Long-term development plan (2002) is not jet approved by the Estonian Government is the previous long-term development plan (1998) still in the force

The National Environmental Strategy sets as a goal to orientate the energy policy towards technological development, the use of renewable resources, a reduction in the generation of greenhouse gases and internalisation of external costs of the energy production and consumption in the price of energy.

With accession to the EU, new rules for energy production and requirements for the protection of the environment will need to be implemented. Concerning the use of RES for energy production, the relevant national legislation has been adopted in Estonia.

Presently, in Estonia the main legislative acts besides the regulation in the energy field defining instruments for the use of RES for energy production are the Pollution Charge Act and Value-Added Tax Act. A substantial reform of the legislation regulating the energy sector has been carried out in 2003. In July 1st, the old Energy Act was repealed and four new acts entered into force: District Heating Act, Natural Gas Act, Liquid Fuel Act and Electricity Market Act. The topics linked with RES use have found largest attention in the Electricity Market Act and in its sub-ordinary regulation.

Various legislative measures for environmental protection and nature conservation are taken into account when implementing policies to promote the use of RES (e.g., Planning Act, Shores and Banks Protection Act, Protected Natural Objects Act, Heritage Conservation Act). Presently, there are about 700 nature protection areas established in Estonia where, for example, erection of wind turbine generators can be problematic.

Responsibility for the drafting and implementation of energy policy (incl RE) in Estonia lies with the Ministry of Economic Affaires and Communication. There is no energy agency in Estonia.

The RES actors

The biggest energy company is 100% state owned Eesti Energia Ltd. (AS Eesti Energia) (a company producing, delivering and selling electricity and heat), together with its associated companies Eesti Põlevkivi (Oil Shale) Ltd (extracts oil shale) and Narva Electric Power Plants Ltd (produces electricity and heat from oil shale).

AS Eesti Energia has established an alternative way to increase development of renewable energy production in Estonia by issuing green energy certificates for producers and customers. “Green Energy Producer Certificate” is issued to all the generators of alternative energy who sell their production to “Eesti Energia”.

Any company, governmental institution and residential customers having a contract with AS Eesti Energia may purchase electricity produced from RES and receive a “Green energy customer certificate”. The price for this green electricity depends on the amount of purchased power. Each Green energy customer supports the Estonian Fund for Nature (ELF) through donations. ELF uses these funds to finance projects related to nature conservation, environmental education and sustainable development9.

Estonian Biomass Association was founded in 1998 as a non-profit organisation. Their fields of activity are biofuels research, resources estimation, development of renewable types of energy, promotion of the use of RES on national and personal level. There are 42 members (enterprises, organisations, research institutions, individuals) in the association.

In 2001 Renewable Energy Council (about 15 members of very different background) was founded to consult and advise the Minister of Economic Affairs and Communications.

EWPA - **Estonian Wind Power Association** was founded on September 2001. EWPA has four members: *AS Tuulepargid, SeeBA Energiesysteme GmbH, Ostwind Verwaltungsgesellschaft GmbH and Tuuleenergia OÜ*. The mission of EWPA is to:

- provide a common voice for the wind power developers and related organisations in Estonia and to provide a platform for joint activities;
- advance the wind energy application in Estonia and thereby contribute to the main objectives of energy policy in Estonia and Europe - energy market liberalization, decentralization, and security of energy supply through wider use of renewable energy;
- improve the legislative environment for wind power development in Estonia;
- represent its members in the relations with legislative and executive authorities, to stand for the rights of its members, and to represent the member organisations both in Estonia and abroad;
- ensure public understanding of the benefits of wind power application;
- create a forum for constructive dialogue with the Estonian government and other key stakeholders.

Electricity

Today, there are sufficient reserves of the electricity production capacities in Estonia (3019 GW_e in 2002), but the structure of the production capacities is not rational considering system requirements. The net electricity production of Estonian power plants was 7.634 TWh in 2002. In 2002 the share of oil shale in the electricity production was 90.7%. The Estonian oil shale as a fuel is characterized by a high ash content (45-50%), moderate moisture (11-13%) and sulphur contents (1.4-1.8%) and a low net calorific value (only 8.3-9 MJ/kg). From the total power produced 6.1% was produced from natural gas, 01% from hydro, 0.04 by wind and rest of 3.06 % by other fuels (peat, shale oil, etc) (see Figure 7). 14% of electrical energy and about one-third of the heat were produced using electricity and heat cogeneration in 1998–2002. About 90% electricity is generated in the Narva Power Plants.

[9] http://roheline.energia.ee/eng/ge_elf.html

The state owned power utility AS Eesti Energia is the main power producer in Estonia (over 97% in 2002). The rest belongs to different independent power producers (IPP) or industries. The power transmission network is 100% state owned and the distribution networks are mostly state owned, only three small networks have been privatised.

Estonian power system covers practically the whole territory of Estonia and is by high voltage (330 kV) transmission lines connected with power systems of Latvia and Russia (region of St. Petersburg). The power systems of Estonia, Latvia and Lithuania are making up the Baltic Interconnected Power System.

Table 2.8 Electricity production and consumption structure dynamics in Estonia, GWh

	1990	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Production	17181	14627	11831	9117	9152	8693	9103	9218	8521	8268	8483	8527
Import	1475	2222	0	221	315	245	240	210	138	138	374	496
Export	8477	6993	3492	1817	1506	1005	1100	1184	528	734	1303	1118
Own use in plants	1733	1566	1394	1124	1146	1086	1116	1153	983	916	922	893
Losses	1147	1086	1029	1470	1527	1773	1710	1510	1569	1470	1240	1361
Final consumption	7299	7204	5916	4927	5288	5074	5417	5581	5579	5286	5422	5607

Source: Energy Balance 2002, ESA 2003

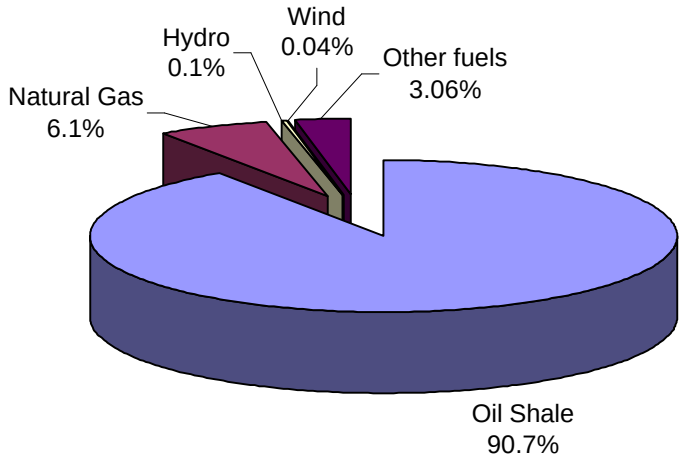

Figure 7 Electricity produced by sources in 2002

According to the new Electricity Market Act, from July 1, 2003 electricity produced from RES (include water, wind, solar, wave, tidal and geothermal energy sources, landfill gas, sewage treatment plant gas, biogases and biomass) will receive a premium price, which constitutes 1.8 times the maximum allowable production price (price cap) of the Narva Power Plant (the major electricity producer in Estonia). In fact, it means reduced (~20%) power purchase price for the electricity produced by RES.

The Act stipulates the purchase obligation of electricity generated using renewable sources. A network operator shall purchase electricity generated from renewable energy sources from a producer connected to the network of the network operator, provided that all technical requirements, stipulated in the same Act, are fully met. The obligatory purchase tariff on renewable electricity is tied to the minimum price for the electricity generated in large (total net capacity of at least 500 MW) oil shale firing power plants located in Estonia. The obligatory purchase price is determined as 180% of the oil shale based electricity price (at present approximately 440 EEK/MWh (28.12 EUR/MWh)), which provides a level of 792 EEK/MWh (50.61 EUR/MWh; excl. VAT). The time horizon provided for the purchase obligation is the following:

- for all generating installations put into operation before 1 January 2002 – until 31 December 2008;
- for installations commissioned later:
- for hydro and biomass – 7 years;
- for other renewables – 12 years.

All types of purchase obligations will be terminated on 31 December 2015 as latest.

In Estonia, the electricity market has been opened only for consumers with annual consumption at least 40 GWh. This corresponds to approximately 10% of consumption. In the present Electricity Market Act, it is provided (in addition to the 40 GWh limit), that by 30.09.2008 the Minister of Economic Affairs and Communication will determine the new limit, which must open 35% of market. At present, nothing more is provided about market opening! Nevertheless, in the Parliament, there is a Bill amending Electricity Market Act with a proposal to provide new limits for eligible electricity users: 20 GWh since 01.01.2006 and 10 GWh since 01.01.2008. These figures mean the market opening of respectively by 20% and by 35%. The full opening of the electricity market for non-household consumers and complete opening are

not stipulated in any act, according to some assessments the full opening may take place in 2013 or be delayed to the year 2016.

According to the Value-Added Tax Act, Estonia has 0% VAT for electricity produced by hydro and wind power stations. This VAT relief was valid until accession to the EU.

Although positive results (see Table 2.2) have already been achieved in Estonia, the Government should take further steps to promote electricity production from RES. Prior to investing large financial resources for the development of renewable energy, the focus so far has been more on the establishment of embedded combustion of oil-shale in order to reduce pollution in north-eastern Estonia, and at the same time to keep energy production from oil shale at high levels so as not to create social problems in this region which is very dependent on the oil shale industry.

Wind energy projects have a higher potential amongst the renewable energy sources, except for cogeneration plants running on bio-fuels. Wind units do, however, require economical support for a long time to come economically effective projects. It is hoped that wind units with total capacity about 30 MW will be installed by 2005. By the end of the planning period (2030) their total capacity may exceed up to 500 MW. Some parallel supporting schemes are applied for supporting wind electricity production. They support economically more effective projects, meaning those that do not generate problems for the supply reliability of the power system

Estonian national goal is to achieve the share of renewable electricity 5.1% from the gross production by 2010. This figure is also that recommended for Estonia by European Union. To achieve this goal priority should be given to bio-fuel based cogeneration electricity and wind energy should be developed, in addition to the small hydro applications.) For building wind farms favourable by the wind condition areas should be used. Taking in consider the existing knowledge and production capacities the expediency of the manufacturing of wind energy equipment in Estonia will be analysed. As an additional opportunity in the development of renewable energy the development of the so-called market of green certificates in Europe is being considered.

Heating and Cooling

In Estonia, current legislation and strategies do not foresee any measures to encourage the use of RES in district heating except for the low-level VAT. Instead of the standard 18% VAT, RES fuels and district heating services are charged only by 5% VAT until the July 2007. In Estonia, according to the Pollution Charge Act, the combustion of biofuels, peat and waste is exempted from the CO_2 tariff, which also promotes the use of RES for energy production.

Environmental policy

Sustainable Development Act[10] sets the most general principles for sustainable development and therefore forms the basis for formulation of national and regional programmes, including action plans to reduce emissions into air.

The Estonian National Environmental Strategy[11] approved by the Parliament in 1997, is the major basis document for the policy-making process in the field of environment. The strategy envisages, among other priorities, the following goals:

- to reduce the environmental impact of the energy sector;
- to direct energy policies towards energy efficiency technology development programmes, more extensive use of renewable energy resources and reduction of greenhouse gas emissions,
- to include all environment-related costs of energy consumption in the energy price.

Everything about Estonian environment policy, laws etc. can be found from the homepage of the Estonian Ministry of Environment (www.envir.ee). Once every three years they arrange an Environment Forum. It is opened for organisations and peoples who are interested in MoE work and the future of Estonian environment. During the forum there are lectures, discussions, workshops etc. The main reason of this meeting is to make a new National Environmental Action Plan for the next three years, revise the last NEAP, specify priorities and give new ideas. In 1997, The Parliament of Estonia approved the National Environmental Strategy (NES). Based on 10 priority goals of Estonian environmental policy, the first NEAP was developed including both short-term activities (1998-2000) and long-term activities (2001-2006). The last meeting was on 22 November 2000 with 250 participants as working group members or advisors. Estonian Government ratified new NEAP (2001-2003) on 05.06.2001.

The NEAP idea is building a bridge between the sustainable development and the EU approximation processes. Many actions included in the NEAP are oriented at legal and substantive approximation with the EU environmental *acquis*. Much effort has been put to make sure that the NEAP is coordinated with the EU Accession Strategy as well as with other environmental programs, particularly the Agenda 21, the National Environmental Health Action Plan, and stimulates development of the local and regional environmental action plans.

This NEAP consists of 657 actions classified by Policy Goal and within each policy goal by objective and subsequently by time scale (short-term actions and medium-long-term actions).

The NEAP contains a large variety of different types of actions such as education, environmental awareness campaigns etc. The top priority actions according to the prioritization methodology applied are typically legal reforms, drawing of management plans or capital investment into pollution abatement.

[10] *Sustainable Development Act* (RT10 I 1995, 31, 384; 1997, 48, 772; 1999, 29, 398; 2000, 54, 348)
[11] *The Estonian National Environmental Strategy* (RT I 1997, 26, 390)

Large number of actions within the NEAP (nearly 1/4 of all actions) is oriented directly or indirectly at the EU approximation (both legal and substantive). Within this number, more than 50 actions are directly targeted at a specific EU Directive. PG4 (Air quality), PG 7 and 8 (Groundwater and Surface water) and PG 3 (Energy) are particularly oriented at the EU approximation.

Among the EU Environmental Directives the most frequently addressed by the NEAP are:

- Air Quality Framework Directive (96/62/EC).
- Emissions from Motor Vehicles (70/220/EEC with amendments).
- Environmental Information Directive (90/313/EEC).

Within particular policy goals, the highest weights were given to the following types of actions:

- Legal reforms: public access to information and public right of appeal, as well as launching of public awareness campaigns.
- Capital investment into pollution abatement technology.
- Legal reforms, traffic management plans.

A few examples of the NEAP:

- Advanced environmental education for teachers (incl. pre-school).
- Nature conservation and environmental protection courses at universities (basics for all faculties, specific courses, adult education and open university courses, obligatory for obtaining teachers qualification).
- To amend the Civil Code to introduce citizens' rights to appeal against violation of environmental rights.
- Revision and amendments to the existing environmental legislation to ensure effective and transparent procedures for public access to environmental information and public participation.
- To organize regular forums and dialogues between the NGOs and the Government.
- To organize environmentally sound consumption campaigns targeted at specific product groups.

In November 2002 the *Riigikogu* approved the *Estonian Forestry Development Plan until the Year 2010*. The development plan attaches importance to forests in Estonian society and plans the use and protection of forests in accordance with the principles of sustainable management.

Ambient Air Protection Act (RT I 1998, 41, 624; 1999, 10, 155) was enforced on 01.01.1999. This new Act repealed the previous Estonian SSR Act on the Protection of the Atmospheric Air, which had been in force since Soviet period (1981). The new Act regulates activities, which involve the emission of pollutants into the ambient air, damage to the ozone layer, and appearance of factors causing climate change. The Act provides main principles for the control of ambient air quality, sets basis for emission standards, foresees measures for reduction of air pollution, etc.

Research and Development

The bases for research and development organization is laid down in *Organisation of Research and Development Act,* which regulates the role of different governmental agencies, methods of management and coordination of the whole system. The country's R&D policy is carried out by the Ministry of Education and Science, innovation policy is the responsibility of the Ministry of Economic Affairs and Communications. The Estonian Government is advised in R&D strategy issues by the R&D Council (founded in 1990), whose activities are based on two standing committees, one focusing on R&D and the other on innovation policy.

The research and development strategy *Knowledge-based Estonia* reflects recognition of the increasingly greater role of research and innovation in shaping Estonia's future, aiming to ensure reproduction of knowledge and skills, renewal of the traditional industries and their integration into the rapidly developing knowledge-intensive areas of new economy. For Estonia the set out key technological areas are information society technologies, biomedicine and materials technologies, but nothing related to energy.

The key elements of the Estonian research system are the universities, whose basic responsibilities are scientific research, post-graduate training and provision of higher education, but also more and more extensive cooperation with other R&D institutions and users of research outcomes; followed by minor institutes and R&D establishments. Besides the above, national innovation system includes also enterprises participating in R&D activities, different state structures responsible for R&D and innovation policy.

The existence of national competitive financing is one of the prerequisites for the development and quality of national innovation system. Division between various categories of research and development in 1999 was as follows: 49,8% to basic research, 34,5% to applied research and 15,7% to technological development.

State financing of R&D is organized through targeted financing, R&D grants, maintenance of the infrastructure, national R&D programmes and support programmes for innovation. Targeted financing is planned for developing new research areas and to obtain the information resources needed for research and remains within the responsibility of the Ministry of Education and Science. The research grants are financed by the Estonian Science Foundation from the budget of the Ministry of Education and Science. Different support schemes are financed from the budget of the Ministry of Economic Affairs and Communications through the Estonian Technology Agency with the aim to raise the competitiveness of enterprises by developing and applying new technologies. The support scheme is oriented to product development in enterprises, research within a market potential undertaken in R&D institutions, and preliminary studies for projects.

Energy research as any other research in Estonia is financed by the institutions described above. So far there are no energy oriented special funding schemes available. The only attempt to launch a National *Programme of Energy*

Research and Development Activities till the year 2000 was made in 1995, but unfortunately the programme was never adopted.

Two universities and one applied higher educational institution have energy related subjects included in their curricula. In Estonian Agricultural University both Institute of Agricultural Energy Engineering and Institute of Forest Industry teach bio-energy related subjects – resources and technologies, theoretical and practical side. Tallinn Technical University is the main centre of technical research and education. Institute of Thermal Engineering in the Faculty of Mechanical Engineering provides education on fuels, boilers, combustion technologies, energy production, energy management etc. Kehtna Economy and Technology School provides applied higher education - processing since 1991, and production of local fuels since 1994, to which maintenance of energy equipment was added in 1997. They also cover organisation of heat production in small business and exploitation of boiler plants.

An initiative has been launched by Tallinn Technical University – Development Centre of Power Engineering, with the aims of activity listed below.

- Application of the newest achievements of science - new materials, renewable energy sources, new optimisation methods, energy storage devices, power electronics, intelligent electrical drives, information technology, productive equipment and technology - for reconstruction of Estonian electrical power system and consumption processes to ensure the sustainable and environment friendly development.
- Development and application of innovative products, technologies and services in mutually beneficial co-operation with companies in Estonia and abroad.
- Transfer of the newest achievements of world science and know-how of the top technologies of power electrical and mining technologies to Estonia, enhancement of development potential and creation of product development environment at Tallinn Technical University.

The centre may develop into a strong promoter of wider application of renewable energy sources, new sustainable and environmentally friendly technologies and new research programmes.

The Estonian Science Foundation (EstSF), established on July 1990 by Estonian Government, is an expert research-funding organisation. Its main goal is to support the most promising research initiatives in all fields of basic and applied research. The EstSF uses state budget appropriations to award peer-reviewed research grants to individuals and research groups on a competitive basis. Grants awarded for research and development in the field of renewable energy sources in the period 2000-2007 are presented in the Table 2.9.

Table 2.9 Grants awarded for research and development in the field of renewable energy sources:

Grant name	Grant holder and university	Period
Production Ecology of Willow Short Rotation Forests and Combined Use of RSF as Vegetation Filters and Renewable Energy Recourses	Katrin Heinsoo, Institute of Zoology and Botany at Estonian Agricultural University	2001-2004
Production Ecology of Willow Short Rotation Forests and Combined Use of RSF as Vegetation Filters and Renewable Energy Resources	Koppel, A. Institute of Zoology and Botany at Estonian Agricultural University	2001-2004
Radiation Regime, Architecture and Biomass Production of the Energy Forest (Willow and Grey Alder) in Estonia	Juhan Ross, Tartu Observatory	2001-2004
Improvement of Biofuels Grate Firing Technology	Ants Veski, Tallinn Technical University	2001-2003
Air distribution influence to the boiler efficiency at grate burning of biofuels	Ants Veski, Tallinn University of Technology	2004-2006
Engineering bases for producing hydroenergy on small rivers considering environmental requirements	Mare Pärnapuu, Tallinn Technical University	2003-2004
Estonian wind climate and wind energy resources	Ain Kull, University of Tartu	2003-2005
Possibilities and Efficiency of the Use of Wind Generators in Estonia	Olev Liik, Tallinn Technical University	2000-2002
Modelling of cooperation of wind turbines and power system	Olev Liik, Tallinn University of Technology	2004-2007
Definition of the Parameters for a Hot Water System and Solar Diffusive Radiation Model for the Estonian Conditions	Teolan Tomson, Estonian Energy Research Institute	2001-2003
Investigation on the Dynamics of the Estonian Wind Energy Resource and Arrangements	Teolan Tomson, Tallinn Technical University	2002-2004
Study of the efficiency of the two-step controlled solar collectors	Teolan Tomson, Tallinn University of Technology	2004-2005
Optical Coatings for Solar Cells	Tiit Varema - Tallinn Technical University	2002-2003
Contacts for Semiconductor Solar Cells	Tiit Varema - Tallinn University of Technology	2004-2005

Promotion

Effective support instruments for promotion of RES are:

- Education and training of those who will be involved with the planning, development, operation or promotion or renewable energy projects;
- Establishment of state or public institutions promoting RES activities; raising public awareness regarding RES, in combination with climate change mitigation issues, through the media, informative brochures, study programs, etc.
- Organization of conferences, workshops for experts and project developers concerning legislation, technologies, market and financial instruments for RES.

The public is primarily made aware of RES through mass media (television, radio, newspapers, etc.). A number of articles have been published in daily newspapers and professional periodicals. Numerous leaflets, booklets, funding projects, etc have been published. Also special conferences, workshops, etc have been held for the public to increase their awareness about RES issues. Of course the co-operation with the Ministry of Environment and of Economic Affairs and Communication & NGOs, work with communities, journalists, etc. help to give better results.

From the year 1999 a special RES conference has been annually organized in Estonia – *Investigation and Usage of Renewable Energy Sources.* The main organizer of the event is Estonian Agricultural University in co-operation with the Estonian Biomass Association and Foundation Archimedes. The conference proceedings are published and distributed to all interested people.

The second example is connected with the international OPET Network where Estonia has been participated from the year 1998. The network is co-financed by European Commission and established for promotion of energy efficient and renewable energy technologies. OPET Estonia has developed a close relationship with the Estonian governmental institutions, research institutes, energy centres, Estonian energy companies, energy specialists, etc. The dissemination work through organised seminars, workshops, training courses and also OPET library with excellent information on RUE and RES technologies has successfully reached the target groups. The project has become very popular and well-known in Estonia.

The Internet plays a very important role, because much information can be obtained there. New books, conferences, environmental NGOs, nature clubs, EME, universities, etc. - everything can be found there. Estonians have good access in the Internet. For example 80% of the inhabitants of Estonia, have access to the Internet from schools, libraries, Internet cafes, etc. Because of good Internet access environmental campaigns, training, etc. can be made also via the Internet. There are several e-mail lists on the environmental subject. For instance *Loodus ja Aeg* (Nature and Time) gives good information about resent articles, MoE work, environmental policy laws, conferences, new books, etc. To become a member of this kind of list is free of charge and usually available for anyone who is interested.
Estonian Academy of Sciences, Estonian universities, research institutes and scientific societies organise regularly workshops and seminars to discuss different aspects of renewable energy and their positive impact to the environment possibilities to mitigate negative consequences of global warming.

Future plans

Estonia will have the opportunity to take part in EU regional policy and to receive considerable financial assistance from the EU budget. In accordance with the criteria established in Council Regulation (EC) No 1260/1999, which lays down the general provisions of Structural Funds, Estonia is a region covered by Objective 1, which is described as “promoting the development and structural adjustment of regions whose development is lagging behind” and provides the largest support rates.

Estonian National Development Plan for the Implementation of the EU Structural Funds – Single Programming Document 2004-2006” (hereafter referred to as SPD) serves as a basis for the common activities of Estonia and the EU in promoting Estonia’s social and economic development.

Regarding renewables, the Estonian SPD includes Measure 4.2: Development of Environmental Infrastructure. The general objective of the measure is to improve the environmental situation in Estonia. The specific objectives, among others, include the goal of reducing the environmental impact of the energy sector, improving efficiency and increasing the share of renewable energy. In the SPD it is emphasized that the main problems in the Estonian energy sector are related to high spatial concentration of the electric power production and the considerable environmental burden caused by it. Therefore, the Measure 4.2 is planned to foster the use of renewable energy sources like biomass, wind and small hydro. This would give rise to decentralization of the electric power production and would reduce the use of fossil fuel sources that in turn helps to save the environment.

Under the Measure 4.2 the following projects are preferred:

- projects having bigger positive impact on the environment;
- projects contributing to the public-private partnership;
- projects having a higher share of applicant’s co-financing;
- projects promoting local employment.

Biomass activities are of special importance for Estonia due to its significant forest potential and due to the fact that 25% of agricultural land is unused in this country. Energy crops and a forestation of abandoned land could mitigate the underemployment problem in rural areas and generate a sustainable energy. They will also contribute to the production of liquid biofuels in line with Directive 2003/30/EC.

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The Estonian National Environmental Strategy (RT I 1997, 26, 390)

The Long-term National Development Plan for the Fuel and Energy Sector. Ministry of Economic Affairs, Tallinn, 1998 (RT I, 19, 295)

Useful links

www.mkm.ee – Ministry of Economic Affairs and Communications
www.energia.ee – AS Eesti Energia
www.roheline.energia.ee – Green Energy Brand
www.envir.ee – Ministry of Environment
www.stat.ee – Statistical Office of Estonia
www.gaas.ee – AS Eesti Gaas
www.tuuleenergia.ee – Estonian Wind Power Association
www.ttu.ee – Tallinn University of Technology
www.eau.ee – Estonian Agricultural University
www.hm.ee – Estonian Ministry of Education and Research