REPORT PURSUANT TO ARTICLE 3(2) OF DECISION 280/2004/EC

ESTONIA

Policies and Measures and Greenhouse Gas Projections

2013

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Abbreviations

AAU – Assigned Amount Unit
ARIB – Agricultural Registers and Information Board
BAT – best available technique
bbl – barrel
CA – Competition Authority
CAP – Common Agricultural Policy
CDM – Clean Development Mechanism
CF – Cohesion Fund
CFBC – circulating fluidized bed combustion
CHP – cogeneration of heat and power
CoC – chain of custody
DH – district heating
EC – European Commission
EIC – Environmental Investments Centre
EMAS – European Management and Audit Scheme
EMP – Electric Mobility Programme
EMS – environmental management system
EnMS – energy management systems
EPBD – energy performance of buildings
ERC – Environmental Research Centre

ERDF – European Regional Development Fund
ERU – Emission Reduction Unit
ESF – European Social Fund
ETS – Emission Trading Scheme
EU – European Union
EUREM – European Energy Manager
F-gas – fluorinated greenhouse gas
FDP – Forestry Development Plan
FM – forest management
FSC – Forest Stewardship Council
GDP – gross domestic product
GEF – Global Environmental Facility
GHG – greenhouse gas
GIS – Green Investment Scheme
HFC – hydrofluorocarbon
HOB – heat-only boiler
ISO – International Standardisation Organisation
JI – Joint Implementation
MBT – mechanical biological treatment
MEUR – million euros
MoE – Ministry of the Environment
MoEAC – Ministry of Economic Affairs and Communications
NAP – National Allocation Plan
NDPES – National Development Plan for Electricity Sector
NEEAP – National Energy Efficiency Action Plan
NFI – National Forestry Inventory
NIR – National Inventory Report
NREAP – National Renewable Energy Action Plan
NSRF – National Strategic Reference Framework
OP – operational programme
PEFC – Programme for the Endorsement of Forest Certification Scheme
PFC – perfluorocarbon
PP – power plant
PTIS – Public Transport Information System
RDF – refuse derived fuel
RDP – Rural Development Plan
RES – renewable energy source
SF6 – sulphur hexafluoride
SPA – sale and purchase agreement
SRF – solid recovered fuel
UNFCCC – United Nations Framework Convention on Climate Change
VA – voluntary agreement
VOC – volatile organic compound

1 Introduction

Estonia is a Party to the United Nations Framework Convention on Climate Change (UN FCCC) and the Kyoto Protocol. Under these international agreements Estonia is committed to provide annually information on its national anthropogenic greenhouse gas emissions by sources and removals by sinks for all greenhouse gases not controlled by the Montreal Protocol. As a member of the European Union (EU), Estonia has obligations also under the EU monitoring mechanism provided by the Decision 280/2004/EC of the European Parliament and the Council.

According to the EU monitoring mechanism Member States have an obligation to prepare every two years report including information on national policies and measures for the assessment of projected progress. Estonia's 2013 report on policies and measures is comprised of this report and a reporting template (an Excel-file).

Chapter 2 provides general information on national policies and measures. Projected greenhouse gas emissions are presented in Chapter 3. Chapter 4 includes information on Kyoto mechanisms and Chapter 5 information on activities under Articles 3.3 and 3.4.

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2 Policies and measures

2.1 General background

2.1.1 Strategy documents

The *Estonian National Strategy on Sustainable Development – Sustainable Estonia 21*, is the most general national strategy document aimed at developing the Estonian state and society until the year 2030 integrating the economic factors with the principles of sustainable development. The strategy was compiled under the coordination of the Estonian Ministry of the Environment (MoE) in close cooperation with experts and stakeholders from various institutions, and its approval was preceded by a thorough public discussion. The strategy document was approved by the Parliament (Riigikogu) in 2005. Among the four main goals of the strategy there is one that requires sustaining the ecological balance in all planned activities. As sub-goals of the aim to achieve an ecological balance the following are indicated:

- the use of natural resources in the way and in amounts that ensures an ecological balance is maintained;
- reduction of pollution;
- preservation of biological diversity and natural areas.

The national strategy is based on the *Sustainable Development Act*[1], adopted by the Parliament in 1995, which establishes, first and foremost, the principles for the sustainable

use of the natural environment and natural resources. No separate plan has been compiled to implement the National Strategy on Sustainable Development. The strategy is being implemented through different sectorial strategies and development plans.

More concrete long-term environmental development objectives are formulated in the *National Environmental Strategy until 2030* that was endorsed by the Parliament in 2007. Also in 2007, the Government approved the *Environmental Action Plan for 2007-2013* prepared by the MoE. The plan identifies basic activities that help to achieve the goals set in the longer-term environmental strategy. Among others, the plan establishes measures for reduction of waste generation, for balancing the use of forests, for eliminating the use of substances depleting the ozone layer, for developing an environment-friendly and comfortable public transport system, etc. The plan includes both EU-oriented and national activities, for example reducing environmental impact of the energy sector and elimination of residual pollution. The estimated implementation costs of the action plan valid until the year 2013 amount to more than 4.88 billion EUR (in 2006 prices). The planned total budget for measures mitigating the climate change and improving the quality of ambient air is 3.11 billion EUR (2006).The financing comes mainly from various EU funds, as well as from the state, local governments' budgets, and from companies.

High priority to environment issues has also been given in documents of current policy. These items are emphasized in the *Action Plan for the years 2011–2015* of the Government

[1] Texts of all Estonian legal acts (in Estonian) are available at the homepage of the *State Gazette* (Official Journal): www.riigiteataja.ee

appointed in March 2011. For example, as to environment there are two major goals set by 2015:

- to increase the share of renewables in final energy consumption up to 23.6%;
- to stabilize the total GHG emissions at the level of 2010 (20 Mt $CO_{2\ eq}$).

It has to be emphasized that according to Regulation no. 302 of the Government (13 December 2005) *The types of strategic development plans and the procedure for drafting, amending, evaluating and reporting on their implementation*, all the strategic development plans for increasing the country's competitiveness and for sustainable development should be taken as a basis when compiling sectorial development plans.

2.1.2 Legislation

The *Sustainable Development Act* prescribes the principles of sustainable development, thus serving as a basis for all environment related legislation and relevant national programmes. Therefore, the legal acts regulating the energy, industrial and transport sectors, i.e. the sectors that are the largest emitters of greenhouse gases; usually take into account major environmental issues.

The *Ambient Air Protection Act* regulates activities, which discharge 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. The main objective of the Act is to maintain the quality of the ambient air in areas where the quality of the air is good and to improve the quality of the ambient air in areas where the quality of the air does not conform to the requirements. The Act stipulates that activities for the reduction of climate change have to be organised by the MoE. The Act also provides that the possessors of pollution sources must take additional measures to reduce the emission levels of carbon dioxide and other GHG. The Act has been amended in numerous cases. For example, the latest amendment (in force since 15 July 2012) provides F-gases related requirements. A great number of secondary level legal acts have been issued on the basis of this Act.

The *Environmental Monitoring Act* provides requirements for the organisation of environmental monitoring, the procedure for processing and storing data obtained, and the relations between persons carrying out environmental monitoring and owners or possessors of immovable. The environmental monitoring is defined as the continuous observation of the state of the environment and the factors affecting it, with the main purpose to predict the changes in the state of the environment and to obtain data for programmes and plans, as well as for the preparation of development plans.

The *Environmental Register Act* provides the basis for the data entry regarding natural resources, natural heritage, the state of the environment and environmental factors in the environmental register, for the retention of data in the register and for the processing and release of the data.

The *Environmental Impact Assessment and Environmental Management System Act* provides legal basis and procedure for assessment of possible environmental impact, organisation of eco-management and audit scheme. The Act also forms legal bases for awarding eco-label in order to prevent environmental damage and establishes liability upon violation of the requirements of the Act. The Act specifies the procedure and principles of environmental impact assessment; especially the strategic assessment is regulated in detail. The strategic environmental assessment is made mandatory in the case of national, county and local plans and programmes.

The *Environmental Supervision Act* defines the nature of environmental supervision, establishes the rights and obligations of persons and agencies who exercise environmental supervision, the rights and obligations of persons and agencies which are subject to environmental supervision, and the procedures for supervisory operations.

The *Environmental Liability Act* is targeted to more effective implementation of the "polluter pays principle" and more efficient reaction to environmental damage. The act specifies the procedures for prevention and cure of environmental damage, which ensures the restoration of the environment by those who cause the damage.

The *Integrated Pollution Prevention and Control Act* determines the environmentally hazardous activities and lays down the bases for the integrated prevention and control of pollution arising from such activities, in order to prevent or reduce the harmful effect of human activities to the environment.

Some of the acts described above will be repealed and replaced with the new acts in near future as the process of the environment related legislation reform has been started. In February 2011, a new framework law was approved by the Parliament – the *Environment Code – General Provisions*. The preparation of more detailed specific acts to be enforced in frames of the legislation reform is in progress. For example, in December 2012 the draft of the *Industrial Emissions Act* was approved by the government. The new act will harmonize the provisions of the Directive 2010/75/EC on industrial emissions (integrated pollution prevention and control). This act will be enforced in May 2013.

The *Electricity Market Act* regulates the generation, transmission, sale, export, import and transit of electricity and the economic and technical management of the power system. Regarding the planning for development of electricity sector it is stipulated in the Act that every three years, the Ministry of Economic Affairs and Communications (MoEAC) has to prepare a development plan for the electricity sector and submit it to the Government for approval. This plan has to include environmental protection aspects as well.

The *Liquid Fuel Act* prescribes liquid fuel quality requirements and procedures for controlling fuel enterprises. The environmental requirements for fuel quality stipulated by regulations of the MoEAC have become gradually more stringent.

The *District Heating Act* regulates the activities related to heat production, distribution and sale in district heating networks and terms for the connection to the network. The Act provides also that in order to increase energy efficiency, to preserve the quality of the environment and to use natural resources rationally, the Government has to approve an energy conservation programme combined with the related action plan.

The *Product Conformity Act* enforced since 1 October 2010 repealed the *Energy Efficiency of Equipment Act.* The new act provides competence of authorities participating in market surveillance and stipulates that the Technical Surveillance Authority has to exercise state surveillance over compliance of household appliances, heating appliances and devices with energy efficiency, energy performance labels and ecological design requirements.

Due to the large share of buildings in total energy use the improvement of energy efficiency in residential and tertiary sectors has an important role also from the emission reduction aspect. Here the impact of the EU Directive 2002/91/EC and its recast 2010/31/EU on the energy performance of buildings (EPBD) has to be pointed out. In Estonia, the implementation of the EPBD is the responsibility of the MoEAC. The provisions of the EPBD have been transposed into the *Building Act*. Several detailed requirements were enforced using secondary legislation. The most important secondary level act is the regulation (No. 258 of 20 December 2007) of the Government on the Minimum Requirements for Energy Performance of

Buildings. The regulation applies to new buildings as well as the existing ones undergoing major renovation. Since 1 January 2009 the regulation (No. 107 of 17 December 2008) providing the format and issuance procedures for the energy performance certificate of buildings is in force. On 19 January 2009 another regulation (No. 194 of 30 December 2008) related to energy performance certificates entered into force. The regulation provides a list of the types of buildings with floor area 1000 m^2 or more where the certificate must be placed in a prominent place clearly visible to the public. Since 9 January 2013 the same requirement will be applied to buildings with the floor area of at least 500 m^2 (Regulation No. 53, 12.07.2012). Regarding the experts performing energy audits and/or issuing relevant certificates, the Building Act provides that only registered legal persons can issue the energy certificate or perform the energy auditing of buildings. The Estonian Technical Surveillance Authority has the authority to carry out the quality control of energy audits and building energy certificates.

As to impact on environment, the *Organic Farming Act* is important among the legislation regulating the agricultural sector. A number of secondary legislative acts have been issued on the basis of this act for regulating various aspects of organic farming.

The *Forest Act* regulates the sustainable management of forest as a renewable natural resource. The Act provides the legal bases for forest survey, forest planning and forest management. The Act prescribes the obligation to prepare the national forestry development plan at least in every ten years.

The *Waste Act* provides the general requirements for preventing waste generation and the health and environmental hazards arising therefrom. It also prescribes the organisation of the waste management with the objective to reduce the harmfulness and quantity of waste.

2.1.3 Joint Implementation and international emission trading

Estonia is using two out of the three Kyoto flexible mechanisms – Joint Implementation (JI) and International Emissions Trading. According to the National GHG Inventories Estonia's emissions have decreased significantly between 1990 and 1993. Since then the annual emissions have stayed approximately 50% below the 1990 level. That gives a clear indication that Estonia does not have problems with meeting its Kyoto target. As a consequence, Estonia is acting as a seller within both mechanisms. The Clean Development Mechanism is not used as Estonia is not a developing country.

Joint implementation

In 1993 Estonia started cooperation with Sweden in projects preceding Joint Implementation – Activities Implemented Jointly – where no actual emission reductions were transferred. Altogether 21 projects were implemented. Information on these projects is available on the UNFCCC website.

Since 2002, Estonia has been active in carrying out JI projects under the Kyoto flexible mechanisms. JI and CDM as Kyoto flexible mechanisms and their relation to the EU Emission Trading Scheme and the national registry are regulated with the Ambient Air Protection Act.

Since May 2006 the Minister of the Environment has been designated by the Government to sign international agreements for JI projects. The Designated National Focal Point for Joint Implementation is the Ministry of the Environment. Guidelines for the procedure and implementation of the JI projects in Estonia are available on the UN FCCC website. Estonia has twelve JI projects which all have been registered in UNFCCC as Track 1 projects.

Estonia has signed a Memorandum of Understanding for JI projects with Austria, Denmark, Finland, the Netherlands, and Sweden. Also, Estonia has signed the Agreement on a Testing Ground for Application of the Kyoto Mechanisms on Energy Projects in the Baltic Sea Region. Parties to the agreement (Denmark, Estonia, Finland, Germany, Iceland, Latvia, Lithuania, Norway, Poland, Russia and Sweden) agreed to establish a Testing Ground for the Baltic Sea Region to gain experience from and facilitate the use of JI under Article 6 and International Emissions Trading under Article 17 of the Kyoto Protocol and to implement projects generating emission reductions prior to and during the commitment period commencing in 2008, in order to reduce anthropogenic emissions of GHG cost-effectively.

Estonia has seven early mover projects that started generating emission reductions before 2008 and for those years Assigned Amount Units (AAUs) will be transferred to the investor countries. During the commitment period 2008–2012 all projects will generate Emission Reduction Units (ERUs). Execution of JI projects brings additional investments to Estonia in the form of technology and knowledge. So far JI projects have been implemented in cooperation with Finland, Austria, Sweden and the Nordic Environment Finance Corporation as the Fund Manager for the Testing Ground Facility.

By 31 December 2012, twelve projects have been approved, resulting in a total expected emission reduction around 1.34 Mt CO_2-eq. by 2012 (see Table 2.1).

Table 2.1 Emission reduction from JI projects in Estonia (2002-2012)

Project	**Emission reductions, t CO_2-eq.**
Tamsalu District Heating Project	52115
Kadrina District Heating Project	37217
Paide Bioenergy project	139043
Saaremaa Animal Waste Management Project	54063
Virtsu III Wind Power Project	50149
Esivere and Virtsu II Wind Farm	214223
Viru-Nigula Wind Farm	231703
Pakri Wind Farm Project	379139
Jägala-Joa Hydropower Joint Implementation Project	31978
Paldiski Wind Farm	0
Vanaküla Wind Power Project	52656
Tooma Wind Power Project	99469
Total:	**1341755**

International Emission Trading

Estonia has joined to the Kyoto protocol, by which the emission of greenhouse gases has to be reduced by 8% if compared to the year 1990. Actually, a significant emission reduction has taken place. There are a total of 196 million AAUs, out of which 103 million are used for the commitment period reserve. Therefore, the surplus of AAUs can be sold.

In 2010 the Ambient Air Act was amended with provisions on AAU trading and procedures for use of revenues from sales in frames of the Green Investment Scheme (GIS). All revenues from sales of surplus AAUs will be used according to the GIS.

The MoE carries out the negotiations and signs the AAU sale and purchase agreements (SPA). For the sales of AAUs, a government regulation is issued to approve each AAU SPA. The use of AAU revenues exclusively for the GIS is required by the State Budget Act and the government regulation for approving the AAU SPAs.

The GIS provides that the money received has to be directed to environmentally friendly projects aiming to reduce CO_2 and other greenhouse gas emissions. A relatively great number of potential projects have been developed in the ministries for using the money received from the sales of AAUs. By now, the primary fields of investments in frames of GIS include:

- renovation (incl. thermal refurbishment) of buildings;
- efficient and environment benign transport;
- development of wind energy farms;
- efficiency improvements and wider use of renewables in district heating sector.

The concrete projects, to which the proceeds from the sales will be directed, are chosen by the purchasing country.

In Estonia, the actual AAU trading started in April 2010 with the contract of selling unused AAUs to the Republic of Austria. Up to today, the 21 SPAs have been concluded, also with governments and/or companies of Japan, Luxembourg and Spain. By now, Estonia has sold AAUs for more than 388 million euros[2].

2.1.4 Emission trading under the EU Emission Trading Scheme

Estonia's first National Allocation Plan (NAP) for the EU Emission Trading Scheme (EU ETS) for years 2005–2007 included 43 installations. The first NAP for greenhouse gas emission allowances delivered the right to emit 56.7 million tons of carbon dioxide during 2005-2007.

On 30 June 2006 Estonia submitted its second NAP for the EU ETS for the years 2008-2012 to the European Commission for approval. On 4 May 2007, the European Commission published the decision on the second NAP, reducing the total quantity of Estonia's allowances by 47.8 %, to 12.7 million tonnes of carbon dioxide per year. Based on the Decision of the European Commission, the Government of the Republic adopted, on 20 December 2007, the Regulation no. 257 on "Total Allowance of Greenhouse Gases Emitted by Stationary Sources of Pollution and Allocation Plan Thereof for 2008-2012", which was used to implement the EU ETS in Estonia during 2008-2009. On 16 July 2007, Estonia contested the decision in the Court of First Instance of the European Communities. The Court agreed to Estonia's positions and annulled the Commission Decision of 4 May 2007 in its judgement of 23 September 2009. On 11 December 2009, the Commission took a new decision by revoking the Estonia's NAP of 30 June 2006. As requested in the Decision of 11 December 2009 and, Estonia, after numerous consultations with the EC, submitted the revised second NAP to the European Commission for approval in February 2011. In the revised NAP2 Estonia applied for 71.65 Mt of allowances (14.44 Mt/a). In April 2011 the Commission with its decision rejected the revised NAP2 as well. The re-revised plan was compiled and presented to the EC in

[2] More detailed information of the GIS is given in the overview of sectors

September 2011. In December 2011 the EC adopted the NAP2 of Estonia. Finally, the NAP2 for the period 2008–2012 was legally enforced in December 2011 with the Regulation of the Government (No. 183; 22.12.2011). The plan provides the right to emit 66.51 Mt of CO_2 eq. (13.3 Mt/a). This quantity includes reserve of 3.47 Mt of CO_2 eq. for new entrants and JI reserve of 0.99 Mt of CO_2 eq.

Article 10c of the EU Emission Trading Directive (Directive 2003/87/EC as amended by Directive 2009/29/EC) allows several Member States (incl. Estonia) to allocate carbon emission allowances free of charge, provided that the funds are used for modernising the energy system. Estonia has applied for free allocation of certain amount of allowances for electricity sector. In June 2012, the EC concluded that provisions of Estonia's development plan for the electricity sector allocating carbon emission trading allowances free of charge are in line with EU state aid rules. During the transition period (2013–2019) Estonia was permitted to allocate 18 Mt of emission allowances free of charge to electricity producers included in the EU emission credit trading system.

2.2 Overview by sector

2.2.1 Cross-cutting measures

2.2.1.1 National programmes and EU assistance

The National Reform Programme '*Estonia 2020*' (approved by the Government in 2011) established two major priorities of the Government for moving towards environmentally sustainable economy and energy sector:

- implementing long-term structural changes in the energy sector in harmony with Estonia's energy security and energy efficiency objectives;
- reducing the general resource-intensity, including energy intensity of the economy, through increasing energy efficiency.

In the Programme the Government has set an ambitious goal for making final energy consumption more efficient in Estonia – to keep the final energy consumption in 2020 at the same level it was in 2010, i.e. reducing final consumption of energy by approx. 11% compared to the forecast for 2020 (see Table 2.2). Accordingly, final energy consumption in 2015 should not significantly exceed the current consumption and it should remain between 123–125 PJ (approx. 4% lower than the projected level for 2015). Keeping final consumption of energy at the 2010 level will require decreased energy use combined with the increase in energy efficiency.

Table 2.2 Final consumption of energy, PJ

Actual (preliminary)	Targets	
2010	2015	2020
120	123 – 125	120

Regarding GHG emissions the National Reform Programme 'Estonia 2020' provides that according to the EU goals Estonia's emissions from the non-ETS sectors should not increase more than 11% by 2020 compared to the 2005 level. The situation is illustrated in the Table 2.3

Table 2.3 GHG emissions from non-ETS sectors, kt CO2 eq

Actual	Targets	
2005	2015	2020
5627	6183	6246

The level of GHG emissions is related to the plans set in the Programme for the wider utilization of renewable energy sources (RES) developing relevant solutions in all sectors (see Table 2.4).

Table 2.4 Share of renewable resources in final energy consumption, %

Actual	Targets	
2009	2015	2020
19.5%	23.6%	25.0%

The total target is in accord with the Directive 2009/28/EC – Estonia must ensure that the share of energy from renewable sources amounts to 25% of the gross final consumption of energy by 2020. The same directive also provides that each member state shall adopt a national renewable energy action plan. In Estonia the *National Renewable Energy Action Plan up to 2020* (NREAP) was approved by the Government in November 2010 (order No 452, 26.11.2010). The national goals for Estonia in the EU 20-20-20-package require 25% share of energy from renewable sources in gross final energy consumption by 2020 and allow 11% increase of the greenhouse gas emissions outside the emission trading directive scope by 2020, if compared to the 2005 level. The 10% share of renewable energy sources in the road transport fuels by 2020 is an EU-wide common goal. The *National Renewable Energy Action Plan* presents estimations and planned policies and measures for achieving the national targets. *Implementation plan for years 2010-2013 of "National Renewable Energy Action Plan up to 2020"* is also adopted. It has to be noted that the Plan predicted the share of renewable energy in final consumption to be 20.9% in 2010, but, actually, it reached 24.0%.

The improvement of energy efficiency can be considered as a goal of increasing priority for the Government. The *National Energy Efficiency Programme for 2007–2013* has been prepared, through which investments will be made in energy efficiency, relevant information will be made more widely available and consumers will be informed about the opportunities to conserve energy. The Programme is one of the documents prepared for implementation of the National Long-term Development Plan for the Fuel and Energy Sector Until 2015 that was approved by the Government of the Republic in December 2004. The Energy Efficiency Programme determines areas that need to be prioritised in order to meet fuel and energy saving goals. The Programme also sets strategic aims and objectives for priority areas, as well as measures for achieving these objectives. It also takes into account the task of achieving the indicative energy conservation objective set by the Directive 2006/32/EC, i.e. saving of 9% of final energy consumption during the period of 2008–2016. The main objectives of the Programme are:

- dissemination of energy efficiency information;
- availability of skills and experts;
- increasing efficiency in the consumption, production and transfer of fuels and energy;
- performing tasks arising from the EU energy efficiency policy.

In the Programme it is estimated that for investments aimed at increasing efficiency in the fields of consumption, production and transfer of fuels and energy a total of 96.0 MEUR is needed during the period up to 2013.

In September 2011, the MoEAC presented the mid-term overview of implementation of Energy Efficiency Plan 2007–2013 and further implementation plan that was presented to the EC as the *Second energy efficiency action plan of Estonia* (NEEAP2). The action plan focuses on the following aspects of energy efficiency:

- continued support programmes for energy conservation activities in apartment blocks;
- a new measure for energy conservation in small houses;
- implementation of the programme for renovation of public sector buildings;
- improving energy efficiency for increasing the competitiveness of industry and small enterprises;
- energy conservation in the transport sector;
- energy efficiency in the service sector;
- improving the quality of implementation of the energy conservation policy.

In May 2011 these topics had been discussed in the Parliament among issues of national importance.

The NEEAP2 includes 99 measures for increasing energy efficiency in all sectors. In the current document, the key measures are described in sector overviews.

In NEEAP2 (as well as in NREAP) there is presented a long-term forecast of the final energy consumption in Estonia by the year 2020 (see Table 2.5). The forecast was compiled by the MoEAC when drawing up the NREAP until 2020. According to this forecast, Estonia's final energy consumption would be 137 PJ in the case of the basic (reference) scenario and 131 PJ in the case of the additional energy efficiency scenario in 2020.

Table 2.5 Final Consumption of energy by sector, PJ

Sector	2009	2020	
		Reference scenario	Efficiency scenario
Industry	20.9	36.5	35.6
Agriculture	3.7	4.7	4.6
Transport	20.3	26.8	26.2
Services	16.7	16.9	16.4
Households	51.3	52.1	48.1
Total	**112.9**	**137.0**	**130.9**

In Estonia, oil shale is the main domestic fuel, therefore to ensure the long-term balanced use of it, the *National Development Plan for the Use of Oil Shale 2007–2015* was prepared to specify the plans for use of oil shale as a nationally strategic indigenous energy resource. These plans include also an assessment of the use of shale fuel oil and oil shale gas taking into account economic, social, security and environmental issues. In the Plan, the upper limit on amount of annual mining of oil shale has been set at 20 million tons with the intention to

reduce it to 15 million tons by 2015. The Plan was endorsed by the Parliament in October 2008. In current legislation, the limit of 20 million tons is set.

During the period of 2007–2013, EU funds are available for Estonia to a greater extent than earlier. In Estonia, planning of EU structural assistance for years 2007–2013 was performed in frames of the general state budgetary strategy preparations. The current *National Strategic Reference Framework 2007–2013* (NSRF) presents the general strategic objectives and priorities for developing the policy areas and sectors that are eligible for EU structural assistance in the years 2007–2013. At the same time, it enables to plan jointly both the activities co-financed from EU funds and the activities financed solely from Estonian own budgetary funds. Joint planning and coherent implementation raises the effectiveness and efficiency of public sector activities. At the same time, planning of structural assistance within the framework of preparing the general state budget strategy also helps to align the structural assistance best with the use of other EU financial instruments and external resources. Considering the importance of assistance issues a relevant law – *2007–2013 Structural Assistance Act* – was passed by the Parliament in 2006.

Based on the strategy, the operational programmes (OP) were prepared to specify the activities that will be co-financed from EU structural assistance and the volumes of the respective financing. These OPs are implementation documents of the NSRF in the domain of activities co-financed from EU structural assistance. Environment related issues are included mainly in the *Operational programme for the development of the living environment* (OP 2) which includes the following priority axes:

1. development of water and waste management infrastructure;
2. development of infrastructure and support systems for sustainable environment use;
3. development of energy sector.

Measures and investments related to transport sector are included in the *Operational programme for the development of the economic environment* (OP 3).

During the EU financial period of 2007–2013, the EU funds for supporting agriculture and fisheries are not regarded as structural assistance anymore as it had been in 1999–2006. Therefore, the planning for the use of respective funds is undertaken separately from structural assistance planning – although in the same general framework of the State budget strategy 2007–2010 preparations. The *Rural Strategy 2007-2013* as a strategic document and the *Rural Development Plan 2007–2013* (RDP) as its implementation document are bases for using the resources of European Agricultural Fund for Rural Development. Environment related issues are included mainly in the following priority axes of the RDP:

1. improving the competitiveness of the agricultural and forestry sector;
2. improving the environment and the countryside.

To promote the use of biomass and bio-energy, the Government has approved (in January 2007) the *Development Plan 2007-2013 for Enhancing the Use of Biomass and Bioenergy*. The objective of the plan is to create favourable conditions for the development of domestic biomass and bio-energy production to reduce Estonia's dependence on imported resources and fossil fuels and decrease pressure on the natural environment. The measures of the development plan are directed at supporting the research and development of biomass and bio-energy and at raising the awareness of consumers, operators and market regulators. After carrying out appropriate analyses, the employment of different market based instruments will be considered to promote the use of biomass and bio-energy. Investment in bio-energy

production will be supported using the measures of the *Estonian Rural Development Plan 2007-2013*.

As required by the Directive 2001/81/EC (on national emission ceilings for certain atmospheric pollutants), the *National Programme for Reduction of Air Pollution from Stationary and Mobile Sources for years 2006–2015* was compiled and presented to the EC in December 2006. The programme covers measures for emission reduction of following substances: SO_2, NO_x, NH_3, VOCs, solid particles (PM_{sum}), heavy metals, and persistent organic pollutants.

For administrating the environment related financial support measures, the foundation Environmental Fund was established in 1993. In 2000 the Environmental Fund was reorganized to Environmental Investments Centre (EIC). The main goal of EIC is to channel the proceeds from the exploitation of the environment into environmental projects, to perform as the implementing agency for the environmental projects funded by the European Regional Development Fund (ERDF), the European Social Fund (ESF) and the Cohesion Fund (CF) and to lend money for the implementation of environmental projects. Since 2010 the EIC also acts as the implementing agency for the Green Investment Scheme, i.e. selling the excess CO_2 quota (AAUs) and supervising the relevant investments. In 2011, EIC distributed foreign aid (ERDF and CF, other smaller EU grant funds), including co-financing, for 149 MEUR in total, which is twice as much as in 2010, when the foreign aid and co-financing was 74 MEUR.

2.2.1.2 Fiscal measures

The fiscal measures having impact on GHG emissions in Estonia include excise duties and pollution charges.

Excise duties

As a Member State, Estonia has to comply with the EU requirements (Directive 2003/96/EC) for the taxation of fuels and energy. Nevertheless, Estonia has been granted some transitional time for the introduction of relevant taxes. Regarding oil shale, Directive 2004/74/EC stipulates that until 1 January 2013 Estonia is allowed to apply a reduced level of taxation for oil shale, provided that it does not result in taxation falling under 50% of the relevant Community minimum rate as from 1 January 2011. Regarding shale oil (oil produced from oil shale), Estonia was eligible to apply a transitional period until 1 January 2010 for adjusting the national level of taxation on shale oil used for district heating purposes to the EU minimum level of taxation. Nevertheless, Estonia had already introduced the tax on shale oil by that date. The tax exemption for natural gas (methane) is permitted by Directive 2003/96/EC, which allows an exemption on natural gas in those Member States where the share of natural gas in energy end-use was less than 15% in 2000. The exemption applies for a maximum of ten years after the directive's entry into force or until the national share of natural gas in energy end-use reaches 25%, whichever comes first. Actually, Estonia imposed excise duty on natural gas since 1 January 2008 already. Directive 2004/74/EC allowed Estonia to apply a transitional period until 1 January 2010 to introduce the output taxation on electricity. Despite this exemption, Estonia introduced excise duty on electricity on 1 January 2008. It has to be noted that some excise rates exceed the minimum level provided by the Directive 2003/96/EC, e.g. for light fuel oil (gas oil) the rate is 5.3-fold, for electricity 4.5-fold (non-business use) or 8.9-fold (business use).

The current tax rates stipulated in the Alcohol, Tobacco, Fuel and Electricity Excise Duty Act are presented in Table 2.6

Table 2.6 Excise tax on fuels and energy (as of 1 March 2013)

Fuel / energy type	Unit	EUR/unit
Unleaded petrol	1000 l	422.77
Kerosene	1000 l	330.10
Gas oil (diesel fuel)	1000 l	392.92
Gas oil fuel for specific purposes	1000 l	110.95
LPG	t	125.26
Gas oil (light fuel oil)	1000 l	110.95
Heavy fuel oil	t	15.01
Shale oil	t	15.01
Coal, coke	GJ	0.30
Natural gas (as heating fuel)	1000 m^3	23.45
Oil shale	GJ	0.30*
Electricity	MWh	4.47

The amendment (was enforced in 2005) to the Act stipulates that if biofuel has been added to motor fuel or heating fuel, the portion of biofuel contained in the fuel is exempt from excise duty. This provision, considered as state aid, needed approval from the European Commission (EC). In July 2005 the EC granted Estonia the relevant right: Estonia was authorized to exempt (until July 2011) from excise duty non-synthetic biodiesel, vegetable oils made from biomass, and bioethanol made from agricultural or plant products. It was not applied for the continuation of the exemption as the analysis of the exemption results indicated that it had almost no impact on the introduction of biofuels in transport – the relevant share in total consumption of motor fuels was only 0.2% (2010).

Pollution charges

The Government's tax policy is based on objectives aimed at reducing environmental impact by increasing the rates of charges on pollution and resource use. According to the *Environmental Charges Act*, pollution charges and charges on the use of natural resources will be gradually increased in the following years. The sums derived from environmental charges go to the state budget and are mainly directed to environmental protection projects through the Environmental Investment Centre.

In Estonia the pollution charge for release of carbon dioxide into ambient air was introduced in 2000. Currently, the *Environmental Charges Act* (enforced in 2006) obliges the owners of combustion equipment to pay pollution charges for several pollutants emitted into air. The pollution charge in the case of emissions into ambient air has to be paid by all enterprises that are required to have an air pollution permit. According to the regulation of the Minister of the Environment the air pollution permit is obligatory for all enterprises which own and operate combustion equipment (utilizing solid, liquid or gas fuel) with rated capacity equal to or higher than 0.3 MW in one location. As an exception, the CO_2 charge has to be paid only by enterprises producing heat. Since 2009 the rate of the CO_2 charge has been 2 EUR/t. In the

case of CO_2 emission in larger quantities than provided in the emission permit higher charge rates shall be applied: since 1 January 2008 the penalty rate is 100 EUR/t. Installations that emit nitrous oxide into ambient air also have to pay pollution charge. Methane and fluorinated gases (HFC, PFC and SF6) are not subject to pollution charge.

In addition to direct pollution charges for CO_2 the taxation of emission of other pollutants has an indirect effect on the consumption of fuels towards more environment benign use. As to other pollutants, there is a charge for emitting into air:

- sulphur dioxide;
- carbon monoxide;
- particulates;
- nitrogen oxides;
- volatile organic compounds;
- mercaptans;
- heavy metals.

As to other pollution, the same act stipulates charges for pollution of water bodies as well as soil. In the act the gradual increase of pollution charge rates is provided up to the year 2015.

As an exception, the Environmental Charges Act provides a possibility to replace the pollution charge (incl. CO_2 charge) with the environmental investment by enterprises. The financing shall replace the pollution charge if the polluter implements, at its expense, environmental protection measures which reduce pollutants or waste 15% from the initial value.

***

Environmental taxes are economic instruments which should, in the long run, result in the reduction of negative environmental impact. The total income from environmental taxes in 2011 was 449 MEUR, of which fuel and electricity excise duties accounted for 87%, pollution taxes for 8%, transport taxes for 2% and resource taxes for 3%. Fuel excise duty alone gave 80% of the total environmental tax revenue. Environmental taxes formed 14% of overall tax revenue. In Estonia, the share of environmental tax revenue in the GDP was 3% in 2009, which was above the EU average. For comparison, it has to be noted, that in 2010 production enterprises (whose main activity is not environmental protection) spent 135.4 MEUR on environmental protection. Investments in integrated environmental technologies amounted to 3.9 MEUR, while 59 MEUR was invested in the end-of-pipe technologies, i.e. for the elimination of already generated pollution. Investments in environmental technologies accounted for 6.1% of all environmental investments.

2.2.2 Energy supply

2.2.2.1 General development programmes

Regarding energy sector, Estonia's second *National Long-term Development Plan for the Fuel and Energy Sector until 2015 (*approved by the Parliament in 2004) was replaced in 2009 with *National Development Plan of the Energy Sector until 2020*. The present structure of strategy documents for developing the energy sector is presented in Figure 2.1.One plan – Development Plan for Heat supply (in italics in the figure) – has not been prepared yet.

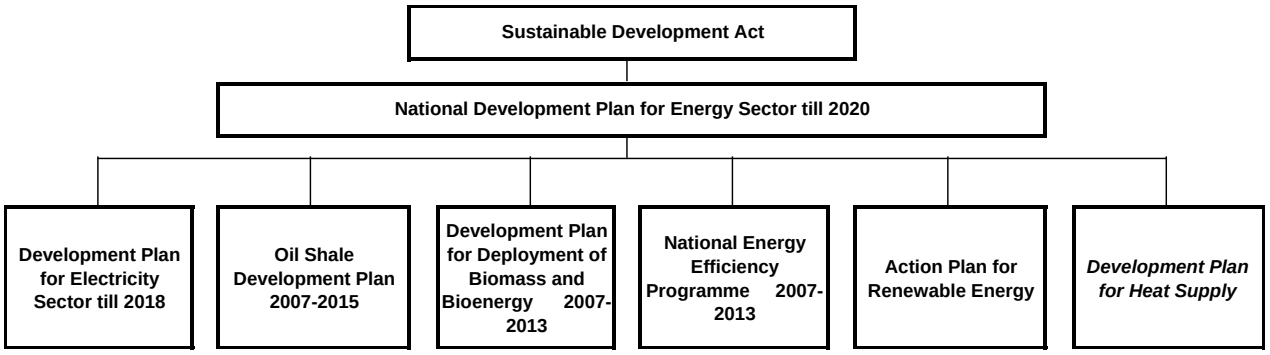

Figure 2.1 The current structure of strategy documents for the energy sector

The *National Development Plan for Energy Sector until 2020* was passed by the Parliament in June 2009. The plan defines the mission of Estonia's energy sector: to ensure a steady, efficient, environment benign energy supply with reasonable prices, while also ensuring the sustainable use of energy. In the plan three groups of major goals are set, all accompanied with relevant sets of specified measures:

- continuous energy supply is ensured for the Estonian population (five measures);
- energy supply and consumption is more sustainable in Estonia (six measures);
- energy supply at a justified price has been ensured for consumers (five measures).

The major measures (or sub-measures) to be taken that have some impact on the emission of GHGs include:

- developing and applying support schemes for the use of renewable energy;
- preparation and implementation of measures fostering the cogeneration of heat and electricity;
- further development of energy efficiency in all sectors;
- improving the energy efficiency of oil shale use;
- developing and introducing up-to-date energy technologies;
- elaboration and implementation of the action plan for the deployment of renewable energy;
- elaboration and implementation of the action plan for heat supply (district heating) systems;
- transposition and implementation of the EU regulations on sustainable energy use;
- analysis of taxation alternatives for the energy sector.

Neither the more detailed scope nor the impact of the planned measures on the emission of GHGs has been indicated in this development plan. The most general measurable target of the plan is the gradual reduction of primary energy use (total primary energy supply) which in 2007 was 124.44 PJ. For several measures, target level indicators have been set. Some quantitative indicators related to the emission of GHG are presented in Table 2.7..

Table 2.7 Key indicators for energy sector development

Indicator	Current level[1)]	Target level
Share of oil shale in meeting the domestic energy	45% (2007)	<30% (2020)
Shares of other energy sources in energy balance	Every source <20% (2007)	Every source <20% (2020)
Share of renewables in energy end-use	17.5% (2006)	25% (2020)
Share of CHP electricity in gross electricity use	10.2% (2007)	20% (2020)
Energy saving (annually)	5 TJ (2007)	9 800 TJ (2016)
Share of renewables in the fuel use of transport	0.06% (2007)	10% (2020)
CO_2 emissions from the energy sector	15.7 Mt (2007)	7.85 Mt (2020)

1) indicator level presented as current in the Plan

As to other targets related to emissions indirectly, it has been established that the losses in electricity and district heating networks must have a declining trend from the current level – in 2007 the average losses had been 11.1% and 10.6% respectively.

Activities provided in the development plan will be financed from the state budget and from the budgets of energy companies. The amount of state expenditures on the activities planned will be approximately 2 045 MEUR until 2020. Together with the involvement of private capital and loan capital, the full implementation of the *Development Plan for the Energy Sector* will cost more than 6 000 MEUR. The final actual amount of investments will depend on administrative and political decisions.

Currently, a new *Development Plan for the Energy Sector 2030+* is under development. It is planned to be finished in October 2013.

The development of environment benign technologies has been defined as one of the priority areas for the *Estonian Research and Development and Innovation Strategy for 2007–2013*. In connection with this, the *National Energy Technologies Programme* has been prepared in 2007. The programme is directed at promoting the energy sector and making it more efficient. The bulk of the programme deals with the development of technologies related to renewable energy sources. The other two fields of the programme are the development of oil shale technologies and of new energy technologies. The programme supports product development as well as both fundamental and applied studies. For the development of innovative environmental technologies, the funds allocated to Estonia through the EU structural funds will be used.

2.2.2.2 Electricity generation

Regarding pollution, the most important part of the energy sector is the combustion of oil shale, as the major share of emissions are discharged by the oil shale based power industry. Introduction of new combustion technology has allowed reducing emissions from oil shale firing power plants which give more than 80% of electricity generation in Estonia. At the same time, the wider use of renewable energy sources in electricity production enables to reduce GHG emission from power sector significantly.

National Development Plan for Electricity Sector until 2018

The major national level document aiming at the electricity sector is the *National Development Plan for Electricity Sector until 2018* (NDPES 2018) approved by the Government in February 2009. The plan foresees a significant decrease of electricity production from oil shale and an increase in the proportion of other sources of energy. The construction of Estonia's own nuclear power plant is considered as a potential development option.

In the plan, it is emphasized that Estonia's electricity sector requires essential changes as the impact of electricity generation on the environment has to be reduced. This process is also affected by the need to use the resources of oil shale in a more sustainable way. Therefore, the plan provides scenarios for the restructuring of electricity production in Estonia within the next 10–15 years. For that purpose, the combined heat and power production should be expanded from the existing level of 200 MW to 300 MW by 2014 and two more units in Narva power plants with the total capacity of 600 MW should be reconstructed. Also the capacity of wind turbines (mainly wind farms) may be increased significantly (up to 900 MW) together with the required capacity reserves.

Also, the plan considers the option of constructing of a nuclear power plant in Estonia by 2023. It is noted that this option requires relevant amendments in the legislation to be made by 2012[3].

Estonia has exported a large share of the generated electricity, e.g. ca 20% in 2007 (in 2011 the net export made up 27.6% of the gross production). The plan stipulates the construction of a second submarine cable (EstLink 2) to Finland. Nevertheless, it is emphasized that after 2015 satisfying the domestic demand has to be the priority for electricity producers in Estonia and therefore relevant amendments in the legislation are planned for.

Regarding the options for electricity generation, the plan considers four main development scenarios. The projected annual increase rate of the peak load is 1.6–3.8%, the average taken to be 2.3%/year. As to consumption, the target is set to keep the domestic final consumption of electricity at the current level or lower (7 180 GWh in 2007). The main precondition is that the whole electricity demand (peak load of 1 800 MW in 2016) has to be covered by domestic generation. All scenarios include the following common elements for generation:

- the currently used oil shale based units with fluidized bed boilers are still in operation;
- at least 200 MW of cogeneration units firing various fuels;
- some old units of oil shale pulverized combustion with desulphurization equipment.

In the proposed scenarios these elements are combined with the following generation options:

- wind turbines (onshore and offshore wind farms);
- additional oil shale based units with fluidized bed boilers;
- units of oil shale pulverized combustion with flue gas cleaning equipment;
- gas turbines firing various fuels (for covering peak loads and for coping with the intermittency of wind generation);
- combined cycle power plants firing coal;

[3] Regarding nuclear energy, no legislation has been adopted or drafted (as of August 2012)

- nuclear energy – either imported from Lithuania and/or Finland or generated in Estonia.

The plan establishes measures for improving efficiency as well for managing the demand for electricity, for example:

- impact analysis of increasing the changing rates of excise duties and environment (pollution) charges;
- gradual internalization of environment related external (life cycle) costs;
- analysis and adjustment, if needed, of support schemes for the use of renewables and of cogeneration schemes in electricity production;
- deployment of energy audit system and running energy efficiency/saving campaigns.

Some quantitative indicators related to the GHG emission are presented in Table 2.8.

Table 2.8 National Development Plan for Electricity sector until 2018

Indicator	**Current level** [1)]	**Target level**
Share of renewable electricity in gross electricity use	1.5% (2007)	5.1% (2010) 15% (2015)
Share of oil shale based electricity in gross electricity production	93.6% (2007)	<70% (2018)
Share of CHP electricity in gross electricity use	10.2% (2007)	20% (2020)
Electricity end-use	7 180 GWh (2007)	max 7 180 GWh (until 2015)
Households' electricity use (per capita)	1 320 kWh (2007)	EU27 average (2018)
Losses in electricity transmission networks	3.0% (2007)	<3% (2015)
Losses in electricity distribution networks	7.8% (2007)	<6% (2015)
CO_2 emissions from the electricity sector	15.7 Mt (2007)	5 Mt (2018)

1) indicator level presented as current in the Plan

The activities provided in the plan will be financed from the state budget and from the budgets of energy companies. The amount of state expenditures on the activities planned in the electricity sector will be approximately over 1 100 MEUR until 2018. The final amount of investments will depend on administrative and political decisions.

The latest actual development

The development of oil shale based power production using environmentally sound technologies is an issue of growing priority in Estonia. In order to comply with the requirements of Directive 2001/80/EC the owner of the largest power plants, Eesti Energia AS, has to reconstruct several units in the power plants of Narva Elektrijaamad AS (Narva Power Plants, including Eesti and Balti plants). Up to 2004, only the pulverized combustion technology of oil shale had been used in these power plants. The electricity generation based on the oil shale pulverized is characterized by a low net average efficiency: 27–29%. This, together with the peculiarities of oil shale as a fuel, resulted in an extremely high specific emission of carbon dioxide per generated electricity – approximately 1.2 t CO_2/MWh_e. The use of pulverized combustion method also causes a high emission of SO_2 and solid particles. All these factors have rendered it unacceptable to continue using this technology in mid- and long-term future.

Therefore, the gradual replacing of oil shale pulverized combustion with the circulating fluidized bed combustion (CFBC) method was started. In CFBC boilers the sulphur is better

bound with the ash and therefore the SO_2 emission can be reduced significantly. The higher combustion efficiency reduces fuel consumption, which in turn means substantially lower CO_2 emission as well – approximately 0.9 t CO_2/MWh_e. The first two new units (both 215 MW) in Narva Elektrijaamad AS, one at the Eesti and the other at the Balti Power Plant, equipped with new CFBC boilers, were commissioned in 2004. The NDPES 2018 foresees the building of two more CFBC units. In May 2012, the construction of a new 300 MW_e CFBC based power plant was started in Auvere. The owner, the state owned Eesti Energia AS, has planned to commission the new plant by the end of 2015. The decision regarding reconstruction of another 300 MW unit will be made later.

Nevertheless, the Eesti Energia has gradually improved the environmental performance of oil shale firing power plants. Investments have been made in flue gas, sulphur and nitrogen emissions purification, in order to comply with the new stricter environmental requirements.

An additional source for investments is related to the EU ETS during the third period. During the transition period (2013–2019) Estonia was permitted to allocate 18 Mt of emission allowances free of charge to electricity producers belonging to the EU emission credit trading system. In June 2012 the EC concluded that provisions of Estonia's development plan for the electricity sector allocating carbon emission trading allowances free of charge are in line with EU state aid rules. According to the estimation by the EC the total value of emission allowances allocated to Estonia free of charge is approximately 371 MEUR that has to be used for modernising the production infrastructure, diversifying the energy mix and for building new installations to replace out-of-date capacity. This will contribute to liberalising energy markets, reducing GHG emissions and increasing the security of supply.

Special attention has been paid to the promotion of renewable energy in producing electricity. In 2010 the Government approved a new *National Renewable Energy Action Plan until 2020* and its implementation plan for years 2010–2013. According to the RES Directive 2009/28/EC Estonia has to increase the share of renewable energy sources in total energy consumption up to 25% by 2020. The plan includes implemented and planned policies and measures to meet the target by 2020. This plan includes even more ambitious objective regarding wind energy. The target is to produce up to 1 500 GWh of wind electricity annually.

The primary measures to support energy generation from renewable resources are feed in-tariffs and investment support. Feed-in tariffs are also provided for efficient heat and power cogeneration (CHP) plants. The major sources of investment support are:

- the funds of EU structural assistance combined with Estonian own budgetary sources;
- GIS based on revenues from sales of surplus AAUs.

The investment support for electricity production is targeted to plants utilizing renewable sources. The support measures for CHP plants are described in Heat Production section of the current report. Wind based electricity production is currently supported according to provisions of the Regulation of the Minister of EAC (No. 85, 15.10.2010). Since then, three new wind energy farm projects have received investment support of 19.85 MEUR in frames of the GIS.

In addition to investment grants the operational support for production of electricity from renewable sources and for efficient CHP is available. The support measure was introduced by the *Energy Act* in 1998 and in 2003 continued with the provisions of the *Electricity Market Act.* For a long period the feed-in type support was combined with the obligation for electricity network enterprises to purchase renewable electricity. At present, the *Electricity Market Act* (§59^1) provides that a producer can apply for the feed-in premium type of support if the electricity has been generated from renewable sources, from biomass in a cogeneration

process, or in an efficient cogeneration process, the latter was introduced in 2007. The support is in force during first 12 years since commencing the generation. For the wind based electricity, there is fixed the upper limit – the support is paid until the total amount of 600 GWh electricity is generated from wind power in a calendar year.

Electricity producer is eligible to receive operational support in cases indicated in the Table 2.9.

Table 2.9 Support for renewable or efficient CHP based electricity production (2012)

Support rate	**Electricity source**
53.7 EUR/MWh	Renewable sources, except biomass
	Biomass, in cogeneration regime
32.0 EUR/MWh	Waste (as defined in the Waste Act), peat or oil-shale processing retort gas, all only if in efficient cogeneration regime
	Generation capacity not exceeding 10 MW_e in efficient cogeneration regime

The support is paid by the transmission network operator (AS Elering) and funded by all electricity consumers according to the volume of network services used and the amount of electricity consumed. In 2011, the total sum of paid operational support was 61.9 MEUR, including 57.2 MEUR for renewables based electricity. The tariff rate for consumers was 0.615 euro cents per kWh, the rate in 2012 being 0.970 euro cents per kWh.

It has to be noted that the system of operational support, both the principles and rates, is in the modification process – several significant amendments into Electricity Market Act have been proposed by the MoEAC for approving by the Parliament. There are plans to connect the support rates with the price of electricity at free market, and to reduce some of rates.

The EU had set the 5.1% renewable electricity target (share in gross inland consumption) for Estonia by 2010. The actual share was 10.8% in 2010 and 12.7% in 2011 (preliminary data). As a result of operational support schemes, since 1998, when the feed-in tariffs were introduced, the generation of renewable electricity has gradually increased reaching 62-fold in 2010 (1 046 GWh), from 17 GWh in 1998. If this quantity (1 046 GWh) was generated in oil shale based electricity plants this would mean the emission of approximately 1 015 thousand t of CO_2.

The rapid increase has taken place as the result of wider deployment of wind energy, and during last two-three years also due to firing biomass in new CHP plants and co-firing wood chips with oil shale in large power plants. In 2010, the installed capacity of wind generators reached 108 MW, by the end of 2011 the capacity was already 184 MW and the electricity generation increased by 32.5% if compared to 2010. In 2012, three new wind farms have been commissioned: in Paldiski two farms (both 25 MW) and one farm (39 MW) on the former ash field of the Narva Power Plant.

As to biomass firing, three new private owned efficient cogeneration plants have started operation in recent years:

- Tallinna Elektrijaam in Väo – 21 MW_e/49 MW_{th}; in 2009;
- Tartu Elektrijaam (AS Fortum Tartu) – 25 MW_e/50 MW_{th} ; in 2009;
- Pärnu Fortum Eesti AS plant – 24 MW_e/48 MW_{th}; in 2010.

All three new plants use primarily wood chips but also wood waste and peat as a fuel. Also, several smaller cogeneration plants are under planning or construction. In addition to planned plants firing wood chips there are four new CHP plants firing biogas under construction (see section Heat production).

In 2009, the state-owned power company Eesti Energia AS started co-firing of oil shale with wood chips in the largest power plants (Balti and Eesti), in CFBC units in particular. Since mid-2010 the co-firing takes place in Balti PP only. Initially, the share of wood chips was ca 10% of total fuel input, but later the higher shares (up to 50%) were tested and used. Such practice reduces the impact on environment significantly. For example, Eesti Energia AS has announced that the co-firing of wood chips in Balti PP in 2011 has enabled to replace 400 kt of oil shale, resulting in reduction of the CO_2 emission by 380 kt. Additionally, the SO_2 emission was lower and 180 kt less of oil shale ash was emitted. Still, Eesti Energia AS has emphasized that the extent of wood chips use in oil shale firing power plant will depend primarily on the conditions of feed-in tariff changes planned by the Government.

Regarding the use of oil shale in electricity production, it is proposed in the National Electricity Sector Development Plan until 2018 to increase the net efficiency of oil shale based electricity generation up to 35%, but at the same time to gradually reduce the share of oil shale electricity in the gross consumption of electricity. Also, it has to be emphasized, that Directive 2010/75/EU on industrial emissions (integrated pollution prevention and control) set out stricter limit emission values for SO_2, NO_x, CO and dust emitted by combustion plants. The energy units in Balti and Eesti PP that have not been renovated (i.e. not equipped with the additional filters for SO_2 and NO_x) do not comply with the new limit values. Nevertheless, the Directive provides an exception for the case the units will not be operated for more than 17 500 hours, starting from 1 January 2016 and ending no later than 31 December 2023. As the result, three old energy units (9, 10 and 12) will be closed finally by 2016 and three old units (1, 2 and 7) can be operated up to 31 December 2023 with limitation of 17 500 hours during the period starting from 1 January 2016.

At the same time, in 2012 a new five-year research project was started in Tallinn University of Technology to investigate the feasibility of oxyfuel technology for the combustion of oil shale. The project aims at obtaining theoretical basic knowledge on burning oil shale in oxygen-rich environment, resulting in reduction of CO_2 emission and increase in power generation efficiency. The research is in the very first phase, therefore it is not possible to estimate the perspectives of the oxyfuel technology in case of oil shale combustion.

For many years it has been planned to draw up a thematic spatial plan for utilisation of wind energy for the whole territory of Estonia, but this still has not been made. In 2009, four county governments – Hiiu, Lääne, Pärnu and Saare initiated preparation process for thematic spatial planning for deployment of wind energy parks in these counties, i.e. for western part of Estonia. The preparation process was supported by a grant from Iceland, Liechtenstein and Norway, also through the EEA Financial Mechanism and the Norwegian Financial Mechanism. The plans analyse the feasibility of erecting wind parks with capacity of 500 kW and more. The smaller wind generation units are not dealt with. By now, the thematic spatial plans for deployment of wind energy for three counties (separate plans for Lääne, Saare and Pärnu) have been approved by county governments.

Due to Estonia’s geographical location the off-shore wind parks could play an important role in development of renewable energy utilisation. Up to 2010, planning and construction of off-shore wind parks were not possible due to lack of relevant provisions in Estonia’s legislation. In January 2010, the Parliament approved amendments in nine laws, enabling the construction of off-shore wind parks if the process fully complies with the relevant legal acts. To improve the expertise in Estonia related to off-shore wind parks a project “Concept development for an environmental impact assessment for off-shore wind parks in the Baltic States” was carried out in 2009–2010. The project was co-funded by the German Environmental Agency.

The opening of electricity market in Estonia may affect the development of generation capacities significantly – since 2009 the market is opened by 35%, and by 2013 the full opening will be completed. Therefore, new possibilities to export and import electricity have to be taken into account when analysing the impact of the energy sector on the environment.

In 2007, a direct current submarine cable line (EstLink) with an interconnection capacity of 350 MW between Estonia and Finland was commissioned. Significant changes in the electricity market in Baltic States (e.g., shut down of Ignalina NPP in Lithuania) and gradual opening of the market in Estonia have caused the electricity export increase from Estonia. In 2011 the electricity export was 5.25 TWh (preliminary data) that is 40.7% of the gross production.

At present, the construction of the second direct current undersea cable (650 MW; EstLink 2) from Estonia to Finland is on-going and planned to be completed by 2014. It will triple the capacity of the connection between the electricity systems of Estonia and the Nordic countries. EstLink 2 is important both for the security of supply for Estonian consumers and for the efficient functioning of the electricity market. At the same time, the volumes of international electricity trade will have a significant effect on emission level from Estonia's power sector.

2.2.2.3 Heat production

Heat supply, particularly district heating, is the next important sector with quite large potential for increasing energy efficiency, which in turn results in lower GHG emissions. Combined with the deployment of renewable energy sources, biomass in particular, it should have an increasing role in mitigating the impact of heat supply on the environment in Estonia.

Regarding biomass, a large amount of the primary energy arising from fuel wood (logs, chips, pellets and wood-waste) is used in heat production. But the development is hindered by a large-scale export of biomass, due to which local energy producers in some cases do not have enough biomass resources. The export results in elevated prices for some biomass products, especially wood pellets. The deployment of smaller scale cogeneration of heat and electricity (CHP) as an element of decentralized energy production strategy would increase the security of energy supply in Estonia. Therefore, the potential use of biomass in new CHP plants can be a development option. Small heat load and the fact that new equipment producing only heat has already been installed in many areas with a favourable heat load can be indicated as hindrances to the development of combined heat and power production based on biomass. Up to now, the other option for reducing CO_2 emissions in energy production has been a wider use of biomass in district heating and other heat-only boiler (HOB) plants. In Estonia, the heat production in HOB plants is already relatively environment-friendly: in 2010 the shares of wood and natural gas were 27% and 42%, respectively. Nevertheless, in the Development Plan 2007−2013 for Enhancing the Use of Biomass and Bioenergy a target was set to increase the share of heat produced from renewable resources to the 33% by 2013.

As a rule, district heating is more environmentally benign as a heat supply option than local heating. Therefore, it is important that the *District Heating Act* enables the zoning of district heating as an element of regional heat supply planning. The Act gives local governments the power to introduce the zoning of heat supply based on analyses, carried out for alternative heat supply options during the planning phase. The zoning of heat supply as an instrument of regulation of the energy sector gives municipalities the authority to avoid chaotic disconnection from district heating (DH) systems. The latter process had taken place in some towns and cities for many years. Planned zoning makes it possible to keep efficient DH systems in operation. Later these systems can form a basis for the introduction of CHP, which

is not, up to now, a widely spread heat supply option in Estonia. In Estonia, tens of municipalities have introduced the zones of district heating.

Heat supply issues are essential elements of local governments' development plans. Energy action (development) plans have been made mandatory for municipalities in order to be prepared for applying financial assistance (grants, subsidies) from national or EU funds (projects, programmes) for energy sector measures. The total number of municipalities having compiled energy plans during the last years is more than 50, of the total 227 (in 15 counties).

Energy efficiency and use of renewable energy at small boiler plants and improvement of district heating networks is supported from the European Regional Development Fund (ERDF) and also through the GIS. The support scheme was started in frames of the *National Strategic Reference Framework 2007-2013* that combines EU structural assistance with Estonian own budgetary funds (24.03.2009 Regulation No. 14 of the Minister of Environment). The measures supporting wider use of renewables for energy production are targeted to following activities:

- construction of small scale combined heat and power plants; establishment or reconstruction of CHP plants with a total installed power capacity of more than 2 MW located outside the Estonian islands is not supported;
- fuel switching from fossil to renewable energy sources at existing boiler plants; establishment or reconstruction of DH boiler plants with a total installed capacity of more than 4 MW is not supported;
- energy conservation through the improvement and reconstruction of DH networks, including also expansion of DH networks.

Later, similar targets were set for support measures financed from the AAU sales in frames of the GIS (30.08.2010 Regulation No. 42 of the Minister of Environment).

The 21 projects have received 9.56 MEUR of investment support from ERDF, with estimated reduction of 60 000 t CO_2 annually. The supported projects include:

- construction of biogas based CHP plants – 4 projects;
- switching boiler plants to renewable sources (wood chips) – 2 projects;
- renovation of DH systems – 15 projects.

Since 2010, an additional financing source was made available – in frames of the GIS financed from the sales of AAUs 41 projects in the field of heat (partially also electricity) supply have received investment grants. The projects include construction of six biomass based CHP plants, the rest being renovations of DH networks.

There are 164 district heating areas in Estonia. From the perspective of developing the energy sector, DH systems have to be optimised in the upcoming years, so that the prices of DH services provided to customers are competitive. Only with the help of sustainable DH systems and measures to reorganise this sector it is possible to ensure conditions that contribute to the development of the renewable energy sector.

An indirect measure of economic regulation targeted to higher efficiency of DH systems results in smaller emissions as well. In Estonia, the price of the heat sold to customers in DH systems has to be approved by the Competition Authority (CA). CA sets the heat price ceilings (caps) for all companies rendering DH services, including both the boiler-houses and CHP plants. The methodology for setting the ceiling includes the minimum technical

requirements for the efficiency coefficient of boiler-houses. The efficiency by fuel type has to be not less than:

- 90% (or 92% for new plants[4]) in the case of natural gas;
- 85% (90%) in the case of liquid fuels;
- 80% (85%) in the case of solid fuels.

Also, there is a ceiling for the level of heat losses in DH pipelines that can be included in the heat price as a cost item. The max level of losses accepted by the CA in the cost calculation will be reduced annually:

2012 – max 20%;

2013 – max 19%;

2014 – max 18%;

2015 – max 17%;

2016 – max 16%.

2017 – max 15%.

This gives DH utilities a strong incentive for reducing heat losses, i.e. for renovating DH pipelines.

In the framework of RDP the investment support is provided for production of bioenergy, including biogas collection equipment and biogas plants. In addition to collection of methane, cogeneration plants on bioenergy are developed and therefore the use of fossil fuels as well as emission of GHG will decrease. Currently, several biogas production plants are under construction. Four planned plants (Oisu, Tartu, Vinni and Aravete) have received investment support from the framework of Operational Programme for Development of Living Environment 2007−2013. At present, the support is combined with the financing from the GIS, using revenues from the sales of surplus AAUs.

2.2.2.4 Shale Oil Production

The shale oil production can be pointed out as a rapidly growing branch of industry. The quantities of oil shale used for producing other fuels have been growing year by year: in 2010, 4.12 Mt (46.6 PJ) of oil shale was processed and the production of shale oil was 525 kt. There are three companies processing oil shale into oil, mainly fuel oil. Two technologies are in use for thermal processing of the oil shale:

- Gaseous heat carrier (Kiviter-type) technology;
- solid heat carrier (Galoter-type) technology.

Due to the growing crude oil prices at the world market, the economic feasibility of shale oil production is improving and new facilities for thermal processing of oil shale will be commissioned in near future. Eesti Energia AS is commissioning the new shale oil plant (solid heat carrier) Enefit-280 in Auvere. The plant will produce approximately 2 Mbbl (310 kt) of oil and 75 Mm^3 of retort gas per year. The oil plant is combined with an integrated 37.5 MW steam-driven turbine that uses residual heat to generate electricity for running the plant. The company has longer-term plans to establish two more Enefit280 shale oil plants and a post-processing plant for upgrading the produced oil. In 2014, VKG Oil AS plans to commission a

[4] New plants are the ones that are less than 10 years old

new shale oil solid heat carrier plant Petroter II in Kohtla-Järve producing approximately 140 kt of shale oil a year. The company has planned to start construction of Petroter III plant in 2013. Kiviõli Oil Shale Processing & Chemical Plant is currently commissioning a new Galoter-type technology (TSK-500). Kiviõli Oil Shale & Chemical Plant plans to additionally build one more TSK-500 (capacity to produce 500 tons of shale oil per day) plant and also one TSK-3000 (capacity to produce 3000 tons on shale oil per day) plant by 2020.

2.2.3 Energy consumption – industry and industrial processes

The latest national level document setting policy targets for energy performance in industry is the second Energy Efficiency Action Plan (NEEAP2) presented to EC in September 2011. In the Plan it is declared that energy consumption in industry has become more efficient due to measures that are related to the wider energy policy, such as opening of the electricity market, renewable energy charge, fuel and electricity excise duties and reduced differences in excise duty rates. Therefore, in the NEEAP2 it is concluded that energy efficiency measures for industry must focus primarily on improvement of the skills and awareness of specialists. It is stated that these energy conservation measures must be implemented simultaneously with other activities to improve competitiveness of companies, and energy conservation policy must be based on following principles:

- encouragement to perform energy audits in industrial plants and small enterprises;
- contribution to improvement of energy auditors' qualification with respect to industrial energy conservation issues, fostering energy consultants' participation in EU projects related to energy conservation in industries;
- better financing opportunities for energy conservation measures in industries and small enterprises;
- development of databases and methods for benchmarking companies' energy performance.

The NEEAP2 includes 12 specific measures for implementing these principles in industry:

- Sectoral legislative acts

➢ Creation of opportunities for using residual heat of manufacturing companies in DH (a planned measure).

- Financing and other support
  - ➢ The programme of technology investment support for manufacturers (2008–2013).
  - ➢ Encouragement of investments into energy conservation of industries within the financial instrument for energy conservation in industries (planned; 2014–).
- Tax policy
  - ➢ Tax exemption for reinvested profit of companies (since 2000).
  - ➢ Pollution charges as provided in the Environmental Charges Act (since 1994).
- Provision of knowhow
  - ➢ Development and provision of training events on energy conservation to increase energy management competences of enterprises (planned).

- Support for energy audits in industry in frames of the financial instrument for energy conservation in industry (planned; 2014–).
- Increasing the number of energy auditors in industry and development of opportunities for further training (incl. for energy consultants for industry).
- Self-financing support for participation in programmes to projects that contribute to improving energy efficiency of industry (planned).

- Research and development
  - Analysis and development of energy efficient technical solutions having a future in Estonia enterprises (planned).
  - Adjustment of methods and development of databases for benchmarking energy efficiency of manufacturing companies (planned).
- Awareness
  - Development and dissemination of informational materials on energy conservation for employees in industry (planned).

As for the direct emissions of GHG from technological processes, in Estonia's industry the carbon dioxide is formed mainly in the processes of cement and lime manufacturing. Limestone decomposes when heated and carbon dioxide is emitted. There are only two companies operating in this sub-sector: Kunda Nordic Cement AS (Heidelberg Cement Northen Europe) and Rakke Plant (Nordkalk), both are included in large international industrial groups. Both companies have been awarded environmental standard ISO 14001 as well as quality management standard ISO 9001 and they publish environmental reports annually.

Already by 2008, both of these manufacturing branches had almost reached their maximum output levels and a further growth of output is impossible, except by means of plant renovation and/or expansion. Some reduction of GHG emissions can be achieved only through the introduction of more up-to-date production technologies. For example, in Kunda Nordic Cement there is a preliminary projection plan about converting from the wet to dry kiln system. The conversion would enable to reduce the specific CO_2 emission from the present 1 162 kg CO_2/t clinker to 760-770 kg CO_2/t, but the plan is not feasible in the near future.

Since 2007 an amendment to Integrated Pollution Prevention and Control Act is in force with stricter requirements in integrated environmental permits for using best available technique (BAT). Therefore, the gradual introduction of BAT would reduce the impact of industry on the environment.

An increasing number of enterprises in Estonia have introduced environmental management systems (EMS). The main drivers for implementing EMS are usually market reasons, but at the same time the enterprises improve their environmental performance by a more efficient use of resources, and minimization of waste and emissions to air and water. Estonian enterprises have a choice to choose between two environmental management systems: international standard ISO 14001 or European Management and Audit Scheme (EMAS). The most common EMS implemented in Estonia is ISO 14001. At present, there are over 350 enterprises in Estonia having the ISO 14001 certificate. As to EMAS, today there are only three enterprises certified to it in Estonia. In 2003 the Estonian Association of Environmental Management was established. At present, the Association has 22 full and 28 associated members. Organisations who participate are recognised as making a strong commitment to the

environment and to improving their economic competitiveness. Also, the information dissemination about the certification of the energy management systems (EnMS; ISO 50001) has started.

Regarding eco-labelling, there is no national eco-label scheme in Estonia. Several food products are labelled with Estonian Organic Farming Label; in service sector the Green Key is used. Amongst the eco-labels there is a possibility to implement the EU Eco-label. EU Eco-Label is awarded AS Eskaro for its ceiling paints.

Voluntary agreements (VA) are agreements between governments and enterprises which can be defined as guidelines adopted or measures taken in the absence of mandatory regulation in order to improve environmental performance of the enterprise and to enhance corporate responsibility. The agreements are bilateral – between one company (or a group of companies) and the MoE. In Estonia, VAs have not included any subsidies or other financial elements from the public administration. Since 1999 several enterprises have made a voluntary agreement with the MoE. Usually, in frames of a VA the MoE is obliged to inform enterprises of planned changes in legislation and involve them in amendment processes. To improve their environmental performance, enterprises are supposed to implement voluntary environment related measures which introduce stronger requirements than mandatory. There are several VA concluded with associations of enterprises, e.g. forest and wood industries, mining industry, chemical industry, water supply utilities. As to bilateral VA with large industry, there is a MoE agreement with the cement plant Kunda Nordic Cement.

As to measures that can support energy performance in industry in an indirect way is the exemption related to the income tax. Since 2000, the Income Tax Act stipulates the exemption for the corporate income tax for the profit re-invested within the company. The corporate profits taxation system, introduced in Estonia, is unique as under this system the reinvested profit is not taxed, only the distributed profit is taxed, i.e., the taxation is shifted from the moment when profits are earned to the moment when profits are distributed to the owners of the capital. Regarding energy efficiency and impact on environment, there is a quite essential impact as investments in new technology improve energy efficiency as well, as a rule.

Also, specialised trainings for energy specialists in companies have been arranged. An *Intelligent Energy – Europe* project *Training and Network of European Energy Managers (EUREM.NET)* was carried out during 2007–2009 in 12 EU countries, including Estonia. The project extended the successful experience of the previous EUREM (2003–2005) project in old member states (Austria, Germany, Portugal and the United Kingdom) to several new EU members adding country-specific features. Energy managers in industry are the main target group of the project. All successful trainees receive a "European Energy Manager" certificate. The first EUREM training courses in Estonia were arranged in 2008. All 13 participants passed the courses successfully and received relevant certificate. EUREM training is nationally recognized and integrated into the training system of engineers as a course of complementary training.

2.2.4 Energy consumption – residential, commercial and other sectors

In the *Second National Energy Efficiency Action Plan* it is pointed out that according to Directive 2006/32/EC, the 2016 target for Estonia is to achieve 9.9 PJ savings as a result of the energy conservation measures implemented in the period 2008–2016.

Residential sector

Regarding residential sector, the key document of policy and measures is the *National Development Plan for Housing Sector 2008–2013*, approved by the Government. One of main objectives of the Plan is targeted to improvement of quality and sustainability of the housing stock in Estonia. The planned measures (2.1, 2.2 and 2.3) for reaching this goal include:

- support for refurbishment of apartment buildings: securing targeted loans for dwelling houses built before 1993, and special soft loans for houses built before 1940;
- elaboration of standard design documentation for refurbishment of apartment houses built after 1945, and making these documents available free of charge;
- special awareness campaigns and training courses for better maintenance and refurbishment of housing stock;
- mapping of actual situation of the whole housing stock, focusing on constructional and energy performance issues of apartment buildings.

The energy saving effect of this Plan has not been ex-ante estimated. Nevertheless, there are target values (to be reached by 2013) foreseen in the Plan for some measures. The following ones are relevant to energy performance of buildings:

- number of apartment houses refurbished with the support – 8000;
- the share of apartment house types with energy performance mapped – 95%;
- energy audits carried out (of the total number of buildings in the target group) – 30%;
- share of apartment houses with the indicators of the highest energy performance category – 10%.

As to the practical refurbishment of residential buildings, already in 2003 the Government started to support repair work related to the reconstruction and restoration of the main structures of pre-1990 apartment buildings. The assistance covers 10% of the cost of these works. To apply for reconstruction assistance, the apartment building in question must have passed technical inspection. To conduct such an inspection, the apartment/house union or the association of apartment owners may receive assistance in the amount of 50% of the inspection cost.

In May 2009 the Minister of Economic Affairs and Communications issued an order (No. 137, 07.05.2009) adopting a new programme on the loan for the renovation of apartment buildings. The programme is implemented by the state owned foundation KredEx. It makes financing the renovation of apartment buildings easier and more advantageous. The scheme and the relevant procedures for long-term loan were developed in cooperation with German Development Bank KfW Bankengruppe. The scheme allows the banks to combine the finances from the structural funds of the EU (financed from the European Regional Development Fund) and the additional loan from the CEB (Council of Europe Development Bank) to issue more advantageous loans with a longer refunding period (up to 20 years) to apartment buildings constructed before 1993. The aim of the renovation loan is to improve the energy efficiency of apartment buildings by at least 20% in apartment buildings with an area of up to 2000 m^2 and by at least 30% in apartment buildings with an area of more than 2000 m^2. Estonia was the first country to launch this type of reuse of EU structural funds. Kredex support scheme is able to cover approximately 6-7% of all apartment buildings. For example, in 2011 in frames of the scheme 167 loan contracts were concluded in the sum of 16.7 MEUR, the total investment being 23.2 MEUR (including own financing). The resulting

average energy saving is estimated at 39.3%. It was estimated that if this scheme will continue, by 2020 15% of apartment houses would be refurbished.

In 2010 a new financial opportunity arose with the successful selling of surplus AAUs (Kyoto Protocol, Article 17). In August 2010 the Minister of MoEAC issued a Regulation No. 52 (17.08.2010) "Terms and Procedures of Using Green Investment Scheme *Apartment Building Renovation Grants*". In September 2010 state owned foundation KredEx started to issue renovation grants in the amount of 15-35% of the total cost of renovation project. The total budget for renovation grants is 28 MEUR. The grant is first of all meant to accompany the renovation loan of KredEx to decrease the required share of self-financing, but the grant may also be combined with own funds of the applier. The grant is financed from the sales of unused AAUs to Luxembourg in frames of the GIS. The grant limits are 15%, 25% and 35% of the total project cost depending on the level of integration in reconstruction of apartment buildings. To obtain a grant of 15%, an apartment building shall achieve energy saving of at least 20% in an apartment building with closed net area of 2000 m^2, at least 30% in an apartment building with closed net area of over 2000 m^2. By performing reconstruction work, the accordance of indoor climate to requirements shall be ensured, and the apartment building shall achieve at least energy label class E (i.e. annual specific energy consumption in range of 201…250 kWh/m^2). To obtain a grant of 25%, in addition to the fulfilment of the above terms, an apartment building shall reconstruct the heating system so that it is locally adjustable, and mount devices that make it possible to divide and measure heating costs individually by apartments, partly or fully insulate and reconstruct the façade, replace all windows with energy-saving ones, insulate or/and reconstruct the roof, achieving energy saving of at least 40%, resulting in being eligible for receiving energy label class D (151…200 kWh/(m^2·a)). To obtain a grant of 35%, in addition to the fulfilment of all above terms, the applicant for the grant shall install a ventilation system with heat return, achieving at least 50% of energy saving from consumption of heating energy, and energy label class C (121…150 kWh/(m^2·a)) for the building.

By the end of 2011 243 apartment buildings have received a positive decision from the KredEx regarding the renovation grant in frames of the GIS. The total amount of grants was 6.71 MEUR, the estimated average energy savings being up to 40%.

In 2012, a similar grant was made available for small private (one or two family) houses. The measure has a budget of 4 MEUR, including 3 MEUR for thermal refurbishment and 1 MEUR for utilizing renewable energy sources (solar and wind) locally. The popularity of the grant demonstrated the demand for such measures – there were 254 applications (for 3.22 MEUR) for refurbishment grant, 111 grants were awarded. The grant for introduction of renewables was extremely popular – the sum of applications exceeded the total grant sum during the first day. 95 grants were awarded: 11 projects of small wind turbines, 64 solar collectors and 25 PV panels with the average sum 10 900 EUR per grant.

Public sector

The Government has gradually concentrated the development and management of state assets into one company Riigi Kinnisvara AS (RKAS; State Real Estate Ltd) established in 2001 with the objective to guarantee the saving and effective provision of the real estate service to the executors of state authority. RKAS creates the preconditions for the state for operating at the real estate market as one person and with the single objective – to guarantee the prudent and effective management of state assets. RKAS has been issued the ISO quality management (9001) in 2007, and environmental certificate (14001) in 2009.

In frames of the GIS financed from the sales of surplus AAUs also the renovation of public buildings is supported to increase the energy efficiency. The renovation process is arranged by the RKAS under the supervision of the Finance Ministry. The applications were received from 201 municipalities (out of total 226) for renovation of 862 buildings:

- 63% – schools, kindergartens;
- 26% – cultural institutions;
- 7% – social and health care establishments;
- 4% – other buildings.

The actual number of state and municipality owned buildings being currently renovated is 490 with the total floor area of more than 1.1 Mm^2. The total renovation budget is approximately 146.5 MEUR and the resulting CO_2 reduction is estimated to be ca 680 Gg during the 30 years period.

Regarding the possible exemplary role of the public sector in the use of energy in buildings, the NEEAP2 sets a target to construct at least 10 publicly accessible nearly zero-energy buildings of various types with total usable area not less than 5 000 m^2 in Estonia by 2015. In the beginning of 2013, the guidelines to build nearly zero-energy buildings was developed by Tallinn Univiersity of Technology and State Real Estate Ltd.

The first steps have been made in introducing environmental management systems in local governments. In December 2011 the Municipal Engineering Services Department of Tallinn City Government was awarded the ISO 14001 certificate (also ISO 9001), being the first municipal entity with this certificate.

Legal acts

As regards improving the energy efficiency of buildings, the EU Directive 2002/91/EC and its recast Directive 2010/31/EU on the energy performance of buildings has played an important role. The transposition of provisions of Directive 2002/91/EC into Estonia's legislation was completed by 1 January 2009, the transposition of Directive 2010/31/EU is in progress. The main provisions were and will be introduced in the *Building Act.* The objective of amendments made already was to introduce the energy auditing and labelling of buildings, to improve the energy performance of new and existing buildings, and to provide the users of buildings with an easier access to information about the building's energy consumption and energy saving measures.

Several detailed requirements have been enforced using acts of secondary legislation. The major secondary level act is the Regulation of the Government on *Minimum Requirements for Energy Performance of Buildings* (No. 258 of 20 December 2007). The Regulation provides detailed requirements for energy performance of buildings. The needed initial data and procedures for calculations of performance indicators are defined. In 2009 another regulation (No. 194 of 30 December 2008) related to energy performance certificates entered into force providing the list of types of buildings where the certificate must be placed in a prominent place clearly visible to the public.

Directive 2010/31/EU on energy performance of buildings requires member states to develop and implement measures to reconstruct public buildings to become nearly zero-energy buildings. Minimum requirements for nearly zero-energy buildings are enforced with Regulation no. 68 of the Government (30 August 2012).

Auditing of energy performance of buildings

As to monitoring the results of the thermal refurbishment of buildings, the legal institution of the energy auditor plays an important role. Regarding experts performing energy audits and/or issuing the relevant certificates, the Building Act provides that only registered legal persons can issue the energy certificate or perform the energy auditing of buildings. The legal persons providing services of energy certification or energy auditing should fulfil following requirements:

- they should be in the register of economic activities;
- they should have legal relationship (a contract) with a competent person, who is a specialist in charge;
- they should keep records of issued energy audits and/or energy certificates and linked documents.

The Estonian Technical Surveillance Authority has the authority to carry out the quality control of energy audits and building energy certificates.

As to training of experts, the MoEAC initiated a project "Development of energy audit practices" in 2007. The professional standards for energy auditors and energy certification specialists were elaborated and the training programme developed for the standardized training course for energy auditors. Three professional levels of energy auditors were established:

- level IV – auditor for residential buildings;
- level V (diploma) – auditor for residential and public buildings;
- level V (chartered) – auditor for all types of buildings (incl. industrial ones).

The training courses started in 2008. Up to present, several rounds of training have been carried out and 82 professional qualification certificates for energy auditors have been awarded (52 at level IV, 24 at level V (diploma) and 6 at level V (chartered); as of 1 July 2012).

Also, professional standards and training programmes for persons authorized to issue energy performance certificates were elaborated. Up to now, 115 specialists have been authorized.

Public procurement

According to Directive 2006/32/EC, member states must implement at least two measures to ensure energy efficiency and conservation via public procurements. Of these, Estonia has decided to implement the following two measures:

1. requirements to purchase equipment and vehicles based on lists of energy-efficient product specifications of different categories of equipment and vehicles;
2. requirements to use energy audits and implement the resulting cost-effective recommendations.

Measure 1 is implemented on the basis of section 3 of the *Public Procurement Act* that describes general principles for conducting public procurements. According to the Act, the contracting authority has an obligation to prefer environmentally friendly solutions, if possible. In its webpage on sustainable public procurements (http://www.envir.ee/KHRH), the MoE has published instructions for environmentally friendly public procurements for various types of products.

Measure 2 has been essentially implemented by the *State Assets Act*, according to which the relevant principles have been applied to ensure efficient management of the real estate owned by the state. The management of the state's activities with respect to buildings will be centralised and one provider of real estate services to the state appointed. Riigi Kinnisvara AS (State Real Estate Ltd.) has been founded for that purpose. The process is gradual, and currently the usable area of the buildings in the portfolio of RKAS amounts to more than 517 thousand m^2. The aim of the provider of real estate services is to ensure expert and cost-effective management of the real estate portfolio. Also, the State Assets Act provides setting up a state real estate registry that gathers data with an aim of providing a uniform overview of all buildings the state uses.

Reconstruction of the existing public buildings and construction of new ones by local authorities depends considerably on the state's support for investments. Investments are applied for in a competitive way and applications are evaluated usually taking into account the environmental impact of the projects as well. At present, the vast majority of the projects aim at improving the energy performance of buildings and facilities.

Information dissemination

The energy efficiency related information dissemination is an essential factor for improving efficient energy use in residential and public sectors. MoEAC has been active in promoting efficient use of energy and in dissemination of relevant information.

The programme for informing residents of energy performance of buildings was approved by the Minister of EAC in his Directive No 146 of 28 April 2008. The aim of the programme is to improve people's awareness of energy conservation and promote, through KredEx, intelligent energy conservation measures that ensure good indoor climate in buildings, reduce pollution of ambient air and increase energy savings in apartment blocks. Within the programme, regular media campaigns have been conducted since 2008.

In particular, the residential sector has been in focus of several studies ordered the MoEAC. For example, by Tallinn University of Technology in-depth studies were carried out on the investigating condition of the stock of residential houses. The major types of houses – concrete panel houses, brick houses and wooden houses – have been separately studied and renovation possibilities analyzed. Also, research and surveys have been carried out on energy performance quality of new residential houses and separately for houses undergone major renovation.

Energy efficiency related information is disseminated by foundation KredEx and by several energy companies. The only institution especially targeted on energy efficiency is the Tartu Regional Energy Agency (*Tartu Regiooni Energiaagentuur*) established in 2009 as a regional energy agency for promoting sustainable energy and energy management in the region.

Electrical appliances

In the *National Energy Efficiency Programme for 2007–2013* the target level for the share of A-label electric appliances sold at Estonia's market by 2013 was set at 75%, the level in 2006 being approximately 50% (estimation). The estimated saving as a result of the increased effectiveness of electrical appliances will increase 10% by 2020 and this is estimated to lead to potential saving of 0.5 PJ of electricity annually.

Also, the gradual phasing out incandescent lamps (bulbs) will give certain savings of electrical energy. According to preliminary estimations the savings in one household can reach 2–3 kWh per 24 hours.

The wider use of heat pumps is gaining popularity in Estonia. The Heat Pump Association of Estonia has estimated that in the period 1993–2010 about 47 500 heat pumps, including ca 41 500 air sourced (air to air) heat pumps and ca 6 000 geothermal (ground to water) heat pumps, have been installed in Estonia. The total installed capacity of heat pumps is approximately 275 MW (estimation of the Heat Pump Association of Estonia). At present, the quality of data on installation and operation of heat pumps does not enable to assess the positive impact on environment.

Street lightning

In 2012, Estonian Environmental Investment Centre started a program, where 7 Estonian cities (with population between 8000 and 15000 inhabitants) will get energy efficient street lightning. The total cost of program is estimated to be tens of millions of euros. The goal of this program, is to provide hight-quality and efficient street lightning. Expected energy saving is estimated to be about 5 GWh per year.

2.2.5 Energy consumption – transport

The latest policy document setting targets for energy consumption in transport is the second Energy Efficiency Action Plan (NEEAP2) presented to EC in September 2011. It states that in Estonia the main energy conservation measure in the transport sector is the excise duty on motor fuels. Nevertheless, the NEEAP2 presents 17 specific energy efficiency measures for implementing in transport sector:

- Sectorial legislative acts
  - Energy conservation criteria in public procurements, i.e. procurements for motor vehicles have to take into account the whole service life of the vehicle: its energy efficiency, CO_2 and other emissions (since 2010).
  - Introduction of larger (60 m^3 instead of 40 m^3) trucks (planned).
  - Development of standard energy performance certificates for cars (planned).
- Financing and other support
  - GIS based projects for the development of public transport (since 2009).
  - A pilot project for a wide introduction of electric cars (in frames of GIS; since 2011).
- Tax policy
  - To offer EU support for devisal and introduction of technical solutions that contribute to the efficient use of infrastructures and to reduction of CO_2 emissions (new pricing and taxation systems for the road network, intelligent transport systems and programmes to increase the capacity) (planned).
  - Free parking for electric and sustainable cars (current measure).
- Provision of know-how
  - A new study programme in the Tallinn University of Technology: integrated transport management (current measure).
  - Eco-driving courses in driving schools (current measure).
- Research and development

- To launch national programmes supporting devisal of sustainable transport technologies and development of new environmentally friendly technologies (e.g. engines and alternative fuels) if possible (planned).
- Introduction of transport based on electricity, hydrogen and hybrid technology and increasing their share (planned).

- Awareness
  - Information campaigns for increasing awareness of the cars impact on the environment and to promote public transport and non-motorised vehicles (current measure).

- Other measures
  - More efficient spatial planning: promotion and development of non-motorised vehicles traffic (development/construction of bicycle roads/lanes in larger cities); development of sustainable transport, incl. priority development of public transport (planned).
  - To create a national public transport planning system that would take into account local needs and eliminate public transport overlaps. Improvement of the railway network, development of a rail connection to Europe (Rail Baltica route) in compliance with the EU standards and allowing to travel from Estonia to Western Europe by an express train (planned).
  - Renewal of public transport rolling stock, transition to electricity-powered transport (the new residential districts of Tallinn must have an environmentally friendly connection with the city centre, by electric transport) (planned).
  - To start using intelligent mobility systems such as the European intelligent transport systems (ITS), new-generation systems for arranging multimodal transport, and information exchange (planned).

The measures presented above are partially reflecting the measures from various sectorial plans and partially new measures planned to be implemented in the future. Some major measures that are either implemented or planned in detail are described below.

Taxation

The rates of excise taxes on fuels have been raised in several cases during the past few years. This has been done, among other reasons, with the objective of affecting the fuel demand of transport and making it more environmentally sustainable. The current rates are presented in section 2.2.1.2 (Fiscal measures). The Government has increased fuel excise duties faster than stipulated in the EU directives. According to the Directive 2003/96/ EC, the EU minimum rates of fuel excise duty were to be reached by the beginning of 2010 in Estonia, but the Government decided to raise the excise duties to the EU minimum level already at the beginning of 2008.

In 2003, the tax on heavy goods vehicles was introduced in Estonia by the *Heavy Goods Vehicle Tax Act*. The aim of the tax is to charge heavy goods vehicles for the use of infrastructure. The impulse for imposing heavy goods vehicle tax was the directive 1999/62/EC. Heavy goods vehicles tax is paid for the following classes of vehicles, which are intended for the carriage of goods:

- trucks with a maximum authorized weight or gross laden weight of not less than 12 tonnes which are registered in the traffic register;

- road trains (composed of trucks and one or more trailers) with a maximum authorized weight or gross laden weight of not less than 12 tonnes whereas the trucks of the road trains must be registered in the traffic register.

The *Heavy Goods Vehicles Tax Act* establishes tax rates for heavy goods vehicles. The rates are differentiated according to the number of axles, maximum weight and type of suspension of driving axle. At present, the quarterly paid rates for trucks (lorries) range from 7.90 to 134.40 EUR and for road trains (a truck with a trailer) from 3.50 to 133.80 EUR. The tax rates in Estonia are in accordance with the EU minimum rates. The tax is paid into the state budget, the taxable period is a quarter. The tax is not earmarked for the environment or energy efficiency related issues.

Biofuels in transport

Regarding the use of biofuels in transport, EU has set common objectives for the share of biofuels in the consumption of all motor fuels: 5.75% by 2010 and 10% by 2020. In Estonia, the corresponding share was 0.2% in 2010. To promote the growth of biofuel use in transport, the amendment (made in 2005) to the *Alcohol, Tobacco, Fuel and Electricity Excise Duty Act* provides that if biofuel has been added to motor fuel, the portion of biofuel contained in the motor fuel is exempt from excise duty. This provision, considered as state aid, needed approval from the EC. In July 2005 the EC authorized Estonia to exempt from excise duty non-synthetic biodiesel, vegetable oils made from biomass and bioethanol made of agriculture products or plant products. The exemption was in force until June 2011 and was not extended. This measure had no effect on the use of biofuels in transport.

In the new *National Energy Sector Development Plan until 2020* it is declared that Estonia considers targets concerning biofuels binding only in case the use of second generation biofuels is economically feasible as well as fully sustainable. At the same time, the *Development Plan 2007−2013 for Enhancing the Use of Biomass and Bioenergy* sets the share of 6% of biofuels in the consumption of transport fuels as the target for 2013. Some specific measures are foreseen in the *National Renewable Energy Action Plan* for reaching the 10% renewables target in transport sector:

- Stipulating 5-7% mixed fuel requirement for liquid fuels. Relevant amendments to legal acts are planned for proposal. Estimated increase of the share of biofuels in transport is up to 5% by 2015.
- Transfer of public transport to renewable energy. Financing plan and conditions for implementation will be prepared by 2013. Expected increase of the share of biofuels is 2% by 2020.
- As a result of technology development, also the share of vehicles using alternative fuels (other than biodiesel and bioethanol) is estimated to increase. Estimated share by 2020 is 1% of total use of fuels in transport.

National transport development programme

In January 2007, the Parliament approved the *Transport Development Plan for 2006–2013*, which includes at least three measures aimed at making transport more environmentally friendly:

- developing the traffic management and coordination system;
- enhancing the competitiveness of public transport;

- promoting light traffic.

There are some differences between the goals set in the EU sustainable development strategy and the target set in the *Transport Development Plan 2006–2013*. While the EU sustainable development strategy establishes a goal for the average CO_2 emission level of passenger cars (120 g/km by 2012), the Estonian transport development plan sets a similar goal for a 30% share of new cars. As there is no car industry in Estonia, the indicator here considers the new cars that are registered in Estonia. In 2005 the respective share of cars was approximately 0.5%.

Currently, the new *Transport Development Plan 2014-2020* is under development.

Public transport

One of the main problems of public transport in Estonia is the poor condition of rolling stock. The average age of buses in public transport is more than 16 years. Currently, public transport subsidies are used to compensate up to 60% of the costs connected with the providing public transport services on local bus lines. Compensation payments are paid in accordance with regulation no. 1370/2007 of the European Parliament and of the Council. However, the compensation mechanism has not stimulated public transport service providers to make sufficient investments into the rolling stock. Therefore a measure through the GIS (financed from the sales of unused AAUs) was introduced, which is based on the principle that new buses are rented to a public transport service provider. In 2010 21 MEUR were invested in energy efficient and environment friendly buses (approximately 100 buses) for public transport system – the Estonian Road Administration purchased new environmentally friendly buses that were given to the public transport service providers' possession only for the duration of the public service contract. The new buses can use gas (including biogas) as the fuel. In Tartu city first five buses using natural gas have been introduced in public city transport in 2012. All new buses exceed the requirements of the European emission standard for motor vehicles EURO5.

In May 2011, the next larger investment in frames of the GIS in public transport was made. The sum of 45 MEUR (from AAU sale revenues) investment is planned in energy efficient and environment benign trams for City of Tallinn. The trams have to use the electricity generated from renewable energy sources. Currently, the average age of trams in Tallinn is 25 years. The AAU based investment enables to purchase 15–16 up-to-date trams that will be used on a 16 km route since 2014.

From January 1. 2013, the public transport of capitol Tallinn is free for persons who are registered in Tallinn.

To increase the proportion of public transport users, the Government has set a goal to increase the number of traffic lanes on streets allocated for public transport in cities by 20% over the coming years. As to passenger train transport, the goal for the coming years is to ensure that the passenger inter-city train traffic infrastructure can support speeds of at least 120 km/h. This would help to enhance the competitiveness of passenger train traffic in comparison with road transport.

In 2008 the Public Transport Department was established in the Estonian Motor Vehicle Registration Centre (at present both are subdivisions of the Road Administration) in order to improve the planning of public transport, as the importance of the latter had been decreasing during the past years.

The national *Transport development plan 2006–2013* has set the goal of increasing the popularity of public transport. As a measure for increasing the comfort and convenience of using public transport the Public Transport Information System (PTIS) was created. The development of the PTIS consists of several elements. The information system was prepared for coordination of public transport lines and timetables. The trip planning web portal (www.peatus.ee) for users of public transport was created that helps in finding public transport connections between departure and arrival points chosen by the user. The system provides the portal with address services; as a result, it is possible to find public transport solutions by entering addresses of departure or arrival points. Using the coordinates of the address entered by the user, the portal finds the closest public transport stops and the fastest connections. As a next stage, it is planned to combine the PTIS with the ticket sales information system.

Electric mobility programme

Estonia has set of goal of achieving a 10% share of renewable energy use in the transport sector. For reaching this target the wider introduction of biofuels is needed but there is another development option supporting reaching the target as well – the use of electricity in transport in case the electricity is generated utilizing renewable energy sources. This option is possible as the generation of renewable electricity in Estonia has increased rapidly during last years: from 110.8 GWh in 2005 to 1 046 GWh in 2010.

In March 2011 the Government decided to launch the *Electric Mobility Programme* (EMP) for Estonia combining the extensive introduction of electric vehicles with the financing available in frames of the Kyoto Protocol mechanisms. Currently, the financing of the EMP is based on sales of the surplus of AAUs in the amount of 10 million AAUs. The EMP includes three parts:

- the Ministry of Social Affairs takes into use 507 electric cars (Mitsubishi model i-MiEV) as a pilot project,
- the MoEAC develops the grant scheme to support acquisition of electric cars by private persons (up to 500 cars),
- charging infrastructure for electric cars, covering the whole territory of Estonia, will be built.

Both the grant scheme and the building of infrastructure will be administered by the Foundation KredEx. The support measure for acquisition of electric cars is available for accelerating introduction of electric cars in Estonia. Acquisition and financial/operational lease of electrical vehicles by private persons are supported within the framework of the support measure. The grant scheme will enable up to 500 Estonian private individuals to acquire an electric car. The selection has to be made between electric cars that have obtained an EU type approval. Grants are awarded to new cars that are pure electric vehicles or plug-in hybrid vehicles. The maximum grant rate for electric vehicles is 18 000 EUR, however the grant will not exceed 50% of the acquisition price of the car or 1000 EUR per 1 kWh of battery capacity, proceeding from the lower price of the two.

In order to guarantee the full environmental effect of the program, including the reduction of GHG emissions related to conventional fossil energy sources, all owners of electric vehicles have to consume only electricity generated from renewable energy sources through guarantees of origin scheme. It is estimated that the owner of an electric car might use 1–2 MWh of electricity a year.

As to system of charging stations, both the fast (CHAdeMO quick charging technology) and conventional chargers will be installed all over Estonia to ensure confidence for all users driving electric cars. The charging infrastructure will consist of around 250 quick charging stations. The building of charging infrastructure should be completed by the end of 2012.

Other measures

As to the direct impact on the environment, the compliance of motor vehicles with the emission restrictions is regulated by the *Traffic Act* and relevant secondary legislation. At first, the Traffic Act stipulates that all types of motor vehicles, wheeled tractors and their trailers, and motorcycles put into service in Estonia for the first time are subject to type approval. The rules for the type approval of motor vehicles are established by the Minister of Economic Affairs and Communications and the rules for the type approval of wheeled tractors and their trailers are established by the Minister of Agriculture. At second, the Traffic Act provides that it is permitted to operate vehicles in traffic only if the roadworthiness of the vehicles complies with the requirements in force in Estonia. According to the Act, the rules for the registration of power-driven vehicles and their trailers and for the inspection of the roadworthiness thereof, and the requirements regarding their roadworthiness and equipment, as well as the rules for the regular mandatory inspection of vehicles are established by regulations of the MoEAC.

Regarding the energy efficiency and environment friendliness of transport vehicles for public sector, the Public Procurement Act stipulates that in the procurement process of motor vehicles the energy and environmental impact of the vehicle during the whole service life must be taken into account. The measure was initiated by the Directive 2006/32/EC, that requires the member states to implement at least two measures (from the list of six eligible measures) to ensure energy efficiency and conservation via public procurements. Among these two measures, Estonia has decided to implement the transport-related measure – to introduce requirement to purchase equipment and vehicles based on lists of energy-efficient product specifications of different categories of equipment and vehicles. The measure is implemented on the basis of section 3 of the *Public Procurement Act* that describes general principles for conducting public procurements. According to the Act, the contracting authority has an obligation to prefer environmentally friendly solutions, if possible. The same act stipulates that if the objects of the procurement contract are transport vehicles, the tender dossier must contain conditions that take into account the energy and environmental impact of the whole service life of the vehicle.

A particular aspect of the efficiency of transportation as well as relevant emissions into air is related to the use of large trucks. At present, the basis for national and European regulations is the Directive 96/53/EC which sets the maximum allowable vehicle loading dimensions in national and international road transport in the EU. Therefore, in Estonia the current regulation permits to use trucks of maximum 16.5 m (1 point of articulation) or 18.75 m (1 or 2 points) in length, 40 tonnes in weight and 4 m in height to circulate across European borders. For intermodal traffic, 44 t is the current maximum. The directive also sets limits for axle loads and overhangs. Still, countries are allowed to set the maxima at higher levels, but only on their own territory. The modular concept, with limits of 25.25 m and 60 t, has been in use for years in Sweden and Finland. In Estonia, the current upper limit for the load is 44 t. For several years already, some sectors have repeatedly applied for increasing the upper freight load limit up to 60 t per vehicle. This has been an acute problem for the forest industry where the relevant experience from Finland and Sweden is well known. In 2010 a comprehensive study was carried out by the Tallinn University of Applied Sciences (*Tehnikakõrgkool*), Tartu University and the Estonian University of Life Sciences

(*Maaülikool*) to investigate the macroeconomic impact of increasing the upper load limit for freight transport in forestry sector. Regarding energy efficiency and impact on environment, the conclusions of the study pointed out that assuming the annual forestry transport volume 6.72 million tons a year, the increase of the vehicle load from 44 t to 60 t would reduce the total forestry transport mileage by 42% and the emission of CO_2 would decrease by 35%. Nevertheless, the official decision on the increasing the upper load limit has not been made.

In Estonia, the Regulation of the Minister of Environment no. 62 of 23 September 2005 provides the procedures for informing customers on the specific fuel consumption as well as on emission of CO_2 of new cars improving public awareness of the environmental impact of cars and to promote vehicles that have low CO_2 emissions.

Several local governments, mainly cities but also some rural municipalities, have started to promote cycling: several networks of roads with safe routes (special lanes and tracks) for cycling have been designed, etc. Some cities have elaborated development strategies for urban cycling to promote cycling in cities and to improve conditions for cyclists in cities. For example, Tallinn, the capital city, started the construction and marking of special cycling routes in 1998. By today, the total length of these routes is approximately 210 km in Tallinn. Several other cities have been active in a similar way: promoting cycling, starting to provide bicycle friendly networks lanes on streets and roads.

2.2.6 Fluorinated gases

In Estonia, the use of F-gases has been growing during last years. A primary reason for that is the increasing use of F-gases (mainly HFC) as substitutes for ozone-depleting substances. As to international multilateral agreements on ozone depleting substances, Estonia ratified the *Vienna Convention for the Protection of the Ozone Layer* and *Montreal Protocol on the Substances that Deplete the Ozone Layer* in 1996. The *National Programme for Phasing out Ozone Depleting Substances* was approved by the Government in 1999. Since 2000 the programme was co-financed from the Global Environmental Facility (GEF) and it was successfully completed in 2005.

As to legislation on F-gases, in the EU several legal acts have been adopted during the period 2006–2008. The framework acts include Regulation (EC) No 842/2006 (the so-called F-gas Regulation) and Directive 2006/40/EC (MAC Directive). The Regulation 842/2006 has been complemented by ten EC regulations adopted between December 2007 and April 2008, which establish certain technical elements of the provisions: Commission Regulations (EC) No 1493/2007, 1494/2007, 1497/2007, 1516/2007, 303/2008, 304/2008, 305/2008, 306/2008, 307/2008, 308/2008. The provisions of regulations are directly applicable in all Member States. Still, a few elements rely upon implementation through national legislation. Therefore, in Estonia the major EU legislation concerning F-gases is directly applied, but amendments to national legislation were needed for providing the infrastructure and provisions to enable competent authorities to perform their obligations under relevant Community law and to take the appropriate decisions.

There has been some delay in the full harmonisation of national legislation with the EU provisions relevant to F-gases in Estonia. Nevertheless, in July 2012, a voluminous set of amendments to the *Ambient Air Act* related to F-gases was approved by the Parliament. In addition to tens of detailed amendments in many articles a completely new section (section 4 in Chapter 7 of the Act) regulating issues relevant to F-gases was added. These amendments together with the relevant secondary level acts formed the basis and infrastructure for full implementing the major requirements of all related EU acts covering:

- training, certification and attestation systems;
- containment provisions;
- proper recovery of F-gases;
- labelling requirements;
- reporting obligations;
- bans and penalties.

In addition to full harmonisation with the EU legislation, there are some new local initiatives in progress for enhancing Estonia's legislation in relation to F-gases. At first, the upper limit values of acceptable F-gas leakage will be provided for all relevant equipment types. Secondly, the preparations are going on to elaborate and introduce a more detailed reporting system for all entities dealing with the F-gases. The goal of the additional reporting system is to get more detailed data on all activities with F-gases, enabling to have annual comprehensive surveys of the field at national level. In frames of the planned reporting system more detailed data than currently presented to the EC will be collected and the reporting will be combined with the new web-based FOKA Registry. Both new acts of secondary level legislation are being prepared with plans for enforcing in the beginning of 2013.

Regarding training of personnel and information dissemination related to F-gases in Estonia, by 2009 the training and certification system was established for personnel working with the following equipment (as notified to the European Commission on 16.01.2009):

- stationary refrigeration, air-conditioning and heat pump equipment;
- stationary fire protection systems and fire extinguishers;
- high voltage switchgear;
- equipment containing fluorinated greenhouse gas-based solvents;
- air conditioning systems for motor vehicles.

As to of information dissemination, there have been some international projects where Estonia has been involved. For example, currently there is an on-going project *REAL Skills Europe* in frames of the European Commission's Lifelong Learning Programme where achievements of a UK programme developed in 2009 to achieve reductions in refrigerant leakage through improved awareness, education and training are introduced in several countries. The Ozone/F-gases Unit (*Osoonibüroo*) of the Environmental Research Centre **(***Keskkonnauuringute Keskus OÜ*; ERC) is the participant institution from Estonia.

The Ozone/F-gases Unit of the ERC is active in the field of F-gases disseminating information, arranging trainings and participating in preparation of legal acts. They render various services related to F-gases, for example recovery, recycling, reclamation, destruction, cleaning, etc. Also, the ERC operates a special centre for handling F-gases (together with ozone depleting substances). In 2012, the ERC started a lending system for providing containers (100 kg) to assist recovery, recycling or/and destruction of F-gases or ozone depleting substances from containers in operation.

2.2.7 Agriculture

The use of environmentally friendly methods in agriculture is encouraged in the *Rural Development Plan 2007–2013* (RDP) that is the implementation document of the *Rural Strategy 2007–2013*. The RDP was prepared for supporting the regionally balanced development of rural areas through the EU Common Agricultural Policy (CAP) measures. In the RDP, the most important measures concerning the protection of air quality and climate change are:

- *modernisation of agricultural holdings*. In the framework of its sub-measure III (investments into the production of bio-energy) the producers have an opportunity to invest into biogas production projects (i.e. the reduction of methane emission), it is possible to reduce the use of fossil fuels with the production of biomass and biofuels.
- *modernisation of agricultural holdings*. In the framework of its sub-measures I (investments into the development of micro agricultural producers) and II (long-term investments of agricultural producers) the producers have an opportunity to invest into the upgrading of manure handling.
- *adding value to agricultural products*, under which it is possible to invest into the equipment for the production of biofuels.
- *agro-environmental support (incl. organic farming, environmentally friendly management in nitrate-vulnerable area, environmentally friendly management)*, which should promote the implementation and continuous use of environmentally friendly management methods for the reduction of diffuse pollution originating from agriculture, incl. the reduction of N_2O emission arising from the processes of nitrification and de-nitrification caused by fertilization.
- *improving the economic value of forests and adding value to forestry products*, under which the actions helping to prevent forest fires will be supported.
- *use of short rotation coppice for energy production*, promoting the increase of the quantities of raw material for bioenergy and thereby helping to contribute to the climate change mitigation.
- *advisory, training and information activities* have indirect positive impact on air quality and climate change. In the framework of these measures agricultural producers have an opportunity to receive relevant training, including on the issues of the sustainable management of natural resources, environmental protection requirements, maintenance and improvement of landscapes and production practices suitable for environmental protection.

In September 2011, a special commission was established to start preparations for drawing up the rural development plan for the period 2014–2020 (Order of Minister of Agriculture No. 117, 13.09.2011).

In agriculture, the improvements in environmental performance are expected also as a result of introducing integrated environmental permit conditions for stock farmers to use of best available techniques (BAT) since January 2007. To assist this process in Estonia, local BAT instructions have been prepared for stock-farming. Technologies preventing the discharge or release of pollution into soil, air or water, and enabling a better utilization of waste are preferred. The optimal use of energy and water is also considered.

Regarding the impact on environment, the organic farming can have an essential role. In Estonia, the development of organic farming began in 1989 when the Estonian Biodynamic Association was founded. The Association used IFOAM (International Federation of Organic Agriculture Movements) standards to work out the first Estonian organic agriculture standards and started to use the trademark „ÖKO“ and also introduced the control system over the producers. In 1997, the *Organic Farming Act* came into force and the Centre for Ecological Engineering started actively organising educational events, published informational brochures and brought to life several development projects. Information about organic farming was made available from many sources. With the support of the Ministry of Agriculture and the European Union several publications about organic agriculture have been published, mainly put together by the Estonian Organic Farming Foundation and the Centre for Ecological Engineering. Organic producers are offered free courses in organic farming, processing and marketing.

Officially, organic farming as an environmentally friendly agricultural production pattern has been supported since 2000. In 2000, the Estonian Organic Farming Foundation was created and it has been very active in developing organic farming. The Agro-Environment Bureau was founded by the Ministry of Agriculture in 2000. In 2007, the *Organic Farming Development Action Plan 2007–2013* together with the relevant action plan were approved by the Minister of Agriculture. These planning documents together with the RDP all contribute to the expansion of the organic sector in Estonia.

Operational support for organic farming has been paid yearly from 2000. Since joining the EU in 2004, the basis for the distribution of support money has been the agro-environment support as provided in the RDP. 80% of the support money is covered by the EU funds and 20% is by the Estonian Government. By applying for support the applicant assumes the duty to continue organic farming for at least five years. In 2011, the rates of support payments for organic production were:

- cereals, legumes, oil and fibre crops, potatoes and fodder roots; black fallow; grassland used as cover crop of up to two years; grass seed field – 119.20 EUR/ha, annually;
- open area vegetables, medicinal herbs and aromatic herbs, fruit crops and berries – 349.60 EUR/ha, annually;
- in the case of grasslands (except when the grassland is used as up to two years cover crop and grass seed field) if at least 0.2 livestock units per hectare of organically kept animals are kept – 76.69 EUR/ha, annually.

The *Organic Farming Development Plan 2007–2013* sets the objective to increase organically farmed area from 72 800 ha to 120 000 ha, and the number of organic producers from 1173 to 2000, the number of the enterprises processing organic products from 14 to 75 and the share of Estonian organic products in the market of foodstuffs from 0.15% to 3% by the end of the year 2013. Actually, the area of land used for organic production has grown rapidly since 2000. In 2011, a total of 134.1 thousand hectares of agricultural land was in organic use by 1431 farms that contributes 14% of total agricultural land. Organic production has grown rapidly, one of the reasons being the financial support given per organic hectare since the year 2000. Still, the development of organic processing and marketing has been modest. In 2011, the organic farming register had a total of 127 organic food processors and traders.

As characteristic of organic agriculture, large areas are grasslands (79%). It has to be considered that short-term grasslands are important in crop rotation for maintaining the soil fertility. 20 493 ha were covered by grains, incl. 15 177 ha on converted land, showing a

growth of 2.4 times in five years (compared to 2006). 630 organic farmers were growing grain. The most popular crop is oats, taking 41% of total grain. Oats was followed by barley, wheat and rye. Food grain production has been growing especially in recent years due to export possibilities. The area covered by industrial crops (mostly oil seed rape and turnip rape) has grown almost seven times in five years. Other crops grown are flax, white mustard, hemp, caraway. At the same time the amount of organic industrial crops grown is still small – in 2011 it was only 2136 ha, incl. 1130 ha converted.

Regarding organic animal husbandry, nearly two thirds of organic farmers (899 farmers) in Estonia are animal raisers. Foremost are organically raised sheep (46 496 animals in 2011) and cattle (28 701 animals in 2011).

Organic products are labelled with the EU organic logo, which is compulsory on pre-packaged products since 1 July 2011. In addition the Estonian organic logo can be used. Labelled products must originate from organic land or organic animals. In processed products at least 95% by weight of the ingredients of agricultural origin are organic and only those non-organic ingredients are used that are listed in the regulation (EC) No 889/2008 Annex IX.

Organic farming has strict inspection systems. In Estonia, organic farming started with private standards and control bodies: the Estonian Biodynamic Association (from 1990) and South-East Estonian Bios (from 1995). In 2001, the state inspection system was implemented and the supervision of organic farm production became the responsibility of the Plant Production Inspectorate, while food and feed processing, and marketing (incl. importing) became the responsibility of the Veterinary and Food Board. From 1st January 2010, the Plant Production Inspectorate has been merged with the newly established Agricultural Board.

2.2.8 Waste

In 2008, a strategy document *National Waste Management Plan 2008–2013* was endorsed by the Government. According to the plan, the closure of non-conforming landfills is supported. In addition, the establishment of regional landfills and other regional waste handling facilities, including incineration plants and facilities for treating biological waste, for example for use in composting fields, etc., that comply with the designated requirements are promoted by Government. Among other items, it plans to set up a waste handling system for biodegradable waste and to improve the options for sorting waste at its place of generation. According to the *Waste Act* all landfills had to meet the EU established requirements by 16 July 2009. Landfills closed for waste deposit by this date have to be conditioned in accordance with the requirements no later than 16 July 2013.

In May 2012, the Minister of the Environment initiated the preparation of the *National Waste Management Plan* for the period 2014–2020. The plan has to be ready for adoption by September 2013.

In order to reduce the pollution load, the Government has introduced a revised waste management system. A new waste management infrastructure has been established – waste sorting and recycling has been developed according to the national waste management plan. The primary attention in the implementation of waste-related legislation has been paid to waste flows based on the responsibility of producers, like packaging and packaging waste, waste from electrical and electronic equipment, end-of-life vehicles and tyres.

The programme of collecting municipal waste separately by type has also been partially launched, enabling materials to be recycled to a greater degree, including recycling them as reusable materials. Recycling organizations have been appointed to organize the recycling of different types of waste and implement the principle of producer responsibility. Landfills,

waste transfer stations and hazardous waste handling facilities that meet the set requirements have been established. More than 300 non-conforming landfills have been made environmentally safe and closed.

General waste related requirements and rules are provided by the Waste Act. Rules on municipal waste planning, producer responsibility and tax on landfilling of waste and prohibition of mixed waste are expected to lead the reduction of waste generation and recycling. Objective regarding the share of waste recycled by 2020 is 50% to meet the requirements of the directive 2009/98/EC.

In 2004 and 2005, a research project was carried out to investigate the amount of landfilled biodegradable waste and to increase the share of biodegradable waste recycling. In 2007, the *Action Plan for Biodegradable Waste 2008–2013* has been compiled for handling of such waste, offering opportunities to attain the objectives of sustainable waste management in handling biodegradable waste, and also providing suitable solutions for each county.

Prohibition concerning percentage of biodegradable waste deposited is stipulated in the Waste Act. The percentage of biodegradable waste in the total amount by weight of municipal waste deposited in landfills in Estonia shall not exceed:

- 45% by 16 July 2010;
- 30% by 16 July 2013;
- 20% by 16 July 2020.

In 2010, 11.7 million tonnes of waste was deposited in 15 landfills (59.6% of all the waste was landfilled). To initiate the process of using waste as a source of energy, the development of incineration technologies and combined heat and power production from landfill gas emitted from closed landfills has begun. General requirements for the construction, operation and closing down of waste management facilities design for waste disposal are provided with the Regulation of the Minister of Environment (No. 38, 29.04.2004).This includes also requirements for the landfills regarding establishing methane collection, recycle and disposal system. The provisions for the waste incineration plants are stipulated in the Regulation of the Minister of Environment (No. 66, 04.06.2004).

Several studies commissioned by the Ministry of the Environment have been conducted on sorting of mixed municipal waste. These studies have been conducted periodically by independent research institutions; thus, the data are a reliable basis for estimates of the share of biodegradable waste. Regarding energy use of waste in Estonia, there are some small scale CHP plants utilizing landfill gas – in Tallinn (2 plants), Jõelähtme (Harju county), Väätsa (Järva county) and Rääma (Pärnu county). Some feasibility studies for constructing more plants have been carried out.

In 2008, the first in Baltic states mechanical biological treatment (MBT) plant processing waste was commissioned in Sillamäe landfill combining sorting with biological treatment (composting) of waste. As the result, waste which is not suitable for recycling is separated, recyclable materials extracted and the rest utilized for producing fuel (solid recovered fuel – SRF; also refuse derived fuel – RDF). At present, there are two more plants that use MBT technology for waste processing to produce SRF, but mixed municipal waste has not been used for direct energy production, yet. However, one waste incineration plants have been planned – in Tallinn (Iru). In Tallinn the new energy unit firing municipal waste is under construction combined with the existing Iru CHP plant (owned by Eesti Energia AS) supplying heat into DH system of the City of Tallinn. It is planned to launch the new energy unit (17 MW_e / 50 MW_{th}) in Iru in 2013. The unit can incinerate up to 220 000 tons of mixed

municipal waste a year converting about 85% of the energy in waste into electricity and heat. It is estimated that the biodegradable content of the mixed municipal waste to be used in the Iru Power Plant is about 60% by weight.

The Kunda Nordic Cement Plant has practiced the waste incineration in cement ovens as an additional fuel. Since 2002, the alternative fuels have formed approximately 10–15% of the energy input in cement production. In 2011, 7 362 t of liquid and 15 655 t of solid alternative fuels were utilized, included municipal waste. The plant has planned to reach the share of 20% for alternative fuels by increasing the use of municipal waste.

As to promotion of sustainable waste management, during several years numerous projects have received investment support from national and international sources. As a rule, the granted support has been administered by the Environment Investment Centre (EIC). For example, in 2011 the total of 27.15 MEUR of grants were paid to 42 waste related projects (see Table 2.10).

Table 2.10 Payments for waste management projects in 2011

Subprogram	Number of projects	Payments, MEUR
Closure and redevelopment of non-conforming oil-shale industry landfills (CF*)	2	12.71
Closure of non-conforming non-hazardous waste landfills (CF)	15	8.74
Management and development of waste collection, sorting and recycling (CF)	18	4.42
Extension of the landfill areas of waste treatment centres with landfill areas (CF)	1	0.85
Non-hazardous waste management (CF)	10	0.30
Non-hazardous waste management (CF)	6	0.14
Total	**42**	**27.15**

** CF – projects were financed from the EU Cohesion Fund*

In 2011, four landfill closure projects were finished with the help of the EU Cohesion Fund measure, the most relevant and extensive being the Rääma landfill at Pärnu. At the end of 2011 there were still three more landfill closure projects in the phase of processing in EIC.

The adaptation or closure of landfill sites that contain waste from the oil shale industry and oil shale fired power plants that did not comply with environmental requirements helps to reduce the load on the environment caused by energy production. Such landfills include the oil shale semi-coke landfills of Kiviõli and Kohtla-Järve, the ash landfills near Narva and some others.

The gradual increase of pollution charges for release of waste into environment (landfilling) provided in the Environment Charges Act is also targeted to support the reduction of landfilled waste – in 2009 the relevant charge for non-hazardous waste was 10 EUR/t, in 2012 the rate is 17.25 EUR/t and in 2015 29.84 EUR/t.

2.2.9 Land use, land use change and forestry (LULUCF)

In the light of climate change mitigation, it is important to preserve and protect areas that have high carbon sequestration capacity: forests, wetlands, peatland and grasslands, as well as promote carbon sequestration through sustainable forest management, reforestation and afforestation, improvement of cropland management practices and resume with supportive activities like mowing and grazing in order to preserve the natural state of meadows and semi-natural grasslands.

In Estonia, there are currently no policies targeted directly to the reduction of greenhouse gases in the LULUCF sector, however there are cross-cutting strategies as well as land-use specific acts that comprise different issues under LULUCF sector, e.g. promoting the use of wood as a renewable material and energy source to other materials and non-renewable sources with higher greenhouse gas emission in the framework of Development Plan 2007–2013 for Enhancing the Use of Biomass and Bioenergy. Since half of Estonian's territory is covered with forest, of which 10% is strictly protected, forestry is of great importance for Estonian economy and environment, therefore forest policies have the major effect on the whole development of the LULUCF sector.

Implemented policies and measures

Forest Act[5] provides the legal framework for the management of forests in Estonia. The main objective of this is to ensure the protection and sustainable management of forests as an ecosystem. The Act provides legal bases for forest survey, forest planning and forest management. Among other sustainable forest management practices, the Forest Act regulates implementation of forest regeneration and requires forest owner to apply reforestation methods specified in the act in order to ensure the regeneration of forest no later than 5 years after the occurrance of final fellings or natural disturbances.

According to the Forest Act and the Sustainable Development Act, forestry development plan is to be done in every ten years. **Estonian Forestry Development Programme until 2020**[6], approved by the Parliament in 2011, is the official sustainable development strategy for Estonian forest sector. The programme determines objectives and describes measures and tools for achieving them for the period 2011–2020. The main objective of the development plan is to ensure the productivity and viability as well as assure multiple and efficient use of forests. One of the aims is to increase annual increment along with carbon sequestration in forests by implementing appropriate forest management activities like regeneration, cleanings and thinnings. In the following table main indicators and target levels are presented for the current situation and for the year 2020.

Table 2.11 Indicators and target levels for forest management

Indicator	Baseline level	Target level
Growing stock	442 Mm^3	450 Mm^3
Annual increment	12.1 Mm^3	12.5 Mm^3
Annual volume and area of regeneration fellings	5.85 Mm^3 22 400 ha	10.1 Mm^3 34 500 ha
Annual area of cleanings	22 200 ha	32 400 ha
Annual area of thinnings	14 200 ha	34 500 ha
Annual usage for energy production	22 PJ (2009)	30 PJ

National timber production is dependent on the existence of mature stands, forest market situation, demand for renewable sources in energy production, taxes, subsidies and other factors that all have a complex impact on harvesting intensity. Taking into account these factors, primarily the availability of wood resources in mature stands, several scenarios were constructed for possible harvest rates until year 2040. Optimal and maximum sustainable harvest rates under the modarate scenario are highlighted in the current forestry development

[5] *https://www.riigiteataja.ee/akt/MS*
[6] *https://www.riigiteataja.ee/.../Eesti_%20metsanduse_arengukava.pdf*

programme as the two most likely estimates used in the future forestry development plans. Optimal and maximum sustainable harvest rates are 12.670 million m^3 and 15.826 million m^3 per year respectively. The general goal is to promote and increase the use of wood as renewable material and energy source instead of non-renewable materials and resources with higher GHG emissions.

Estonian Forestry Development Programme is supported by the **Estonian Rural Development Plan 2007–2013**[7] (ERDP) that funds measures addressed to private forest owners who hold the share of 45% of the total forest area in Estonia (NFI 2010). ERDP was prepared to support regionally balanced development of rural areas through the European Union Common Agricultural Policy measures. Overall objective of the ERDP is to improve the competitiveness of the agricultural and forestry sector as well as improve the environment and countryside. Under measure 1.5 "Improving the economic value of forests and adding value to forestry products" there are activities directed at the improvement of the economic value of forest, at the restoration of the forest damaged by natural disasters or forest fires and at the prevention of fires to ensure the sustainable and efficient management of private forest and protect the function of forest. The target of the measure is to restore 3 500 ha of forest damaged by natural disturbances or forest fires and additional creation of 7 000 ha of forest area with measures to the prevention of forest fires.

Measure 2.6 under ERDP is targeted to support the establishment of protection forest on agricultural land. During the last decades, there has been an increase in the number of areas left out of use and this is causing an increase in forest coverage in the areas which would otherwise be productive agricultural lands. One of the possibilities for limiting further the share of unused land is the afforestation of protective belts on soils exposed to erosion, and the afforestation of the areas in the vicinity of water bodies, in order to ensure good status of the environment. With establishment of forest with protective functions, the share of agricultural land sensitive to the environment will be reduced and the need to establish protection forests on the account of commercial forests will be decreased. The total area supported for the establishment of protection forest is 4 000 ha.

The analysis on the additional CO_2 sequestered through the implementation of abovementioned measures under the rural development plan has not been done though.

Estonian **Earth's Crust Act**[8], entered into force in 2005, stipulates that the owner of the extraction permit is obliged to restore the land disturbed by mining. According to the **National Greenhouse Gas Abatement Programme 2003–2012**[9] (NGGAP), approved by the Government in 2004, additional 7 Gg CO_2 can be sequestered per year through afforestation if 250–300 ha of exhausted mines will be recultivated. Another measure aimed to increase the uptake of CO_2 is afforestation of abandoned croplands. Currently, more than 100 000 ha of agricultural land is still out of active management in Estonia. Pursuant to NGGAP, additional 700 Gg CO_2 can be sequestered annually when 100 000 ha of abandoned arable land will be afforested.

Planned policies and measures

Estonian Rural Development Plan 2014–2020[10] is currently under development. Under priority No 5: Resource-saving and environmental-friendly economy, one of the objectives is

[7] *http://www.agri.ee/public/juurkataloog/MAK/RDP_2007-2013.pdf*
[8] *https://www.riigiteataja.ee/akt/1011618*
[9] *http://www.envir.ee/orb.aw/class=file/action=preview/id=1159256/20a.pdf*
[10] *http://www.agri.ee/public/juurkataloog/MAAELU/MAK_20142020/prioriteedid/Prioriteet_5_ressursisaast_01.05.2012.pdf*

promoting CO_2 uptake in agriculture and forest sectors. Detailed targets or activities for achieving the targets have not been determined yet.

Analysis for moving to a competitive low-carbon economy in 2050 in Estonia is currently under compilation. *Inter alia*, the analysis is focusing on different opportunities for reducing greenhouse gas emissions in sectors included in the EU's climate policy, including LULUCF.

3 Projections

The main objetive of this chapter is to give an indication of future trends in greenhouse gas (GHG) emissions in Estonia, given the current policies and measures implemented and adopted within the current national climate policies. Projections of GHG emissions have been produced for the years 2015 and 2020. The year 2010 has been used as a reference year.

Two scenarios are presented in this report. „With Measures (WM)“ scenario evaluates future GHG emission trends under current policies and measures. In the second scenario a number of additional measures and their impacts are taken into consideration forming the basis of a scenario „With Additional Measures (WAM)“

3.1 Methodology

Projections in the energy sector are calculated using LEAP (Long Range Energy Alternatives Planning System) program, developed at the Stockholm Environment Institute. LEAP is an integrated modelling tool that can be used to track energy consumption, production and resource extraction in all sectors of an economy. It can be used to account for both energy sector and non-energy sector GHG emission sources and sinks.

The estimated final consumption of fuels in the future years are based on the projections of Ministry of Economic Affairs and Communications presented in the National Renewable Energy Action Plan (NREAP) of Estonia (corrected with updated GDP assumptions and also updated historical data). Consumption of electricity (including losses) is projected according to the report compiled by the transmission network operator of Estonia AS Elering (*Varustuskindluse aruanne 2012*). Consumption of heat (including losses) is projected according to the report compiled by Estonian Renewable Energy Association and the Estonian Council of Environmental NGOs (*Renewable Energy 100*).

Consumption of fuels for electricity, heat and shale oil production are calculated by LEAP. The calculations take into account current legislation and also investment plans of this sector in the future.

Projections in industrial processes sector are based on data received from companies that are included in industrial processes sector. Emission projections from consumption of halocarbons and SF_6 are based on expert judgement.

Projections in Solvent and other product use sector are calculated based on historical data (2005-2010) and are also based on the projection of population.

Projections in agriculture sector are based on the information received from Ministry of Agriculture and also expert judgement.

Projections in LULUCF are calculated using land use data from 1990 to 2010 and emissions reported in the *National Inventory Report 2012* and CRF tables.

Projections of CO_2 are calculated as an average of linear forecasts over time series 1990–2010 and 2004–2010. Main reason for using second forecast in calculations is that year 2004 is the starting point for the current trend of all relevant factors – both, intensive felling period and afforestation of agricultural areas, stopped at this time. Projections of CH_4 and N_2O are calculated as linear forecast over whole time series 1990–2010.

Projections in waste sector are based on National Waste Management Plan for years 2008-2013 and on expert judgement.

3.2 With Measures (WM) scenario for 2010-2020

3.2.1 Scenario formulation

A „With Measures“ projections encompass currently implemented and adopted policies and measures.

3.2.2 Demographic assumptions and macroeconomic outlook

Data on population for the years 2010-2020 was received from Statistics Estonia. Annual projected gross domestic product (GDP) growth rates for the years 2010-2015 are according to the projections of Ministry of Finance from summer 2012. GDP growth rates for the years 2015-2020 are according to the “Recommendations for reporting on projections in 2013” sent by European Commission (see Table 3.1).

Table 3.1 Population and GDP growth rates 2010-2020

	2010	**2015**	**2020**
Population (thousand people)	1340.1	1332.4	1328.3
Annual GDP growth rates	2.3%	3.5%	2.3%

3.2.3 Energy Sector

Energy sector includes GHG emissions from consumption and production of fuels and energy (electricity and heat). The main sub-sectors in energy sector are: Energy Industries (including Public Electricity and Heat Production and shale oil production). Manufacturing Industries and Construction, Transport, Other sectors (including Commercial/Institutional, Residential and Agriculture/Forestry/Fisheries).

Final consumption of energy in Estonia’s energy sector according to Statistics Estonia in 2010 was 119 PJ, including 64 PJ fuels and 55 PJ electricity and heat. Total GHG emissions of 2010 in energy sector were 17867.34 Gg CO_2 equivalent.

3.2.3.1 Energy Industries

Main electricity producer is Narva Elektrijaamad AS (Narva Power Plants) including Eesti Power Plant and Balti Power Plant. Both of these plants use mainly oil shale for electricity production. Narva Power Plants are also the largest GHG emissions producers in Estonia. In 2010, there were a total of 10 pulverized combustion (PC) blocks and 2 circulating fluidised bed (CFB) blocks in Narva Power Plants. The process of building one more CFB block in Narva is currently underway. Construction of the new CFB block should be completed in 2015 (capacity of 300MW).

In recent years the share of electricity produced from renewable energy sources have grown rapidly, achieving over 9% from gross electricity production in 2010. The main reason for this growth has been the support paid by Elering AS to electricity produced from renewable energy sources as shown in Table 2.9

Historically Estonia has been an exporter of electricity (In 2010, Estonia exported over 30% of gross produced electricity). In the WM scenario it is projected, that the export of electricity starts declining linearly from the year 2012 and by the year 2025, no export occurs. This will

lead to decrease in GHG emissions due to the fact, that Estonia has been exporting oil shale based electricity. Projected export and import of electricity is presented in Figure 3.1.

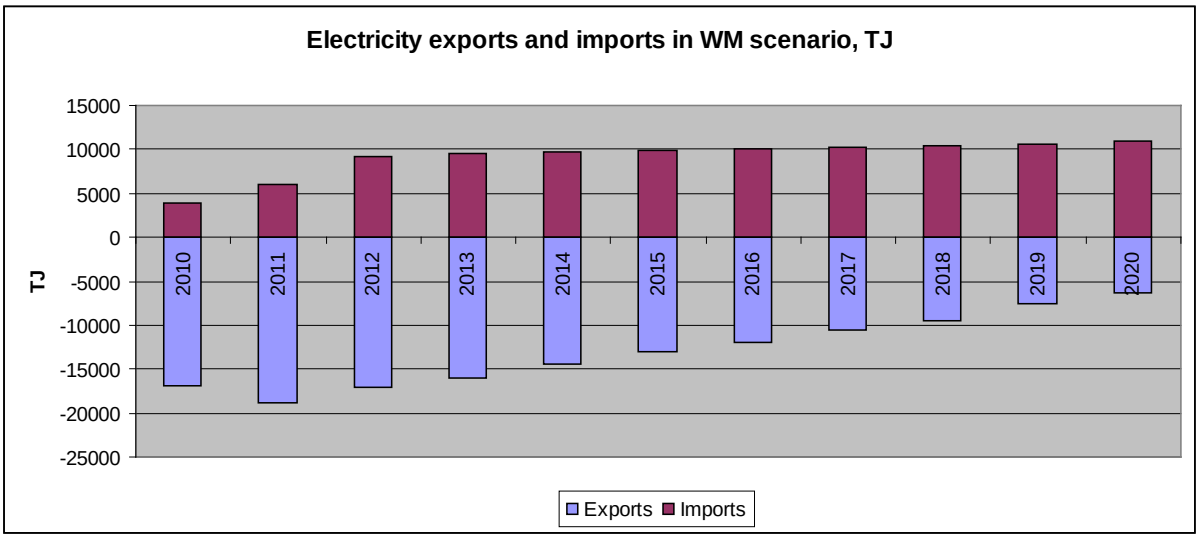

Figure 3.1Projected export and import of electricity in WM scenario, TJ

Table 3.2 Production and consumption of electricity and heat in WM scenario, TJ

	2010	**2015**	**2020**
Production of Electricity	41447	36553	32011
... Including Wind	997	3294	3294
... Including Hydro	97	115	115
... Including CHP	4806	6094	6769
... Including condensing PP-s	35547	27050	22842
Production of Heat	33467	32290	31115
... Including CHP	12323	15954	17730
Losses of Electricity	3769	4177	4511
Losses of Heat	3730	3358	2975
Net Import of Electricity	-12854	-3135	4572
Final Consumption of Electricity	24825	29241	33081
Final Consumption of Heat	29540	28932	28141

In the WM scenario it is expected, that 2 of the PC blocks using oil shale are going to be closed down by the year 2016. For 4 PC blocks, it is planned to install SO_2 and NO_x emissions abatement technology and therefore they are expected to be working until year 2025. For the remaining 4 PC blocks, an exception under Industrial Emissions Directive (IED) is granted, so that each block can work 17500 hours between the period 2016-2023. After 2023, these blocks will be closed. The limit of oil shale mining limit is set to 20 Mt (approximately 178000 TJ). The priority of oil shale usage is to produce shale oil and then the rest of the 20 Mt will be available for power plants.

Table 3.3 Total GHG emissions from Public Electricity and Heat Production in WM scenario, kt

		2010	2015	2020
Public Electricity and Heat Production	**CO2**	13741.7	10493.9	7730.1
	CH4	0.5	0.5	0.5
	N2O	0.1	0.1	0.1
	Total CO2 eq.	13781.3	10530.8	7771.3

Emissions from Public Electricity and Heat Production are expected to decrease about 44% by 2020 compared to 2010. The main reason for this decrease is the increase in wind electricity production and also the projection, that Estonia will change from exporting country of electricity to importing country of electricity.

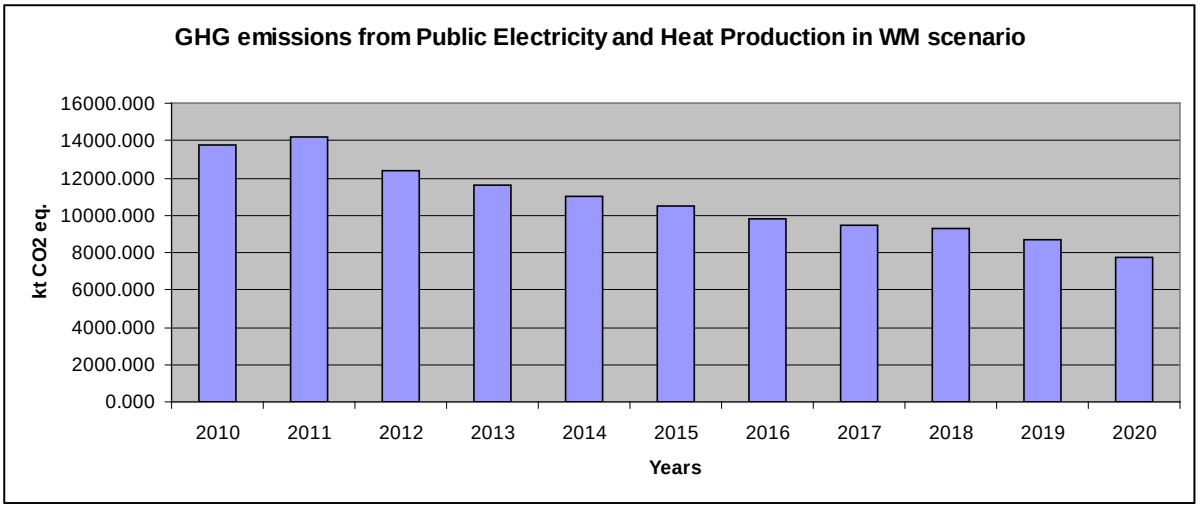

Figure 3.2 Total GHG emissions from Public Electricity and Heat Production in WM scenario, kt CO2 equivalent

There are two different technologies in use for shale oil production in Estonia – technology of processing large-particle oil shale in vertical retorts with gaseous heat carrier (GHC) and technology of processing fine-grained oil shale with solid heat carrier (SHC). The GHC technology is universal technology and suitable for retorting high-calorific oil shale. Thermal processing of oil shale in GHC technology takes place without any contact with the ambitient atmosphere – therefore no pollutants are emitted. GHG emissions occur only in SHC technology – therefore data of projections is presented only for SHC technology (see Table 3.4).

Table 3.4 Oil shale consumption and shale oil production in WM scenario, TJ

	2010	2015	2020
Oil shale for shale oil production in SHC technology	17170	52170	107259
Oil shale for shale oil production in GHC technology	25252	25377	25377
Oil shale for shale oil production total	42422	77547	132636
Shale oil production in SHC technology	8818	29331	60623
Shale oil production in GHC technology	13275	14130	14130
Shale oil production total	22093	43461	74753

As seen from Table 3.4, the production of shale oil is expected to grow about 3 times by the year 2020 compared to 2010.

Table 3.5 Total GHG emissions from Shale Oil production in WM scenario, kt

		2010	2015	2020
Shale Oil Production	**CO_2**	418.7	1292.4	2737.9
	CH_4	0.0	0.1	0.1
	N_2O	0.0	0.0	0.0
	Total CO_2 eq.	419.6	1295.2	2743.5

Due to very high oil shale usage increase in shale oil production, the GHG emissions from shale oil production are also expected to increase rapidly (see Table 3.5. and Figure 3.3)

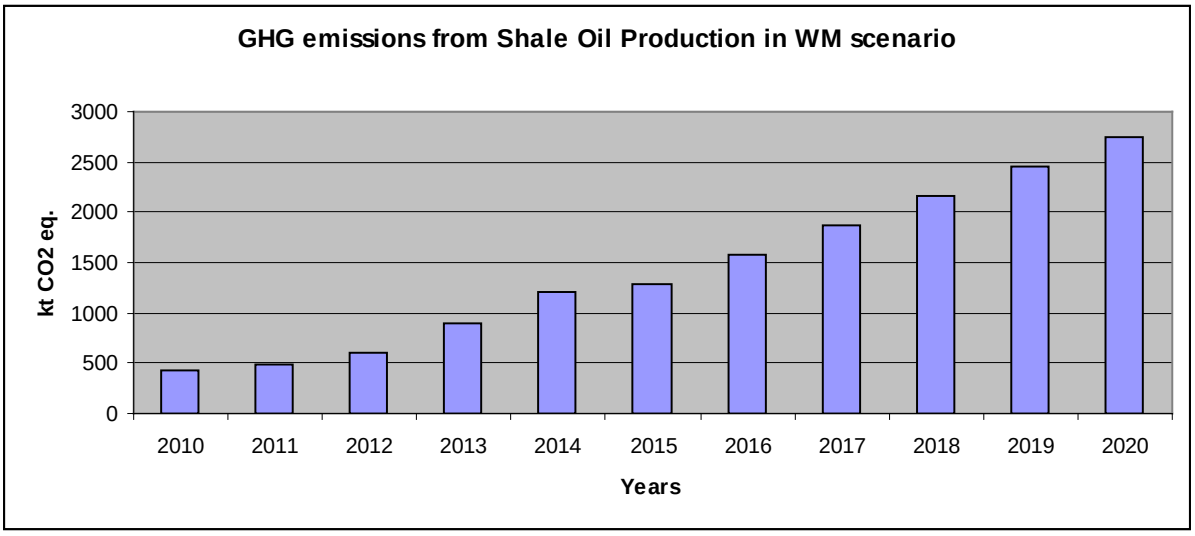

Figure 3.3 Total GHG emissions from Shale Oil Production in WM scenario, kt CO2 equivalent

GHG emissions from Shale oil production are expected to increase from 464 kt of CO_2 equivalent in 2010 to 2743 kt of CO_2 equivalent by 2020.

3.2.3.2 Manufacturing Industries and Construction

Manufacturing Industries and Construction sector is divided into following sub-sectors: Iron and Steel; Non-Ferrous Metals; Chemicals; Pulp, Paper and Print; Food Beverages and Tobacco; Other Industries. Under Other Industries the main share of fuel (mainly oil shale and coal) is used in cement production. Also diesel and natural gas is used a lot in Manufacturing Industries and Construction sector.

Table 3.6 Fuel and energy consumption in Manufacturing Industries and Construction sector in WM scenario, TJ

	2010	**2015**	**2020**
Iron and Steel	16.0	17.7	19.5
Non-Ferrous Metals	89.0	98.3	108.5
Chemicals	221.0	244.0	269.4
Pulp, Paper and Print	88.0	97.2	107.3
Food Beverages and Tobacco	112.0	123.7	136.5
Other	6349.0	7009.8	7739.4
Electricity	7534.0	9893.0	11260.6
Heat	7660.0	7848.0	8035.2
Manufacturing Industries and Construction Total	22069.0	25331.6	27676.3

The overall energy consumption in Manufacturing Industries and Construction sector is expected to grow almost 25% by 2020 compared to 2010 (see Table 3.6).

Since the most fuels are used in Other Industries, then also the main share of GHG emissions come from this sub-sector. The share of GHG emissions from coal and oil shale use for cement production was almost 50% from total GHG emissions in Manufacturing Industries and Construction sector due to their relatively high carbon emission factor. GHG emissions from diesel, natural gas, oil shale and coal combined emitted about 80% of total emissions from Manufacturing Industries and Construction sector in 2010.

Table 3.7 Total GHG emissions from Manufacturing Industries and Construction in WM scenario, kt

		2010	**2015**	**2020**
Manufacturing Industires and Construction	**CO_2**	504.9	557.4	615.5
	CH_4	0.1	0.1	0.1
	N_2O	0.0	0.0	0.0
	Total CO_2 eq.	509.1	562.1	620.6

The overall structure of fuels and energy consumed in Manufacturing Industries and Construction sector is expected to stay quite steady for the whole period from 2010 to 2020. No major structural changes are projected.

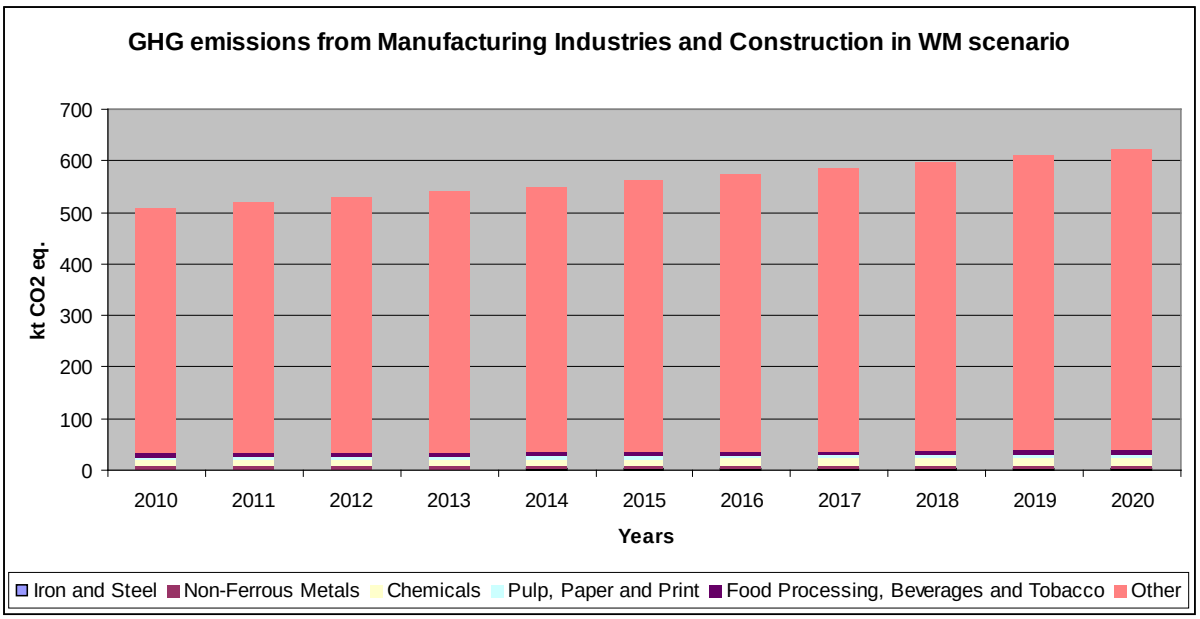

Figure 3.4 Total GHG emissions from Manufacturing Industries and Construction in WM scenario, kt CO2 equivalent

GHG emissions are expected to increase about 22% in 2020 compared to 2010 in WM scenario (see Table 3.7 and Figure 3.4).

3.2.3.3 Transport (excluding international aviation and marine bunkering)

The main share of GHG emissions in Transport sector originate from road transport. Historically the share of road transport GHG emissions have been over 90% from total Transport GHG emisssions. Although new vehicles are more environmentally friendly and efficient, the share of those vehicles is relatively small. Therefore the consumption of motor fuels is expected to increase in the future.

Table 3.8 Fuel and energy consumption in Transport sector in WM scenario, TJ

	2010	**2015**	**2020**
National Aviation	24.3	26.8	29.6
Road Transport	28374.0	30233.0	32219.9
Railways	2125.0	2146.3	2167.9
Inland Waterways	319.0	335.3	352.4
Electricity	206.0	348.2	394.9
Heat	100.0	107.8	112.9
TOTAL	**31148.3**	**33197.4**	**35277.6**

Total fuel and energy consumption in Transport sector is expected to increase about 13% by 2020 compared to 2010 (see Table 3.8). This increase is mainly related to the increase of gasoline and diesel consumption in road transportation.

Table 3.9 GHG emissions from Transport Sector in WM scenario, kt

		2010	2015	2020
Transport	**CO_2**	2233.8	2351.5	2500.0
	CH_4	0.3	0.4	0.4
	N_2O	0.1	0.1	0.1
	Total CO_2 eq.	2258.9	2378.1	2528.2

Total GHG emissions from Transport Sector are expected to increase about 12% by 2020 compared to 2010 (see Table 3.9 and Figure 3.5). The share of GHG emissions from road transport is projected to increase slightly throughout the period from 2010 to 2020 (about 1% total).

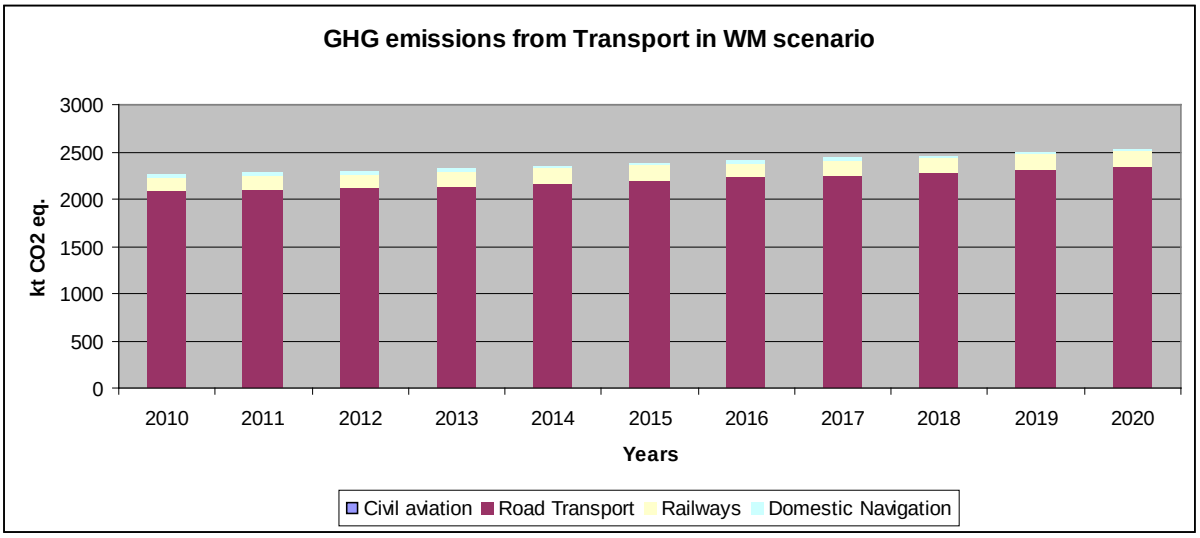

Figure 3.5 Total GHG emissions from Transport in WM scenario, kt CO2 equivalent

3.2.3.4 Other sectors

Other sectors include energy consumption in Commercial/Institutional sector, Residential sector and Agriculture/Forestry/Fisheries sector. In current projections GHG emissions from Military use of fuels is included under Other sectors (In National Inventory Report of Estonia these GHG emissions are reported separately under 1.A.5 not 1.A.4). Historically the most energy (including fuels) has been consumed in Residential sector. The share of biomass used in households was about 85% of all fuels used in households in 2010. Diesel used in off-road transportation forms the biggest share of fuels in Agriculture/Forestry/Fisheries. Activity data used in the projections is presented in Table 3.10.

Table 3.10 Fuel and energy consumption in Other sectors in WM scenario, TJ

		2010	2015	2020
Commercial/Institutional	**Fuels**	1644.0	1723.7	1803.2
	Electricity	9123.0	10339.2	11725.8
	Heat	6542.0	6270.0	5999.0
Residential	**Fuels**	20900.0	20723.7	20549.1
	Electricity	7283.0	7767.0	8686.6
	Heat	14792.0	14249.0	13526.0
Agriculture/Forestry/Fisheries	**Fuels**	2785.0	2854.2	2925.1
	Electricity	679.0	893.1	1012.9
	Heat	446.0	457.0	468.0
Total	**Fuels**	**25329.0**	**25301.6**	**25277.4**
	Electricity	**17085.0**	**18999.3**	**21425.3**
	Heat	**21780.0**	**20976.0**	**19993.0**

Heat consumption is expected to decrease in Other sectors. This decrease is result of measures and programmes that cover development and implementation of regulation on energy performance of buildings, modernisation of renovation and construction of buildings, tax policy measures, improvement of the skills of construction specialists, applied R&D to ensure analysis of the state of repairs of the buildings and the technical options for modernising them.

Table 3.11 Total GHG emissions from Other sectors in WM scenario, kt

		2010	2015	2020
Commercial/Institutional	**CO_2**	86.2	90.7	94.9
	CH_4	0.0	0.0	0.0
	N_2O	0.0	0.0	0.0
	Total CO_2 eq.	87.4	91.8	96.1
Residential	**CO_2**	198.3	198.3	198.3
	CH_4	5.4	5.4	5.3
	N_2O	0.1	0.1	0.1
	Total CO_2 eq.	335.0	333.7	332.4
Agriculture/Forestry/Fisheries	**CO_2**	241.9	248.4	254.6
	CH_4	0.0	0.0	0.0
	N_2O	0.1	0.1	0.1
	Total CO_2 eq.	264.6	271.7	278.5
TOTAL	**CO_2**	526.5	537.4	547.9
	CH_4	5.5	5.4	5.4
	N_2O	0.1	0.1	0.1
	Total CO_2 eq.	687.0	697.2	707.0

The reduction of biomass used in households leads to decrease of GHG emissions from Residential sector. Other fuels used in households are expected to stay in the same level throughout the period from 2010 to 2020. Therefore CO_2 emissions from Residential sector stay also in the 2010 level. Increase of GHG emissions from Agriculture/Forestry/Fisheries is related to growing demand and use of motor fuels in agricultural machines. GHG emissions from Other sectors are expected to grow about 3% by the year 2020 compared to 2010 (see Table 3.11 and Figure 3.6).

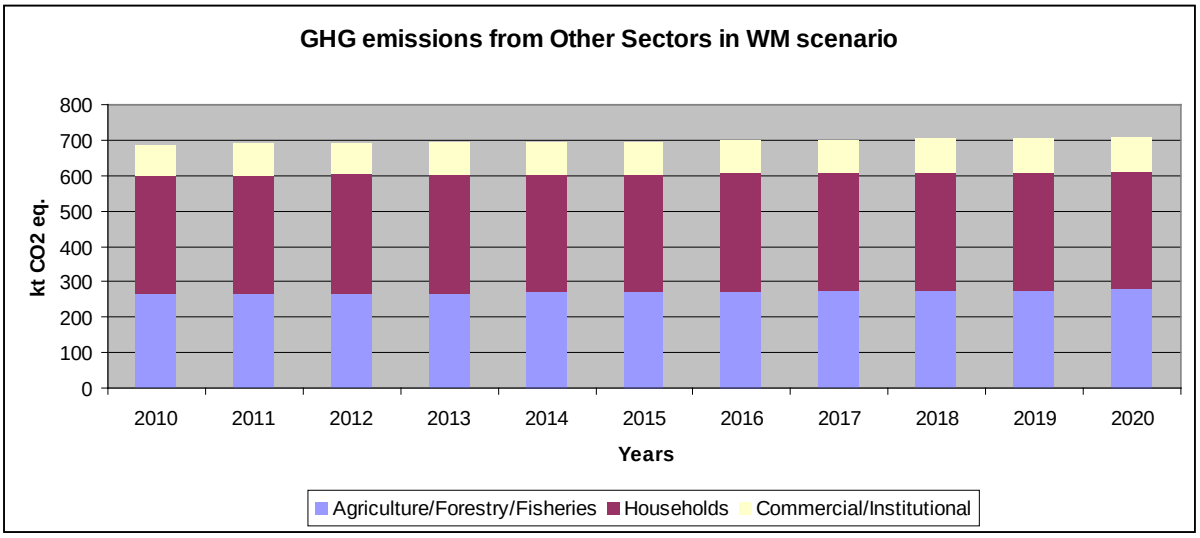

Figure 3.6 Total GHG emissions from Other Sectors in WM scenario, kt CO2 equivalent

3.2.4 Industrial Processes

Mineral products and chemical industry are the sources of CO_2 emissions in industrial processes sector. Data from 8 companies are included in the projections. In mineral products sector the main share of emissions (about 91% in 2010) come from cement production. Other CO_2 emissions from mineral products production come from soda ash use, glass, lightweight gravel, bricks and tiles production.

Ammonia production is the only production under chemical industry branch. Also there is only one company in Estonia producing ammonia (AS Nitrofert). Due to low market prices of ammonia there was no ammonia production in 2010. But it is expected, that the production of ammonia will continue in future years.

The consumption of fluorinated GHGs (HFCs, PFCs and SF_6) in Estonia depends on import. F-gases are imported either in bulk by trade or industry for domestic productive consumption (manufacturing) – filling of newly manufactured products, refilling of equipment – or imported preliminary and final products respective equipment already filled with F-gases.

Table 3.12 Total GHG emissions from Industrial Processes sector in WM scenario, kt

		2010	2015	2020
Mineral Products	**CO_2**	339.4	421.4	458.6
Chemical Industry	**CO_2**	0.0	262.9	262.9
Consumption of Halocarbons and SF_6	**HFCs (CO_2 eq.)**	156.3	184.7	218.1
	SF_6 (CO_2 eq.)	3.8	4.1	4.3
	Total CO_2 eq.	160.1	188.8	222.5
Industrial Proceses Total	**Total CO_2 eq.**	499.5	873.1	944.0

GHG emissions are projected to increase in all sub-sectors under Industrial Processes. Total GHG emissions are expected to increase almost two times by the year 2020 compared to 2010 (see Table 3.12 and Figure 3.7). The main share of this increase is related with cement production and ammonia production.

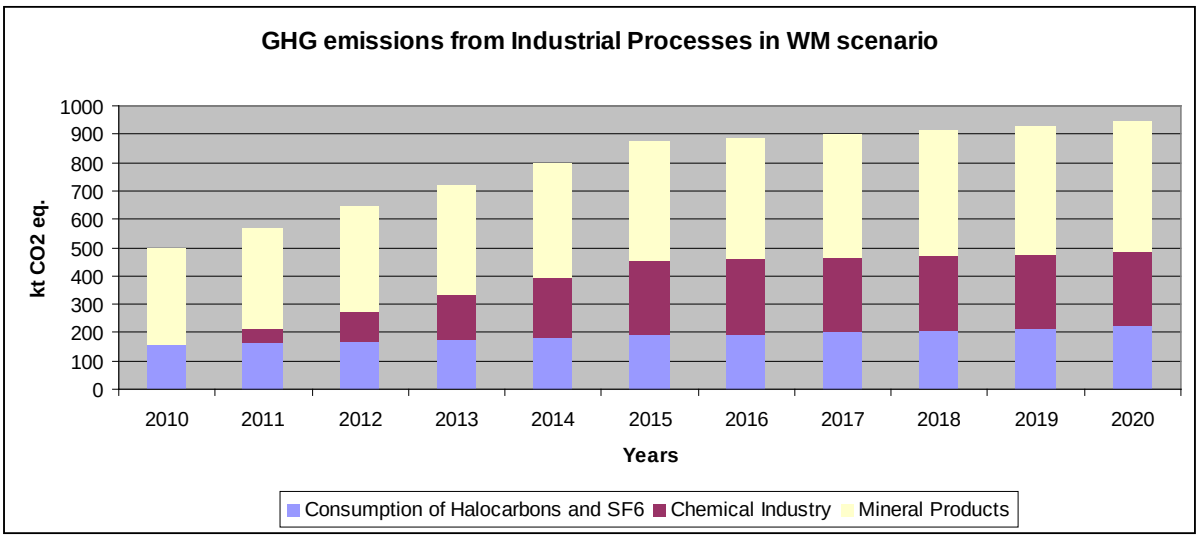

Figure 3.7 Total GHG emissions from Industrial Processes in WM scenario, kt CO2 equivalent

3.2.5 Solvent and Other Product Use

Emissions from Solvent and Other Product Use sector in Estonia are divided into following categories: Paint application, degreasing and dry cleaning, chemical products, manufacture and processing and other (including printing industry, domestic solvent use and other product use). Under this category, mainly CO_2 emissions are occurring (except N_2O emissions from use of N_20 for Anaesthesia).

Table 3.13 Total GHG emissions from Solvent and Other Product Use in WM scenario, kt

		2010	2015	2020
Paint Application	**CO_2**	5.3	4.7	4.7
Degreasing and Dry Cleaning	**CO_2**	2.3	1.8	1.8
Chemical Products, Manufacture and Processing	**CO_2**	0.3	0.4	0.4
Other	**CO_2**	5.0	5.8	5.8
	N_2O	0.0	0.0	0.0
	Total CO_2 eq.	9.8	12.0	12.0
Solvent and Other Product Use Total	**CO_2**	**12.9**	**12.8**	**12.7**
	N_2O	**0.0**	**0.0**	**0.0**
	Total CO_2 eq.	**17.7**	**19.0**	**18.9**

Increase of total GHG emissions from Solvent and Other Product Use sector is expected to be 7% by 2020 compared to 2010 (see Table 3.13 and Figure 3.8)

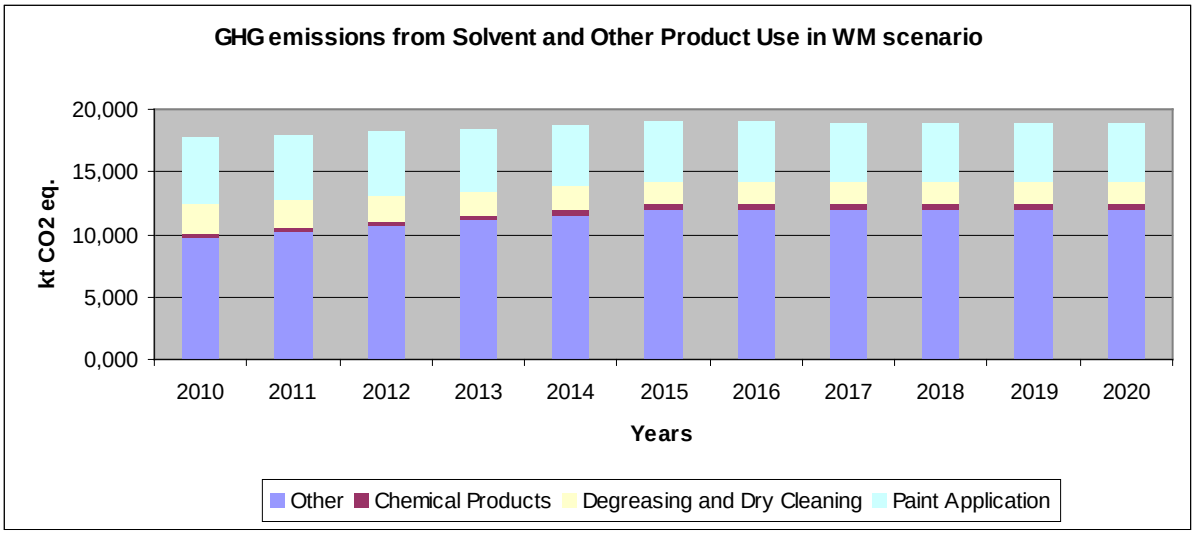

Figure 3.8 Total GHG emissions from Solvent and Other Product Use in WM scenario, kt CO2 equivalent

3.2.6 Agriculture

In agriculture sector CH_4 is emitted from enteric fermentation and manure management. N_2O is emitted from manure management and agricultural soils. No CO_2 emissions occur in the agriculture sector. CH_4 and N_2O emissions occurred in Estonia in the years 1990-2006 from field burning of agricultural residues. Since 2007, the burning of crop residues is prohibited by an Estonian law, therefore no GHG emissions occur under this sector from the year 2007.

Projections on the number of livestock are received from Ministry of Agriculture and they are presented in Table 3.14

Table 3.14 Projected number of livestock, thousand heads

	2010	**2015**	**2020**
Cattle	236.3	236.9	243.7
Sheep	78.6	80.0	82.0
Goats	4.1	4.2	4.4
Horses	6.8	5.1	5.0
Swine	371.7	360.0	352.0
Poultry	2046.4	2046.0	2046.0

Projections on GHG emissions from Agriculture are presented in Table 3.15

Table 3.15 Total GHG emissions from Agriculture in WM scenario, kt

		2010	2015	2020
Enteric Fermentation	**CH_4**	19.3	19.0	20.2
	Total CO_2 eq.	405.5	398.2	425.2
Manure Management	**CH_4**	2.3	2.3	2.4
	N_2O	0.3	0.3	0.3
	Total CO_2 eq.	150.0	149.2	150.7
Agricultural Soils	**N_2O**	2.3	2.2	2.3
	Total CO_2 eq.	698.1	688.3	719.8
Agriculture Total	**CH_4**	**21.7**	**21.3**	**22.6**
	N_2O	**2.6**	**2.5**	**2.6**
	TOTAL CO_2 eq.	**1253.6**	**1235.7**	**1295.7**

GHG emissions from Agriculture sector are expected to stay just about the same level in the years 2010-2020 (increase of 3% by 2020 compared to 2010). The slight increase is related to the fact, that the number of cattle and the surface of agricultural land is expected increase by 2020 compared to 2010. (see Table 3.15 and Figure 3.9).

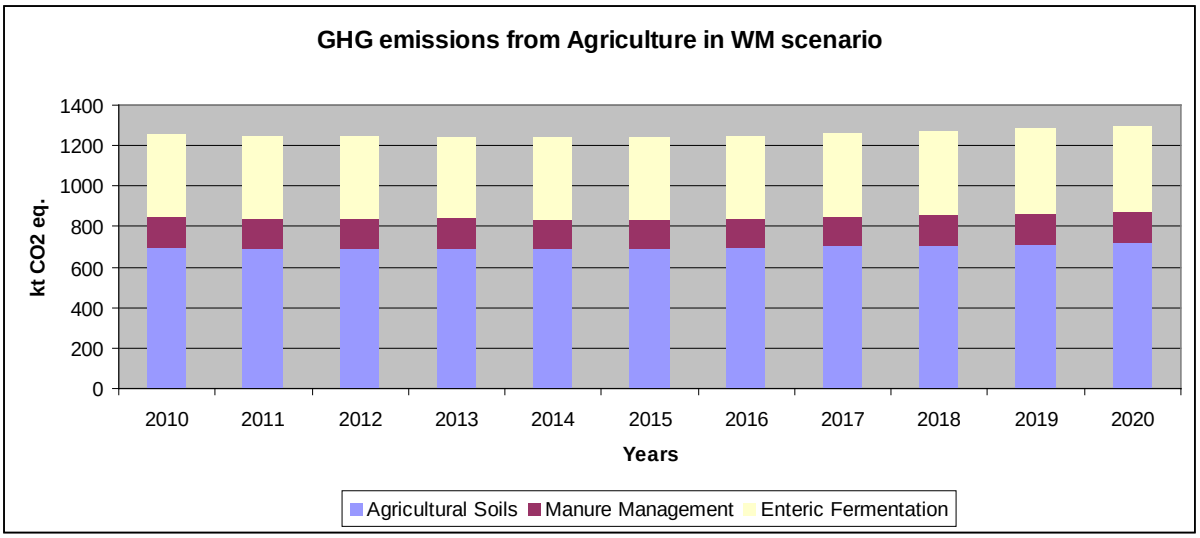

Figure 3.9 Total GHG emissions from Agriculture in WM scenario, kt CO2 equivalent

3.2.7 LULUCF

LULUCF sector includes emissions and removals of GHG-s from forest land, cropland, grassland, wetlands, settlements and other land. There are a number of factors that have affected the use of land during the last 20 years. The most important of these is the land reform, but also accession to the European Union, economic rises and falls.

Forest area grew steadily until 2004. As there are several EU support schemes at present for agriculture activities, only slight increase of forest land is foreseen in future (mainly conversion of grassland to forest land). Area of cropland has increased since 2004 until 2010 and is not expected to increase further. Grasslands should continue to decline in the near future, mainly due to natural afforestation. Infrastructure and settlements area extends continuously, at the expense of all other mineral lands. Predicted area of land use classes is shown in Table 3.16.

Table 3.16 Predicted land use in LULUCF sector in WM scenario, kHa

	2010	**2015**	**2020**
Forest land	2253.5	2252.3	2251.1
Cropland	1078.3	1076.4	1074.5
Grassland	346.3	340.9	335.5
Wetlands	499.1	501.3	503.4
Settlements	300.7	309.1	317.5
Other Land	44.8	42.7	40.7
Total	4522.7	4522.7	4522.7

Table 3.17 Total GHG emissions and removals from LULUCF sector in WM scenario, kt

		2010	**2015**	**2020**
Forest Land	**CO_2**	-4013.0	-3925.0	-3838.0
	CH_4	0.1	1.6	1.7
	N_2O	0.0	0,29	0.3
Cropland	**CO_2**	103.0	102.0	100.0
Grassland	**CO_2**	-161.0	-147.0	-133.0
	CH_4	0.0	0.1	0.1
	N_2O	0.0	0.0	0.1
Wetlands	**CO_2**	14.0	25.0	36.0
	N_2O	0.9	0.9	0.9
Settlements	**CO_2**	298.0	308.0	317.0
Other Land	**CO_2**	0.0	21.0	42.0
TOTAL	**CO_2**	-3759.0	-3617.0	-3476.0
	CH_4	0.1	1.7	1.8
	N_2O	0.9	1.2	1.3
	Total	-3758.0	-3614.0	-3473.0

In general, GHG emissions are expected to be stable or increase in near future (see Table 3.17).

3.2.8 Waste

Main GHGs in waste sector are methane and nitrous oxide. No CO_2 is emitted from the waste sector. Main share of the methane from waste sector comes from solid waste disposal on land.

Nitorus oxide is emitted from waste water handling, biological treatment and waste incineration. Measure conserning the solid waste disposal on land is taken into account in the projections – the percentage of biodegradable waste in the total amount by weight of municipal waste deposited in a landfill shall not exceed 45% by 2010, 30% by 2013 and 20% by 2020.

Table 3.18 Total GHG emissions from Waste sector in WM scenario, kt

		2010	2015	2020
Solid Waste Disposal on Land	**CH_4**	12.9	10.7	7.6
	Total CO_2 eq.	271.3	225.1	160.0
Wastewater Handling	**CH_4**	0.3	0.3	0.3
	N_2O	0.1	0.1	0.1
	Total CO_2 eq.	40.1	40.6	40.6
Waste Incineration	**N_2O**	0.0	0.0	0.0
	Total CO_2 eq.	0.1	0.1	0.1
Other (Biological Treatment)	**CH_4**	3.2	3.2	3.3
	N_2O	0.2	0.2	0.2
	Total CO_2 eq.	140.9	142.7	147.0
Waste Total	**CH_4**	16.4	14.2	11.2
	N_2O	0.3	0.4	0.4
	Total CO_2 eq.	452.3	408.5	347.7

Decrease in GHG emissions from waste sector is mainly related to the decrease in the percentage of biodegradable waste in total amount of municipal waste deoposited in landfill. This leads to a reduction of GHG emissions in solid waste disposal on land to 41% by 2020 compared to 2010. Total reduction of GHG emissions in waste sector is projected to be 23% by 2020 compared to 2010 (see Table 3.18 and Figure 3.10).

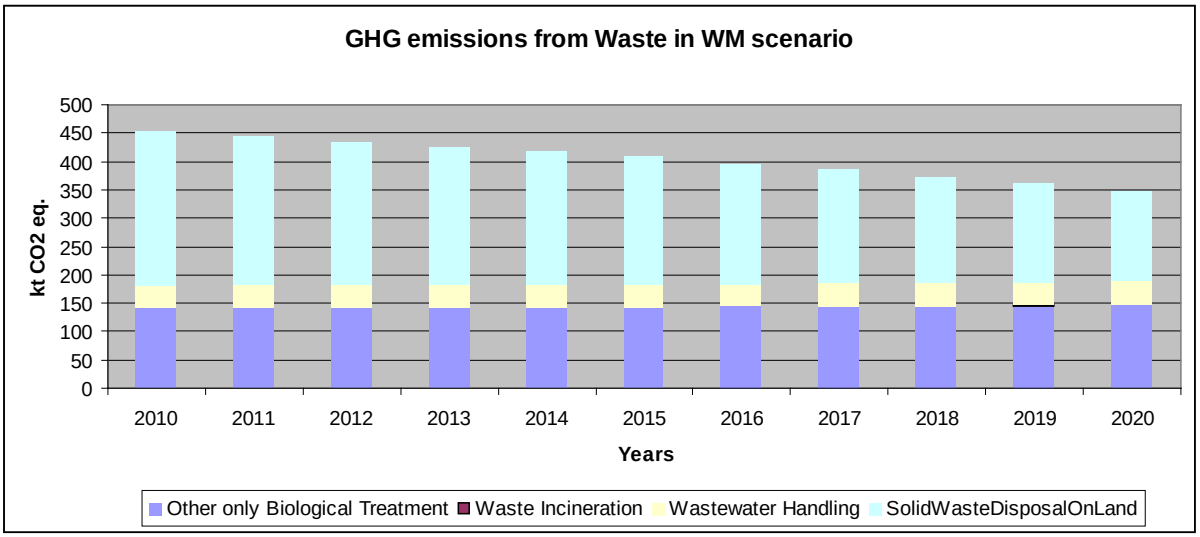

Figure 3.10 Total GHG emissions from Waste in WM scenario, kt CO2 equivalent

3.2.9 Total GHG emissions in WM scenario

Total GHG emissions in WM scenario are presented in Table 3.19.

Table 3.19 Total GHG emissions in WM scenario (without LULUCF), kt

		2010	2015	2020
Energy (Including Fugitive emissions from Fuels)	**CO_2**	17425.7	15232.7	14131.4
	CH_4	10.4	10.7	10.4
	N_2O	0.3	0.3	0.3
	Total CO_2 eq.	17739.2	15552.9	14454.1
Industrial Processes	**Total CO_2 eq.**	499.5	873.1	944.0
Solvent and Other Product Use	**CO_2**	12.8	12.8	12.7
	N_2O	0.0	0.0	0.0
	Total CO_2 eq.	17.7	19.0	18.9
Agriculture	**CH_4**	21.7	21.3	22.6
	N_2O	2.6	2.5	2.6
	Total CO_2 eq.	1253.6	1235.7	1295.7
Waste	**CH_4**	16.4	14.2	11.2
	N_2O	0.4	0.4	0.4
	Total CO_2 eq.	452.4	408.5	347.7
Total WM scenario	**CO_2**	17938.0	16118.5	15088.1
	CH_4	48.5	46.2	44.3
	N_2O	3.2	3.2	3.4
	Total CO_2 eq.	19962.4	18089.2	17060.4

Total GHG emissions of Estonia in WM scenario (without LULUCF) are expected to decrease about 14% by 2020 compared to 2010 as shown in Table 3.19. This decrease is mostly connected to decrease in GHG emissions from energy sector.

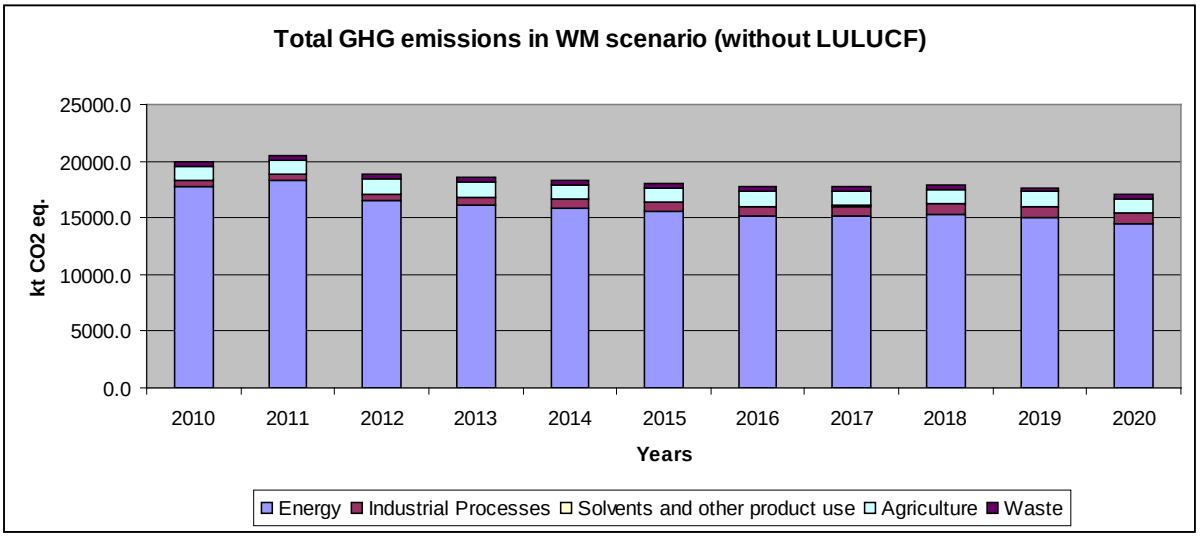

Figure 3.11 Total GHG emissions in WM scenario (without LULUCF)

3.3 With Additional Measures (WAM) scenario for 2010-2020

The WAM scenario includes all policies and measures applied in the WM scenario and additional measures that are planned, but have not been implemented or adopted.

3.3.1 Energy Industries

Measures taken into account in WAM scenario are actually planned to be implemented in Manufacturing Industries and Construction. These measures are basically energy efficiency measures that lead to reduction of consumption of heat and electricity. The reduction in consumption in turn leads to reduction of produced heat and electricity. Therefore these measures reduce GHG emissions from Public Electricity and Heat Production.

Table 3.20 Total GHG emissions from Public Electricity and Heat Production in WAM scenario, kt

		2010	2015	2020
Public Electricity and Heat Production	**CO_2**	13741.7	10244.7	7525.5
	CH_4	0.5	0.5	0.5
	N_2O	0.1	0.1	0.1
	Total CO_2 eq.	13781.4	10281.1	7566.1

In the WAM scenario, the total GHG emissions from Public Electricity and Heat Production are expected to decrease 45% by the year 2020 compared to 2010 (see Table 3.20 and Figure 3.12).

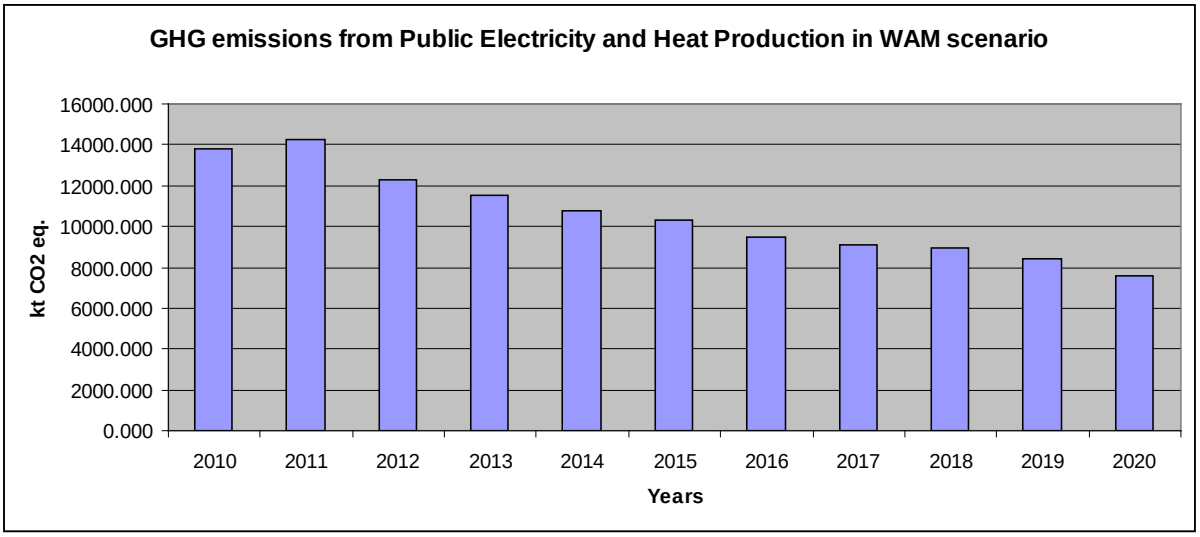

Figure 3.12 Total GHG emissions from Public Electricity and Heat Production in WAM scenario, kt CO2 equivalent

3.3.2 Manufacturing Industries and Construction

Measures included in the WAM scenario in Manufacturing Industries and Construction sector are mainly related to energy conservation – encouragement to perform energy audits in industries and small enterprises; contribution to improvement of energy auditors' qualifications with respect to industrial energy conservation issues, fostering energy

consultants' participation in European Union projects related to energy conservation in industry, better financing opportunities for energy conservation measures in industries and small enterprises, development of databases and methods for benchmarking of companies.

Table 3.21 Total GHG emissions from Manufacturing Industries and Construction in WAM scenario, kt

		2010	2015	2020
Manufacturing Industries and Construction	**CO_2**	504.9	501.3	548.1
	CH_4	0.1	0.1	0.1
	N_2O	0.0	0.0	0.0
	Total CO_2 eq.	509.1	505.7	553.0

GHG emission reductions in the WAM scenario under Manufacturing Industries and Construction sector include only fuel use reduction. Energy saved by reduced consumption of electricity and heat lead to additional GHG emission reductions in Energy Industries sector.

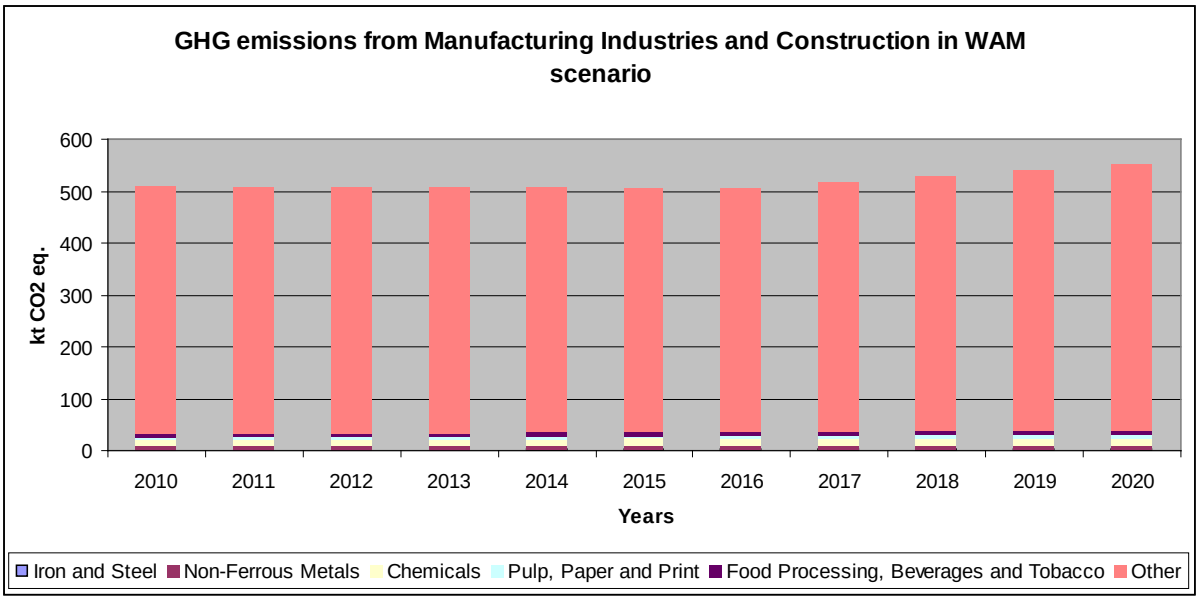

Figure 3.13 Total GHG emissions from Manufacturing Industries and Construction in WAM scenario, kt CO2 equivalent

3.3.3 Transport (excluding international aviation and marine bunkering)

In the WAM scenario it is projected, that the share of renewable fuels used in transport will increase to 10% by the year 2020 from fuels used in transport.

Table 3.22 Total GHG emissions from Transport in WAM scenario, kt

		2010	2015	2020
Transport	**CO_2**	2233.8	2242.1	2266.6
	CH_4	0.3	0.3	0.3
	N_2O	0.1	0.1	0.1
	Total CO_2 eq.	2258.9	2267.7	2292.8

The increase of the share of renewable fuels used in transport is expected to lead to decreased GHG emissions in the WAM scenario compared to WM scenario in 2020. The increase of GHG emissions in the WAM scenario are expected to be about 1.5% by 2020 compared to 2010 (see Table 3.22 and Figure 3.14).

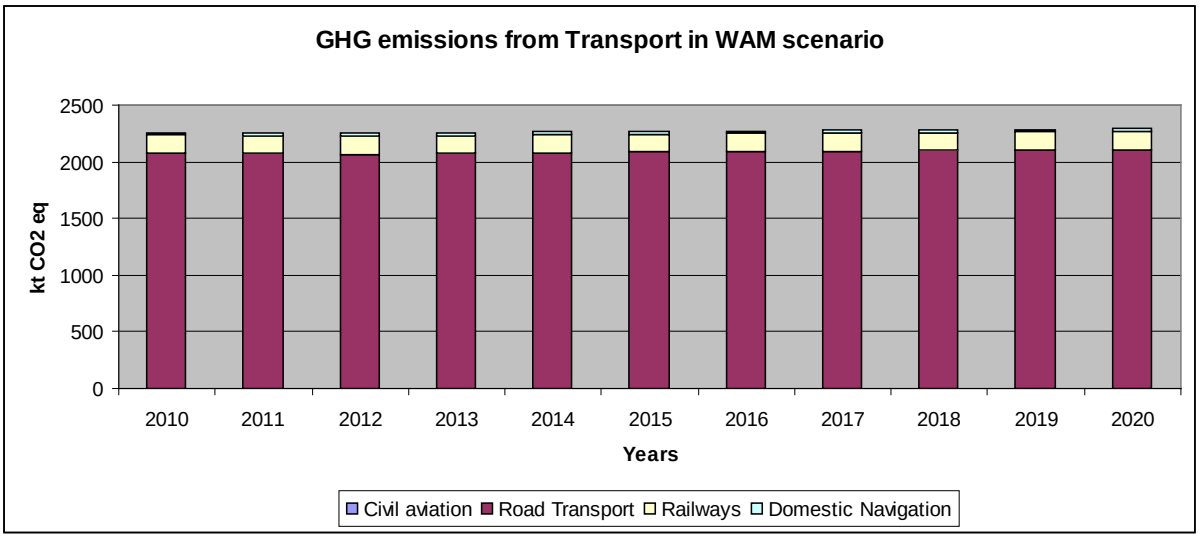

Figure 3.14 Total GHG emissions from Transport in WAM scenario, kt CO2 equivalent

3.3.4 Other sectors

Since there are no additional measures foreseen to reduce GHG emissions from industrial processes, agriculture, LULUCF and waste sector, then the projections of emissions in WAM scenario are expected to be equal to projected emissions in WM scenario.

3.3.5 Total GHG emissions in WAM scenario

Projections on GHG emissions in WAM scenario are presented in Table 3.23.

Table 3.23Total GHG emissions in WAM scenario (without LULUCF), kt

		2010	2015	2020
Energy (Including Fugitive emissions from Fuels)	**CO_2**	17425.7	14817.9	13626.0
	CH_4	10.4	10.6	10.3
	N_2O	0.3	0.3	0.3
	Total CO_2 eq.	17739.3	15134.3	13943.5
Industrial Processes	**Total CO_2 eq.**	499.5	873.1	944.0
Solvent and Other Product Use	**CO_2**	12.8	12.8	12.7
	N_2O	0.0	0.0	0.0
	Total CO_2 eq.	17.6	19.0	18.9
Agriculture	**CH_4**	21.7	21.3	22.6
	N_2O	2.6	2.5	2.6
	Total CO_2 eq.	1253.6	1235.7	1295.7
Waste	**CH_4**	16.4	14.2	11.2
	N_2O	0.3	0.4	0.4

	Total CO_2 eq.	452.3	408.5	347.7
Total WAM scenario	**CO_2**	17938.0	15703.8	14582.7
	CH_4	48.5	46.1	44.1
	N_2O	3.2	3.2	3.4
	Total CO_2 eq.	19962.4	17670.6	16549.8

Total GHG emissions of Estonia are projected to decrease 17% by the year 2020 compared to 2010. Additional reduction in total GHG emissions of WAM scenario compared to WM scenario is related only with GHG emissions reduction in energy sector.

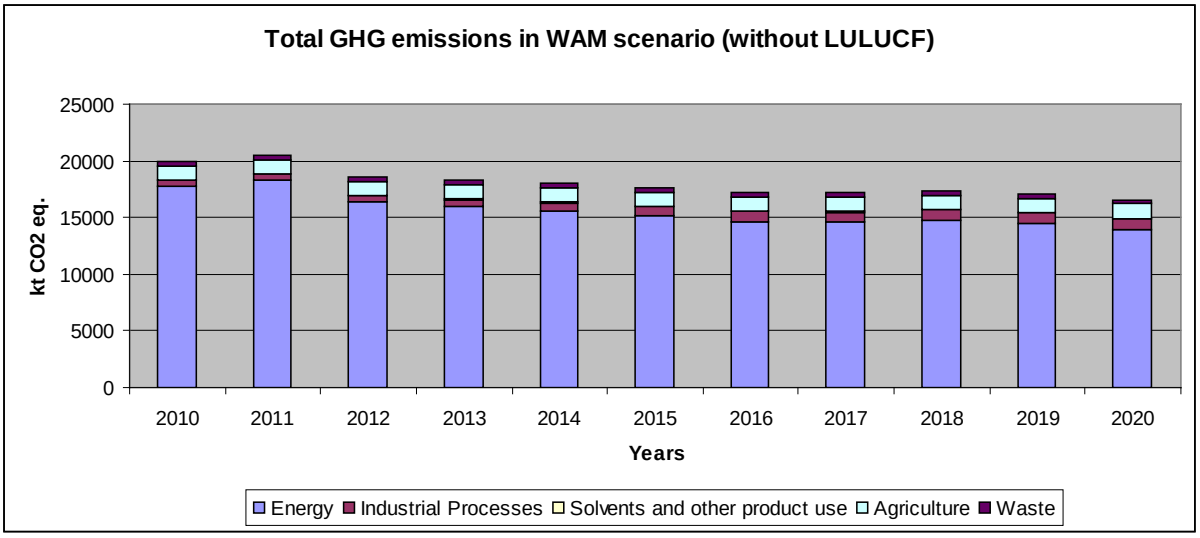

Figure 3.15 Total GHG emissions in WAM scenario (without LULUCF)

3.4 Comparison of WM and WAM scenarios

Main difference in the results of WM and WAM scenarios is related to measures foreseen to be implemented regarding energy efficiency and use of biofuels. This leads to smaller final consumption of energy in WAM scenario compared to WM scenario.

Table 3.24 Final consumption of energy in WM and WAM scenarios, TJ

	2010	**2015**	**2020**
WM	128632	135249	141326
WAM	128632	133094	138806

Comparison of both scenarios (see Table 3.24) in the year 2020 shows, that final consumption of energy is expected to decrease fromethe level of 141326 TJ in WM scenario to 138806 TJ in WAM scenario. Decrease in fuel consumption leads to decreased GHG emissions in final consumption sectors. Decrease in electricity and heat consumption leads to decreased GHG emissions in energy supply sector.

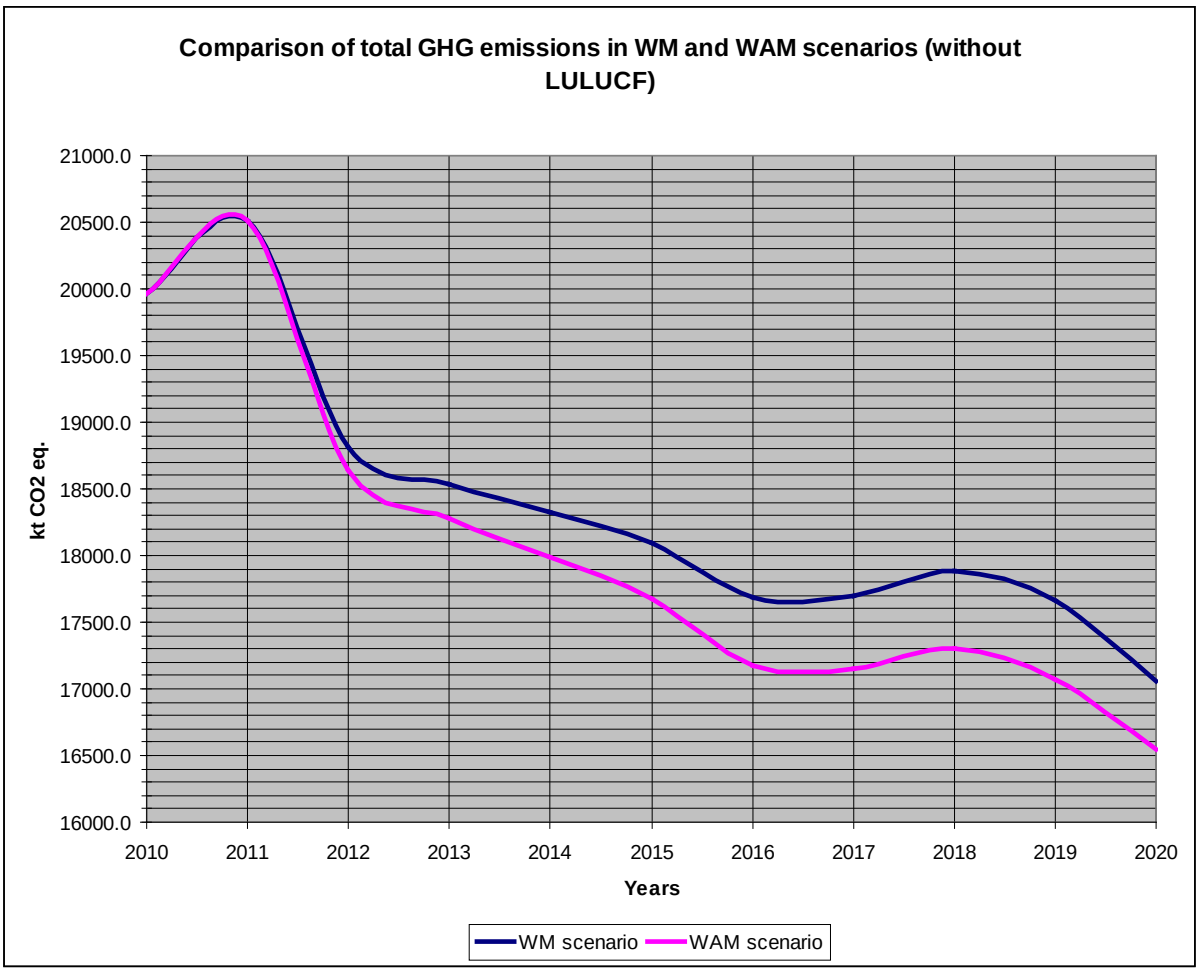

Figure 3.16 Total GHG emissions in WM and WAM scenarios (without LULUCF)

The difference of total GHG emissions between WAM and WM scenario is expected to be about 511 kt CO_2 equivalent by the year 2020.

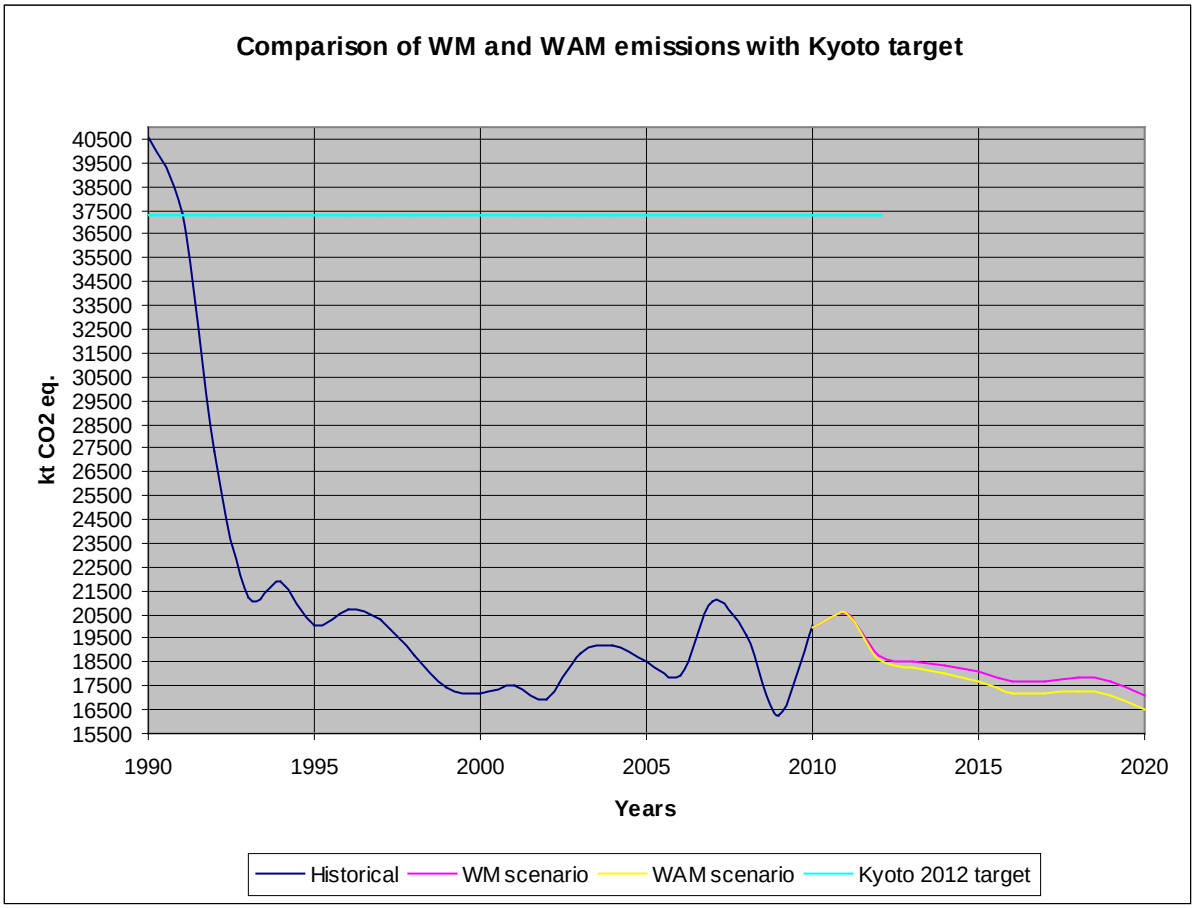

Figure 3.17 Historical and projected GHG emissions in WM and WAM scenarios

Figure 3.17 illustrates the situation of Estonia's historical GHG emissions, projections of GHG emissions and also Estonia's Kyoto target. In both WM and WAM scenarios the projected GHG emissions are expected to stay much lower than the Kyoto target for Estonia (8% reduction compared to the base year 1990).

3.5 Sensitivity analysis

The main share of GHG emissions in Estonia are emitted from electricity generation in condensing power plants using oil shale as fuel. Also, historically Estonia has been an exporter of electricity, that is produced from oil shale. In 2010, the export of electricity was 4354 GWh and import was 1100 GWh. This means, that the net export was about 25% of gross produced electricity. This resulted in higher GHG emissions, than in case, where Estonia would be an importer of electricity. Therefore the projections on how the electricity flows with other countries are expected to change in the future plays essential role in future GHG emissions.

In the projections the mining limit of oil shale is set to 20 Mt. per year. Since use of oil shale in shale oil production industry is expected to increase rapidly from 2010 to 2020, then availability of oil shale to produce electricity will decrease (priority of oil shale usage is set to shale oil industry).

To show that the sensitivity of projections is mostly dependant on electricity flows and oil shale, there was an alternative scenario put together. In the alternative scenario it is assumed that although there is still oil shale mining limit of 20 Mt. per year then there is also

availability to import oil shale from Russia. Also in the alternative scenario there is assumed, that after 2012 no electricity imports or exports occur. This means, that Estonia would produce all of its electricity demand. The production, losses, net imports and final consumption of electricity in the alternative scenario is presented in Table 3.25.

Table 3.25 Production, losses, net imports and final consumption of electricity in the alternative scenario, TJ

	2015	**2020**
Production of Electricity	33417	37592
... Including Wind	3294	3294
... Including Hydro	115	115
... Including CHP	6094	6769
... Including condensing PP-s	23914	27414
Losses of Electricity	4177	4511
Net Import of Electricity	0	0
Final Consumption of Electricity	29241	33081

The increased production of electricity from oil shale leads to higher GHG emissions. The results of GHG emissions of alternative scenario and WM scenario are presented in Table 3.26

Table 3.26 Total GHG emissions in alternative scenario and in WM scenario, kt CO_2 equivalent

	2015	**2020**
Total GHG emissions in alternative scenario	17925.2	19846.3
Total GHG emissions in WM scenario	18089.2	17060.4

As seen in Table 3.26, the GHG emissions in the alternative scenario would be about 2785 kt CO_2 equivalent higher in 2020 compared to WM scenario.

Another important part in GHG emissions projections is the development of electricity generation from renewable energy sources. In current projections it is expected, that since support for electricity produced from renewable energy sources is paid until 600 GWh of electricity from renewable sources is produced, then the investors have no interest in investing in power units, that would not get the support. If the limit of 600 GWh renewable electricity produced will be raised, then probably more capacities producing electricity from renewable energy sources will be built.

4 Participation in the mechanisms under Kyoto Protocol Articles 6, 12 and 17

Estonia is using Joint Implementation (JI) and International Emission Trading (IET). In April 2004 the Government approved the National Programme of Greenhouse Gas Emission Reduction for 2003-2012 (RT L 2004, 59, 990). On 5th of May 2004 the Government approved Ambient Air Protection Act (RT I 2004, 43, 298) where § 153 changed the Law for Ratifying Kyoto Protocol, conditions and authorization was set for using Kyoto flexible mechanisms. Amendment to the Ambient Air Protection Act from 11th of March 2007 regulates the use of JI and the issue of double counting concerning linking EU Emission Trading Scheme with Kyoto flexible mechanisms.

Regarding the activities under Kyoto Protocol article 17, in August 2009 the Government decided to sell excess Assigned Amount Units through Green Investment Scheme. Special working group led by State Chancellery was created to work out environmentally friendly projects and programs to offer these to potential buyers. Each agreement shall be approved by the Government and Government will give the mandate for the Minister of the Environment to sign the Agreements.

The legal framework for the Green Investment Scheme is stipulated in the Ambient Air Protection Act. Also the Kyoto Protocol Ratification Act adopted by Riigikogu in 2002 established some condition for International Emission Trading.

Estonia has concluded six agreements with different European Governments and 15 agreements with different Japanese companies by February 2013. The proceeds received by these agreements are solely disbursed for Green Investment Scheme projects or programmes.

The primary fields of investments in frames of GIS include:

- renovation (incl. thermal refurbishment) of buildings;
- efficient and environment benign transport;
- development of wind energy farms;
- efficiency improvements and wider use of renewables in district heating sector.

Estonia's national designated focal point for JI has been notified to UNFCCC:

Ministry of the Environment

Narva mnt 7a

15172 Tallinn

Estonia

Ms. Karin Radiko

Climate and Radiation Department

Ministry of the Environment

Phone: +372 626 2977

Fax: +372 626 2801

Email: Karin.Radiko@envir.ee

Estonia has also submitted its Joint Implementation Guidelines to UNFCCC secretariat. The document is available at http://ji.unfccc.int/JI_Parties/PartiesList.html#Estonia

CO_2 emissions in Estonia are below Kyoto target and Estonia does not need to make any quantitative contributions. Estonia is host country in JI and seller in IET. Therefore Estonia does not have the budget for the total use of the Kyoto mechanisms.

Table 4.1 Quantitative contribution of Kyoto mechanisms for the first commitment period

Kyoto mechanism	Total projected quantities for the first commitment period (Gg CO_2 equivalent)
Total for all Kyoto mechanisms (*)	73619
International emissions trading	*72 592*
All project based activities	*1027*
joint implementation	*1027*
clean development mechanism	-

(*) *these are the quantities that Estonia has transferred or intends to transfer as a JI host country and has sold in IET*

The Government of the Republic of Estonia has approved and signed Memorandums of Understanding with the Netherlands (RTL, 06.08.2003, 90, 1341), Denmark (RT II, 06.10.2003, 25, 126), Sweden (RTII, 28.06.2005, 16, 49), Austria (RTII, 07.11.2006, 22, 57) and an Agreement on Joint Implementation of Emission Reductions of Greenhouse Gases with Finland (RT II, 16.12.2002, 37, 183). On 1st of May 2004 Agreement on a Testing Ground For Application of the Kyoto Mechanisms on Energy Projects in the Baltic Sea Region was approved (II, 16.06.2004, 22, 92). Estonia is one of the Parties.

Information on planned, ongoing and completed Estonia´s joint implementation project activities is given in Table 4.2

Table 4.2 Joint implementeation projects in Estonia

A	Project title and category (JI/CDM)	Pakri Wind Farm Project (JI)	Paide Bioenergy project (JI)	Tamsalu District Heating Project (JI)	Kadrina District Heating Project (JI)	Esivere and Virtsu II Wind Farm (JI)	Saaremaa Animal Waste Management Project (JI)	Viru-Nigula Wind Farm (JI)	Virtsu III Wind Power Project (JI)	Jägala-Joa Hydropower Joint Implementation Project (JI)	Paldiski Wind Farm (JI)	Vanaküla Wind Power Project (JI)	Tooma Wind Power Project (JI)	Total emission reductions
B	Host country/investor	Finland	Finland	Finland	Finland	Austria	NEFCO	NEFCO/Sweden	Austria	Austria	The Netherlands	NEFCO	The Netherlands	
C	Financing	Partnership between private and public sector	Partnership between private and public sector	Public sector	Public sector	Partnership between private and public sector	Partnership between private and public sector	Partnership between private and public sector	Partnership between private and public sector	Partnership between private and public sector	Partnership between private and public sector	Partnership between private and public sector	Partnership between private and public sector	
D	Project type	Renewable energy generation	Fuel-switching	Fuel-switching	Fuel-switching	Renewable energy generation	Manure management	Renewable energy generation	Renewable energy generation	Renewable energy generation	Renewable energy generation	Renewable energy generation	Renewable energy generation	
E	Status	In operation	In operation	In operation	In operation	In operation	In operation	In operation	In operation	In operation	In operation	In operation	In operation	
F	Lifetime													
	date of official approval	19.12.2003	09.10.2003	01.09.2005	01.09.2005	28.12.2006	20.07.2006	13.11.2006	20.04.2009	16.03.2010	25.08.2003	06.12.2010	06.12.2010	
	date of project initiation	2005	2003	2001	2001	2005	2005	2007	2008	2008	2011	2009	2009	
	expected date of project termination	-	-	-	-	-	-	-	-	-	-	-	-	
	crediting period	15.12.2004 - 31.12.2012	01.10.2003 - 31.12.2012	01.01.2002 - 31.12.2012	01.02.2002 - 31.12.2012	01.10.2005 - 31.12.2012	01.01.2006 - 31.12.2012	01.02.2007 – 31.12.2012	01.01.2008 - 31.12.2012	01.11.2008 – 31.12.2012	01.07.2011 – 31.12.2013	01.01.2008 - 31.12.2012	01.11.2009 – 31.12.2012	
	date(s) of issue of emission reduction units (ERUs)	Dates of issuance are given below verified ERUs												
G	First or second track approval procedure	First track	First track	First track	First track	First track	First track	First track	First track	First track	First track	First track	First track	
	ITL project ID	EE1000067	EE1000069	EE1000068	EE1000066	EE1000052	EE1000174	EE1000101	EE1000144	EE1000216	EE1000176	EE1000214	EE1000217	
H	Projected total and annual emissions reductions that accrue until the end of the first commitment period (t CO_2 eq)													
	Projected emissions from the project initiation until 31.12.2012	424 523	100 000	32 406	46 100	243 411	88 605	295 453	50 149	29 703	72 292	71 095	99 469	**1 553 206**
	Projected emissions for 2008-2012	**252 889**	**54 000**	**14 730**	**21 100**	**169 784**	**63 775**	**245 791**	**50 149**	**29 703**	**72 292**	**71 095**	**99 469**	**1 144 777**
	2002 projected emissions			2 946	3 900									
	2002 verified emissions			included in 2003 verification report	included in 2003 verification report									
	Date of issuance of AAUs for **2002**			09.11.2009	09.11.2009									
	2003 projected emissions			2 946	4 220									
	2003 verified emissions			**9 845**	**8 162**									
	Date of issuance of AAUs for **2003**			09.11.2009	09.11.2009									
	2004 projected emissions		13 600	2 946	4 220									
	2004 verified emissions		**17 110**	included in 2005 verification report	included in 2005 verification report									

A	Project title and category (JI/CDM)	Pakri Wind Farm Project (JI)	Paide Bioenergy project (JI)	Tamsalu District Heating Project (JI)	Kadrina District Heating Project (JI)	Esivere and Virtsu II Wind Farm (JI)	Saaremaa Animal Waste Management Project (JI)	Viru-Nigula Wind Farm (JI)	Virtsu III Wind Power Project (JI)	Jägala-Joa Hydropower Joint Implementation Project (JI)	Paldiski Wind Farm (JI)	Vanaküla Wind Power Project (JI)	Tooma Wind Power Project (JI)	Total emission reductions
	Date of issuance of ERUs for **2004**		09.11.2009	09.11.2009	09.11.2009									
	2005 projected emissions	51 172	10 800	2 946	4 220	5 398								
	2005 verified emissions	**40 734**	**14 578**	**10 053**	**7 102**	included in 2007 verification report								
	Date of issuance of AAUs for **2005**	09.11.2009	09.11.2009	09.11.2009	09.11.2009	25.11.2009								
	2006 projected emissions	60 313	10 800	2 946	4 220	29 940	12 415							
	2006 verified emissions	**45 968**	**16 309**	**4 862**	**3 318**	included in 2007 verification report	possibly will not be verified (small amount)							
	Date of issuance of AAUs for **2006**	09.11.2009	09.11.2009	09.11.2009	09.11.2009	25.11.2009								
	2007 projected emissions	60 149	10 800	2 946	4 220	38 289	12 415	49 662						
	2007 verified emissions	**52 076**	**17 171**	**4 543**	**3 101**	**48 357**	possibly will not be verified (small amount)	**11 728**						
	Date of issuance of AAUs for **2007**	09.11.2009	14.09.2010	14.09.2010	14.09.2010	25.11.2009		13.01.2011						
	2008 projected emissions	55 804	10 800	2 946	4 220	34 181	12 755	35 075		4 100				
	2008 verified emissions	**55 804**	**14 953**	**5 223**	**3 295**	**34 181**	included in 2009 verification report	included in 2009 verification report		included in 2010 verification report				
	Date of issuance of ERUs for **2008**	01.04.2011	01.04.2011	01.04.2011	01.04.2011	11.01.2010	06.07.2011	13.01.2011		15.07.2011				
	2009 projected emissions	40 267	10 800	2 946	4 220	28 964	12 755	35 076		4 100		1 201	991	
	2009 verified emissions	**40 267**	**15 156**	**4 689**	**3 222**	**28 964**	**21 374**	**70 152**		included in 2010 verification report		included in 2010 verification report	included in 2010 verification report	
	Date of issuance of ERUs for **2009**	01.04.2011	01.04.2011	01.04.2011	01.04.2011	08.03.2011	06.07.2011	13.01.2011		15.07.2011		21.10.2011	04.01.2012	
	2010 projected emissions	42 356	10 800	2 946	4 220	29 703	12 755	49 036	13 775	4 099		19 100	29 000	
	2010 verified emissions	**42 356**	**15 421**	**4 861**	**3 365**	**29 703**	included in 2012 verification report	**49 036**	**13 775**	**12 299**		**18 412**	**36 888**	
	Date of issuance of ERUs for **2010**	04.10.2011	04.10.2011	04.10.2011	04.10.2011	30.08.2011		30.08.2011 and 04.10.2011	04.10.2011	15.07.2011		21.10.2011	04.01.2012	
	2011 projected emissions	57 258	10 800	2 946	4 220	38 468	12 755	63 302	18 187	8 702		25 397	34 739	
	2011 verified emissions	**53 730**	**14 532**	**4 169**	**3 002**	**38 656**	included in 2012 verification report	**50 581**	**19 867**	**9 189**		**18 730**	**45 843**	
	Date of issuance of ERUs for 2011	10.07.2012 and 28.12.12	29.10.2012	29.10.2012	29.10.2012	12.07.2012		15.08.2012	12.07.2012	25.05.2012		12.07.2012	12.07.2012	
	2012 projected emissions	57 204	10 800	2 946	4 220	38 468	12 755	63 302	18 187	8 702	72 292	25 397	34 739	

A	Project title and category (JI/CDM)	Pakri Wind Farm Project (JI)	Paide Bioenergy project (JI)	Tamsalu District Heating Project (JI)	Kadrina District Heating Project (JI)	Esivere and Virtsu II Wind Farm (JI)	Saaremaa Animal Waste Management Project (JI)	Viru-Nigula Wind Farm (JI)	Virtsu III Wind Power Project (JI)	Jägala-Joa Hydropower Joint Implementation Project (JI)	Paldiski Wind Farm (JI)	Vanaküla Wind Power Project (JI)	Tooma Wind Power Project (JI)	Total emission reductions
	2012 verified emissions	**48 204**	**13 813**	**3 870**	**2 650**	**34 362**	**32 689**	**50 206**	**16 507**	**10 490**		**15 514**	**16 738**	
	Date of issuance of ERUs for 2012	10.12.2012 and 28.12.12	21.12.2012	21.12.2012	21.12.2012	11.12.2012 and 28.12.12	20.11.2012	5.12.2012 and 28.12.12	14.11.2012 and 28.12.12	24.12.2012		5.12.2012 and 28.12.12	21.12.2012	
I	Amount of ERUs or CERs generated by the project that will be acquired by the Member State	Estonia as a host country will not acquire ERUs.												
J	Credits accrued until the end of reporting year	Estonia as a host country will not acquire ERUs or CERs. For credits resulting from land use, land use change and forestry activities Estona has selected commitment period accounting (ending in 2012).												

5 Information on activities under Kyoto Protocol Articles 3.3 and 3.4

Estonia has elected to account the activities under article 3.3 (afforestation, reforestation and deforestation) for the first commitment period stated in the *"Report to facilitate the estimation of Estonia's assigned amount under the Kyoto Protocol, 2007"*.

Estonia has estimated greenhouse gas emissions and removals from forestry activities under Article 3.3 for years 2008 to 2010 as part of 2012 greenhouse gas inventory submission. Extract from the inventory (September 2012 re-submission v2.2) is presented in the following table.

Table 5.1 Information table on accounting for activities under article 3.3 of the Kyoto Protocol

GREENHOUSE GAS SOURCE AND SINK ACTIVITIES		Net emissions/removals				Accounting Parameters	Accounting Quantity
	BY	2008	2009	2010	Total		
	($Gg\ CO_2$ equivalent)						
A. Article 3.3 activities							
A.1. Afforestation and Reforestation							-552,10
A.1.1. Units of land not harvested since the beginning of the commitment period		-170,58	-184,02	-197,50	-552,10		-552,10
A.1.2. Units of land harvested since the beginning of the commitment period							NA,NO
Total Estonia		NA,NO	NA,NO	NA,NO	NA,NO		NA,NO
A.2. Deforestation		989,08	437,42	451,31	1 877,81		1 877,81
B. Article 3.4 activities							
B.1. Forest Management (if elected)		NA	NA	NA	NA		NA
3.3 offset						1 325,71	NA
FM cap						1 833,33	NA
B.2. Cropland Management (if elected)	0,00	NA	NA	NA	NA	0,00	0,00
B.3. Grazing Land Management (if elected)	0,00	NA	NA	NA	NA	0,00	0,00
B.4. Revegetation (if elected)	0,00	NA	NA	NA	NA	0,00	0,00

In 2008–2010 activities under Article 3.3 were net source in total. At present, no special measures regarding afforestation, reforestation and deforestation are foreseen. Therefore current trends are expected to continue and activities under Article 3.3 are expected to be net source during the first commitment period.

Estonia has not elected to account the activities under article 3.4 for the first commitment period.

Estonian Forestry Development Plan up to 2020 has approved by the Parliament on 15 February 2011. The main aim of the Forestry Development Plan is to ensure sustainable forest management.

6 References

Statistics Estonia (www.stat.ee)

Estonian Greenhouse Gas Emissions Inventory 1990-2011 (January submission in 2013)

National Renewable Energy Action Plan up to 2020

National Development Plan for the Use of Oil Shale 2007-2015

The Estonian Rural Strategy 2007-2013

Estonian Rural Development Plan 2007-2013

National Waste Management Plan 2008-2013

National Development Plan of the Energy Sector until 2020

National Development Plan for Electricity Sector until 2018

The National Development Plan for Housing Sector 2008-2013

Forestry Development Plan up to 2020

The second energy efficiency action plan of Estonia

Eleringi Varustuskindluse aruanne 2012

Renewable Energy 100

Development Plan 2007-2013 for Enhancing the Use of Biomass and Bioenergy;

Nature Protection (Conservation) Development Plan 2020;

Appendix I List of relevant EU directives (CCPMs)

Nr.	EU legislative act	Status	Date of adoption
1	Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC	Transposition complete	7.11.05
2	Directive 2008/101/EC of the European Parliament and of the Council of 19 November 2008 amending Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community	Transposition complete	12.7.11
3	Directive 2009/29/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community	Transposition complete for deadline 31.12.2009	12.07.11
		Transposition partial for deadline 31.12.2012	Adoption in progress
4	Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC	Transposition complete	1.2.12
5	Directive 2005/32/EC of the European Parliament and of the Council of 6 July 2005 establishing a framework for the setting of ecodesign requirements for energy-using products and amending Council Directive 92/42/EEC and Directives 96/57/EC and 2000/55/EC of the European Parliament and of the Council	Transposition complete	24.7.08
6	Commission Directive 2003/66/EC of 3 July 2003 amending Directive 94/2/EC implementing Council Directive 92/75/EEC with regard to energy labelling of household electric refrigerators, freezers and their combinations	Transposition complete	29.3.04
7	Directive 2010/30/EU of the European Parliament and of the Council of 19 May 2010 on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products	Transposition complete	27.8.12
8	Directive 2004/8/EC of the European Parliament and of the Council of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC	Transposition complete	15.6.07
9	Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC	Transposition complete	2.1.07
10	Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the energy performance of buildings	Transposition complete	21.4.11
11	Council Directive 2003/96/EC of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity	Transposition complete	4.2.05
12	Directive 2001/80/EC of the European Parliament and of the Council of 23 October 2001 on the limitation of emissions of certain pollutants into the air from large combustion plants	Transposition complete (Transitional period until 31.12.2017)	23.10.06

13	Directive 2008/1/EC of the European Parliament and of the Council of 15 January 2008 concerning integrated pollution prevention and control	Transposition complete	17.3.11
14	Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC and Regulation (EC) No 1013/2006	Transposition complete	2.1.12
15	Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants	Transposition complete	16.11.12
16	Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy	Transposition complete	7.7.10
17	Directive 2009/30/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 98/70/EC as regards the specification of petrol, diesel and gas-oil and introducing a mechanism to monitor and reduce greenhouse gas emissions and amending Council Directive 1999/32/EC as regards the specification of fuel used by inland waterway vessels and repealing Directive 93/12/EEC	Transposition complete	5.1.11
18	Directive 2003/30/EC of the European Parliament and of the Council of 8 May 2003 on the promotion of the use of biofuels or other renewable fuels for transport	Transposition complete	2.9.05
19	Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste	Transposition complete	9.7.10
20	Directive 2006/12/EC of the European Parliament and of the Council of 5 April 2006 on waste	Transposition complete	29.3.07
21	Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives	Transposition complete	15.12.11
22	Council Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources	Transposition complete	13.2.06
23	Directive 2006/40/EC of the European Parliament and of the Council of 17 May 2006 relating to emissions from air conditioning systems in motor vehicles and amending Council Directive 70/156/EEC	Transposition complete	15.5.07
24	Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control)	Transposition deadline 7.01.2013	Adoption in progress
25	Directive 2011/76/EU of the European Parliament and of the Council of 27 September 2011 amending Directive 1999/62/EC on the charging of heavy goods vehicles for the use of certain infrastructures	Transposition complete	24.7.12
26	Directive 2009/33/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of clean and energy-efficient road transport vehicles	Transposition complete	1.11.11
27	Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings	Transposition deadline 7.09.2012	Adoption in progress