Ministry of the Environment of the Republic of Estonia

National allocation plan of Estonia for greenhouse gas emission allowances trading for the years 2008-2012

Tallinn

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The work is requested by the Estonian Environment Information Centre

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SUMMARY

The Ministry of Environment being responsible for transposition of the 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 Community and amending Council directive 96/61/ EC (hereinafter the Directive) pursuant to Article 9, also the Directive 2004/101/EC of the European Parliament and of the Council of 27 October 2004 amending Directive 2003/87/EC in respect of the Kyoto Protocol's project mechanisms has been prepared this document and its annexes, which constitute the second national allocation plan (NAP II) of Estonia for greenhouse gas emission allowance trading for the years 2008-2012.

The proposal for the second national allocation plan (NAP II), adopted by the government of Estonia comprises 121.875 229 million allowances. It has been submitted to the European Commission for approval before the deadline, 30th of June 2006 and it has been amended afterwards with additional information. NAP II proposal to Commission have total reserve of 9.208 575 million and includes 0.948 531 million of allowances for Joint Implementation projects. All allowances have been allocated to installations free of charge as provided for by Article 10 of the Directive, i.e. without organising bidding. The possible remaining new entrants reserve will be be auctioned. The difference between Kyoto target and allocation for NAP II is planned to use for implementation of other mechanisms of international climate mitigation co-operation.

The national allocation plan includes, at present, a total of 50 installations in three groups of activities; 42 in the energy production sector, six in the mineral industry and two in sector which is classified as *other activities* (paper and pulp industry), plus 5 preliminary identified installations in reserve. Compared to NAP I the number of installations has grown for 11 out of which 5 in the energy production sector, and one in the mineral industry sector, which are included to NAP I as new entrants, and 5 in fixed reserve. Three major installations owned by AS Eesti Energia, main electricity utility company, produce majority of electricity at present. There is a number of combined heat and power stations (5) supplying heat and power. District heating installations with a capacity exceeding 20 MW, as provided for in the Directive, form the rest of the energy production sector. No other installations that could be classified on the list of installations provided for by directive 2003/87/EC have submitted applications to date.

As the the main share of greenhous gases emissions comes from the Energy activities sector, in the present Report a lot of emphasis is placed to description of the sector. In the sector also major potential to decrease the emissions is involved.

NAP II has two reserves for new entrants. The first is an *earmarked reserve* and comprises the so-called "fixed new entrants reserve", where five installations, which correspond to requirements given in p.2.1.6.2 of Criterion (6) of COM (2003) 830

final have fixed number of allowances to be allocated starting from 2008 onwards. These installations still lack some documentation needed to be issued GHG permit and qualified to the main list of installations. The reserve comprises 5.8 million allowances and is intended to use for allocation to mentioned known installations only. The another reserve comprises 3% of total number of allowances (3.4 million) and is planned for the installations not identified yet, but being assessed by the sectoral development plans. The reserve will be divided between the five years in proportion to the emission allowances for each year. Aplied amount of allowances per annum 0.68 million is well comaparable with NAP I reserve. Any residual reserve for new entrants may be carried over to the next trading year. Any emission allowances remaining from the second trading period cannot be transferred for the periods after 2012.

The basic allocation follows the same principles used for NAP I, i.e. the trend method or *grandfathering* principle based on historical emissions provided for by the directive, where projections of emissions for the five-year trading period are calculated from previous periods. Average of three years highest emissions in reference period and the projected up to 3 % growth rate for the heating sub-sector and industry and up to 6.5 % for power producing installations has been taken for the basis for preparation of the national allocation plan. Periods of different lengths were used for obtaining primary data on three abovementioned sectors — a longer, nine-year period of 1995-2003 for heat producing installations, the four-year period of 2000-2003 for electricity producing installations, the same four-year period for industrial plants as well.

The national allocation plan applies the terms provided by the directive to take into account “early action”, i.e. voluntary action by installations to reduce greenhouse gases pending submission of this allocation plan. To compensate for their early action, additional emission allowances have been allocated in the allocation plan to electricity producing installations and to installations that have performed *fuel switch*, i.e. replaced their more polluting fossil fuel, or installed new technology. Share of early action in installation total comprises 0.88% only, the yearly amount being 0.99 million allowances.

Following the Directive 2004/101/EC of the European Parliament and of the Council of 27 October 2004 amending Directive 2003/87/EC in respect of the Kyoto Protocol’s project mechanisms, Guiding the Commission Decision of 13 November 2006 on avoiding double counting of GHG emission reductions under the Community emissions trading scheme for project activities under the Kyoto Protocol pursuant to Directive the Set-aside for for 7 Joint Implementation projects comprises 0,948 531 million of allowances per annum. The another Set-aside comprises a number of projects, mostly in wind power sector and comprises 9,194 742 million allowances per annum for the period 2008-2012.

Contents

1. Introduction

1.1 Emission trading Directive 2003/87/EC and amending it Linking Directive 2004/101/EC

Major objective of the greenhouse gas emission allowance trading scheme of the European Community is to achieve at the lowest cost the reduction of greenhouse gas emissions required by the commitments established by the UN Framework Convention on Climate Change and the Kyoto Protocol. The costs related to reducing greenhouse gas emissions are markedly higher in economically developed "EU old Member States", countries of Europe than in the "EU new Member States" or recently joined countries coming from the transitional economies. For this reason, the objective is to optimise, within the Community, the costs for mitigating climate change by introducing the trading scheme.

Directive 2003/87/EC of the European Parliament and of the Council establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC (text with EEA relevance) (OJ L 275/32, 25.10.2003)[1], hereinafter referred to as the Directive, is the main legal basis for the implementation of the United Nations Framework Convention on Climate Change (RT II 1994, 43), hereinafter referred to as UN FCCC and for the fulfilment of the obligations to reduce greenhouse gas emissions imposed by the Kyoto Protocol (RT II 2002, 26, 111; RT I 2004, 43, 298) in the European Union Member States. The Directive entered into force on 25 October 2003.

Linking Directive 2004/101/EC[2] enables involvement of the result of project based mechanisms in the NAP II. To consider the results of implementing Kyoto "flexible mechanisms" - Joint Implementation (JI) and Clean development Mechanism (CDM) European Commission has issued a Commission Decision of 13 November 2006 on avoiding double counting of GHG emission reductions under the Community emissions trading scheme for project activities under the Kyoto Protocol pursuant to Directive Linking Directive to guide Member States in regard of correct accounting of the greenhouse gases emission reductions as a result of JI or CDM projects. ANNEX I and ANNEX II Tables are proposed to be filled in by MS planning to be the JI host or buy additional credits via the project-based co-operation to reach their target in Kyoto first commitment period 2008-2012.

The Directive commits Member States to prepare a national allocation plan for greenhouse gas emissions in order to limit as efficiently as possible the release of greenhouse gases into the air and implement emission allowance trading in the Community. Pursuant to the guidance on implementation of the Directive the national allocation plan will decide and justify carbon dioxide allowances for each

[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 (text with EEA relevance) [EÜT L 275/32, 25.10.2003].

[2] Directive 2004/101/EC of the European Parliament and of the Council of 27 October 2004 amending Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community, in respect of the Kyoto Protocol's project mechanisms.

participating installation for the forthcoming trading period. According to the Directive, community wide first period 2005-2007 trading started on 01.01.2005 and it is intended to start the next period trading 2008-2012 in 01.01.2008.

The installations covered by the Directive belong to four sectors according to Annex I. In Estonia out of four categories of activities referred to Articles 2(1), 3, 4, 14(1), 28 and 30 the activity under *Production and processing of ferrous metals* is not eligible as the quantities of processing does not comply with the foreseen requirements.

Installations categorised under *Energy activities* comprise 42 installations including electricity-, heat- or electricity and heat producing installations, also the enterprises producing heat for their main production technology e.g. petrochemical enterprises, oil terminals, food- or peat processing enterprises. There are a number of small CHP plants, which produce electricity and heat for their own needs, they are not include in the first activity category. District heating boiler houses with a capacity less than 20 MW, as provided for in the Directive, are not included. The umber of heat- only boilers comprises more that 30, however, their number of alloances in whole sector is relatively small due to oil shale burning installations producing electricity.

Installations categorised under *Mineral industry activities* comprise 6 installations. There are cement factory prevailing with the number of allowances allocated, a glass producing installation and four bricks and other building materials producing installations.

Installations categorised under*"Other activities"*classified as (paper and pulp industry) comprise 2 installations only. Launched during the first trading period pulp mill and another main pulp and paper mill in country.

The second national allocation plan submitted to the European Commission comprises a total of 51 installations in three groups of activities with the overall allocation of 122,400 668 million allowances.

In Estonia the implementation of Joint Implementation has been successful due to the gaining of good practise with Activities Implemented Jointly (AIJ) with Sweden as a donor in 1990-ies. 21 AIJ projects are currently registered in UN FCCC Secretariat database. Thanks to experience gathered in course of the work with various project types, Estonia today has got a wave of JI projects under the development. Majority of them are registered in wind power sector, see the included ANNEX I and ANNEX II Tables. Following the Linking Directive 2004/101/EC and guiding a Commission Decision of 13 November 2006 on avoiding double counting of GHG emission reductions under the Community emissions trading scheme for project activities under the Kyoto Protocol in regard of correct accounting of the greenhouse gases emission reductions as a result of JI or CDM projects in NAP II, the yearly reduced amounts of ERUs, transformed to allowances, from particular installations in the first sector are exposed in separate column. Thus a Set-aside included in the NAP II comprises 0,948 531 million of allowances for Joint Implementation projects, see ANNEX I. So-called Another Set-aside which contains the JI projects still under the different stages of development in the time of submission NAP II to EC comprises total reserve of 9,547 862 million allowances.

As the development in the wind power sector is extremely high at present time, a number of new JI projects are expected to be initiated during coming years. All those projects I case they are eligible, will be considered in the frame of second trading period.

This Directive and amending it the Linking Directive establish a general scheme for trading in greenhouse gas emission allowances during Kyoto first commitment period.

1.2 Revised value of Kyoto target

Estonia ratified the Kyoto Protocol in 2002, thereby taking on a commitment, like the Member States of the European Union, to reduce greenhouse gas emissions within the first obligatory period, i.e. in the years 2008-2012, by 8% as compared to 1990 levels. Since greenhouse gas emissions in Estonia comprised 37.174 million tons in 1990, the 8% reduction would total 2.973 million tons. Thus the Kyoto commitment for Estonia has been so far 34.201 million tons.

Following the IPCC (2006) guidelines on recalculation of greenhouse gases emissions the total (together with HCFs, PFCs and SF_6 (in 1995)) base year value is 43.022 295 million tonnes of CO_2 equivalent. This leads to an updated value for the Kyoto target - 39.580,5 million tonnes.

Commitment foreseen by Kyoto Protocol to reduce greenhouse gas emissions has already been achieved in Estonia as a result of significant re-organisation of economic sectors, particularly energy, in particular electricity production but also of industry and agriculture. In general one can conclude that it has been a result of the qualitative and quantitative restructuring of the whole economy at the beginning of 1990s. It must be stressed that 1990 is the base year for calculation of the Kyoto commitment, from the percentage reduction, although some exceptions towards earlier years have been granted, for example for Slovenia, Poland, Hungary, etc.

The Kyoto Protocol establishes three approaches for global co-operation for the countries that have joined it, known as flexible mechanisms, one of which is greenhouse gas emission allowance trading. The Kyoto Protocol provides for trading in allowances to start in 2008, with the objective in the first commitment period, from 2008 to 2012, of bringing the greenhouse gas emissions of all countries throughout the world that have ratified the protocol into line with the commitments taken on by these countries in the most economically efficient way.

Kyoto commitment for a country is determined on the basis of net amounts, i.e. considering the absorbtion by sinks. The 8% reduction of emissions in the first commitment period, i.e. in 2008-2012, compared to 1990, comprises 3.44 million tonnes. Therefore, the “Kyoto commitment” for Estonia is 39.580,5 million tonnes as figured out in the *Report to facilitate the estimation of Estonia’s assigned amount under the Kyoto Protocol the* submitted to European Commission (see Figure 1 below)

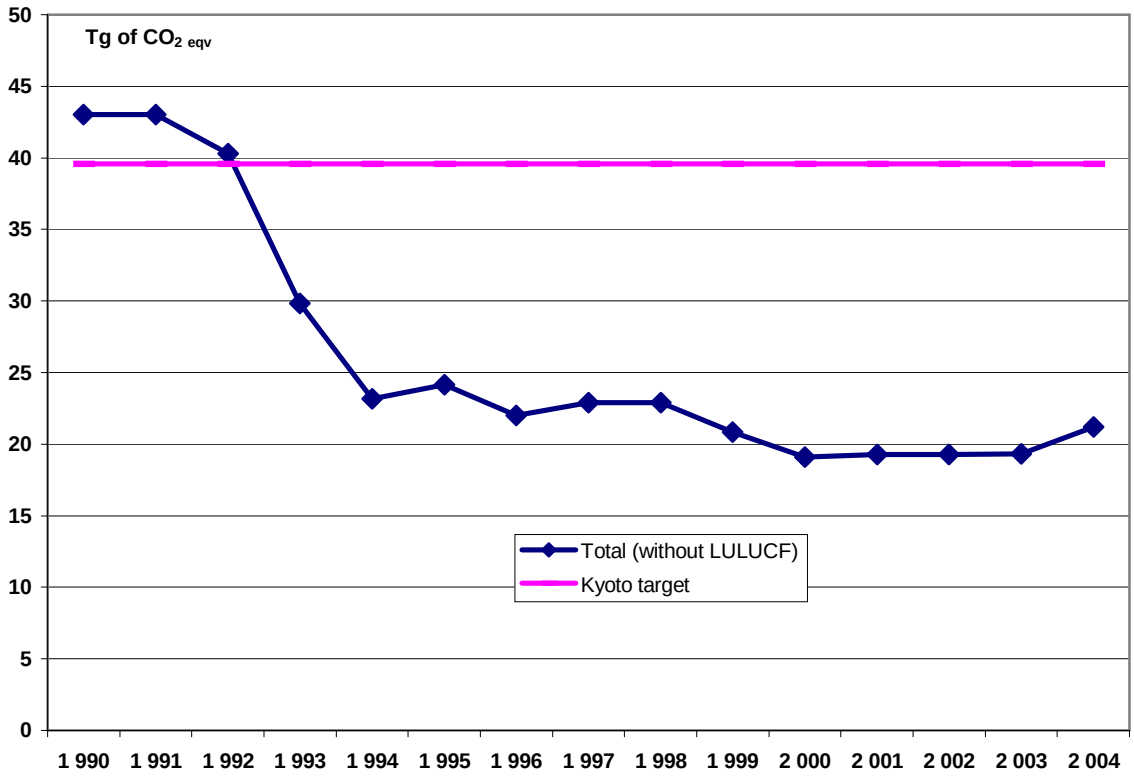

Figure 1. Trend of greenhouse gas emissions 1990-2004.

Greenhouse gas emissions decreased radically as a result of the fall in energy consumption in connection with the complete reform of the structure of the economy of Estonia at the beginning of the 1990s. This was accompanied by a remarkable reduction in energy and heat production. The energy production sector along with the sectors of industry and agriculture, which saw enormous reorganisations and qualitative and quantitative restructuring at the beginning of the 1990s have been the major factors behind the reduction of releases of greenhouse gas emissions into the air.

On the other hand, it is relatively cheaper to carry out various schemes to reduce greenhouse gas emissions in these countries where labour, energy production, fuel, transport and other costs are lower. As the countries with transitional economies do not actually need to do anything themselves to fulfil the obligations taken on voluntarily in the context of ratification of the Kyoto Protocol and do not need to reduce their greenhouse gas emissions due to various activities, they can sell their emission allowances at market prices. It would be reasonable to use the revenue from this for further improvements — obtaining new technologies, sustainable energy measures or further introduction of renewable energy sources.

As for the intended government purchase of Kyoto units it will not be accommodated for the Kyoto first commitment period in 2008-2012. It is hereby referred to the following guidelines of Commision for the implementation of Community scheme; the Communication from the Commission COM (2003) 830 final from 7th of January 2004, amended by the Communication from the Commission COM (2005) 703 final from 22nd of December 2005, also amended by the Communication from the

Commission COM (2006) 725 final from 29th of November 2006. As there is no need at present to purchase Kyoto units for reaching target, also no operational programme in place, no signed contracts or initiated carbon purchase tenders, no Kyoto units purchase is not foreseen for the period 2008-2012.

1.3 Procedure for preparation of the allocation plan

The responsibility for implementing the UN Climate Change Convention and mitigating the climate change via policies and measures to reduce greenhouse gas emissions, as required by the Kyoto Protocol and to implement the Directive, lies with the Ministry of the Environment. The Commission of Experts for Implementation of Flexible Mechanisms for the Kyoto Protocol of the UN Framework Convention on Climate Change, in short — "Climate Commission" — was established within the Ministry of the Environment in December 2003. Its members include the officials of the Ministry of the Environment, the Ministry of Economic Affairs and Communications and the Ministry of Agriculture who are in charge of implementation of the Climate Change Convention. Representatives of large-scale installations and a representative of the Estonian Power and Heat Association — 13 experts in total — are also represented in the Commission. The Climate Commission has held a number of meetings on implementation of the Directive and has approved this second national allocation plan plus the explanatory report and annexes presenting the data on participating installations.

Preparation of the second national allocation plan for greenhouse gases emission allowances trading was assigned as the result of public tender to the Estonian Institute for Sustainable Development, SEI-Tallinn, having prepared also the first national allocation plan. In SEI-Tallinn based on the Climate and Energy Programme the NAP II team lead by Dr Tiit Kallaste bas been formed. There has been close co-operation with the Department of Thermal Engineering of Tallinn University of Technology, what regularily performs energy and industrial sector inventories, also with the Climate and Ozone Bureau responsible for final submission of greenhouse gases inventories to UN FCCC Secretariat, and the GHG Registry. SEI-T NAP II team harmonised the applicable methodological principles with the Climate Commission, created the Joint Implementation projects database, updated and tested the emission database of all installations under the Community scheme, carried out the calculations necessary for the allocation of allowances to installations for NAP II and wrote the present explanatory Report to second national allocation plan.

A large proportion of the initial information has been collected by questionnaires sent out to operators included to NAP I, also to some no yet involved potential operators. Also, the detailed work was carried out to keep the Joint Implementation projects' database pursuant to Linking Directive 2004/101/EC currently updated. The methodological principles to follow the guidelines to avoid double counting were discussed in the Climate Commission in the course of which proposals and specifications were submitted and positions were harmonised on several matters of extraordinary importance. As a preliminary step the report was publicly exposed on both the websites of MoEnvironemnt and SEI-Tallinn. All comments, remarks and proposals were discussed in the Climate Commission and taken into account as far as

possible in the final draft of the report. The government experts were consulted continuously and the primary data were specified and checked with the operators in the course of preparation and in cases neede, double-checked. The necessary amendments and corrections were made to the allocation plan as a result. Finally the Climate Commission accepted the NAP II and accompanying Expalnatory Report and NAP Summary Tables.

1.4. Criteria in Annex III for the preparation of NAP

The present allocation plan for greenhouse gas allowances for the implementation of the European Community scheme has been prepared in compliance with Articles 9 and 10 of the Directive and pursuant to the requirements of Annex III to the directive.

To be more specific, Article 9 requires that the allocation plan has to be based on objective and transparent criteria, including those listed in Annex III to the directive. Article 10 requires that at least 90% of the emission allowances must be allocated to installations free of charge for the 2008-2012 period. Annex III to the Directive lists 11 criteria that have to be considered in the preparation of the allocation plan. The Communication from the Commission from 22 December 2005[3] introduces one more criteria to be considered based on the Linking Directive 2004/101/EC to specify the maximum amount of ERUs and CERs which may be used by operators in the Community scheme as a percentage of the allocation of the allowances to each installation. Estonia's national allocation plan for emission allowances has been prepared on the basis of the guidelines and meets all the criteria.

Criteria for National allocation Plans referred to in Articles 9, 22 and 30 of Annex III of Directive, also the Communication from the Commission COM (2003) 830 final from 7th of January 2004, amended by the Communication from the Commission -- COM (2005) 703 final from 22nd of December 2005, also by the Communication from the Commission COM (2006) 725 final from 29th of November 2006, are followed by a reference to the sections, where more detailed description of relevant criterion applied is presented.

1. **Criterion (1). Kyoto commitments**.
   The total quantity of allowances to be allocated for the relevant period shall be consistent with the Member State's obligation to limit its emissions pursuant to Decision 2002/358/EC and the Kyoto Protocol. The current situation in greenhouse gas emissions is analyzed in chapter 2, where in the paragraph 2.1 statistics is presented for the years 1990-2004 and the consistency with Kyoto target is analyzed in paragraph 2.3. Revised Kyoto commitment is introduced in paragraph 1.2.

2. **Criterion (2). Assessments of emissions development.**
   The further development of greenhouse gases emissions is presented in chapter 2 and illustrated with a number of tables. It should, however mentioned the lack of appropriate updated studies on projections, what makes

[3] COM (2006) 725 final on the assessment of national allocation plans for the allocation of greenhouse gas emission allowances in the second period of the EU Emissions Trading Scheme.

it imposible to assess the different scenarios like with measures causes (WM), without measures (WOM) and with additional measures (WAM). Paragraph 2.3 explains the current situation in the field of policies and measures in climate change mitigation policy.

3. **Criterion (3). Potential to reduce emissions.**
   This theme is presented in paragraph 2.4, where the trends of greenhouse gas emissions are related to thrends of general macroeconomic indicators. The future situation with greenhouse gases emissions will in the first order depend on macroeconomic indicators.

4. **Criterion (4). Consistency with other legislation**.
   The plan is cosistent with other Community legislative and policy instruments. NAP II is worked out based on Community legislative and policy framework and appropriate Estonian legislative documents. There is no special paragraph on that as the directives, acts, decrees and Commission guidelines have been currently followed and always referred in the appropriate sections.

5. **Criterion (5). Non-discrimination between companies or sectors.**
   This sphere of questions is handled in chapter 4 describing the determination of allowances at national, activity and installation level. Principles of determination of historical emissions, accommodation of early action , also treating equally new entrants, are introduced there. Equal treatment of installations has been assured by classifying them by nature of activities into various groups for which different base periods and reference values are being implemented. The same allocation criteria, which are described in detail in chapter 4, are being implemented within each activity.

6. **Criterion (6). New entrants.**
   The issues related to new entrants are described in paragraph 6.1, including equal treatment of new entrants compared to the installations covered by this allocation plan and the reasons why they are supplied with emission allowances from the national reserve free of charge.

7. **Criterion (7). Early action.**
   The matters related to early action are described in detail in paragraph 6.2, which establishes the principles for compensation within the Community scheme of voluntary measures allowed by the Directive.

8. **Criterion (8). Clean technology.**
   The issues of clean technology are currently described in whole text of this explanatory report, inparticular in chapter 3, which is devoted to energy sector development problems, including renewable energy sources based energy production accelerated development, and also in paagraph 2.2.

9. **Criterion (9). Involvement of the public.**
   Public consultation of national allocation plan and information dissemination has been described in paragraph 6.6.

10. **Criterion (10). List of installations.**

The detailed list of installations exposing the yearly allocation of allowances to each individual installation, also with total for the period 2008-2012, and with introducing the detailed allocation of allowances for installations in earmarked reserve, is presented in Annex 1 to this report.

11. **Criterion (11). Competition from outside the Union.**
    Competition from outside of the European Union countries is prescribed in chapter 3, where the most vulnerable issue, electricity production, import and export problems are described in details. Also, the opening of electricity market and related networking issues are presented here.

12. **Criterion (12). Consistency with supplementary obligations (JI/CDM limit).**
    The additional criterion as for the maximum amount of ERUs and CERs, which may be used by operators in the Community Scheme as a percentage of the allocation of the allowances to each installation This issue is being handled in chapter 4,1 also in paragraph 1.2, where the generalised look on the present situation with Kyoto commitment is decribed for Estonia.

2. Assessments of GHG emissions development

2.1 Estonia's emissions and removals in 1990-2004

In the following some tables containing basic inventory information only which has been submitted to UN FCCC Secretariat (NC 4) in November 2005 and amended in some parts in October 2006, is given. A complete inventory on greenhouse gas emissions and removals for the years 1990-2004 is provided in the report Greenhouse Gas Emissions in Estonia 1990 – 2004 (*Estonia's national inventory report and the common reporting tables*). The report is prepared in accordance with the UN FCCC Guidelines for the preparation of national communications by Parties included in Annex I to the Convention: Part I: UNFCCC reporting guidelines on annual inventories (following incorporation of the provisions of decision 13/CP.9). The methodologies used in the preparation of Estonia's greenhouse gas inventory are consistent with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* as complemented by the *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories and the IPCC Good Practice Guidance on Land Use, Land-Use Change and Forestry*.

In the following some parts of this general information is presented

The estimation of GHG emissions in Estonia is based almost entirely on the Intergovernmental Panel on Climate Change (IPCC) tier 1 methods and default emission factors. However, country-specific data are applied in the case of oil shale combustion, which is Estonia's principal source of emissions, accounting for approximately two-thirds of the total in 2004.

The GHG emissions by gas in 1990 - 2004 are given in Table 1 in Tg CO_2 eq.
In Figure 1 the GHG emissions in 1990-2004 by sectors (UN FCCC) reporting sectors are presented in Gg CO_2 eq.

During 1990 to 2004 the energy sector emissions have remained the most important category in the inventory, in 2000 - 2004 the share has increased from 91% to 91.9 %. In the other sectors the emissions have grown less rapidly (e.g. in the industrial processes and waste sectors) or even decreased (agriculture sector).

In the Industrial Processes sector the most important sources of CO_2 emissions are the cement industry and the lime industry, for which the process emissions have been allocated in the Industrial Processes sector. The emissions from these sectors have been calculated using plant-specific data.

The emissions from the Agriculture sector are calculated based on default emission factors. Activity data are mainly based on official Estonian statistics provided by the Statistical Office of Estonia. Livestock is the main contributor to greenhouse gas emissions from agriculture. Methane emission from enteric fermentation forms about 53%, CH_4 from manure management about 10%, N_2O from agricultural soils about 37% and N_2O from manure management only 1% of the total GHG emission from agriculture.

Table 1. Estonia's GHG emissions and removals in 1990-2004, Tg.

GHG EMISSIONS	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
CO_2	**38.56**	**36.34**	**26.43**	**20.55**	**21.38**	**19.32**	**20.26**	**200.22**	**18.32**	**16.77**	**16.85**	**17.08**	**17.21**	**19.11**	**19.26**
Fuel Combustion	37.49	35.30	25.83	20.36	21.16	19.09	20.06	200.00	17.95	16.42	16.49	16.73	16.95	18.83	18.56
Industr. Processes	1.07	1.04	0.60	0.19	0.21	0.22	0.21	0.23	0.37	0.35	0.35	0.36	0.25	0.28	0.70
CH_4	**3.4**	**3.35**	**2.85**	**2.03**	**2.28**	**2.22**	**2.19**	**2.20**	**2.04**	**1.94**	**1.98**	**1.77**	**1.67**	**1.73**	**1.73**
N_2O	**1.07**	**1.05**	**0.86**	**0.57**	**0.52**	**0.45**	**0.42**	**0.46**	**0.47**	**0.40**	**0.45**	**0.40**	**0.35**	**0.35**	**0.36**
SF6, HFCs, PFCs	NO	NO	NO	NO	NO	0.000	0.001	0.002	0.003	0.004	0.006	0.007	0.009	0.011	0.013
Total GHG in CO_2 eq	**43.03**	**40.74**	**30.13**	**23.16**	**24.17**	**21.99**	**22.88**	**202.88**	**20.82**	**19.11**	**19.28**	**19.25**	**19.23**	**21.18**	**21.35**
Land-Use Change and Forestry	**-6.32**	**-7.16**	**-7.81**	**-9.69**	**-7.60**	**-7.78**	**-9.61**	**-9.11**	**-8.52**	**-8.11**	**-8.37**	**-9.42**	**-8.56**	**-8.72**	**-8.02**

(Note. Due to rounding the sum of subtotals does not equal to total figures.)

Table 2. GHG emission trends (summary) in 1990-2004, Tg.

Estonia

2004

Submission 2006

GREENHOUSE GAS EMISSIONS	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
	CO_2 equivalent (Gg)															
Net CO_2 emissions/removals	32 243.133	32 243.133	28 752	18 325	10 858	13 773	11 533	10 657	11 118	9 795	8 664	8 484	7 685	8 748	10 389	11 243.100
CO_2 emissions (without LUCF)	38 563.090	38 563.090	35 915	26 142	20 553	21 378	19 315	20 264	20 225	18 318	16 771	16 849	17 103	17 312	19 106	19 259.170
CH_4	3 393.539	3 393.539	3 351	2 846	2 033	2 275	2 221	2 189	2 199	2 036	1 939	1 979	1 770	1 672	1 727	1 726.257
N_2O	1 069.016	1 069.016	1 047	861	570	515	449	425	461	467	395	450	400	350	349	364.357
HFCs	NO	NO	NO	NO	NO	NO	0.13	0.73	1.39	2.44	3.33	4.19	4.89	5.68	6.59	7.210
PFCs	NO	NO	NO	NO	NO	NO	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
SF_6	NO	NO	NO	NO	NO	NO	0.25	0.31	0.58	0.81	1.05	1.43	2.24	3.68	4.75	5.280
Total (with net CO_2 emissions/removals)	**36 705.688**	**36 705.688**	**33 150**	**22 033**	**13 461**	**16 564**	**14 203**	**13 271**	**13 780**	**12 302**	**11 002**	**10 919**	**9 863**	**10 779**	**12 477**	**13 346.204**
Total (without CO_2 from LUCF)	**43 025.645**	**43 025.645**	**40 313**	**29 849**	**23 157**	**24 168**	**21 985**	**22 878**	**22 886**	**20 825**	**19 109**	**19 284**	**19 280**	**19 343**	**21 194**	**21 362.274**

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[1]	1 990	1 991	1 992	1 993	1 994	1 995	1 996	1 997	1 998	1 999	2 000	2 001	2 002	2 003	2 004
	CO_2 equivalent (Gg)															
1. Energy	38 827.416	38 827.416	36 606	26 735	20 958	21 874	19 891	20 948	20 873	18 717	17 155	17 308	17 590	17 734	19 645	19 347.010
2. Industrial Processes	1 069.428	1 069.428	615	313	193	215	222	208	228	371	351	360	363	350	288	713.000
3. Solvent and Other Product Use	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
4. Agriculture	2 368.246	2 368.246	2 328	2 050	1 480	1 358	1 117	909	921	911	775	808	769	702	732	757.901
5. Land-Use Change and Forestry	-6 316.227	-6 316.227	-7 160	-7 814	-9 693	-7 603	-7 782	-9 607	-9 107	-8 522	-8 107	-8 365	-9 417	-8 564	-8 717	-8 015.020
6. Waste	756.825	756.825	762	749	523	720	755	813	865	826	829	808	559	557	528	543.228
7. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Total (with net CO_2 emissions/removals)	**36 705.688**	**36 705.688**	**33 150**	**22 033**	**13 461**	**16 564**	**14 203**	**13 271**	**13 780**	**12 302**	**11 002**	**10 919**	**9 863**	**10 779**	**12 477**	**13 346.204**
Total (without LU LUCF)	**43 021.915**	**43 021.915**	**29 846**	**23 154**	**24 166**	**21 985**	**22 878**	**22 886**	**20 824**	**19 109**	**19 283**	**19 280**	**19 341**	**21 193**	**21 361**	**21 361.226**

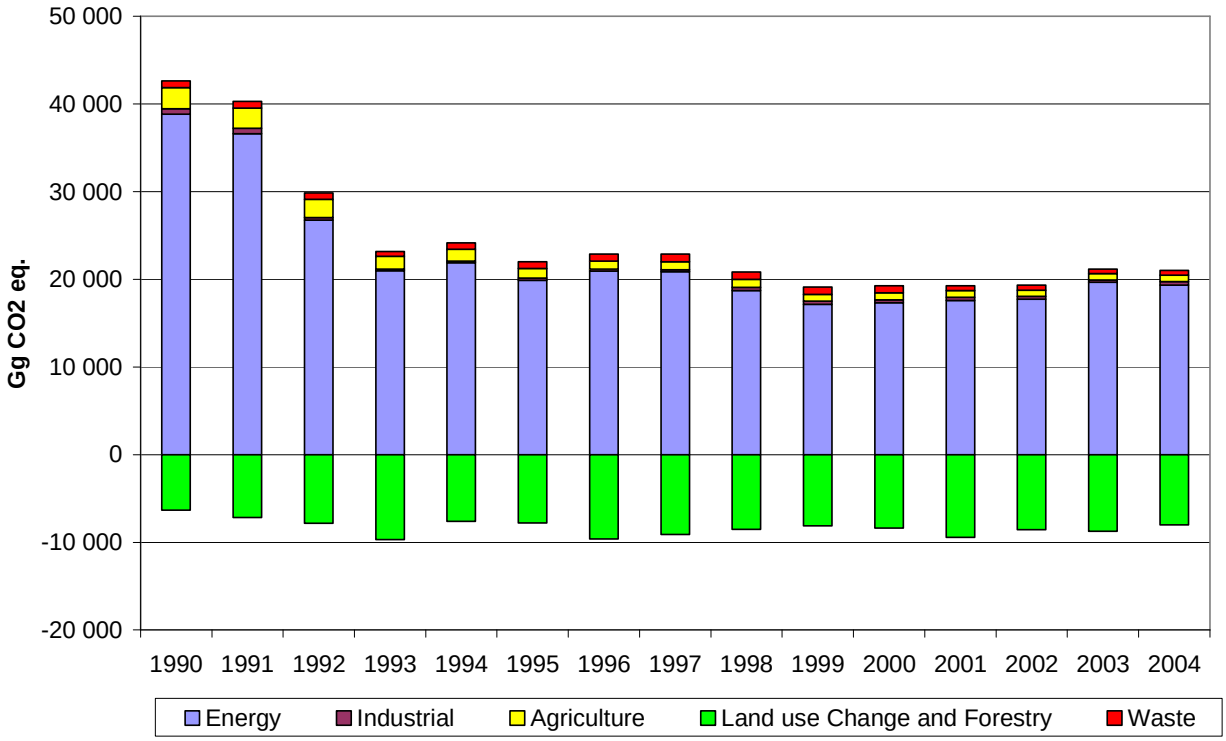

Figure 2. Greenhouse gas emissions in Estonia in 1990-2004 by reporting sectors (Gg CO_2 eq).

Due to joining the EU in May 2004 Estonia started to use new (so called Western Europe and Developed countries) emission factors since that time. This causes a slight discrepancy (increase) in the methane net emission form manure management in 2004. The decreasing number of animals, decreasing nitrogen fertiliser use and decreasing area of organic arable land has lead to an overall decreasing trend in the emissions from Agriculture. In total emissions in 2004 from Agriculture were about 69% lower compared with 1990.

The emissions from the waste sector are calculated using the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories and the IPCC Good Practice Guidance. In waste sector the reliability of activity data is rather low for the years 1990-1994. Before 1990 there was a big number of landfills, however, the statistical data about the deposits and relevant statistics was absent, but for 2-3 bigger landfills only.

The LULUCF sector, which includes forest land only, acts as a carbon dioxide sink. Emissions from the forestry sector (CO_2 and CH_4 emissions by biomass removals and burning) are smaller than removals (increase in carbon stock in tree biomass on the forest land.

Based on updated 2004 forest land data the LULUCF sector was a sink of about

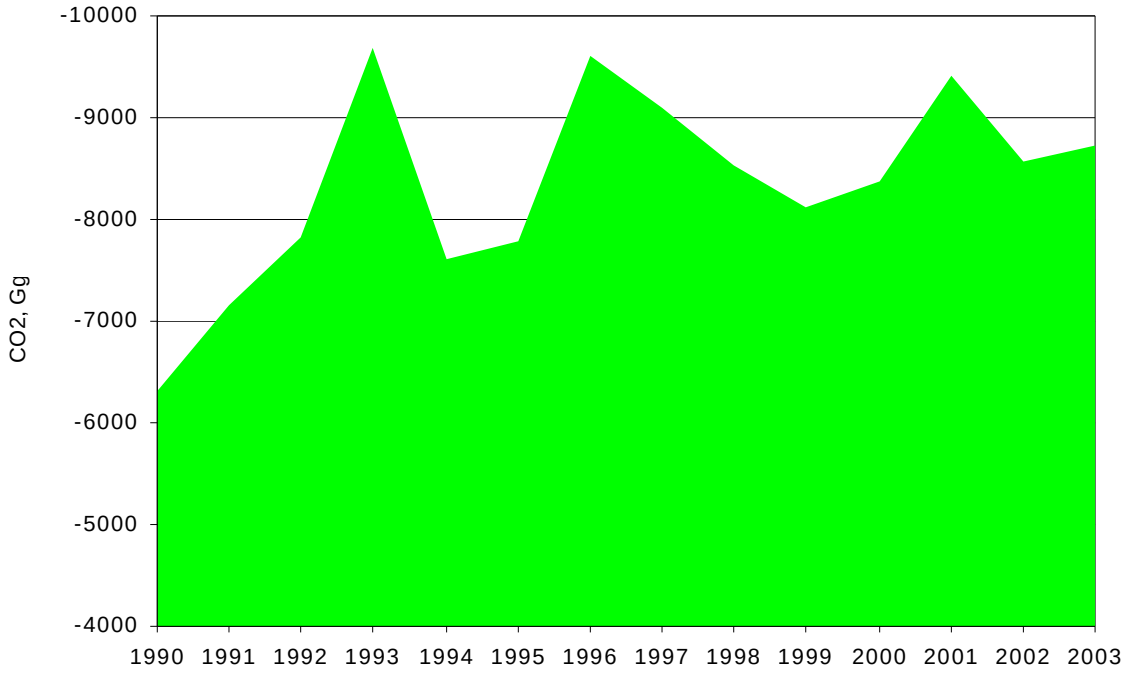

Figure 3. Net CO_2 removals by forests, Gg.

8015.02 Gg CO_2 eq. This means the LULUCF sector offsets about 15% (in 1990) up to 38% (in 2004) of emission of the other sectors in Estonia, see Figure 3.

The summary of GHG emissions trends is presented in Tables 1 and 2. In the base year - 1990 the most important source of emissions was energy sector, which contributed about 90% to the total emissions without LULUCF. Also, the agriculture (5.5%), industrial processes (2.5%) and waste (1.8%) were important sources of emissions.

2.2. Greenhouse gases specific indicators

In Figure 4 the emissions of carbon dioxide per capita and per GDP are presented. Estonia is one of the biggest emitters of carbon dioxide per capita in Europe. In 2002, it was 14.3 tonnes of carbon dioxide per capita (without LULUCF), while the average EU indicator was about 9 t per capita only.

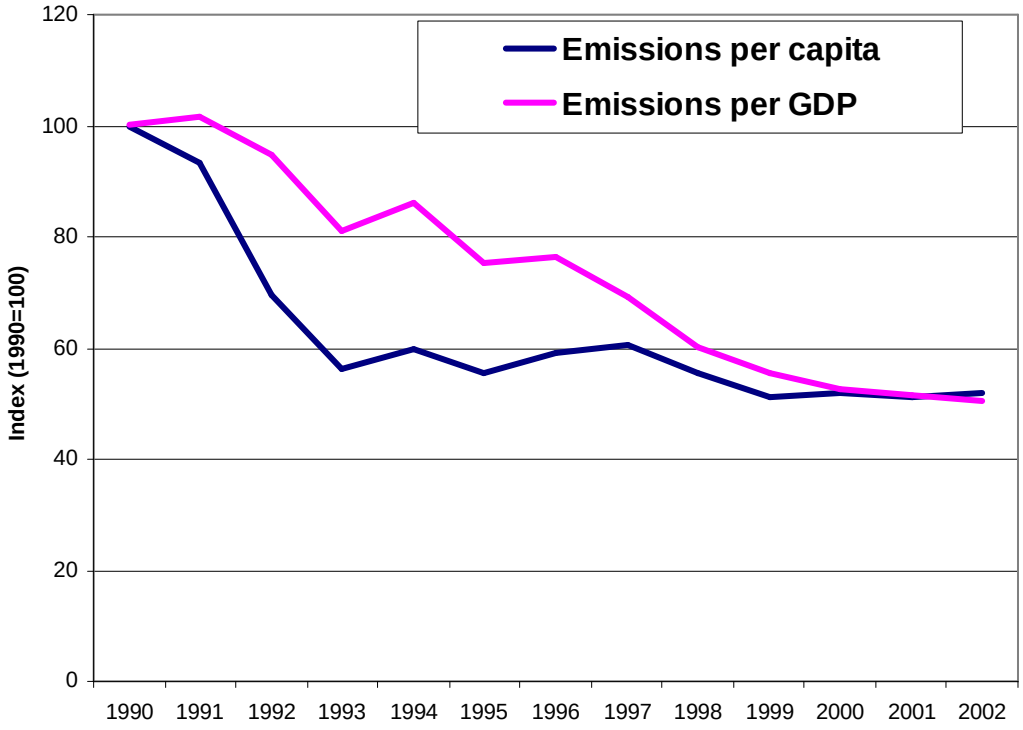

Figure 4. Estonia's greenhouse gas emissions (without LULUCF) per capita and per gross domestic product. Note. The updated data is given in the NAP common format summary tables.

It is important to point out that while in EU CO_2 emission per capita has been almost stable, it started to decrease since 1990 in Estonia. The CO_2 emission per capita was about 27.7 tons per capita in 1990, which makes up the reduction almost 49%.

The CO_2/GDP indicator is defined as the amount of CO_2 emitted in the country to generate a unit of GDP. The amount of total GHG emissions follows the development trend of primary energy supply in Estonia. Intensity of CO_2 emission reflects the contribution of the economy and whole society to the global warming. The intensity of CO_2 emissions decreased during the 1990 to 2002 almost by 50% in Estonia, see Figure 4 above. Nevertheless, the Estonia's carbon intensity indicator per GDP distinguishes from other countries exceeding the average EU25 value of this indicator about 3.5 times. It means, that despite to the mentioned before perceivable GDP growth (about 62%) during the last ten years, is the amount of TPES (and accompanied emission of CO_2) used for generation of a unit of GDP still to high. This is mainly related to the high-energy intensity of economy in general and carbon intensive structure of total primary energy supply.

2.3. Consistency with the Kyoto target.

Information on the evolution of all GHG emissions in the non-trading sectors for the period 1999-2004 is given in standarized UN FCCC reporting formats. Estonia stands below of Kyoto target which recalculated value equals tos 39.580 million tonnes, see for more details and in Tables 1 and 2 and Figure 1, 2 and 3 in above. Unfortunately, the information on GHG projections until 2012 on annual basis is not available at present on the reasons explained in former paragraph. .

Climate change mitigation policy needs serious updating as the latest policy document, the *National Programme of Greenhouse Gas Emission Reduction for 2003-2012* [4] has been enacted in 2004, i.e., prepared in 2002. The main goal of the Programme is to ensure the meeting of targets set by the UN FCCC and the Kyoto Protocol. The long-term objective of the National Programme is reduction of greenhouse gas emissions by 21% by 2010 as compared with the 1999 emissions level. This would include reduction of carbon dioxide emissions by 20%, methane by 28% and increase of nitrogen dioxide emissions by 9%.

No other programmes have been worked out since that time, therefore, the updating is needed, in particular, as for the forecasts by sectors and by activities as majority of long-term trends and forecasts of macroeconomic indicators, for example – GDP, are not relevant any longer. Policies and measures have been worked out based on those forecasts, trends and GHG projections. Also, the planned policies *with (additional) measures and without additional measures* to further mitigate the continuously increasing GHG emissions, need amendment as the data based on 2003 are in majority of cases no longer relevant for long-term projections.

Lack of updated comprehensive information makes the answering to above presented questions rather vague.

2.4. Potential to reduce emissions

The paragraph 2.1.3.1. of the Guidelines COM (2003) 830 final says that no definition or further determination of the term "potential" has been established, and potential should therefore not be limited to technological potential but may include, *inter alia"*, economic potential.

The biggest potential is in technological improvement using new technologies and high efficiency burning equipment in Energy activities sector. The most significant could be the continuing modernisation of in oil shale based pwer production sector, where the introduced fluidized bed combustion instead of pulverized combustion has the biggest potential of reduction of greenhouse gases emissions.

Also, the energy saving and energy efficiency should be emphasized here as the potential in this sector could bring with significant reduction of emissions.

[4] Kasvuhoonegaaside heitkoguste vähendamise riiklik programm aastateks 2003-2012. Tallinn 2004. (RT L 2004,59,990)

The majority of information on GHG emissions trends and projections, also the analysis of policies and measures to reduce greenhouse gases emissions up till 2015 and even 2030 has been performed based on 2002 and 2003 data for the purposes of the Fourth National Communication (NC4), which was presented to UN FCCC at the end of 2005. The only projections by sectors are usually given for the key-years 2010, (sometimes also for 2015), 2020 and 2030. The projections have been calculated based on MARKAL model runs considering different options of fuel supply and basic assumptions of macroeconomic development. MARKAL is a dynamic linear programming "bottom-up" model, which finds the optimal development of the energy system in time under given technology characteristics and boundary conditions.

The MARKAL models allow a wide flexibility in representation of energy supply and demand technologies and are typically used to examine the role of energy technologies under specific policy constraints, e.g. CO_2 mitigation, local air pollution reduction, etc. As it was said above, the information used for MARKAL modelling needs updating. For the development of the main energy indicators until 2010 the forecasted in the National Long-Term Development Plan for the Fuel and Energy Sector until 2015 (with a vision until 2030) 2001 and 2002 data were used. GDP forecasts are based on the actual value of 2000 GDP in market prices, actual growth in 2001 and 2002, and the annual growth forecast from that in turn bases on the forecast of the Ministry of Finance of Estonia until 2030, see Figure 6. By present time also the GDP initial data are no longer adequate, see for the comparison Fig. 7 where the most recent data are exposed.

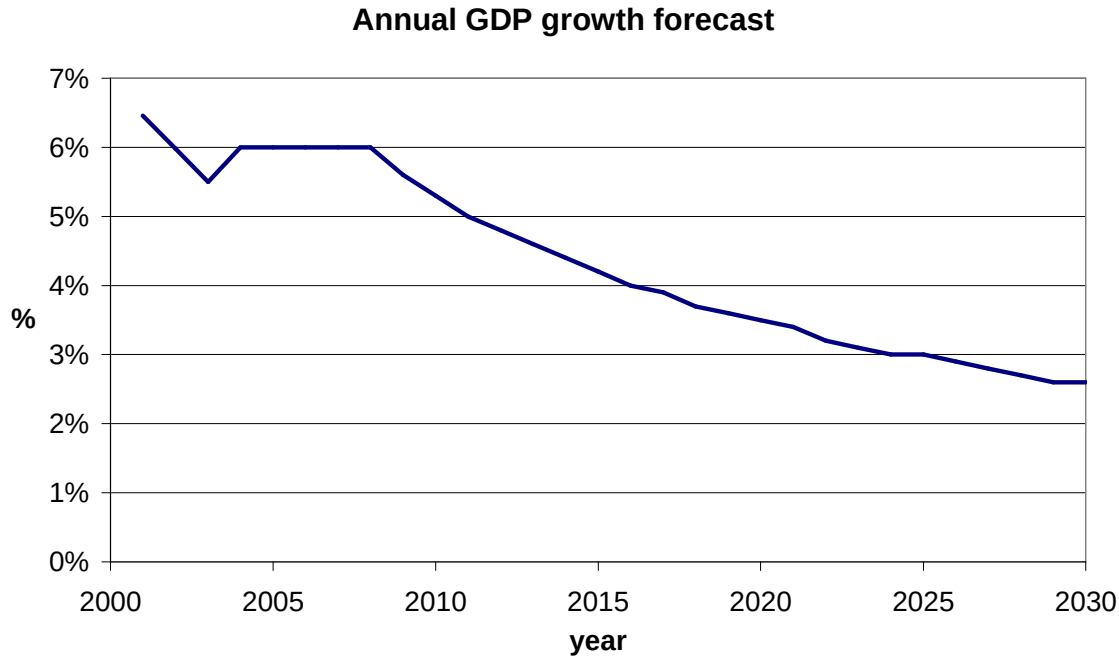

Figure 5. Estonia's annual GDP growth 2001-2030.

This GDP growth data has been used in MARKAL modelling. Appropriate projections made for energy sector, industry, etc, for the purpose of The Fourth National Communication (NC 4) thus no longer adequate. There have been no more updates on GHG emissions made by MARKAL.

The continued high growth rate is expected for the period up till 2010 thus influencing the greenhouse gases emissions of installations included in NAP II. The latest GDP forecast made by the Ministry of Finance in Summer 2006, see Figure 7, represents radically another (different) trends occurring since 2004 onwards and presented in Figure 6. It would be very relevant to make the updated forecasts of various GHG emissions related indicators using the most updated information on GDP growth. Unfortunately the forecasts are not available at present.

It should be pointed out the economic growth is the major reason for the rise in electricity production. The average growth of the electricity consumption has been formerly assessed approximately 6.5% annually. The real GDP growth 11.2% in 4th quarter and 9.8% in average in 2005 assure that forecasts have still shifted towards higher average values, see Figure 7. Even the trend marked with red, is not appropriate any longer as it should have upwards decline started since 2003 (2001) already. Based on the preliminary assessment of the Ministry of Finance, the 2006 yearly average growth is assessed to be 10.7 %, while an average of EU is projected on around 2%. GDP indicator is one especially important factor when giving evaluation to present economic growth related GHG emissions and projections up till 2012 in Estonia.

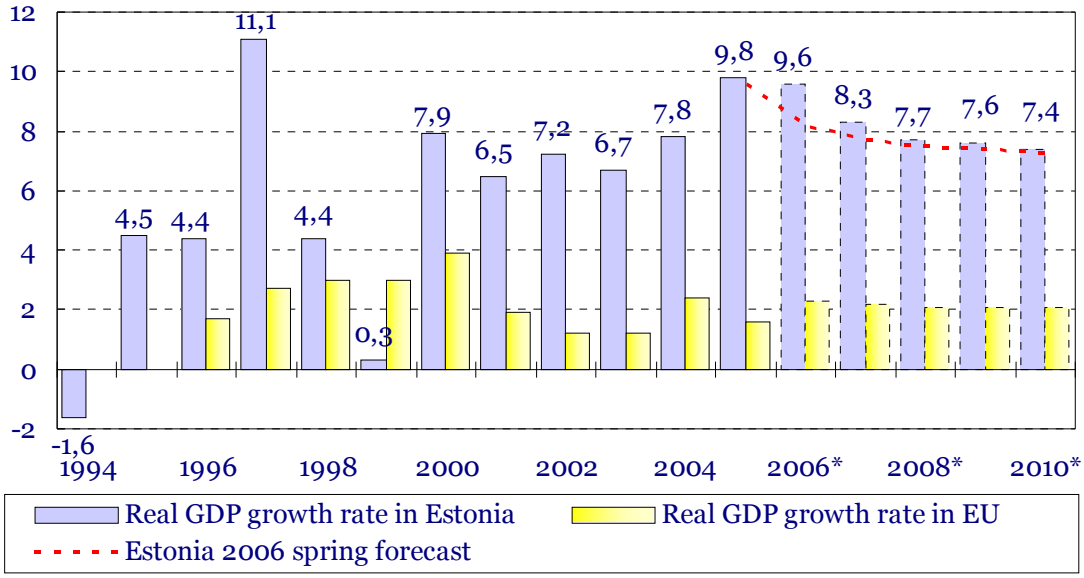

Figure 6. Estonia's annual GDP growth 1994-2010
(data of The Estonian Ministry of Finance. Summer 2006)

As no adequate data on greenhouse gases emissions projections is available for making assessment of various policies and measures in regard of WM, WOM or

WAM, one should just hope that the next calculations will be performed in the near future. Thereafter only, it would be possible to give an assessment of different type of GHG emission projections and foloow the most appropriate path.

In the notified the Commission NAP II for the period 2008 – 2012 the emissions per annum compared with the allocated emissions of NAP I for the period 2005-2007 are somewhat bigger. This is in coherence with present significantly higher GDP yearly average growth rates around 10%. For NAP I the forecasted GDP growth rate value of 5,3 … 5,9% was used in 2004. Due to the significantly accelerated growth in whole economy, also the projected GHG emissions have significantly increased.

Big changes are foreseen in energy sector, in particular in electricity generation sector where several large scale export activities will be undertaken. The first sea-cable of 350 MW capacity between Estonia and Finland *Estlink*, which has been included into the NAP I, will be inaugurated in November 2006. Estonia's share in the cable will be 1.7TWh per annum. The second sea-cable of 650 MW capacity will be built to increase the export of electricity to Nordic countries. According to the development plans of AS Eesti Energia it will start operation in 2010. Potential additional sale comprises up to 5TWh per annum. Appropriate additional GHG emissions have been included to the AS Eesti Energia's yearly allocations starting from 2010.

Also, several CHP plants will be launched during 2008-2012; Anne CHP by AS Fortum Tartu, Väo CHP by OÜ Digismart, both of them are included in NAP NAP II. The first in the reserve with fixed GHG emissions and the latter in NAP. The reason for differentiation includes in having or having not all relevant documentation preliminary prepared to start the new installation in fixed year during the second trading period.

Beside of mentioned CHP plants, also plans on construction of natural gas fuelled CHP plants are currently analysed to create the compensating power for wind power sector. However, this installation is not included in allocation plan and the allocations will be covered from the regular reserve foreseen in NAP II.

These activities, no doubt, should be considered and actually are taken into account when analysing the increased future emissions compared with 2005 verified emissions. It is pointed out here that the Estonian authorities share the common position of many other Member States on the not most appropriate approach of using 2005 verified emissions to be taken for the basis of an assessment of allocation for next trading period.

3. Background information on main sectors influencing greenhouse gases emission

3.1. Estonian Energy Sector Development trends

The energy sector is the main industrial sector in Estonia. Both the energy and the chemical industry are based on oil shale. Oil shale is a specific low-calorific domestic fuel, which made up 62% of the primary energy supply in 2003 in the Estonian energy sector. Beside of oil shale, peat and wood are the major domestic fuels. The primary energy supply of renewable energy sources in Estonia is ~12.5%. Approximately 90% of Estonia's energy is produced through the combustion of fossil fuels. This is the reason for having one of the highest in Europe per capita emissions of greenhouse gases. Still, the climate mitigation policies are in place and are introduced in the Long Term Development Plan of Electricity Sector for 2005-2015 from 03.01.2006[5]. Stepwise decrease of the use of oil shale in the longer prospective will have the most remarkable influence here. Also, the share of renewable energy sources has increasing trend. As regards significantly wider deployment of renewable energy sources, the main energy policy document – the Long Term Fuels and Energy Sector Development Plan up to year 2015[6] sets a target to increase the share of renewables and peat in the primary energy supply by 2/3 to the year 2010 compared with 1996.

3.2 Primary energy balance and its structure

Estonian energy sector relays heavily on use of fossil energy sources. In the following brief description is given.

Oil shale is the most important energy resource of Estonia. Since 2000 the production of shale oil has continuously increased, the growth continued also in 2005. In 2005 about 14 mln. t of oil shale was mined out of which 85 % was used for power production in Narva, Ahtme and Kohtla-Järve power stations on the eastern border to Russia. In addition to combustion in power stations, oil shale is also used for the production of oil and in petrochemical industry, e.g. in 2005 about 2.0 mln t of oil shale was used in petrochemical industry. There is rapidly increasing demand for domestic heavy fuel oil worked out from domestic oil shale. Also, the latest fuel price rise in Europe supports the demand for oil. At present there are a number of new applications from companies planning to start oil cracking from this domestic fuel. The mentioned trend should be strongly considered also in forecasting the future needs for more allowances in the frame of NAP II.

[5] Eesti elektrimajanduse arengukava 2005-2015., (2006). Majandus- ja kommunikatsiooniministeerium. Tallinn (in Estonian, 35 p). (https://www.riigiteataja.ee/ert/act.jsp?id=979263).

[6] Kütuse- ja energiamajanduse riiklik arengukava aastani 2015, (2004). Majandus- ja kommunikatsiooniministeerium. Tallinn. (https://www.riigiteataja.ee/ert/act.jsp?id=829062).

Table 3. The maximum need of oil shale for the purpose of power production in 2008-2012, in th t.

	2007	2008	2009	2010	2011	2012	2013	2014	2015
TOTAL	16 15	17 244	14 755	16 273	18 947	14 605	14 159	13 925	14 720
Share of oil shale for domestic electricity consumption	10 982	11 590	12 195	12 799	12 969	13 238	11 656	12 398	12 904
Share of oil shale for elecytricity export	5 133	5 654	2 560	3 474	5 979	1 367	2 503	1 527	1 816

Source: AS Eesti Energia, 2007

As oil shale is the strategic energy source of Estonia, environmental, economic and social policy and security aspects must be considered when planning its further use in power generation and petrochemical industry. At the current volume of consumption (12-14 mln tons per year), the active supplies of the operating mines and quarries will last until 2025, what-after the new mines must be opened. At the current rate of consumption, the total active supplies of oil shale will last for 60 years calculated on the basis of the technical-economic conditions of power stations. At present the national program of usage the oil shale is underway. It will fix the marginal volumes of mining, also the potential threats to environment. The program will pass several rounds of amendments and is discussed publicly in the spheres of experts. The program will be finally adopted next year by Parliament. The Long Term Fuels and Energy Sector Development Plan up to year 2015 (Kütuse ja ..., 2004) foresees stepwise decrease of using oil shale. https://www.riigiteataja.ee/ert/act.jsp?id=829062. However, it should be emphasized here, that there is enough oil shale deposits available for covering the needs for electricity domestic consumption as well for the needs of projected export via Estlink I and Estlink II.

Peat is a competitive local fuel in power generation. It is possible to use peat also in combined heat and power generation. It could be also used in fuel mix together with oil shale in renovated energy blocks of the Estonian power station in Narva. At present, the supply of peat is estimated around 775 mln t/y. It could be actually considered slowly renewable source of energy. Restrictions arising from nature protection significantly affect the use of peat - natural moors in EU are protected with *Natura 2000* framework restrictions. Thus, upon peat mining, it must be taken into account that only the peat of drained swamp areas is used and new areas are not drained until 2025. The use of peat in the Estonian power generation sector increases slowly.

Table 4. Indigenous production of primary energy, TJ.

	1993	1995	2000	2002	2004	2005
Oil-shale	126705	122370	108330	111103	124121	129423
Peat	4175	5563	3345	6416	2678	3550
Firewood	7275	20730	20617	22608	28580	28162
Other fuels	0	85	76	112	84	150
Electricity, hydro-and wind energy	6	10	21	26	108	270
Primary energy produced	**138161**	**148758**	**132389**	**140265**	**155571**	**161555**

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

Natural gas is a considerable alternative to oil shale in power generation sector. Besides, it is the most environmentally-friendly compared to all fossil fuels. Natural gas is supplied from one single state, Russia. The competitiveness of natural gas upon energy production is affected by environmental taxes and the state security aspect. By 2010, the use of natural gas is expected to double in the whole Europe and the consumption of gas will increase also in Estonia.

If the consumption of gas increases to a significant extent, the state shall have to interfere more in the gas industry and analyse the risks of ensuring the security of supply of natural gas. The long-term price risk of natural gas is also of significant importance.

Estonia may increase the stability of gas supply if it participates in the development of the underground storage facilities of Latvia and establishes stocks into the facilities. Additionally, connection of the gas networks of Estonia and Finland offers additional stability. The most important development project of the recent years is connecting the city of Pärnu (in the South of Estonia) to the natural gas network.

Table 5. Primary energy production and imported fuels

		1993	1995	2000	2002	2004	2005
Oil-shale	TJ	126705	122370	108330	111103	124121	129423
Peat	TJ	4175	5563	3345	6416	2678	3550
Firewood	TJ	7275	20730	20617	22608	28580	28162
Other fuels	TJ	0	85	76	112	84	150
Production of primary energy	TJ	**138155**	**148748**	**132368**	**140239**	**155463**	**161285**
Natural gas	TJ	14892	24388	27757	24963	32458	33481
Liquid fuels	TJ	62038	47278	30950	40234	43690	43205
Imported fuels	TJ	76930	71666	58707	65197	76148	76686
Total primary energy	TJ	215085	220414	191075	205436	231611	237971
Oil-shale	%	58,9	55,5	56,7	54,1	53,6	54,4
Peat	%	1,9	2,5	1,8	3,1	1,2	1,5
Firewood	%	3,4	9,4	10,8	11,0	12,3	11,8
Natural gas	%	6,9	11,1	14,5	12,2	14,0	14,1
Liquid fuels	%	28,8	21,4	16,2	19,6	18,9	18,2
Total		100	100	100	100	100	100
Index of self-sufficiency		64	67	69	68	67	68

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

The consumption of **coal** has been reduced in Estonia. The greatest consumers are industrial enterprises, households (for heating) and small boiler plants (for heat generation). Coal is not used for the production of electricity in Estonia. Due to large coal resources available in world, in the long-term, the production of electricity on the basis of coal might become feasible. However, according to present long term plans it will not happen before 2015, which means - new clean technologies will be used.

Liquid fuels formed 13,7 per cent of the primary energy supply in 2004, they are divided into fuel oils and motor fuels. In connection with the increasing number of motor vehicles, the consumption of motor fuel in Estonia increases. According to the prognosis of the Ministry of Economic Affairs and Communications, the consumption of motor vehicle petrol and diesel fuel increases 1-3 per cent per year, and the increase decelerates in the long term. By 2010, the consumption of motor vehicle petrol increases to up to 328 000 tonnes and the consumption of diesel fuel increases to up to 208 000 tonnes per year.

Table 6. Consumption of Fuels for Power and Heat Production, PJ

	1998	1999	2000	2001	2002	2003	2004
Coal	0,8	0,8	0,5	0,5	0,4	0,4	0,4
Oil shale	98,8	95,3	92,5	88,9	86,5	104,5	103,7
Peat	1,7	1,4	1,3	1,7	1,9	1,9	1,6
Firewood	6,2	6,4	6,4	7,7	7,7	7,7	8,7
Natural gas	14,6	14,4	18,5	19,8	19,4	19,2	21,4
Heavy and light fuel oil	14,3	12,3	5,0	4,3	3,5	2,6	2,1
Shale oil	4,3	4,3	4,2	4,9	4,8	4,5	4,4
**Other fuels*	3,3	2,7	4,2	4,7	5,2	5,2	5,5
TOTAL	**144,0**	**137,6**	**132,6**	**132,5**	**129,5**	**146,0**	**147,8**

** Oil shale gas and biogas*

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

The Table 6 presented above is illustarted with the diagram, see Figure 7. For more detailed comments, see paragraph 3.5.

3.3 Assessment of the RES-E development

Estonian renewable energy sources include biomass, hydro, wind and solar power. In 2004, according to State Statistical Office, the total share of renewable energy sources based electricity generation (RES-E) reached 0.3% (Table 7). Still, the landfill gas based CHP electricity generation is not included here. For the 2005 it could be noticed a heavy raise of electricity generation due to erection of a number of real big wind farms. Unfortunately data on their production are not yet refelected in official statistics.

The Estonian government has set a demanding target of 5.1% share of renewable energy sources based electricity consumption to year 2010 according to European

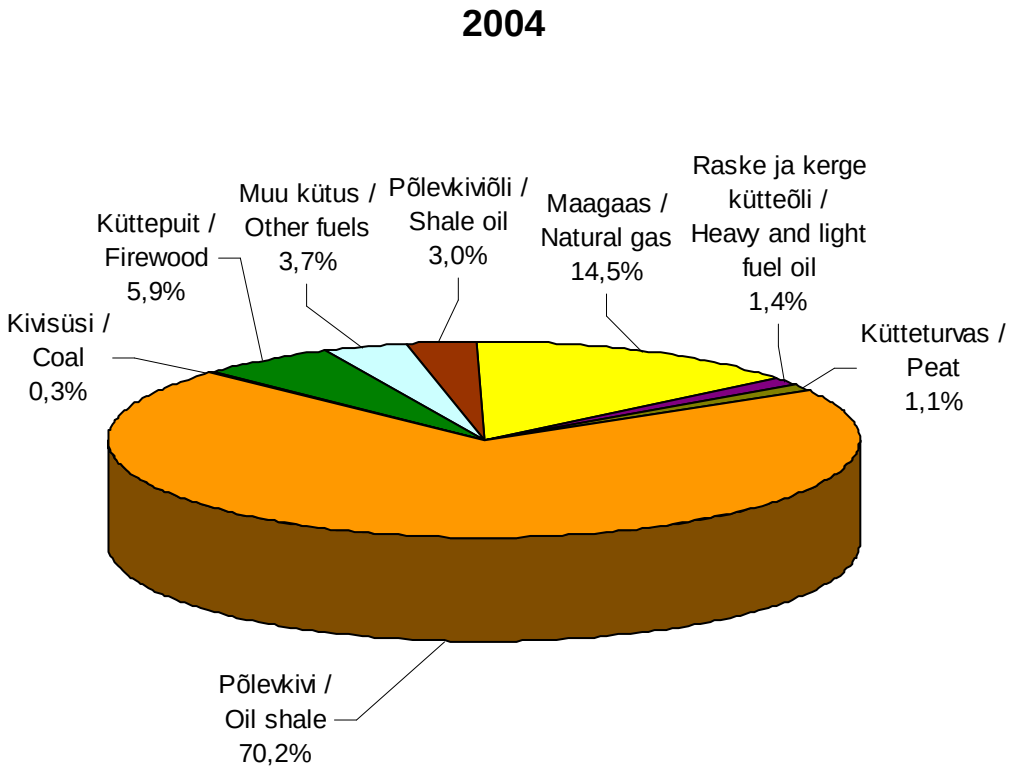

Figure 7. Consumption of fuels for power and heat production, %

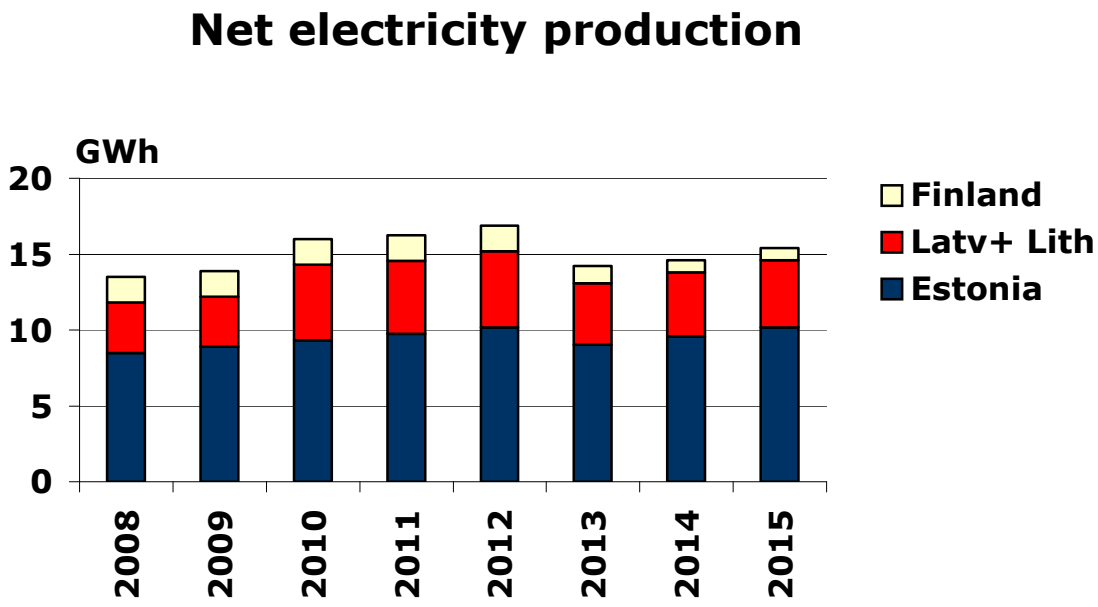

Figure 7. Forecasts of net electricity production of Estonian power plants

Union Directive 2001/77/EC[7]. The main sectors here to achieve the target set are wind and biomass sectors.

Wind power. It has only recently started to play a leading role in RES-E (renewable energy sources based electricity) generation, therefore it is given more emphasize also in the present report. The avoiding double counting rules presented in Commision Decision of 13 November 2006, have been considered. Estonia has good wind resources suitable for RES-E production. It should be mentioned that the wind potential in the coastal zone in Estonia is higher than in the other Baltic countries. At present there are many wind farms under the construction and a pipline comprises relatively long list. Wind has experienced a considerable rate of growth in recent years. A number of green-field projects have been launched, off-shore wind farms are designed at present. It should be emphasized, that majority of wind power projects have been and are currently being performed in the frame of Joint Implementation following Art 6 of Kyoto Protocol.

Table 7. Use of Energy Resources for Electricity Production, GWh

Indicator	1997	2000	2001	2002	2003	2004
Electricity gross production, GWh	9218	8513	8483	8527	10159	10304
Share of oil shale-based electricity, %	95.7	91.1	90.5	90.9	92.5	92.6
incl. from oil shale	95.3	90.7	90.0	90.6	92.2	92.3
from shale oil	0.4	0.4	0.5	0.3	0.3	0.3
Share of natural gas, %	1.3	6.6	6.7	6.1	5.0	4.7
Share of other fuels, %	3.0	2.3	2.7	2.9	2.3	2.4
Electricity production from hydro- and wind energy, GWh	3	6	8	7	19	30
incl. hydroenergy	2.95	5.67	7.72	6	13	22.4
wind energy	0.05	0.33	0.28	1	6	9.6
Share of hydro- and wind energy, %			0.1	0.08	0.2	0.3

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

The first wind turbine for commercial energy production with a capacity of 150 kW has been operating since September 1997 only. Thereafter, the first windfarm of 1.8 MW capacity at the western coast in Virtsu in 2002. Two 220 kW turbines have been erected in Mõntu, Saaremaa. Four smaller windturbines with capacity 500 kW each, have been installed in Salme, Saaremaa. The next big windfarm with the capacity of 18.4 MW started in January 2005 at Pakri Peninsula. Next two generators in Aseri, 1 MW each. Next – Esivere (Virtsu II) wind farm with capacity of 23 MW, started in October 2005, During recent years huge progress has been made in wind sector – at 01.01.2007 the installed wind based generation capacity totalled 48 MW. Most probably it will exceed the 70 MW boundary in March 2007, when Viru-Nigula wind farm in North-East of Estonia with the capacity of 24 MW will start operation. In the

[7] Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market.

pipe, however, there are some more 500 MW capacity wind generators, included to the Another Set-aside of JI in NAP II, see Annex 3. Beside of all, planning of 5 off-shore windfarms altogether with 200 wind generators to west from island Hiiumaa has started, Environmental Imapact Assessment tender has been launched, etc. The latter plans are not yet part of ANNEX II of avoiding double counting guidelines, however, most probably will be.

Hydro energy. The potential of hydro energy in Estonia is quite insignificant. The flatness of the territory of Estonia does not enable to use the energy of hundreds of rivers. Nowadays Estonia has total capacity of hydro plants slightly over 5MW and a great number of real small-scale hydro plants. However, the potential of small-scale hydro power plants recently started to be used more wider. Overall technical potential could reach 35 MW of capacity, depending on solution on sharing the large border river Narva to Russia. Several JI projects in hydro energy sector are included to JI Another Set-aside, see Annex 3.

Solar energy. The solar energy resource potential is small in Estonia because of climatic conditions are unfavorable for using solar energy. The average actinometrical resource in Estonia is estimated at approximately 1000 $kW \cdot h/m^2$, that restricts the wider use of active solar energy. The possibilities for passive use of solar energy are usually considered in design and construction process of buildings.

Pursuant to Linking Directive and the Decision of Commission of 13. November 2006 the generated ERUs have included in NAP II. The more detailed overview on a Set-aside is given in ANNEX I tables. Here wind power and biomass projects are presented. The projects in the pipe, so-called Another Set-aside are presented in Annex 3 to presnt report, which contains ANNEX I and ANNEX II

3.4 Carbon intensity of GDP

Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 describes national emission ceilings (NEC) for atmospheric pollutants[8]. Carbon intensity of Estonian GDP is relatively high due to the fact that the main fuel used for producing electricity is oil shale. According to National Ceilings Directive Estonia used 1945t CO_2 per MEUR'00 GDP[9].

If we would like to assess the carbon intensity indicator of carbon content, we can notice the very positive continuously decreasing trend, see the NAP Summary Table II a, in Annex 2, which reflects the significant improvement compared to the beginning of 1990ies. The value of the carbon indicator has continuously decreased from 5.20 in 1993 to 3.16 in 2000 and to value 2.16 in 2004. The trend is well reflecting the significant improvement in whole economy, also including the sectors and installations covered by EU ETS

[8] Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001
[9] http://ec.europa.eu/environment/air/baseline.htm (low carbon constraint / with CCS)

Table 8. Ratio of CO_2 Emissions to GDP (t of CO_2/MEUR'00) compared to 1990 baseline

CO_2 Emissions to GDP, t of CO_2/MEUR'00	1990	1995	2000	2005 a	2010*
EU 25 against 1990 baseline	100%	90%	79%	76%	67%
Estonia against 1990 baseline	100%	63%	42%	35%	22%

Source: Directive 2001/81/EC on national ceilings.
* estimations

Table 8 demonstrates that Estonia has consistently lowered its usage of carbon to produce GDP compared with 1990 baseline. This has been due to combined effect of decrease of carbon intensity and raise of GDP growth rate at the same time. Furthermore, the carbon intensity decrease has been from 5.20 in 1993 to 2.60 in 2004 (in million tonnes of CO_2 / billion €), see also the NAP Summary Table IIa.This is about twice as much as EU-25 average decrease.

Much of decrease in carbon intensity itself can be attributed to application of technological improvements and implementation of best available technology, such as circulating fluidized bed (CFB) technology in oil shale fuelled power plants.

According to the estimations of National Ceilings Directive, Estonia's carbon intensity should decrease to 22% compared to 1990 levels by 2010, whereas EU-25 average decreases just to 67%. Effectively, Estonia's share of the decrease burden is 2,3 times higher than the average reduction over Europe.

3.5 Electricity export to Latvia, Lithuania and Finland

The growth rate of electricity consumption has been continuously high around 6.5% and the same rise is foreseen also for the next six years period. The electricity markets around are opening to 100% in Latvia and Lithuania in 2008. The consumption growth rate in both countries is very similar to that of Estonia – 6.5%. To year 2010 their demand in electricity will increase to 5.5 TWh. To the end of 2009 Ignalina NPP will be closed, which causes the need to produce/import 9,5 TWh more compared to 2005 starting from 2010 This in its turn means increased generation in Estonia. In 2009 the Estonian electricity market will open to 35% and in 2013 – 100%. All in all, Estonia supplies around 15-17% of Latvia's and Lithuania's consumption of electricity, see also Fig. 7.

Increased production of electricity will start with the launching of the first sea-cable to Finland. As for the increased export the additional GHG emissions for via 350 MW first sea-cable from Estonia to Finland *Estlink*, have been already included into the NAP I. Referring to work on NAP I in 2003, the forecasts built by the company AS Eesti Energia on possible launch of the sea-cable from Estonia to Finland have been shown very high rate of probability. Relevant amount of allowances were allocated to AS Eesti Energia starting from 2007.

The cable itself has been inaugurated in November 2006 and it started to transfer electricity on full power since the 01.01.2007.

Estonia's share in the cable will be 1.7 TWh a year. The Board of electricity utility company AS Eesti Energia has the decision to build the second, 650 MW sea-cable to increase the export of electricity to Finland and other Nordic countries. According to the development plans of AS Eesti Energia it will start operation in 2010. Additional sale comprises up to 5 TWh in a year. Appropriate additional GHG emissions have been included to the AS Eesti Energia installations' yearly allocations starting from 2010 This also explains the differences when comparing the trends of GHG emissions of the installations of the company in 2005-2007 with that of the period 2008-2012.

Energy sector more distant plans involve the participation in Ignalina nuclear power plant construction, which will increase the scurity of supply and decrease the dependence from non-EU main electricity supplier to Baltic States, Russia.

The construction of power transformation grid connecting Estonia with Poland, will significantly increase, in case it happens, the production of oil shale based electricity. However, the allocation of allowances to such a distant activities is not performed in the frame of present plan.

3.6 Options for further emission reduction

Due to use of mostly fossil fuels for generating power and heat, it is accompanied by remarkable carbon emissions forming more than 90%[10] of total greenhouse gases emissions. Hence the biggest reduction potential is involved in this sector.

Further rapid decrease to the level set in the National Ceilings Directive[11] can only be achieved with following measures; increase in energy efficiency, wider deployment of RES-E capacity and imports of electricity. The potential of energy efficiency improvements is estimated to increase the efficiency ~ 2-3% a year in the next 5…10 years period.

As it was said in above already, Estonian Government plans to increase the share of consumed electricity generated based on renewable energy sources, to 5.1% or 400 GWh till year 2010[12]. As possibilities to produce energy from other renewable sources are relatively limited, most of new RES-E capacity will be added via developing wind power sector. Only a minor increment is foreseen to produce from biomass in CHP plants as the mostimportant fuel, peat, is categorized to fossil fuels at present. However, there are the limits to growth, set by high - voltage network. Government does not have any good compromise between grid owners and RES-E developers at present, however, the extraordinary rapid growth of RES-E in country very probably will induce the next revision of electricity market law. For the rational solution to perform the real step forward to increase the use of RES-E, could be the construction of natural gas fuelled compensating capacities, being able to switch over in short time period. The another option under discussion is widening the grid connections to Sweden, et al.

[10] Based on 2005 actual emissions. Source: AS Eesti Energia.
[11] Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001
[12] Estonian Accession Treaty with the European Union.

As for the option of import of electricity, it does not have any climate change mitigation effect as Russian thermal power plants are of similar or lower fuel efficiency compared to Baltic power plants. Thus, producing electricity in Russia and importing to Estonia will not reduce the emissions (ecological footprint) of the region, but will only transfer value and jobs from the EU region to Russia. Beside of that, importing electricity from Russia would significantly increase the energy dependence of Estonia as well as other Baltic states. As recent events in Ukraine and Georgia have shown, lock-out of supply of energy and energy carriers has been used as a tool to influence the political governanace. Hence, it is not realistic to achieve such energy intensity reductions without significantly increasing the Baltic states energy dependence on Russia.

4 Determination of emission allowances

4.1 Determination of emission allowances at national level

In regard to Kyoto commitment in 2008-2012 foreseen by Protocol, Estonia's GHG emissions below the target, which has been recently recalculated according to IPCC Guidelines (2006) and equals to 39.581 million tonnes of CO_2eq. The situation in Estonia is similar to most other new EU Member States whose total emissions allowed are not restricted by the greenhouse gas emissions reduction obligations imposed by the Kyoto Protocol. The main concern of the new Member States is to bring the special carbon emission indicators down to the level of the best indicators in the Community. This means that the "top-down principle" cannot be applied, with the commitment prescribed at national level based on 8% lower than the 1990 level. Estonia will definitely not be up to this level during the first Kyoto commitment period from 2008 to 2012 either. Even in the worst-case scenario, which assumes that no measures will be taken to mitigate climate change, the total emissions in the country will still remain below the Kyoto commitment. Should the economic growth of Estonia continue at present high rate of 10.7 % (2006 in average), it definitely has to be borne in mind while updating the national climate change mitigation policy program.

Government is not committed to purchase the Kyoto units and this provision, foreseen with the Directive and appropriate guidelines Communication from the Commission COM (2005) 703 final from 22nd of December 2005, also amended by the Communication from the Commission COM (2006) 725 final from 29th of November 2006 (see also paragraph 1.2) will not be accommodated for the second emissions allowances trading period in 2008-2012. Estonia is far below of Kyoto target and thereis no evidence of extraordinary rapid growth of greenhouse gases emissions during next six years. As there is no need at present to purchase Kyoto units for reaching target, government has not established any operational programme or initiated carbon purchase tenders. There are, also no signed contracts to purchase the Kyoto units for the period 2008-2012.

The Directive and amending it the Linking Directive prescribed no restrictions for Estonia that would concern, for instance, the combustion of oil shale or peat which have a high coefficient of special carbon emissions, in the period that precedes the first Kyoto commitment period or within the second trading period.

4.2 Determination of quantity of allowances at activity level

Related to the situation, where country in whole is below Kyoto target, no limit has been set for total emissions at national level, no direct restrictions will be established for the activities prescribed by the Directive, i.e. energy production, mineral industry and other activities or sectors. In principle it means bottom-up approach would be wise to exploit. Installations are restricted only by ambient air pollution permits, which set restrictions in terms of manadtory reduction of greenhouse gas emissions.

The permits issued can be regularly renewed so that they can be adjusted to the predicted emissions.

The biggest share of emission allowances in the national allocation plan is taken by energy production activities. A number of EC directives are incorporated into Estonian legislation, which is followed by the sector. No sectoral target for GHG emissions limitation can be emphasized here.

The second biggest area of activities is the mineral industry, which includes only six installations. The situation in this sector is the same as in the aforementioned sector — the installations in the sector may release greenhouse gas emissions pursuant to the ambient air pollution permit, which is vital part of the comprehensive environmental permit issued by the local Environmental Protection Service.

The third area, known as "other activities", involves only two installations, one of which, a newly inaugurated pulp plant, has just (April 2006) started its operations following sharply the preliminary timeschedule fixed in NAP I. Otherwise it could be classified under the new entrants. Another installation is a paper mill. Like the energy production installations in the first sector, these installations have no sectoral restrictions on greenhouse gas emissions.

All in all the following summarizing table charaterizes sectoral allocation of allowances to three sectors under consideration both yearly and for 5-years period.

Table 9. National allocation plan. Part of NAP II specifying the amount of allowances allocated by sectors of activities.

Sector	Yearly average allocation	Total allocation for 2008-2012	Share in three sectors' total, %
1	2	3	4
I Energy activities	20 815 278	104 076 389	92.38
III Mineral industry	1 586 603	7 933 016	7.04
IV Other activities	131, 450	657,248	0.58
Total	**22 533 331**	**112 666 653**	**100.00**

Explanation to the Table 9.
Both columns 2 and 3 reflect total amount of allowances allocated to installations belonging to relevant sector of activity. Early action grants were accommodated and generated by Joint Implementation projects emission reduction units reduced from a number of installations in energy activities sector only. The rest two sectors mineral industry and other activities sectors' installations were not considered under those provisons. The amount of early action grant allocated yearly comprises 986 315 allowances. The yearly amount of Joint Implementation projects in first sector of NAP II includes 948 531 thousand allowances.

As it could be followed from column 3, the prevailing majority of allowances 92% have been allocated to one sector – energy activities. The second biggest is mineral industry, its' share comprises 7% only. The third sector is negligible small compared to others.

4.3 Determination of emission allowances at installation level

Like the situation described in the previous paragraph, the emission allowances at installation level set no definite restrictions. Individual development trends at each installation, justified both by market demand and introduction of new technologies, were taken into consideration in the preparation of the national allocation plan.

The integrated environmental permits issued for larger installations pursuant to the IPPC directive determine the greenhouse gas emissions, which are necessary for the operation of the installation under a full working load. No special restrictions are established for the installations participating in the Community scheme on the basis of the Directive. The only restriction at installations and activities level is that the emission allowances allocated to installations and the emissions of undertakings outside the Community scheme may not exceed the level set for the country with the Kyoto commitment. The 15 old Member States are in the opposite position: the prescribed emission allowances will be determined at sector level based on the national allocation plan while the allocation at installation level is carried out in proportion to the emissions up to that time. The country as a whole has the reduction obligation and the allocation will be proportional to the present emissions due to the implementation of certain preliminary defined principles.

The maximum permitted amount for the period 2008-2012, i.e. based on the Kyoto revised commitment, is approximately 39.581 million tonnes. This means that the emission allowances planned for every year of the five-year period in second allocation plan 24.375 million tonnes, which forms roughly 62% of the amount foreseen with Kyoto target.

4.3.1 Application of grandfathering approach

The allocation method of allowances to installations under Community trading scheme is based on historical emissions or so called *grandfathering* approach suggested by the Directive. It could be also named trend method as it is based on studying the past trends with the aim construct most probable projections for installations for next six or seven years. The installations involved in the national allocation plan of Estonia are classified, as mentioned above, into only three categories of activities or sectors:

- energy activities,
- mineral industry, and
- other activities.

As it is not possible to determine the emission allowances by uniform historical trend methods for all installations due to the nature of their production and market demand, the installations covered by the directive were classified by their base period into two

sub-groups; heat producers, and electricity producers and industrial enterprises generating heat or electricity for their basic production acitivity or as a by-product.

Inside energy production sector, it was necessary to distinguish between installations with similar production so that their emission allowances could be determined as precisely as possible for a certain in the past and based on that make assessment on their projections up to 2012.

Within the energy production sector, installations, which produce electricity, were differentiated from boiler plants. Base periods with different lengths and different years were applied to these two sub-groups in order to determine emission allowances to be allocated. Heat producers were given a relatively long, eleven-year retrospective period whereas electricity installations had a significantly shorter base period, going back over the last six years.

The years 1995-2005 were chosen as the base period for heat producers, i.e. boiler plants, as their production, the amount of heat, depends primarily on weather. Weather fluctuations, particularly in the ambient temperature, are very marked in Estonia. There are winters when the ambient temperature can drop to minus 30° Celsius. Such a cold spell can last for weeks. Heating sector is actually extremely vulnerable to average monthly temperature during the whole heating season, which in case of Estonia is usually from September to May. *The degree-days approach* has been used here similar to the one used for the first trading period allocation. This provision is foreseen by the Directive and it was considered appropriate also, by EC in 2004 when the Estonian NAP I has got approval by Commission. Some other EU Member States have been using similar in principle approach to construction of NAP.

In the mid-1990s, 1995 and 1996 were the coldest years of the entire decade. By choosing such a long base period the impact of weather has been taken into consideration as much as possible for determination of the emission allowances. In other words, the probable higher risk to operators of boiler plants due to weather turning colder in the near future was avoided as much as possible and the coldest weather of the past decade, with the directly resulting heat production and greenhouse gas emissions into the air from the installation, was considered as much as possible.

Installations for industrial production, including electricity, do not depend on weather to such a large extent although in very cold years electricity consumption is also higher due to extra electric heating of accommodation. The most typical indicators for electricity producers are still the production volumes and quality indicators of the previous years. This is why the base period for the installations producing electricity was chosen to be the last six years, from 2000 to 2005.

To sum up, the last six years, 2000-2005, were taken as the basis for some of the installations in the first sector (electricity producers), for all installations in the third and also for the fourth sector. The eleven years base period chosen for boiler plants was 1995-2005. Historical base years figures are presented in enclosed Excel sheet in Annex 4 to present report.

4.3.2 Reference value and its use

The allocation described above is designed to ensure equal treatment within the sector of installations participating in the Community scheme. The reference value is defined as the representative average value of three maximum emissions' per year taken as the basis for the trading period of the national allocation plan. The reference value is calculated by the same principle both for the longer and shorter base period. The three years with the biggest emissions of carbon dioxide are chosen from the abovementioned periods and their average value is calculated. This will be taken as the reference value for the emission allowance of the installation, which will be used as a basis for the calculation of emission allowances for each trading year. The reference values of installations covered by the national allocation plan are presented in Annex 4 to this report.

The reference value cannot be implemented in cases where the reference value is many times different from the actual emissions in the last two years, i.e. 2002 and 2003. This is the situation with big changes in the production volume of the installation, owing to the market situation, competition, replacement of technology or fuel, etc. Such situations are referred to in the guidance of the Directive, which advises an individual approach on such occasions. In both NAPs such cases have been analyzed.

The national allocation plan based the forecasts of carbon dioxide emissions growth on the calculations of predicted growth of production prepared by the installations themselves

There have been two sets of historical emissions used for the allocation for the period 2008-2012. First, eleven years period (1995-2005) for the heating sub-sector as heating sector heavily depends on the climatic conditions.

From the very content of the matter, the first year of trading, 2005 has been climatically very exceptional in Europe thus bringing with the very differential from forecasted climatic situation. Majority of EU MS experience the same situation. In Estonian NAP heating sector together with the electricity sector comprises absolute majority of allowances issued for the year 2005. This must be considered when evaluating the 2005 verified emissions. Also, referring to COM (2005) 703 final overview, in Estonia the share of installations covered by ETS is the biggest in EU.

For the electricity generation sub-sector much shorter period has been used, 2000-2005, as the sector is less vulnerable to average monthly temperature. Still, climatic conditions play an important role in electricity consumption, which should not be neglected in the future allocation process. Electricity is widely used for heating purposes in Estonia. Beside of that, the electricity sub-sector development has been very dynamic in particular during last few years.

For the industry sector the same shorter historic emissions period has been used. The industry emissions do not depend on climatic conditions and much shorter historic emissions period has been used in the assessment of future trends.

The general allocation approach has been the following. Out of the particular reference period the average of three maximum values years have been chosen and used as a reference value. However, it should be emphasized that there are a number of exceptions made, according to realistic assessment of the perfomance of an installation.

In heating sector the majority of years with maximum degree-days have been fixed in the second half of 1990-ies, i.e. the years 1995, 1996 and onwards. The climatic conditions play an important role in case of Nordic countries as the cold winter periods alter with 10-15 years cycles. So, one could expect the heavy winters again right during the Kyoto first commitment. This is the reason why one must be very careful not to underestimate the possible severe climatic conditions. This type of problem of course could be negligible small in many EU southern regions Member States, but it must not be neglected in case of northern European states.

Estonian Government similar to many other Member States' governments does not consider the opinion of Climate Committee of 31 May 2006 to take the 2005 verified emissions for the basis of second period allocation, well grounded. From the methodological point of view the value of one year can never be used for construction of the forecasts for the next years. This contradicts with every elementary principle of the basic of statistics. In particular case the trends for the next six years should be derived from much longer statistical period.

Beside of that said above, the EU new Member States have drastically different development paths compared to "old" MS, see Figure 7, which well describes the very dynamic development of whole economy and in particular the energy production sector under EU ETS, which contributes more than 90% of emissions.

4.3.3 Processing primary data on installations

For determination of the greenhouse gases emissions' projections required for the second trading period, the installations were obliged to use the methods prescribed in the Decree no 94 of 16th of July 2004 of Minister of Environment from 2004[13]. Excel spreadsheets built up based on its Annex 4 have been passed to all installations to be filled in. Thus, the drafters used the most updated information from operators, also the data of Estonian Board of Statistics. The GHG permits and permit applications, passed to Ministry of Environment were also, of good use to analyse the current and future situation of installations in regard of GHG emissions projections.

The basic formula for calculation carbon emission and carbon dioxide is given as follows.

[13] Method of calculating the CO_2 emissions into ambient air (in Est).
(https://www.riigiteataja.ee/ert/ert.jsp?link=print&id=783834)

Carbon dioxide emissions (M_{CO2} in Gg) into ambient air during the combustion of fuels of a certain type is calculated by the formula:

$$\mathbf{M_C = 10^{-3} * B^1 * g_C * K_C},$$

where:

B^1– fuel consumption, TJ;
g_C – special emission factor of carbon, tC/TJ
K_C – share of oxidized carbon or "oxidation factor".

$$\mathbf{M_{CO2} = M_C * 44/12,}$$

where
Mc – carbon emission, GgC

Table 8. Values of the carbon emission factors for various fuels (g_C, tC/TJ)

Type of Fuel	**Carbon emission factor g_C,. tC/TJ**
Solid fuels	
Anthracite	26.8
Coking oil	25.8
Boghead coal	26.2
Lignite	27.6
Peat	28.9
Estonian oil shale	27.85
Secondary products	
Coke	29.5
Biomass	
Solid biomass (wood)	29.9
Liquid fuels	
Crude oil	20.0
Liquid gas	17.2
Secondary fuels:	
Petrol	18.9
Jet fuels	19.5
Kerosene	19.6
Diesel fuel	20.2
Heavy fuel oil	21.1
Light fuel oil	17.2
Shale oil	21.1
Ethane	16.8
Bitumen	22.0
Lubricants	20.0
Petroleum coke	27.5
Refined oils	20.0
Other oils	20.0
Gaseous fuel:	
Natural gas	15.3

Source: Decree no 94 of the Minister of Environment from 16th of July 2004

Table 9. Oxidation factor values of different fuels, K_C

Share of oxidised carbon in combustion of fuels	K_C
Coal and oil shale	0.98
Oil and oil products	0.99
Natural gas	0.995
Peat in large combustion plants	0.99

All installations, in fact have calculated its' emissions based on the abovementioned approach. In addition, the installations having technological emissions, supplied drafters of NAP with the data on those emissions. According to EC Climate Committee Decision from 31-st of May 2006, the technological emissions were added to former emissions (burning of fuels), thus increasing the total number of allowances to be allocated to several installations in Energy activities, also in mineral industry sectors.

In some cases the internationally recognised calculation methods were also considered and compared with those enacted in Estonia. For example, in Mineral industry sector an installation AS Kunda Nordic Tsement greenhouse gases reporting formats are in good coherence with the HeidelbergCement Group consortium guidelines, based calculation methods worked out by WBCSD (World Business Council for Sustainable Development) Cement Working Group (CWG)[14] and used by HeidelbergCement Group GmBH and Considering the Estonian most recent legislation (RTL 2006, 85, 1546)[15], amending the former Decree no 94 of 2004, it gives special guidance in paragraph 11 on calculation of free lime (CaO) and MgO content in clincer, also clincer kiln dust leaving the kiln system. In fact, there is no difference between referred two methods, the one of WBCSD CWG just allows a more rational way of calculation and allows to give more detailed information. The Decree amends the guidance of calcination factor, what is calculated based on the CO_2 emissions for all installations in the mineral industry sector.

The figures and calculations on the emissions from installations participating in the Community scheme were subjected to a final check in the course of preparing the allocation plan. Also, the forecasts for the five years of the trading period, prepared by the operators, passed a double-check.

[14] WB SD CWG - World Business Council Sustainable Development Working Group Cement, http://www.ghgprotocol.org/index.htm

[15] 22.11.2006 Keskkonnaministri määrus 22.11.2006 nr 66 **(**RTL 2006, 85, 1546**)**.), jõustunud 08.12.2006. https://www.riigiteataja.ee/ert/ert.jsp?link=print&id=12757215

6. Technical issues. Criteria for determination of allowances

6.1 New entrants

Two types of reserves have been formed in the frame of NAP II; reserve for un-identified potential new entrants whis are unknow at this present moment, and so-called *Earmarked new entrants reserve*. The first comprises three per cent 3.4 million tonnes, i.e. 3% of the emission allowances of total of the the national allocation plan and it has been reserved for un-identified new entrants during 2008-2012. This has evaluated based on preliminary data on long term development plans of national economy and comprises roughly the well comaparable quantity with the reserve allocated for the first trading period, – 679 th tonnes annually during the five years period. The biggest demand may happen in the oil shale chemical processing (oil shale cracking sector), where a significant demand for new installations, producing domestic heavy fuel oil to replace the imported, has grown up. Joining the EU in May 2004 launched much faster development path in whole economy, see the explanations given in above.

Beside of that new woodchips and peat fuelled CHP installations, could be expected to launch during the coming 6 years as the co-generation efficiency of energy production is considered one of the priorities. One could also presume the number of natural gas fuelled CHP plants to be built to balance the electricity production of big number of wind farms (total capacity could reach approximately 500 MW) to be built in coming years. Majority of them are included in another Set-aside of Joint Implementation projects in ANNEX II Table in Annex 3 of the Report to NAP II. AS Eesti Energia, for example, is planning at present a new natural gas fuelled CHP as extension to Iru heat and power station supplying capital city Tallinn with heat. This will increase the capacity of this installation for more than 250 MW. Also, several greenfield industrial enterprises will very probably be founded in period 2008-2012. Considering abovementioned, the drafters of NAP expect to avoid completely random figure for this reserve.

The *Earmarked new entrants reserve,* comprising 5.8 million allowances for 2008-2012, has been formed for the installations missing some formal documentation or any single permit only. The latter being the main reason they are not included to the basic list of installations yet is they still missing some formal permits from e.g., the local county Environmental Protection Service or Health or Security Board, etc. However, all new installations in this reserve have performed greenhouse gases emissions calculations according to the Decree no 94 of the Minister of Environment from 16th of July 2004 and submitted the relevant spradsheets to NAP team. In opinion of drafters of NAP, these installations could be considered with more than 95% probability reliable installations for the next trading period as some of them even have started the construction, thus making first significant investments already. Thus, these installations are treated as new entrants in earmarked reserve to second emissions allowances trading period. This reserve is designated for abovementioned installations only.

This reserve comprises of allocations to two oil cracking installations in oil shale mining region in Ida-Virumaa county planning to produce oil out of local fuel, oil shale. Also, to new peat fuelled CHP plant in Tartu county. In all such cases the GHG emissions have been calculated following the abovementioned Decree no 94 from 16 th of July 2004 of the Minister of Environment. Both installations are currently in the process of testing the calculations, and approval by local environmental protection services.

To sum up both reserves, it makes altogether 9.2 million allowances. New entrants will be provided with the emission allowances free of charge, without bidding to stimulate the participation in Community trading scheme. *First come first served* principle will be applied to not yet identified, unknown so far, new entrants, who could apply to reserve of 679 thousand tonnes per annum

In NAP II no dedicated reserves have been created for specific technologies, activities or purposes in compliance with the requirements of paragraph 64 of the Guidance COM (2003) 830 final[16] on the directive. Should there be so many new entrants that the allocated reserve is not sufficient, the shift from on trading year to another is allowed, also, there will be a possibility forinstallations to buy insufficient amount of allowances on the market.

During Fall 2006 according to additional call performed by counties' environmental protection services, a number of additional new entrants to first trading scheme submitted their applications for the participation. They are treated as incumbients, so-called "forgotten installation" belonging to first trading scheme, however left out by mistake. In NAP II they are in the basic list of installations.

New entrants must have access to emission allowances according to Article 11(3) of the Directive. They have to be treated equally to existing installations that will enlarge their capacity. New entrants will not be discriminated against each other — on the contrary, the state wishes to encourage any new potential installations falling under the scope of the Directive and participating in the Community scheme. And once again - *First come first served* principle will be applied to new entrants. Pursuant to Art. 11(4) "…the competent authority shall issue a proportion of the total quantity of allowances each year of the five year period".

Should the state plan to sell emission allowances from new entrants reserve, no special decisions will have to be adopted for that.

An installation which has to renew its greenhouse gas emissions permit for the activities presented in the directive after the allocation plan has been presented to the European Commission either because its activity has changed or because the installation has been extended is defined as a new entrant in paragraph (h) of Article 3 of the Directive. In this case the classification as a new entrant applies only to renewal

[16] Communication from the Commission COM(2003) 830 final on guidance to assist Member States in the implementation of the criteria listed in Annex III to Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC, and on the circumstancies under which force majeure is demonstrated.

of the emission permit related to the extension of the installation and not to the whole installation.

In conclusion, it has to be remembered that, pursuant to paragraph 54 of the guidance COM (2003) 830 final from the 7th of January 2004[17], or the preparation of the allocation plan a new entrant is an installation which has not been issued a trading permit for greenhouse gas emission allowances or whose permit has not been updated. If drafters of the allocation plan have received reliable information to the effect that the operator has the relevant building permits or is applying for extension and really obtains all necessary permits, it can be allocated emission allowances in the same way as existing installations. A Member State may issue or update GHG emission permits with respect to installations, which will start or extend operations with considerable certainty during the relevant trading period." The described new entrants to first Community trading scheme correspond to this definition and provision.

New entrants will not receive more allowances compared what they will need to cover their projected emissions. The amount f allowances awarded will be allocated on yearly basis to avoid possible overallocation.

The reserve will be distributed evenly for each out of five trading years. Transfer of allowances from one to another year is possible, however the transfer the excess of allowances to post 2012 period is not allowed. In case the reserve will be exhausted, new entrants have to buy relevant allowances from market. In case not all allowances of the reserve will be used, the excess of allowances will be sold by the government.

Beside of the NAP II, also the JI projects Set-aside 0.95 Mt and the Another Set-aside of 9.2 Mt have been introduced in NAP II according to EC Decision double counting rules from 13 November 2006.

6.2 Early action

Estonia has accommodated early action as a provision described by the Directive 2003/87/EC. It enables Member States to take into account early action while allocating emission allowances to installations by an individual approach.

Early action can be defined as voluntary action taken by the operator for reducing greenhouse gas emissions which is not required by national or European Union legislation before the publication of the national allocation plan and its final submission to the European Commission.

A provision in paragraph 2.1.7 of the *Guidance to assist MS in the implementation of the criteria listed in Annex III to Directive* (COM (2003) 830 final) says the plan may accommodate early action and shall contain information on the manner in which early action is taken into account. Paragraph 2.1.7.1. says …"The accommodation of early action is considered as desirable from a fairness point of view. Those installations that have already reduced GHG emissions in the absence of or beyond

[17] Communication from the Commission COM(2003) 830 final on guidance to assist Member States in the implementation of the criteria listed in Annex III to Directive 2003/87/EC.

legal mandates should not be disadvantaged vis-a`-vis other installations that have not undertaken such efforts." And further on paragraph 2.1.7.2. says … "Early action is to be understood as action undertaken in covered installations to reduce covered emissions before the national allocation plan is published and notified to Commission." In line with criterion (4), only measures that operators undertook beyond requirements arising from Community legislation can qualify as early action. Thus early action is limited to reductions of covered emissions beyond reductions made pursuant to a Community or national legislation, or to actiuons undertaken in the absence of any such legislation.

In abovementioned *Guidance*… it gives an abundant description of the possibility to grant, to give a bonus to those installations having performed the climate change mitigation activities. Taking early action into account in the national allocation plan provides a basis for the fair recognition of installations, which have taken voluntary action compared to those, which have not taken any measure to decrease their emissions. This will result in determination of a relatively larger emission allowance in accordance with the emission reduction effect achieved as a result of early action.

The following forms of early action have been used in the preparation of the Estonian national allocation plan and can be applied to separate installations pursuant to the guidance for the allocation plan.

Firstly, the conversion of boiler plants from fossil fuels (e.g. imported heavy fuel oil or heavy shale oil, in general - mazut) to cleaner fossil fuels like natural gas or biomass - mechanical wood pulp, residuals of saw mills, waste from wood processing, etc. It has been agreed internationally under the UN FCCC that the carbon dioxide emissions from biomass will be counted as zero.

The early action approach was applied to boiler plants participating, in line with the requirements of the Directive, which voluntarily started to use natural gas or biomass instead of heavy fuel oil during the basic reference period, i.e. from 1995 to 2004.

Secondly, lower usage of fossil fuels for the production of electricity with the same level of consumption of the final product entailing raising the efficiency of electricity production, transmission and conversion stations accompanied by a reduction in emissions of greenhouse gases and of a range of other pollutants. In case the efficiency measures have been taken bby the operator without any pressure from the local or EU legislation before the preparation of the national allocation plan, these can be considered as early action. Otherwise the emissions of greenhouse gas and other pollutants would have continued and would have been accordingly larger.

The calculations of electricity production, transfer and conversion losses were applied only to the main electricity producers or to the combined heat and power installations. The savings in oil shale as the most polluting fossil fuel were based on the respective losses and this was proportional to the production of electricity converted to the reduction of carbon dioxide emissions in four power stations burning oil shale. The respective emission allowances were additionally summed up for all mentioned installations within the five trading years.

Thirdly, actions which enable or facilitate the introduction of best technologies and respective special emission coefficients in the provision of equivalent production. For combustion plants, e.g. boiler plants using heavy fuel oil only, this includes the replacement of heat production with combined heat and power production (or making its production, electricity and heat, available for consumption with the help of more efficient combustion technology). Combined production undoubtedly means more efficient use of fuel, i.e. higher coefficient of using the carbon available in the fuel as compared to producing enrgy in heat-only boiler plants.

Fourthly. Voluntary construction by the operator of technical and technological plants (e.g. building of pumping stations and pipelines for transporting the heat from a more efficient combined heat and power station fired by natural gas) to supply consumers with heat on the same scale as the former boiler plant burning residual fuel oil can also be classified as early action. The net result is a marked saving of greenhouse gas emissions, as the production of heat from heavy fuel oil has been replaced with far cleaner production of heat from natural gas, plus the introduction of values for special emission factors for combined heat and power production approaching the level of the best technology.

While applying the provision of early action to particular installations one would have to verify that the difference in emission levels over time was not due to installations having implemented legal requirements foreseen by EC or government. This test has been proceed for all installations in the course of allocation.

The emission figures for the historical base years 1995-2003 are part of the NAP I, approved by the Commission in October 2004. Based on the historical emissions the average annual value of the three years with the highest emissions during this period (known as the reference value) was taken as the basis and was compared to carbon dioxide emissions in the last year of the base period when either natural gas or mechanical wood pulp was already being used, see for more details in paragraph 4.3.2. The reference values for all installations are set out in the tables in Annex 4. The difference between the reference value and the emissions in the last year was additionally taken into consideration while allocating the allowances for all years of the trading period. In case big changes in installation's emissions happened during the reference period the solution has been reached by individual assessment of each installation under analysis. There have been a number of such cases.

Based on comprehensive assessment described above of the situation, the early action grant (bonus) has been calculated for eligible installations, who have submitted an appropriate application to the Ministry of Environment. The same values of grants used in NAP I have been granted to the same installations in NAP II to avoid unequal treatment pursuant the Directive. In addition the historical emissions' trends have been complemented with the data of 2004 and 2005 to be taken for the basis in case of new entrants to the 2005-2007 Community scheme. The same approach described above has been used.

The early action grant (bonus) $\mathbf{G}_{e.a}$. for a single year of the trading period is calculated as follows:

$$\mathbf{G}_{\text{e.a.}} = \mathbf{E}_{\text{avg. of ref. period}} - \mathbf{E}_{\text{last year of ref. period}},$$

where

E $_{\text{avg of ref. period}}$ - stands for the average of three maximum emissions' years in the relevant reference period;

E $_{\text{last year of ref. period}}$ – value of the last year emission of the relevant reference period when the results of voluntary activity in regards of reduction of emissions have been possible to be registered by official inventory.

The operators of installations were informed about the possibility of accommodating early action and they have submitted relevant applications during the preparation of allocation plan.

In general, Estonian NAP I and NAP II are designed following abovementioned guidelines. In NAP II the same values, which were calculated in NAP I to a number of energy production sector installations have been used to grant also during the second trading period. There are roughly 15 installations in heating sub-sector and 5 installations in electricity generation sub-sector, which have been granted with early action allowances. To perform the granting to the installations, who have reduced their GHG emissions thus elaborating to the GHG mitigation in reality, there was no need to reduce the number of allowances from any other installations in the NAP as Estonia is currently below the Kyoto target and has used the bottom up approach. This is just opposite to approaches old Member States are experiencing.

Share of accommodated early action in installations' total comprises 0,88% only, the yearly amount being roughly 1 million allowances.

6.3 Pooling between the installations

To make up the pools of installations has been under discussion in the Climate Commission. Pooling is essential in cases where the intensity of activities is continuously redistributed between a number of installations. Such a situation may arise when, for example, the installations that supply a town belong to different operators and the heating load is regulated between the heat suppliers under certain, preliminary prescribed and agreed optimisation criteria. The amount of heat worked out supplied by the installations as a result of such regulation may significantly change the actual emissions of greenhouse gases of the boiler plants included to pool. It is difficult or even impossible to predict the greenhouse gas emissions into the air from one installation or another in the pool under such conditions as the heating load of each individual installation in each specific case depends on the prescribed restrictions or regulation conditions. Beside, heat production is heavily dependent on weather conditions. The amount of heat supplied to consumers could be the same in the end, yet the carbon dioxide emissions into the air by individual installations could vary as the heat is produced by means of different technology or equipment and based on different fuels available.

The opinion of the Climate Commission on this issue is that installation pooling in the way described in paragraph 28 of the Directive in order to tackle the competition issue

properly is not necessary for the allocation plan as no application was submitted for pooling during preparation of the national allocation plan in 2006.

6.4 Closer rules

The mentioned cases when the installation closes are in general terms described in the Governmental order no 8 (RTI, 20.01.2005, 4, 14) from the 8th of January 2005. *Käitajate tegevusalade loetelu ja kasvuhoonegaaside lubatud heitkogustega kauplemise kord* (in English - *The list of operators activities and the order of trading with greenhouse gases allowances*)[18]. Paragraph 10 enacts the procedures needed for operator to be followed to exit the Community sheme The detailed rules considering possible specific cases should be further elaborated and introduced to abovementioned order in a way of proposed amendments to order in near future. In the first NAP there has been only several cases yet and the solutions have been worked out pursuant to the Directive.

6.5 Rules of banking

The rules on banking into the third trading period (2013 onward) are pursuant to Article 13(3) of the Emissions Trading Directive 2003/87/EC.

6.6 Public consultation of national allocation plan

The Ministry of the Environment and the Climate and Ozone Bureau in the Information Centre have kept the wider public informed on the preparation of Estonian second national allocation plan. It published a press release about the work started on NAP II on the 8th of March 2006, which thereafter appeared in major newspaper portals of country.

Responsible work NAP II preparation SEI-Tallinn published several articles on the essence, principles and process of compiling NAP II in the republican Journal of "*Environmental Technology*" no (2) and (3), widely spread in various spheres of entrepreneurs and general public. NAP II team also posted e-letters to all probable JI project developers with the information package on possibilities to be included to NAP II in 2008-2012. The e-letters, also contained the request to regist itself for JI database, and the inventory Excel spreadsheet to be filled in. A number of interviews made with the NAP II team in SEI-T was published in central newspapers as well in a number of radio and TV channels.

The draft second national allocation plan of the allowances for greenhouse gas emissions of all eligible under the Directive for the years 2008-2012 for individual installations pursuant to the Public Information Act and Administrative Procedure Act was published by Ministry of the Environment and the Climate and Ozone Bureau

[18] ibid.

publication on the 12th of June 2006. A public notice was published in the newspapers and a press release about the publication of the allocation plan appeared in major newspaper portals.

The public asked questions on the details and methodology of the allocation plan and make remarks, comments and proposals to the Ministry of the Environment and NAP II team. The questions and proposals were received both via e-mail and by telephone from the moment the allocation plan was unveiled. All remarks and proposals were discussed in the Climate Commission and were taken into account as much as possible in amending the allocation plan before submitting it to the government.

The Ministry of the Environment organised an open discussion on 15th of June 2006 for all parties interested in the principles and technical details of the national allocation plan. Quite a modest number of participants took part in public introduction of NAP II in the premises of the MoEnvironment. The questions and remarks on allocation were in majority made towards the participants own installation issues. Ther have been also represented the JI project developers who were interested in the implementation of forthcoming guidelines on avoiding double counting.

As a result all questions were answered by NAP team members and some remarks and comments have taken into consideation before presenting NAP II to the Government.

The NAP II explanatory text and the detailed numerical allocation plan was available to the public on the homepage of the Ministry of the Environment and the SEI-Tallinn for two weeks up to the final adoption of Estonian proposal on the 30th of June 2006.

ANNEXES

Annex 1 List of installations participating in the Community scheme with yearly and total for the period of 2008-2012 allocation of their greenhouse gas emission allowances.

Annex 2 NAP Summary Tables.

Annex 3. ANNEX I and ANNEX II Tables on Joint Implementation projects.

Annex 4. Historical emissions and reference values of the installations covered by the Directive.