



Impact on activity and employment of climate change and greenhouse gas mitigation policies in the enlarged Europe

Final Country Report - Slovenia

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Report prepared by:
Carolin Schäfer-Sparenberg

With support from:

Wolfgang Irrek
Lutz Jarczyński
Dagmar Koths
Frederic Rudolph

Wuppertal Institut für Klima, Umwelt, Energie GmbH
im Wissenschaftszentrum Nordrhein-Westfalen
Döppersberg 19, 42103 Wuppertal, Germany
www.wupperinst.org

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Summary

This country report by the Wuppertal Institute is part of the broader study "Impact on the activity and employment of climate change and greenhouse gas mitigation policies in the enlarged EU" (No 07-0402/2005/420169/SUB/C2), co-ordinated by the European Trade Union Confederation / Social Development Agency on behalf of the European Commission (DG ENV). It summarises the opinions and expectations of 16 interviewed stakeholders, existing scientific studies, official reports and further sources (internet, literature, company reports and statistics) as well as own analysis by the Wuppertal Institute with regard to the question in how far climate mitigation policies affect employment in Slovenia.

In October 2006, the Ministry of the Environment and Spatial Planning prepared a new Action Programme to Reduce Greenhouse Gas Emissions and the national allocation plan (NAP) (2008-2012) was also published in October 2006. So far, both documents are only available in Slovenian. Due to the shortness of time since publication, it was not possible to take the new action programme and the new NAP fully into account.

The Kyoto target for Slovenia demands a reduction of 8 % of total greenhouse gas (GHG) emissions referring to the base year of 1986 emissions. However, according to the latest common reporting format from 2006, the CO₂ emissions have increased by 2.9 % in comparison to the base year and it has to be doubted that Slovenia can fulfil its Kyoto target without taking sinks into account. Projections or scenarios for the development of emissions and emission reduction policies and measures for the time beyond 2012 do not exist.

Impacts of climate change mitigation measures on employment are no topic in Slovenia so far. Studies evaluating such impacts have not yet been carried out. Moreover, the interviews have shown that there is still a lack of knowledge referring to climate change, suitable mitigation measures and other environmental problems. Contrary to statements of the interviewees that comprehensive knowledge on climate change, GHG emissions problems etc. exists in Slovenia, there have been several indications during the interviews that knowledge of some representatives on causalities between causes and effects of GHG emissions are still missing.

Globalisation, rationalisation and automation of production processes have a strongly higher impact on Slovenia's economy and employment than policies and measures in the framework of climate change. Thus, structural changes in Slovenia do not result from climate change mitigation measures or only to a very small extent.

Stakeholders interviewed do not expect any negative net impact of mitigation policies and measures on economic activity and employment. However, there is some fear that EU emission trading scheme (EU ETS) might additionally affect the security of jobs in energy-intensive industry, while the jobs would be already insecure because of general structural changes, liberalisation and globalisation. Furthermore, most of the representatives criticize the distribution of burdens to reduce GHG emissions as uneven and unfair as only the energy and industry sector is part of the EU ETS. Stakeholders men-

tioned that there were no more or only small energy efficiency potentials left in the energy-intensive industry because strong efforts had been made in the past to reduce CO₂ emissions. However, much has to be done on the demand side in households and the building sector, which required skilled and trained workers. Furthermore, in Slovenia's transport sector, with its outstandingly increase of emissions, policies and measures would have to be taken in order to reduce CO₂ emissions. Positive employment effects might arise from expected increased use of biomass and other renewables, and strengthening of energy efficiency in the building sector.

All of the interviewees agreed on the fact that, on the one hand, more and more highly educated employees would be needed and that, on the other hand, the number of jobs for less educated people would decrease. However, also this development would not be caused by mitigation policies and measures.

1 Introduction and overview

The general aim of this country report is to summarise

- the opinions and expectations of 16 stakeholders in politics, ministries and other public administrations, employers organisations, trade unions, selected industry companies as well as in NGO and research institutes, collected by the Wuppertal Institute within face-to-face or telephone interviews, or in writing, and
- published results from scientific studies, official reports and further sources (internet, literature, company reports)

with regard to the question in how far climate mitigation policies affect employment in Slovenia.

The Wuppertal Institute would like to thank all the interviewees who provided data and information to this study, or presented their views on this central topic.

Based on investigations on the internet, relevant institutions and suitable interviewees were identified. Due to language barriers, the search was more difficult. To avoid these language barriers an interpreter helped to establish the first contact to some institutions. In addition to the search on the internet and the support from the interpreter, some institutions or persons were recommended by the interviewees themselves and by some Slovenian colleagues the Wuppertal Institute had already worked with in the framework of other research projects.

In total, 62 institutions, which had been identified for an interview, were contacted by mail and/or by phone. All of them were given some general information about the project and were asked for support. In 46 cases, no interview could be conducted due to different reasons (s. table 14).

Eventually, 16 stakeholder interviews were carried out in Slovenia (s. table 15). Experts from public authorities, trade unions, employers' organisations, environmental non-governmental organisations, research institutes and companies were asked for their assessments with regard to impacts of climate change mitigation measures on employment.

In addition to the interviews, annual reports, environmental reports and information on the internet of the institutions interviewed were analysed as well as official documents (e.g. National Allocation Plan, National Inventory Report, National Communications) were considered for the following country report (see References).

In chapter 2, the report focuses on the development of CO₂ emissions in Slovenia in general and by sector and describes two national emission projections for Slovenia.

In order to achieve the national emission reduction targets, policies and measures have been developed which are presented in chapter 3. Besides giving an overview about implemented and planned measures according to the Action Plan of Reduction Greenhouse Gas Emissions, the strategies and positions of stakeholders in different sectors are presented.

Chapter 4 deals with the impact of mitigation policies and measures on employment.

Measures to help transition for workers in the losing sectors and measures to support growth of winning sectors are topic in chapter 5.

Finally, the main conclusions with regard to the question in how far climate mitigation policies affect employment in Slovenia are presented in the last chapter 6.

2 CO₂ emissions and emission reduction targets

2.1 Emission reduction targets

Slovenia became an independent state on 25 June 1991 following the break-up of the former Socialist Federal Republic of Yugoslavia and has ratified the Kyoto Protocol in 2002 before entering the European Union. By ratifying the Kyoto Protocol, Slovenia has committed to an average reduction of greenhouse gas (GHG) emissions by 8 % below 1986 levels (Ministry of Environment, Spatial Planning and Energy 2004b: 3). According to the UNFCCC, base year emissions were 20.220 Mt CO₂ equivalents (CO₂ eq) (http://unfccc.int/ghg_emissions_data/predefined_queries/items/3841.php, 15. Nov 2006) so that the emissions in 2008-2012 have to be reduced to 18.602 Mt of CO₂ eq. In October 2006, the Ministry of the Environment and Spatial Planning prepared a new Action Programme to Reduce Greenhouse Gas Emissions. So far, the new action programme is only available in Slovenian, but according to information given by the Ministry, new base year emissions were presented according to the final submission of the emissions inventory in July 2006 and these new base year emissions are 20.203 Mt CO₂ eq. Thus, the new emission target for Slovenia is 18.587 Mt CO₂ eq in 2008-2012 (Ministry of the Environment and Spatial Planning 2006b).¹ Whereas specific emission reduction targets by sector were missing in the past, the following sectoral targets have been defined for the period 2008-2012 in the new action programme (Ministry of the Environment and Spatial Planning 2006b):

- Energy sector: 6.095 Mt CO₂ eq
- Industry and construction sector: 2.372 Mt CO₂ eq
- Transport sector: 4.400 Mt CO₂ eq
- Other sectors: 2.778 Mt CO₂ eq
- Industrial processes: 1.063 Mt CO₂ eq
- Agriculture: 2.172 Mt CO₂ eq
- Waste: 0.707 Mt CO₂ eq

The difference between the total emissions of CO₂ eq projected and the Kyoto target is about one Mt CO₂ eq. According to the Ministry of Environment and Spatial Planning, sinks should achieve reductions of these emissions.

Due to the fact that the new action programme was published in October 2006 and only in Slovenian, it was not possible to take the revised action programme fully into account for this report. Representatives of the Ministry of the Environment and Spatial

¹ These data was taken from the Slovenian National Allocation Plan for 2005-2007. However, in other official documents, the data slightly differs; e.g. according to the National Inventory Report 2005 and the Fourth National Communication, base year emissions were 20.2 Mt CO eq and so GHG emissions in 2012 must not exceed 18.6 Mt CO eq (Environmental agency of the Republic of Slovenia 2005; Ministry of the Environment and Spatial Planning 2006a).

Planning were so kind to provide us a brief English summary of the main changes between the new action programme and the one from 2003. Wherever it was possible, the information about the new action programme was considered. However, it has to be kept in mind that the interviews were carried out before the new action programme was published. Thus, the representatives interviewed could not take into account that there are for instance sectoral targets for the transport sector.

This report focuses on CO₂ emissions. As in many official documents and publication, the development of GHG emissions in total – mostly quoted in CO₂ equivalents – are described, it is not possible to concentrate all information on CO₂.

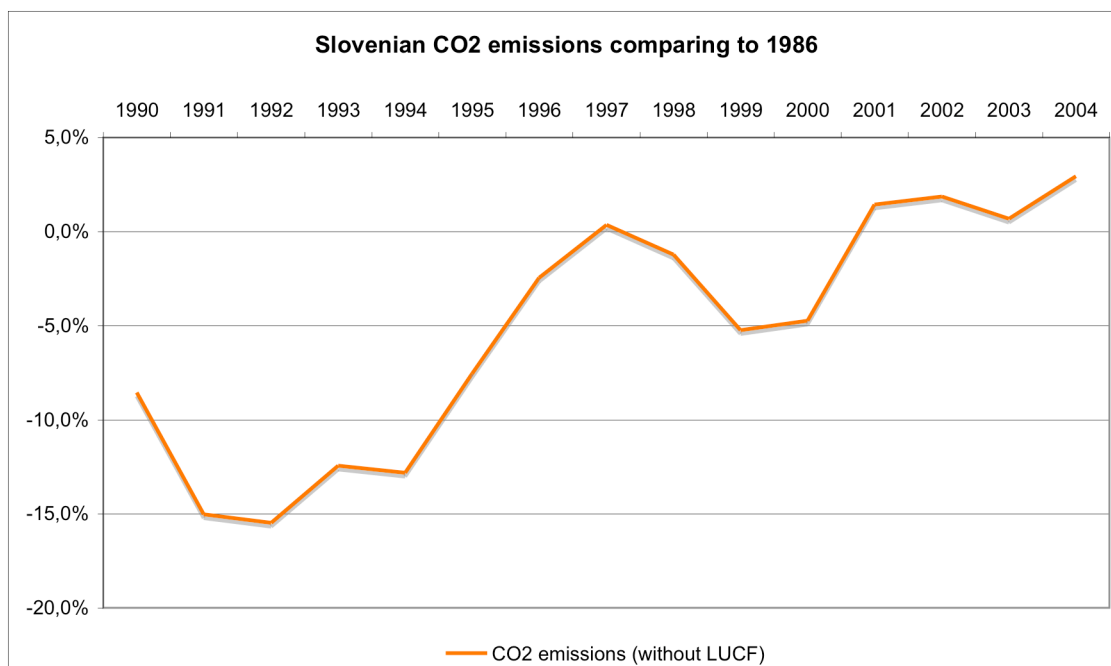
2.2 Overall development of CO₂ emissions

In 2003, total GHG emissions accounted for 19.80 Mt CO₂ eq that means that emissions have been only reduced by 1.9 % below base year 1986 (Environmental Agency of the Republic of Slovenia 2005: 7). Most of the CO₂ eq are in fact CO₂ emissions (81.3 %), followed by CH₄ (10 %) and N₂O (7.6 %). Only a small amount of the GHG emissions go back to F-gases (1.1 %) (Ministry of the Environment, Spatial Planning and Energy 2004a: 10).

As a result of economy restructuring and independence process, the lowest CO₂ emission level was reached in 1992 (up to 15.5 % below 1986). However, the emissions strongly increased during the following years due to revival of industrial production and because of “gasoline tourism” as the prices for motor fuels were appreciably lower in Slovenia than in the neighbouring countries so that the first peak was reached in 1997 (0.4 % more than in 1986). Then came a short period of emission reduction as a consequence of the reduction of gasoline tourism and decreased consumption of fossil fuels for the production of electrical energy (Environmental Agency of the Republic of Slovenia 2005: 26). A second peak in 2002 went back to lower electricity production from hydro power plants, replaced by increased thermal power plants electricity production (Ministry of the Environment, Spatial Planning and Energy 2004a: 10). In 2002, the CO₂ emission increased by about 2 % more than in the 1986 base year. However, in 2003 the emissions slightly decreased, which was mainly due to lower emission from energy industries. In that entire period, the strongest increase of CO₂ emissions was caused by the transport sector, which nearly doubled its emission (1.97 Mt CO₂ in 1986 and 3.94 Mt CO₂ in 2003) (Environmental Agency of the Republic of Slovenia 2005: 26). This increase does not only result from gasoline tourism, but from an increase of transit traffic and transportation of goods as a consequence of permanent economic growth and from a changed modal split. Due to worsening of public transport, the share of motorised individualised transport has grown continuously.

According to the latest common reporting format from 2006, the CO₂ emissions have amounted to 16.464 Mt in 2004 and so have increased by 2.9 % in comparison to base year 1986 (http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/3734.php, http://eionet-si.arso.gov.si/Dokumenti/GIS/zrak/index_en_html).

Figure 1: Slovenian CO₂ emissions comparing to 1986



Own compilation; data: 1990-2003: Environmental Agency of the Republic of Slovenia 2005: 8; 2004: http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/3734.php

With the figures shown in table 1 Slovenia's CO₂ emissions per capita are continuously rising, however, in comparison to Germany or the Czech Republic it is still relatively low.

Table 1: Overview of CO₂ emissions per capita in some chosen EU countries

CO ₂ / Per Capita	Czech Republic	Germany	Hungary	Slovenia
1990	14.84	12.18	6.81	6.26
1995	11.72	10.71	5.71	6.55
2000	11.50	10.15	5.44	7.26
2003	11.47	10.35	5.70	7.64

Source: IEA 2005a

2.3 Development of CO₂ emissions by sector

2.3.1 Overview

Due to economic growth, the final energy demand is continuously rising. The industrial energy demand has fallen (from 1990 to 1999 by 27.4 %) whereas the energy use in transport (+ 42.1 %) and in other use (households, public sector, service sector, agriculture) (+ 46.1 %) has been increased (Ministry of the Environment, Spatial Planning and Energy 2003: 89).

The following table gives in overview about the GHG emission development in Slovenia by sector.

Table 2: Relative development of GHG emissions by sector in comparison to 1986

	1986	1990	1995	2000	2001	2002	2003
Energy	0,0%	-9,6%	-7,1%	-4,3%	1,6%	2,4%	0,8%
Industrial processes	0,0%	0,2%	-12,6%	-22,1%	-18,2%	-17,1%	-10,9%
Solvent and other product use	0,0%	-36,7%	-62,5%	-38,3%	-43,0%	-43,0%	-45,3%
Agriculture	0,0%	-4,7%	-10,4%	-11,6%	-14,2%	-13,4%	-16,9%
Land-use change and forestry	0,0%	47,1%	92,4%	88,5%	88,5%	88,5%	88,5%
Waste	0,0%	5,4%	1,0%	11,8%	12,3%	12,7%	12,1%

Own compilation; data: Environmental Agency of the Republic of Slovenia 2005: 28

Focusing on CO₂ emissions, table 3 gives an overview about the sources of CO₂ emission in Slovenia in 2004. The largest fraction in CO₂ emissions among the sectors belongs to the energy sector (94.0 %), industrial processes account for 5.8 % of total CO₂ emissions, and solvent and other product use for 0.2 % (http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/3734.php).

Table 3: Sources of CO₂ emissions in Slovenia in 2004

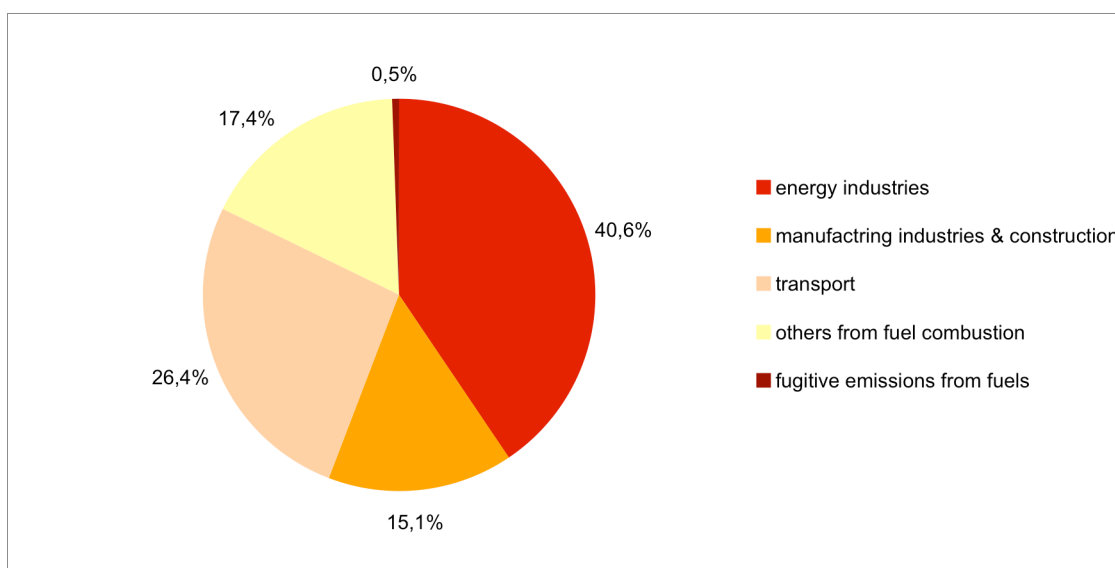
CO2 emission source	absolut in Mt	relativ in %
A. energy	15472,44	93,98%
energy industries	6287,28	38,19%
manufacturing industries & construction	2335,48	14,19%
<i>thereof steel industries</i>	297,06	1,80%
transport	4092,35	24,86%
others from fuel combustion	2684,58	16,31%
fugitive emissions from fuels	72,752	0,44%
B. industrial processes	953,83	5,79%
mineral products	591,01	3,59%
<i>thereof cement products</i>	485,58	2,95%
chemical industry	67,76	0,41%
metal production	295,06	1,79%
<i>thereof steel production</i>	29,77	0,18%
<i>thereof aluminium production</i>	210,56	1,28%
others	0	0,00%
C. solvent and other product use	38,03	0,23%
D. agriculture	0	0,00%
TOTAL	16464,29	100,00%

Own compilation; data:
http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/3734.php

2.3.2 Energy / Fuel combustion

The most important emission source in energy sector is fuel combustion sub-sector, which is split further in energy industries, manufacturing industries and construction, transport, other sectors (see Figure 2 below).

Figure 2: CO₂ emissions within the energy sector



Own compilation; data: http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/3734.php

2.3.3 Industrial processes

The most important industrial sectors in Slovenia are production of metals and metal products, production of non-metal mineral products, food and beverage production and fibres and pulp production. (Ministry of Environment, Spatial Planning and Energy 2004a: 8). CO₂ emissions arise on the one hand by fuel combustion and on the other hand by industrial processes during the metal production.

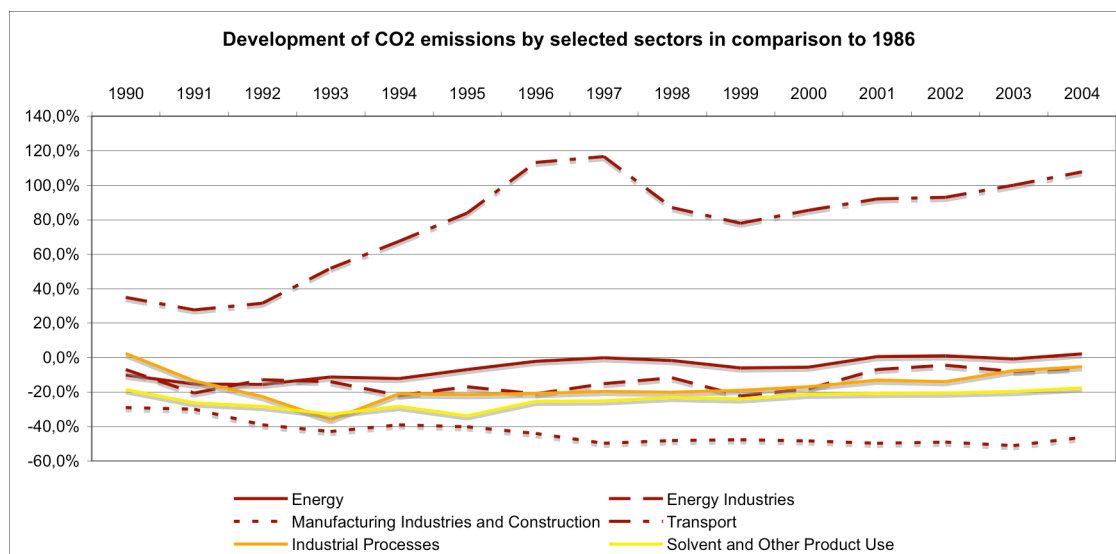
Most of the CO₂ emissions by industrial processes of mineral products arised from the cement industry (486 Mt of 591 Mt in total). In Slovenia, there is one aluminium producer. According to the National Inventory Report, the production of aluminium has undergone numerous modernisations, resulting in reduced GHG emissions in spite of increased production since the base year (Environmental Agency of the Republic of Slovenia 2005: 11). Nevertheless, the production of aluminium caused 71,4 % of all CO₂ emission (211 Mt) within the metal production sector. The iron and steel industry were responsible for about 327 Mt CO₂ emissions, mainly caused by fuel combustion (297 Mt) and partly caused by industrial processes during the metal production (30 Mt).

2.3.4 Transport

Referring to the report "Environment in Slovenia" by the Ministry of the Environment, Spatial Planning and Energy, transport consumes a third of all primary energy and is one of the biggest consumers of non-renewable energy sources (2003: 27). The majority of CO₂ emissions from transport are due to road transport, which accounts for 99 % of all CO₂ emissions in the transport sector in 2004 and so just under a quarter of all CO₂ emissions (http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/3734.php).

The level of motorization is quite high in Slovenia and still increasing due to a changing structure of transport: The share of road traffic is continuously growing. The number of registered cars, which has increased by 50 % (1990-2001), illustrates this trend (Ministry of the Environment, Spatial Planning and Energy 2004a: 8). On the other hand, it has to be noted that there is a decrease in public passenger transport, especially notable in public road passenger transport, while a positive trend is noted in the railway passenger transport of the last years.

Even if the rising proportion of diesel cars (so far 19% in Slovenia, but 36 % in EU average) contributes to a reduction of GHG emissions, as they are more energy efficient than petrol-driven cars (Burja 2003: 33-34), it has to be pointed out that diesel-driven cars without particulate traps emit more particulate matters than petrol-driven ones. Thus, the rising proportion of diesel cars can result in worsening of air quality. Figure 3 shows that the strongest increase of CO₂ emissions was caused by the transport sector whereas the manufacturing industries and construction sector has continuously decreased its emissions.

Figure 3: Development of CO₂ emissions by selected sectors in comparison to 1986

Own

compilation;

data:

http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/3734.php

2.3.5 Building sector

There is no specific information about the development of CO₂ emissions by the building sector available and the building sector is neither mentioned in the National Allocation Plan nor in the National Inventory Report.

2.4 Ex-ante projections (national scenarios)

Slovenia was the only one of the ten new European Member states to meet the deadline for submitting a final draft national allocation plan (2005-2007) for the European Union's emission trading scheme to the European Commission. As the national allocation plan for 2008-2012 was published in October 2006 and is only available in Slovenian so far, it was not possible to take it into account. Thus, the following ex-ante projections refer to the first national allocation plan (2005-2007).

The Ministry of Environment, Spatial Planning and Energy has determined that 26,329,969 tonnes of CO₂ will be allocated to Emission Trading (EU ETS) for the First Trading Period from 2005 to 2007. Total GHG emissions in the period 2005-2007 are projected to be 47.238 Mt of CO₂ eq.; thus allowances allocated to the installations covered by the EU ETS represent approximately 56 % of projected total national emissions in that period in Slovenia (Ministry of Environment, Spatial Planning and Energy 2004b: 7). There will be 98 Slovenian EU ETS participants in total. Allocations will be made in two-stage approach that allocates allowances at two sectors: power generation and industry. (Ministry of Environment, Spatial Planning and Energy 2004b: 5). Allocations to the power sector will be based on forecast emissions, while those to in-

dustry will be based on a mixture of grandfathering (based on past emissions) and best available technology benchmarking (Ministry of Environment, Spatial Planning and Energy 2004b: 5).

In order to fulfil the Kyoto targets and reduce the GHG emissions, the Slovenian Government has adopted the Action Programme to Reduce Greenhouse Gas Emissions in August 2003. The most important sectors for reducing the emissions are energy, industry, waste management, while the most problematic transport sector is left out² (Ministry of the Environment, Spatial Planning and Energy 2003: 63).

Even if the Slovenian Government takes the view that the Kyoto targets will be fulfilled (compare Slovenian National Inventory Report, interview with Ministry of the Environment and Spatial Planning); the Slovenian environmental NGO community does not share the optimistic view. They seriously doubt the quality of the Operational Plan for GHG emissions reductions and the possibility of implementing it (Focus/Umanotera 2004: 1). The UNEP GRIDA forecasts a rise in GHG emissions in Slovenia (over 21.5 Mt CO₂ eq) and therefore expects problems according to the fulfilment of the Kyoto targets (only 18.95 Mt CO₂ eq).

The representative of an employers' organisation also doubted that the Kyoto targets could be fulfilled because Slovenia had still a strong industrial sector and most of the energy was produced by large thermal energy plants (coal), which emitted high CO₂ emission. As the service sector was not well developed so far, Slovenia would depend on industry.

There are two emissions projections for Slovenia, which have been developed when the National Energy Programme was prepared in 2000 and which have been modified continuously.

Both scenarios are based on moderate economic growth (3.6 % annual growth in GDP in 2000 to 2010, 2.2 % annual growth in GDP in 2010 to 2020), a slightly decrease of population (0.1 % per year) and a fuel price development according to international studies. The scenario "with existing measures" assumes a continuation of current policies, which are characterised by a low level of measure implementation; whereas the second scenario also includes additional measures (Ministry of the Environment and Spatial Planning 2006a: 82).

² As mentioned before, the new action programme from October 2006 includes an emission target for the transport sector and contains measures for the reduction of CO₂ emissions.

Table 4 shows the projection results by year and scenario for GHG emissions in total and CO₂ emissions in particular.

Table 4: Projection of GHG and CO₂ emissions for 2005, 2010, 2015 and 2020

Sector/Year	Projection of GHG emissions "with existing measures" in CO ₂ eq. Mt				Projection of GHG emissions "with additional measures" in CO ₂ eq. Mt			
	2005	2010	2015	2020	2005	2010	2015	2020
Energy	7033	6478	6485	5398	7010	6168	6346	5339
Transport	4174	4571	4837	4866	4176	4271	4523	4553
Industry	3559	3821	3796	3938	3464	3523	3501	3571
Use of Fuel Power Processes	2289	2443	2402	2447	2285	2419	2376	2421
Other Sectors	1270	1378	1394	1492	1179	1104	1124	1150
Solvent	3305	3433	3517	3560	3180	3183	3132	3046
Agriculture	39	35	35	35	39	35	35	35
Waste	2141	2199	2183	2181	2141	2149	2133	2131
TOTAL	20966	21192	21404	20446	20725	19901	20063	18946
comparison to base year 1986	1,8%	2,9%	3,9%	-0,8%	0,6%	-3,4%	-2,6%	-8,0%
Sector/Year	Projection of CO ₂ emissions "with existing measures" in Mt				Projection of CO ₂ emissions "with additional measures" in Mt			
	2005	2010	2015	2020	2005	2010	2015	2020
Energy	6646	6127	6174	5096	6623	5816	6043	5036
Transport	3987	4367	4624	4654	3989	4079	4322	4354
Industry	3241	3380	3377	3460	3219	3333	3323	3398
Use of Fuel Power Processes	2283	2437	2396	2441	2261	2390	2342	2379
Other Sectors	958	943	981	1019	958	943	981	1019
Solvents	3178	3315	3402	3448	3054	3051	2996	2906
TOTAL	17074	17205	17593	16674	16907	16295	16700	15710
comparison to base year 1986	6,7%	7,6%	10,0%	4,2%	5,7%	1,9%	4,4%	-1,8%

Own compilation; data: Ministry of the Environment and Spatial Planning 2006a: 147-149

In contrast to the estimation of the Slovenian Government in 2005 (compare National Inventory Report, Environmental Agency of the Republic of Slovenia 2005), it does not seem that Slovenia will fulfil the Kyoto targets. In 2006, the Ministry of the Environment and Spatial Planning published the 4th Communication and the projections show that a reduction of 8 % will be achieved in 2020 at the earliest if additional measures are implemented.

The representative of the Ministry of the Environment and Spatial Planning pointed out that Slovenia would easily achieve the Kyoto targets because about 70 % of the emission reductions needed could be achieved by Slovenia's forests. To sum up, it draws attention to the fact that Slovenia can only fulfil its emission reduction targets by taking sinks into account.

3 Mitigation scenarios, strategies, policies and measures

3.1 Attitude of stakeholders to mitigation scenarios

Independent from the scenarios of the National Communication, interviewees were asked what kind of scenario would match best for their institution's opinion or attitude. They could choose between three alternative scenarios for the development of Europe's energy and emissions until 2020/2030:

Table 5: Short description of three different scenarios for the development of Europe's energy and emissions until 2020/2030

BAU/PRIMES-Scenario (Business As Usual)	Continuation of the current policy including with its policies and measures; no focus on an active climate or energy policy, the European emission targets are not reached.
Policies & measures-scenario	Active climate policy: first priority are energy efficiency/energy saving measures; an enforced emissions trading system, a better market penetration of renewable and combined heat and power-technologies; completion of the exit from nuclear energy that was begun in some countries; no new nuclear power plants; special focus on the transport sector; a Europe-wide eco-tax and a reform of the subsidies policy.
LCEP-Nuclear-Scenario	The climate protection targets can only be reached through substantial reduction of GHG outside of Europe; within Europe, energy efficiency is given first priority; a further change of the fuel-mix is only relevant on a long-term basis; intensification of emissions trading; 40-50 new nuclear power plants and re-evaluation of the nuclear-exit strategies already decided upon; fixed target quota for renewable energy; reform of the current subsidies policy; enforced promotion of research & development; increased awareness for ecological issues.

Referring to the energy and emission scenarios, there were different opinions, which would be the most realistic, and which was the one preferred. In some experts' view the business-as-usual scenario was currently the most realistic, because even if there were some climate policies in Slovenia at the moment, it had definitely not been done enough (Jozef Stefan Institute). While representatives of environmental NGOs (Focus) and of research institutes (Jozef Stefan Institute) supported the second scenario, most of the experts interviewed preferred at least a mixture of scenario 2 and scenario 3.

Table 6: Overview of Scenario Preferences

	BAU-Scenario	WWF/WI-Scenario	Nuclear Scenario	Mixture of WWF/WI-Scenario and Nuclear Scenario	No (clear, unambiguous) answer
Public Authorities				X	X
Trade Unions			XX		
Employers' Organizations	O	X			
Environmental NGOs/Research	O	XX			
Power					X
Iron and Steel			X		
Building industry			X		
Electric equipment			X		
Oil, gas		X			
O = current situation, X = scenario preference for the future					

Source: interviews carried out by the authors

A representative of Slovenia's Council for Environmental Protection explained that the transition to renewable energies was important, but nuclear energy would be needed under the current pressure of time to mitigate climate change. Energy efficiency and energy saving measures should be supported, but they could not replace the energy demand, which was currently covered by fossil energy. He summarized that the future energy mix would consist of renewable energies, nuclear energy and fossil energy (with CO₂ storage in the underground) and it was of great importance that electricity was available at low costs. One representative of a trade union supported the third scenario due to the following reasons: So far about one third of the electricity demand was missing and could not be covered by renewable sources. The extension of hydroelectric power plants and thermal power plants would not be possible from his point of view so that nuclear power would be the only solution. From the trade unions' perspective it was decisive that enough energy was available at low costs without depending on energy imports. The energetic advisor of a steel company (Acroni) summed it up very clearly that clever people could only support scenario 3 and nuclear energy would be an important pillar to fulfil the European emissions reduction targets.

One representative of a power company (Holding Slovenske elektrarne d.o.o.) agreed on the importance of nuclear power as Slovenia possessed only little primary resources, and also nuclear fusion technology might be an option for the future. Nevertheless, the efficiency of existing power plants by converting primary energy in end-use energy had to be increased significantly. Last but not least, he mentioned that research on renewables had to be intensified and it had to be considered that for instance energy was spent for the production of solar cells.

3.2 Policies and measures of the Slovenian government

In November 2000, the Slovenian government adopted the Strategy and Short-Term Action Plan of Reduction of Greenhouse Gas Emissions with more than 120 measures to reduce GHG emissions. However, this plan did not contain a timetable of individual measures, nor an indication of the intensity of their implementation, it gave an overview what kind of policies and measures had been planned (Ministry of the Environment, Spatial Planning and Energy 2002: 10). Furthermore in 2003, measures and key instruments to fulfil the Kyoto targets were presented in the Action Plan for Reducing GHG Emissions (Burja 2003). Measures in the Action Plan were mainly the result of a harmonisation between Slovenian and EU legislation.

The focus laid on economic instruments ("green" tax reform) and was amplified by regulatory instruments, indirect promotional activities, voluntary agreements, and the promotion of research and education.

Referring to Slovenia's First National Communication under the UN Framework Convention on Climate Change, the most important measure was the adoption of the CO₂ tax in 1996, charging the use of fossil fuels. In 1997, the CO₂ tax has been implemented and according to the Ministry of the Environment and Spatial Planning, in the future the carbon tax would entail a dedicated source of funding for measures to reduce CO₂ emissions. The carbon tax would encourage energy efficiency and the use of renewable energies.

Furthermore the tax will also be a source of funding for measures to replace fossil fuels with renewable sources of energy, for the reconstruction of existing plants supplying residential areas with heat and for measures to reduce heat loss from buildings and to reduce greenhouse gas emissions by the commercial sector and by households, which are responsible for 1.7 Mt and 1.3 Mt of CO₂ each year, respectively. (Burja 2003: 24-25). Although it is difficult to forecast how much the tax will contribute to reducing emissions, it is – according to Alenka Burja – possible to raise the carbon tax in the future, if there are difficulties to meet the Kyoto targets (Burja 2003: 24-25).

In July 2004 the Second and Third National Communication to the Conference of the Parties of UN Framework Convention on Climate Change (2nd and 3rd Communication) was published where measures from the 1st Communication and the Action Plan for Reducing GHG Emissions have been brought together. Slovenia's Fourth National Communication under the United Nations Framework Convention on Climate Change (4th Communication), published in June 2006, gives an overview over all policies and measures which have been implemented so far and which have been planned for the future including a rough estimation how far these measures will contribute to a reduction of CO₂ emissions (or GHG emissions in general) until 2012.

Table 7 gives an overview about implemented and planned measures according to the 4th Communication.

Table 7: Policies and measures for reduction of CO₂ emissions, selected sectors

	Title of measure	Objectives or area of measure	Instru- ment	Sta- tus	Reduction in CO ₂ eq in Mt (2010)
Energy sector	Promotion of electricity production from renewable sources (RES) and CHP generation	Increasing the proportion of RES and cogeneration of electrical energy and heat	e- con., reg.	I	300
	Opening the electricity market	Changing the structure of electricity production, greater import possibilities	reg.	I	600
	Opening the natural gas market	Partial replacement of coal with nat. gas (thermo power & CHP plants) and increased production of el. energy from nat. gas	reg.	I	
	Construction of large hydro power plants	Increasing the proportion of RES in electricity generation		I	180
	Incentives for implementing EEU measures and for investment in RES	Greater energy efficiency and increased proportion of RES	e- con., prom.	I	300
	Informational, educational and awareness raising activities	Increasing the level of public awareness and public information	prom., edu., info.	I	100
	Energy labelling of household appliances	Greater energy efficiency	info., reg.	I	
	Regular inspections of small boilers and air-conditioning units	Higher energy efficiency owing to improved efficiency of boilers and air-conditioning units	reg.	I	n.e.
	Thermal insulation and energy labelling of buildings	Increased energy efficiency	reg., info.	I	310
	Cost accounting for heating by actual consumption	Stimulating the public towards more efficient energy use	stim.	I	19

	Title of measure	Objectives or area of measure	Instru- ment	Sta- tus	Reduction in CO ₂ eq in Mt (2010)
	Contracting	Promoting investment in efficient energy use especially in the public sector	econ.	I	7
	Certification of energy source ("Green certificates")	Stimulating electricity production from RES	reg.	I	n.e.
	Demand Side Management	Encouraging consumers to use energy efficiently	prom.	P	n.e.
	Introducing excise duties on fossil fuels and electrical energy	Increasing energy efficiency in households and the public sector	fis.	P	n.e.
Transport sector	Excise duties on motor fuels	Reducing fuel consumption and, consequently, lowering CO ₂ emissions	fis	I	n.e.
	Control of exhaust composition and engine adjustment in motor vehicles	Reducing emissions through technical improvement of vehicles	reg.	I	185
	Informing consumers of fuel consumption and CO ₂ emissions of motor vehicles and agreement between the European Commission and car manufacturer	Reducing emissions through improved energy efficiency of vehicles	info., negotiated agreement	I	250
	Promotion of biofuel consumption	Reducing GHG emissions through the use of environment-friendly fuel	fis., reg.	I	126
	Encouraging the use of public transport and development of non-motorised forms of transport	Reducing emissions and air pollution in towns	reg., prom.	P	100
	Increasing the share of railways in goods transport	Reducing GHG emissions through the transport of goods and passengers by rail	prom., reg.	P	50

	Title of measure	Objectives or area of measure	Instru- ment	Sta- tus	Reduction in CO ₂ eq in Mt (2010)
Industry sector	EEU in industry	Increasing energy efficiency in industry	prom., e- con.	I	460
	Promoting the introduction of ISO 14001 environmental management systems and joining the EMAS system	Greater energy efficiency and productivity (efficiency) in industry	prom., e- con., vol.	I	
	IPCC directive		reg.	I	
	Eco-labelling of products	Greater energy efficiency	vol.	I	n.e.
Interdepartment-	CO ₂ tax	More efficient energy use	fis.	I	n.e.
Kyoto mechanisms	Emission trading scheme	Facilitating for polluters a more cost-effective way of reducing emissions	econ.	I	
	CDM and JI	GHG emission reduction	reg., econ.	P	n.e.
Others	Measures in agriculture and forestry sector, waste sector in order to reduce different GHG emissions				> 395 (CO eq.)

econ. = economic; reg. = regulatory; stim. = stimulative; prom. = promotional; edu. = educational; info. = informational; fis. = fiscal; vol. = voluntary

I = implemented; P = planned

n.e. = not estimated

Own compilation; Source: Ministry of the Environment, Spatial Planning 2006: 75-78

The estimated impact of all measures listed in table 7 are more than a reduction of 3,442 Mt CO₂ eq emissions in total or to be precise, a reduction of more than 3.047 Mt

CO₂ eq (mainly CO₂ emissions) by measures in the energy, transport and industry sector. That means that only by these measures, the 8 % reduction target below 1986 level (corresponding to roughly 1,651 Mt CO₂ eq.) should be fulfilled referring to the 4th Communication.

Having a closer look at the different sectors, measures in the energy sector should mainly contribute to emission reductions (at least 1,876 Mt CO₂). By the following five measures alone,

- Promotion of electricity production from RES and CHP,
- Opening of electricity market,
- Opening of natural gas market,
- Incentives for implementing EEU measures and for investments in RES, and
- Thermal insulation and energy labelling of buildings

almost all emission reductions should be achieved.

The transport sector is the secondly most important sector to reduce CO₂ emissions. All measures implemented or planned should result in a reduction of at least 711 Mt CO₂ emissions, especially by informing consumers of fuel consumption and CO₂ emissions of motor vehicles and an agreement between the European Commission and car manufacturers (- 250 Mt CO₂) as well as by controlling of exhaust combustion and engine adjustment in motor vehicles (- 185 Mt CO₂). Measures referring to the industry should bring a reduction of 460 Mt CO₂ emissions.

However, it has to be pointed out that until now, it does not seem that Slovenia will fulfil its emissions targets, because in 2004 the CO₂ emissions are even higher (+ 2,9 %) than in 1986 (base year). Thus, it indicates that the measures implemented will probably not be as effective as they have been estimated. For instance, it was assumed that a voluntary agreement between the car industry and the EU would remain in place, so that after 2008 new petrol driven cars would emit on the average 140gCO₂/km, which was a fuel consumption rate of 6.2 l per 100 km, while diesel engines would consume 5.1 l per 100 km. However, there is the problem of slow replacement of older vehicles (Burja 2003: 34).

Long-term scenarios as well as policies and measures until 2030 are not today's subject. Measures for the reduction of CO₂ emissions according to the new action programme from October 2006 are listed in the appendix.

3.3 Strategies and positions of stakeholders in the different sectors

3.3.1 Public bodies, NGOs and research institutes

According to the Ministry of Environment and Spatial Planning, the biggest effects in emission reductions could be achieved in the field of energy production by energy sav-

ing and energy efficiency measures on the demand-side. As the industry has reduced their emissions by about 40 % during 1987 and 2002, no further reductions are imposed according to the National Allocation Plan. The fact that the industry did not need to decrease their emissions any further was criticized by some of the interviewees (Council for Environmental Protection). On the other side, representatives of the industry complained that only the energy and industrial sector were part of the National Allocation Plan and therefore bared the sole responsibility for achieving the Kyoto targets. It was also criticized that no reduction targets were established for the transport sector in which a visible increase in emissions (about 50 %) could be scored.

Referring to the low effectiveness and efficiency of the current European as well as national measures to reduce emissions in the industrial sector, representatives of environmental NGOs and research institutes (Focus and Jozef Stefan Institute) demanded for additional policies and measures to be implemented. According to Focus, the already implemented measures were a good start, but they would not have a significant impact on GHG emissions in the long term. Drastic cuts would be needed and that would demand for drastic changes, mainly in the energy and transport sector. While Slovenian energy policy had started going at least marginally to the right direction, in particular, intensive measures in the transport sector were missing (Jozef Stefan Institute, Council for Environmental Protection, Trade Union and representatives of industry). For instance, there had not enough been done in the public transport sector, which was well developed about 20 years ago, but nowadays the public transport system was getting worse and worse. Thus people depend more and more on their own car. Additionally, the integration of different policy sectors (e.g. regional policy, transport policy, spatial planning and climate policy) was missing. All experts agreed on the importance of energy efficiency and energy savings in order to reduce GHG emissions.

However, the same development could be seen on the EU level. Environmental NGOs (Focus) also criticized that the emission trading system could have better impacts, if the certificates were not given for free to the energy and industry sector. Furthermore they demanded to improve Slovenian subsidies policy and that renewables should at least be supported with as much subsidies as the fossil energy sources. In summary, efficiency legislation would not be sufficient, and faster steps in regard to implementation would be needed.

A representative of a research institute (Jozef Stefan Institute) focused on different aspects: In her opinion the Slovenian industry had done a lot in the 1990ies, amongst other things due to the implementation of the CO₂ tax. The trends in the power sector would not be so positive, in particular, because the energy demand was constantly increasing. Even if energy-efficient products were increasingly sold in Slovenia on the one hand, the higher demand in total would be the main problem: More energy was particularly needed in the growing service sector, in private households (e.g. stand-by-use, computers run all day), and in the public sector (e.g. more street-lighting).

According to the representative of Slovenia's Council for Environmental Protection, the renovation/redevelopment of buildings and shifting car trips to public transport were decisive measures for a rational energy use.

3.3.2 Industry and trade unions

There are different political measures in order to induce companies to reduce their CO₂ emissions and establish emission reduction strategies, which were discussed with the interviewees:

- Laws and standards;
- Fiscal measures such as eco-taxes or fiscal incentives for emissions reducing investment;
- State subsidies for research and development;
- Market regulation through emission quota, regulations for public procurement etc;
- Labelling;
- Voluntary agreements.

From the perspective of most of the industrial interview partners, laws, standards and fiscal measures were the most important political measures to make their companies establish emission reduction strategies. The representative of a steel company (Acroni) also added that state subsidies for research and development as well as voluntary agreements could support emission reduction measures. Conspicuously, nobody mentioned market regulation through emission quotas as a suitable political measure, and only one representative of the oil industry supported regulations for public procurement as for example forcing public transport and governmental bodies to use biofuels in order to support their breakthrough.

Beside these political measures, a representative of an energy company (Holding Slovenske elektrarne d.o.o.) pointed out that consumers would have to rethink. To his mind it was essential that consumers became aware of the limitedness of resources and the necessity to change the individual behaviour. According to him, people were addicted to consume even in the case of increasing costs. Thus, consumers would have to learn how to manage their own energy demand.

In case a company is forced to reduce their emissions substantially, there are again different possible measures to be taken by the company, as for instance

- Investments in technical measures for energy efficiency;
- Organisational measures to improve energy efficiency;
- Conversion of the production process (products and processes);
- Closing or reducing of capacities and/or production sites;

- Important technological breakthrough;
- Instruments of the Kyoto protocol (purchase of emissions certificates on the European CO₂-market, CDM, JI projects).

Asking representatives of trade unions and of industry for suitable measures to reduce emissions in their company/branch, they all agreed on the fact that closing or reducing capacities and/or production sites was not suitable, but all other measures listed above could contribute to emission reductions.

Whereas one trade union representative doubted the effectiveness of all measures proposed at all as they made only small contributions to emission reductions, he supported nuclear power combined with hydroelectric power as the only solution to achieve GHG emission reductions and have enough energy at Slovenia's disposal.

Investments in technical measures and organisational measures to improve energy efficiency seemed to be (very) suitable to all of those questioned.

The representative from the steel industry (Acroni) emphasized that the steel industry had invested much in modernisation and energy efficiency. Acroni's efforts had resulted in a reduction of CO₂ emissions by 87 % (1987-2005), e.g. by switching to natural gas, and in the future Acroni would continue the use of technology which was low in emissions, but the extent of further investments would depend on the demand-side. From today's perspective, further GHG emission reductions would not be possible and they could only stay within their GHG limits if they shut down their production by 10 % or if they bought additional certificates.

4 Impact of mitigation policies and measures on economic activity and employment

4.1 Other factors influencing economic activity and employment overlie any impact of mitigation policies and measures

Slovenia is a relatively small country with roughly 2 million inhabitants and according to Eurostat projections the population will slightly decrease by 2010 and by 2020 (Ministry of the Environment and Spatial Planning 2006a: 26). After an initial transitional recession, which was reflected in negative growth rates of the gross domestic product (GDP) and high inflation, in 1993 it again achieved positive economic growth. From the second half of the 1990ies to 2000, Slovenia had a high level of economic growth, which decreased in the years from 2001 to 2003, and again rose above 4 % in 2004; the GDP in current prices was EUR 26,075 million or EUR 13,210 per capita. In 2004 the highest share of value added was created by services at 59.8 %, followed by industry (including mining, electricity, gas and water supply and construction) at 37.2 % and agriculture at 3%. Since 1990, the share of services has increased (+ 5.5 %), and the share of industry (- 4.1 %) and agriculture (- 1.4 %) has decreased. During the transitional period, Slovenia's biggest problems were high inflation and maintaining employment. Unemployment in Slovenia since 1991 has fluctuated between 6 and 9 %, reaching 6.3 % in 2004 (Ministry of the Environment and Spatial Planning 2006a: 15, 28-29). According to the Employment Service of the Republic of Slovenia and the Statistical Office of the Republic of Slovenia (<http://www.europa.eu.int/eures/main.jsp?lang=en&acro=Imi&catId=2815&countryId=SI®ionId=SI0&langChanged=true>), there were 907 690 active persons in Slovenia in January 2006, of whom 812 486 were economically active. The greatest number of economically active persons was in the service sector (57.3%), followed by 38% in the non-agricultural sector, and the remaining 4.7% in the agricultural sector. A total of 28.1% of the population was economically active in manufacturing, with quite a large number continuing to be employed in commerce (13.3%) and construction (8%).

Table 8: Basic economic indicators in Slovenia

	2001	2002	2003	2004	2005
Population (in 1000) *	1992	1995	1996	1997	2001
GDP (Mio EURO) *	22099	23673	24876	26257	27626
GDP (growth in %) *	2.7	3.5	2.7	4.4	4.0
Employment (in 1000) *	899	912	909	913	916
Unemployment rate (in %) **)	6.2	6.3	6.7	6.3	6.5

*) Source: Statistical Office of the Republic of Slovenia

***) Source: eurostat

According to the interviewees, important factors influencing these developments are:

- Economic restructuring in the 1990ies, in particular, rationalisation and automation of production processes
- Globalisation.

The service sector would increase, but only due to structural changes in general than because of climate change mitigation measures.

According to the Ministry of the Environment and Spatial Planning, no negative impacts on economy and employment were expected due to existing mitigation policies and measures, but positive impacts due to an increase of jobs in the biomass sector. Also the association of free trade unions assessed that neither technical nor organisational measures to improve energy efficiency nor instruments of the Kyoto protocol would influence the number of jobs in Slovenia. Only the closing or reducing of capacities would lead to losses of jobs, of course. However, during the interviews no example of closing capacities in the industry sector was given, but they referred to the closing of coalmines.

However, studies evaluating possible impacts of mitigation policies and measures on economic activity and employment have not yet been carried out. Nevertheless, one representative of an environmental NGO (Fokus) pointed out that all in all Slovenia would benefit from structural changes due to mitigation measures. New jobs would be created and some jobs would get lost. As there were no studies on employment effects, the positive effects could not be quantified. Having energy trends in mind, companies had to think about solutions how to save energy. It were for sure, that financial investments were needed for energy efficient technology, but in the middle- and long-term they would profit by lower energy demand and energy costs. The representative of the NGO did not expect negative effects to the employees because of investments in environmental standards. There might be financial problems, that some companies could not afford energy-efficient technologies because of missing investment money. But to her mind, it changed in Slovenia, that it was not any longer a problem and most companies were able to invest more. Additionally, there were also a few governmental programmes to support environmental investments: a) the environmental fund gave cheap loans for environmental investments to private households and companies. b) Companies did not have to pay the CO₂-tax (or only a reduced amount) if they did some environmental investments.

In the past, there had been small positive employment effects of climate policy, because nowadays every company has an environment department and thus, new jobs had been created, according to a representative of a research institute (Jozef Stefan Institute). Another small employment effect in the consulting sector resulted from the necessity to draw up documents for IPPC.

There are different measures to initiate new economic activities and employment in the context of reducing emissions. The interviewees have suggested the following measures in general:

- All measures supporting the development of new products and services and their breakthrough. (Jozef Stefan Institute) One example was green public procurement: public bodies lead the way to use renewables etc. (Ministry of the Environment and Spatial Planning)
- Various economic measures for new “green” products and services, e.g. tax assumptions or new ways how development costs of energy efficient/energy saving products could be considered in balance sheets. (Jozef Stefan Institute)

4.2 Sector-specific effects

4.2.1 Energy Sector

The gross value added for electricity, gas and district heating has increased during the last years whereas the number of employees has slightly decreased at the same time.

Table 9: Gross value added for electricity, gas and district heating and number of employees

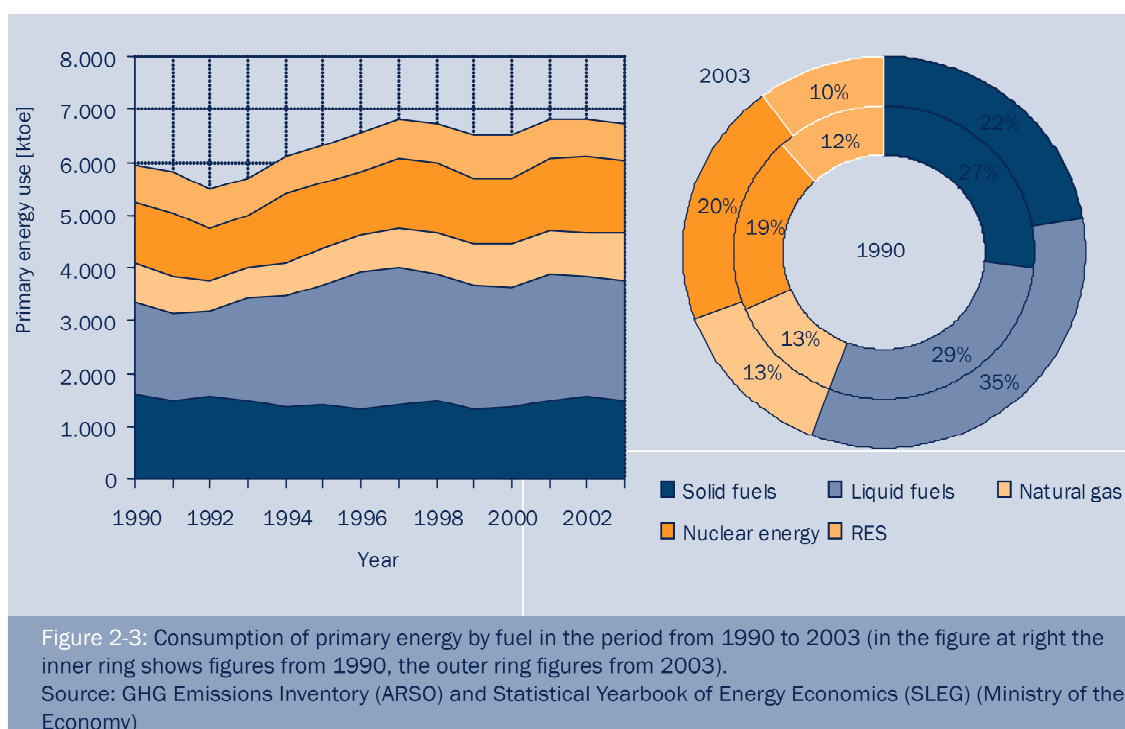
	2000	2001	2002	2003
Gross added value [million Euro]				
Electricity	150.1	142.2	178.6	394.0
Gas	5.3	6.1	5.0	11.0
District Heating	15.0	15.4	21.0	35.8
Number of employees				
Electricity	no data available	no data available	7,111	6,686
Gas	no data available	no data available	159	155
District Heating	no data available	no data available	885	897

Source: Eurostat

Referring to Slovenia’s energy mix, it has to be stated that due to increased energy efficiency, the exchange of fuels and changes in the value added structure the intensity of the consumption of primary energy decreased significantly during the last ten years.

Figure 4 shows the changes according to the energy mix.

Figure 4: Consumption of primary energy by fuel in the period from 1990 to 2003



Source: Ministry of the Environment and Spatial Planning 2006a: 30

The highest share was held by liquid fuels (35 %), followed by coal (22 %), nuclear energy (20 %), natural gas (13 %) and renewable energy sources (10 %). The most important renewable energy source is wood (64 %), followed by hydroenergy (36 %) (Ministry of the Environment and Spatial Planning 2006a: 30).

The structure of primary energy use has changed during the last years: The consumption of hydroelectricity, solid fuels (coal) and biomass has shown a falling trend, but the consumption of nuclear energy, liquid fuels, and natural gas has risen. In comparison between 1992 and 2001 the share of natural gas has risen (from 10.3 % to 13.3 %) whereas the share of solid fuels (coal) has been reduced (from 29.5 % to 22.5 %). In the long-term (2015) the share of coal will decrease to 13 % while the consumption of natural gas (13 % to 19 %) and renewables (10 % to 13 %) will significantly grow (Burja 2003: 14). The changed structure of primary energy sources will lead to a higher efficiency and less CO₂ emissions.

The change of the energy mix have resulted in closing down of five coalmines and thus job losses. A representative of a trade union (Sindikata delavcev dejavnosti energetike Slovenije) pointed out that the Kyoto protocol had influenced the closing of coalmines and thus the loss of workplaces. Furthermore he criticized the results of the Kyoto protocol that coalmines were closed in countries that had ratified the Kyoto protocol, but new coalmines were built in countries that had not ratified it. Therefore no positive ef-

facts for the climate could be expected to his mind, but the burdens were shifted on to countries as Slovenia.

On the other hand, an increase of workplaces due to a rising share of renewable energies is expected, especially in the biomass sector, according to the Ministry of the Environment and Spatial Planning. From the perspective of a trade union representative (Sindikat delavcev dejavnosti energetike Slovenije) the renewable energy sector had potentials for positive employment effects, but so far they were not developed. So far, electricity from renewable energy sources was more expensive than the one from conventional energy sources and thus there was only little demand for "green electricity". As long as no subsidies were allowed to support renewable energy sources due to EU regulations, no positive employment effects would arise resulting from a breakthrough of renewables.

The representative of an energy company (HSE) agreed that no negative employment effects were expected by climate change mitigation measures, but negative effects result from rationalisation processes. Higher efficiency always lead to less employment, but the number of workplaces could be reduced in an aging society in a socially sound way.

4.2.2 Energy-intensive industry

An overview about the development of employment in the Slovenian energy-intensive industry is given in tables 10 to 12. According to the national inventory report, there are three iron and steel producers in Slovenia. The gross value added was nearly doubled in the period 2000-2005 by a decreasing number of workplaces.

The cement and lime sector has also doubled its gross value added, but there are no information to the employment development in this sector. There is only one aluminium producer (Talum) in Slovenia, which has increased its gross value added slightly.

Table 10: Gross value added for different sectors [million Euro]

	2000	2001	2002	2003	2004	2005
Metal sector*	589.9	635.6	689.5	876.7	-	-
Thereof steel sector**	22,443	22,613	24,185	24,777	30,847	39,000
Thereof aluminium sector***	49,352	44,232	42,703	45,890	49,174	53,463
Building material sector*	169.1	171.6	182.8	248.5	-	-
Thereof cement, lime*	24.6	23.3	30.6	50.5	-	-
Manufacturing of electrical appliances for electricity generation and distribution*	212.5	224.1	265.7	341.9	-	-

- = No data available

Source: * = Euro stat, ** = Chamber of Commerce, Metals Association 2006, *** = Talcum 2006

Table 11: Employment in the Slovenian industry

	2000	2001	2002	2003	2004	2005
Metal sector*	-	-	42,263	40,798	-	-
Thereof steel sector**	4,063	4,025	3,504	3,489	3,308	3,200
Thereof aluminium sector***	933	957	1,050	1,046	965	950
Building material sector*	-	-	10,227	10,193	-	-
Thereof cement, lime*	-	-	795	-	-	-
Manufacturing of electrical appliances for electricity generation and distribution*	-	-	14,389	14,609	-	-

- = No data available

Source: * = Eurostat, ** = Chamber of Commerce, Metals Association 2006, *** = Talum 2006

Table 12: Average monthly gross income per sector [Euro]

	2000	2001	2002	2003	2004	2005
Metal sector*	-	-	951	982	-	-
Thereof steel sector**	700	800	850	900	1,000	1,100
Thereof aluminium sector***	1,010	994	1,113	1,102	1,185	1,329
Building material sector*	-	-	993	1,012	-	-
Thereof cement, lime*	-	-	1,551	-	-	-
Manufacturing of electrical appliances for electricity generation and distribution*	-	-	1,077	1,075	-	-

- = no data available

Source: * = Eurostat, ** = Chamber of Commerce, Metals Association 2006, *** = Talum 2006

According to the Ministry of the Environment and Spatial Planning, the energy-intensive industry and especially producers of iron and aluminium are still mainly state-owned and are not competitive. In the long-term, after fully privatisation, they probably move to other countries. Future job losses would not result from climate change mitigation measures, but because of structural changes, liberalisation and globalisation processes.

A representative of an employers' organisation stating that Slovenia would lose some energy intensive industry by industrial reconstruction/structural changes because it was not competitive raised similar expectations. The secretary general of the association of employers forecasted that this energy intensive industry (e.g. steel industry) would move to less developed countries, which had not ratified the Kyoto protocol and there-

fore did not have to reduce their GHG emissions. Simultaneously Slovenia would reduce GHG emissions. Based on his expectation, there are grounds for the assumption that the EU ETS might influence Slovenia's economic development in the future.

The representatives of the industry agreed in general, that in all sectors pressure on wage costs could be perceived due to globalisation, rationalisation and automation, but not so much because of climate change, but nobody had given a concrete example of cuts in wages. However, the strategy of Lafarge (cement sector) consists of reducing the number of workplaces in a socially sound way instead of reducing the wages.

4.2.3 Transport

In spite of intense efforts no representatives of the transport sector were willing for an interview in order to support the study by their statements and assessments. Therefore, there are no specific expectations in regard to policies and measures in the transport sector and their impact on economy activity and employment. However, the representative of an employers' organisation (Association of Employers of Slovenia – ZDS) expected new jobs in the service sector, including the transport sector in general due to an increased importance of tourism for Slovenia.

Table 13: Employment in the Slovenian transport sector

	2000	2001	2002	2003	2004
Land	-	-	25,042	23,917	-
Water	-	-	182	185	-
Air	637	613	611	597	-
Rail	9,026	9,023	8,794	9,402	8,073
Road cargo	6,062	6,221	6,575	6,664	7,228

- = No data available

Source: Eurostat

Especially employment in Slovenian road cargo sector has increased whereas the number of jobs in the railway sector has decreased. Employment impacts of changes in the modal split also result in negative climate impacts due to increased CO₂ emissions.

4.2.4 Building sector

Producers of insulation materials will benefit from mitigation policies and measures. Termo produces stone wool and by that CO₂ is produced, but their products help to isolate buildings and therefore, GHG emissions are net saved/reduced. In fact 1500 times more emissions were saved than produced according to a producer of insulation materials (Termo). Termo benefits from increasing energy costs and therefore the need to reduce energy in the building sector.

The representative of the Council for Environmental Protection expected only positive employment effects for Slovenia in general and especially in the construction and building sector as the potential of energy efficiency was very high. To his mind new jobs would be created resulting from reconstruction and renovation measures. Even in the case of decreasing energy demand because of energy efficiency measures, he did not expect any negative effects on employment in the energy sector.

Subsidies for energy efficient windows had given boost to local production and had raised efficiency standards at the same time. Referring to a representative of a NGO (Focus), developing and producing technologies that would help to save energy and produce energy from renewable sources were a good opportunity for Slovenia to create new jobs.

5 Social transition

The climate issue is currently not a major topic in Slovenia. During the interviews it became apparent, that besides from representatives of ministries and environmental NGOs, only companies covered by the EU ETS are dealing with the topic.

Especially companies interviewed which are part of the EU ETS (e.g. steel industry, producer of insulation material), inform their employees about the financial situation, environmental aspects and ask their employees for improvement suggestions, e.g. to increase the energy efficiency. As an incentive, some industrial companies offer rewards to the employees.

Apart from the fact that globalisation, rationalization and automation of production processes have a much bigger effect on the number of jobs in Slovenia than GHG mitigation measures, the interviewees state that qualification demands are generally getting higher. However, the higher qualification structure of the employees also results from general further developments (e.g. automation) and further training becomes more and more important for the employees.

All of the interviewees agree on the fact that in the future they need more highly educated employees and therefore all representatives of companies interviewed agreed on the importance of training and qualification measures. However, higher qualification needs were mainly induced by globalisation, rationalisation and automation of production processes and not at all by climate mitigation measures. In case, further qualification of employees was not possible, new staff was recruited.

The trade unions have talks with the government and with employers' organisation about social aspects of employment, which might result from the EU ETS because the allowance of certificates directly affects the security of jobs in energy-intensive industries according to a representative of a trade union. The trade unions' influence is legally established.

Especially the energy sector is confronted with job losses due to changes in the primary energy mix. In the past, five coalmines have already been closed and the last one will be closed in 2009. In order to mitigate the reduction of workplaces, the government, trade unions and employers have concluded an agreement, consisting of the following three aspects:

- The coal miners are given further training for new jobs and thus are supported in finding new jobs.
- Older employees receive a settlement in case of early retirement pension.
- The government pushes pressure to employers creating new jobs. In order to support the creation of workplaces, the government partly bears the costs of these new jobs, which are tax-exempt during the first year.

However, this agreement has nothing to do with climate change mitigation policies and measures.

6 Conclusions

The main result of the interviews is that in Slovenia there is still a demand for information and education concerning the impacts of climate change and climate protection measures. Despite numerous experts to be found among NGOs, public authorities and (partly) companies which are involved in the emission trading, in particular, trade unions and companies not involved in EU ETS still lack know-how referring to climate change, suitable mitigation measures and other environmental problems. Another experience of the NGO "Focus" is that nobody is really interested in the topic "climate change". When Focus tried to organise a climate change awareness campaign, they have contacted many companies to ask for their cooperation and support. However, nobody was interested in doing so.

Effects of climate change mitigation measures on employment are no topic in Slovenia so far. Globalisation, rationalisation and automation of production processes have a strongly higher impact on Slovenia's economy and employment than policies and measures in the framework of climate change. Thus, structural changes in Slovenia do not result from climate change mitigation measures or only to a very small extent.

Stakeholders interviewed do not expect any negative net impact of mitigation policies and measures on economic activity and employment. However, there is some fear that EU emission trading scheme might additionally affect the security of jobs in energy-intensive industry, while the jobs would be already insecure because of general structural changes, liberalisation and globalisation. Furthermore, most of the representatives criticize the distribution of burdens to reduce GHG emissions as uneven and unfair as only the energy and industry sector is part of the EU ETS. Stakeholders mentioned that there were no more or only small energy efficiency potentials left in the energy-intensive industry because strong efforts had been made in the past to reduce CO₂ emissions. However, much would be needed to be done on the demand side in households and the building sector, which required skilled and trained workers. Furthermore, in Slovenia's transport sector, with its outstandingly increase of emissions, policies and measures would have to be taken in order to reduce CO₂ emissions. Positive employment effects might arise from expected increased use of biomass and other renewables, and strengthening of energy efficiency in the building sector.

7 References

- Burja, Alenka (2003): Action Plan for Reducing Greenhouse Gas Emissions. Short version. Adopted by the Slovenian Government on July 31st, 2003.
- Chamber of Commerce, Metals Association (2006): written information about number of employees, gross value added and wage level in the steel sector. Unpublished.
- Ecofys (2006): Factors underpinning future action. Cologne.
- Environmental Agency of the Republic of Slovenia (2005): Slovenia's National Inventory Report 2005. Submission under the United Nations Framework Convention on Climate Change 2005. Ljubljana.
- European Environment Information and Observation Network (EIONET) (2006): Airnet in Slovenia. http://eionet-si.arso.gov.si/Dokumenti/GIS/zrak/index_en_html
- Focus; Umanotera (2004): Comments to the proposed National Allocation Plan of Slovenia (NAP). URL: <http://www.climnet.org/pubs/NAPSlovenia.pdf>
<http://www.europa.eu.int/eures/main.jsp?lang=en&acro=lmi&catId=2815&countryId=SI®ionId=SI0&langChanged=true>
- Ministry of the Environment and Spatial Planning (1999): National Environmental Action Programme. Ljubljana.
- Ministry of the Environment and Spatial Planning (2006a): Slovenia's Fourth National Communication under the United Nations Framework Convention on Climate Change. Ljubljana.
- Ministry of the Environment and Spatial Planning (2006b): Comment to Draft Final Report Impact on Activity and Employment of Climate Change and Greenhouse Gas Mitigation Measures in the Enlarged Europe. Unpublished.
- Ministry of the Environment, Spatial Planning and Energy (2002): Slovenia's First National Communication under The UN Framework Convention on Climate Change. Ljubljana.
- Ministry of the Environment, Spatial Planning and Energy (2003): Environment in Slovenia 2002. Ljubljana.
- Ministry of the Environment, Spatial Planning and Energy (2004a): Slovenia's Second and Third National Communication to the Conference of the Parties of the United Nations Framework Convention on Climate Change. Ljubljana.
- Ministry of the Environment, Spatial Planning and Energy (2004b): Slovenian National Allocation Plan for 2005-2007. Draft document. Ljubljana.
- Representatives of non-governmental environmental organisations, representatives of the Ministry of the Environment and Spatial Planning of the Republic of Slovenia and The Regional Environmental Centre for Central and Eastern Europe: Partnership for the Environment. Programme of Co-operation between Non-Governmental Environmental Organisations and the Ministry of Environment and Spatial Planning of the Republic of Slovenia.
- Republika Slovenija (2004): National Action Plan for Employment 2004. Ljubljana.
- Talum (2006): written information about number of employees, gross value added and wage level. Unpublished.
- UNFCCC (2006): Common reporting format from 2006 for Slovenia. http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/3734.php

Appendix

List of measures for the reduction of CO₂ emissions according to the new action programme from October 2006 (Ministry of the Environment and Spatial Planning 2006b):

Energy industries

- Technological renovation of the thermal power plants (instruments: opening of electricity and gas markets, IPPC directive, EU-ETS)
- Increase in the production of electricity and heat from cogeneration plants (instruments: opening of electricity and gas markets, promotion of CHP, EU-ETS)
- Increase of production of electricity from renewable energy sources (instruments: opening of electricity market, promotion of electricity production from RES, EU-ETS)
- Emission trading scheme (instrument: EU-ETS)

Industry and construction

- Reduction of energy intensity (instruments: EU-ETS, CO₂-tax, IPPC directive, excise duty on fossil fuels, promotion of CHP)
- Increase in the use of RES (especially wood biomass) (instruments: EU-ETS, CO₂-tax, IPPC directive, excise duty on fossil fuels, incentives for investments in RES)
- Exchange of fuels (instruments: EU-ETS, opening of gas market, CO₂-tax, IPPC directive, excise duty on fossil fuels, incentives for investment in RES)
- Emission trading scheme (instrument: EU-ETS)

Transport

- Substitution of fossil fuels with biofuels (instrument: stimulation of use biofuels)
- Informing of consumers of fuel consumption and CO₂ emissions of motor vehicles and an agreement between the European Commission and car manufacturers)
- Stimulation of use of public transport
- Stimulation for the increased use of railways for the transportation of goods and people

Other sectors (households, commerce, services, public sector)

- Thermal insulation and energy labelling of buildings, energy labelling of household appliances, increase in energy efficiency of final energy use (instruments: CO₂-tax, excise duty on fossil fuels, energy efficiency directive, labelling of household appliances, buildings directive)

- Increase in the use of RES for hot water and electricity (instruments: CO₂-tax, excise duty on fossil fuels, incentives for investment in RES, feed in tariffs, promotion of CHP)

Industrial processes

- Adaptation of industry to best available techniques (instrument: IPPC directive)
- EU F gases regulation
- Emission trading scheme (instrument: EU-ETS)

Waste

- Use of biogas at landfills
- Separation of wastes, recycling, re-use, energy recovery, composting

Agriculture

- Introduction of environmental friendly animal breeding and construction of anaerobic digesters in farms
- Increase of pasturing
- Decrease of nitrogen use
- Better cultivation practices and fertilizations
- Energy efficiency and renewable energy

Sinks

- Sustainable forest management

Table 14: Overview of companies, organisations and authorities contacted

Sector	Number of companies/organisations/authorities contacted	Number of interviews conducted	Number of written replies	Negative answers / rejection	Reasons for rejection
Public Authorities	6	2	0	4	(a) (b) (c)
Trade Unions	7	2	0	5	(c)
Employers Organisations	3	2	0	1	(b)
Environmental NGO	3	2	0	1	(d)
Steel Companies	5	1	0	4	(b) (f)
Aluminium Companies	4	0	0	4	(a)
Cement, Building Materials Companies	2	1	0	1	(g)
Electric Equipment	8	1	1	6	(a) (f)
Building, construction & refurbishment	3	1	0	2	(b)
Power	10	2	0	8	(a) (b) (c) (g)
Oil, gas	5	1	0	4	(b) (c)
Transport	6	0	0	6	(b) (g)
Hydrogen	0	0	0	0	-

Others	0	0	0	0	-
TOTAL	62	15	1	46	-

Reasons for rejection:

(a) No interest to take part in study; (b) No reply at all; (c) Not responsible for topic; (d) No time for interview/written response; (e) No reply after email/phone contact; (f) Company too small; (g) Cannot answer the questionnaire

Table 15: List of interviewees

Stakeholder group	Institution	Name of interviewee	Date
Public Authorities	Ministry of Environment and Spatial Planning	Mr. Radovan Tavzes and Ms. Alenka Burja	7 June 2006
	Council for Environmental Protection	Prof. Dr. Peter Novak	6 June 2006
Trade Unions	TU Energy Sector	Mr. Franc Dolar and colleague	18 July 2006
	TU Freelancers	Mr. Gregor Miklic	19 July 2006
Employers' Organisations	Chamber of Commerce and Industry Slovenia	Ms. Janja Leban	19 July 2006
	Association of Employers in Slovenia	Mr. Samo Hribar-Milic	6 June 2006
Environmental NGO, Research Institutes	Focus	Ms. Lidjia Zivcic	7 June 2006
	Jozef Stefan Institute	Ms. Andreja Urbancic and Mr. Tomaz Fatur	21 July 2006
Steel	Acroni	Mr. Dusan Novkovic	20 July 2006
Cement	Lafarge	Ms. Iva Dominkovic	7 June 2006
Electric Equipment	Domel	Dr. Boris Benedicic and Mr. Anton Rovtar	20 July 2006
	Anonymous	Anonymous	12 July 2006
Building construction and refurbishment	Termo	Dr. Joze Hafner	19 July 2006
Power	Holding Slovenske elektrarne d.o.o.	Mr. Djordje Zebeljan	18 July 2006
	Istrabenz Gorenje	Mr. Primož Pogacnik	7 August 2006
Gas, Oil	Anonymous	Anonymous	6 June 2006