

# Liechtenstein

## Contents

<a href="#">1. SUMMARY</a>	2
<a href="#">2. GHG PROJECTIONS AND PROGRESS TO KYOTO TARGETS</a>	3
<a href="#">3. CLIMATE CHANGE MITIGATION POLICIES AND MEASURES</a>	10
<a href="#">4. METADATA</a>	19

## Tables

<a href="#">Table 1. Summary of reported projections by sector and by gas in 2010 (Mt CO<sub>2</sub>-eq.)</a>	5
<a href="#">Table 2. Summary of projections by sector and by gas in 2010 compared to 1990 emissions (MtCO<sub>2</sub>-eq.)</a>	6
<a href="#">Table 3. Summary of projections by sector and by gas in 2010 compared to 1990 emissions (index 100 = 1990)</a>	7
<a href="#">Table 4. Summary of projections in 2010 compared to base year emissions under the Kyoto Protocol</a>	8
<a href="#">Table 5. Summary of the effect of policies and measures included in the 2010 projections (Mt CO<sub>2</sub>-eq.)</a>	10
<a href="#">Table 6. Summary of the effect of existing policies and measures in 2010 (t CO<sub>2</sub>-eq.)</a>	11
<a href="#">Table 7. Detailed information on Planned Policies and measures</a>	18
<a href="#">Table 8. Information provided on policies and Kyoto flexible mechanisms</a>	21
<a href="#">Table 9. Information provided on projections</a>	21
<a href="#">Table 10. Parameters for Projections</a>	23

## Figures

<a href="#">Figure 1. Greenhouse gas projections in 2010, 2015 and 2020 (Mt CO<sub>2</sub>-eq.)</a>	8
<a href="#">Figure 2. Comparison of 2010 projections reported in 2006, 2007 and 2008</a>	9

## 1. SUMMARY

Liechtenstein's target for the First Kyoto period is an 8% reduction in emissions compared to the base year. Liechtenstein's 4th National Communication and Demonstrable Progress Report provides a "with existing measures" projection scenario, in which 2010 emissions are projected to be 3.9% above base year emissions. Liechtenstein intends to cover the gap to target through a mix of additional domestic measures<sup>1</sup> and Kyoto flexible mechanisms.

Emissions in the industry, transport, and residential, institutional and commercial sectors are projected to increase between the base year and 2010 while those from the agriculture sector are projected to decrease slightly.

Waste sector emissions do not occur in Liechtenstein, as all waste is incinerated in Switzerland and former waste disposal sites in Liechtenstein no longer generate gas. However the latest emissions inventory (May 2008) includes waste sector emissions for 1990, which reflects the recalculations required as a result of the findings of the UN In-Country Review in June 2007 requiring these emissions to be included.

Liechtenstein provided a comprehensive and detailed description of policies and measures designed to reduce greenhouse gas emissions, and the reporting of projections was also clear in both table and graphical format. Future reporting could be improved by further quantifying the effect of policies and measures, individually and/or collectively; providing the actual number values used in all graphs; and providing a summary table showing the base year, Kyoto target and progress to target.

---

<sup>1</sup> A "with additional measures" projection was not provided in the 4NC or DPR (2006). However the Government's intentions in this regard have been published in the National Climate Strategy (September 2007) and other recent documents.

## 2. GHG PROJECTIONS AND PROGRESS TO KYOTO TARGETS

Base-year emissions of greenhouse gases for Liechtenstein are calculated using 1990 emissions for all gases including fluorinated gases (SF<sub>6</sub>, HFCs and PFCs).

The 4NC provides projections for the following sectors: “industry” (meaning energy supply/consumption rather than industrial process emissions), “transport”, “residential, institutional, commercial” (energy consumption), and “agriculture”.

Table 1 indicates that greenhouse gas emissions from all sectors except agriculture are projected to increase between the Kyoto base year (1990) and 2010: by 7% in “energy – industry”, 6% in “energy – other (commercial, residential, agriculture)”, and 2% in the transport sector. A 3% reduction is projected in the agriculture sector.

The following Table 1 shows, for all gases and main sectors:

- GHG emission projections for the two scenarios “with existing measures” (WEM) and “with additional measures” (WAM), as reported by Liechtenstein;
- Historic emissions (in the “reference year”) as reported together with projections.

For Liechtenstein, the reference year is 1990.

Table 2 shows, for all gases and main sectors:

- 1990 GHG emissions as reported in the latest (2008) GHG emissions inventory (1990-2006);
- Adjusted GHG emission projections for the WEM and WAM scenarios. This adjustment of the projections reported in Table 1 is carried out to allow consistency and comparability between projections and the latest (2008) GHG inventory data<sup>2</sup>. In Liechtenstein’s case the correction factor reduces the projections in the 4NC, as shown in Figure 2.

---

<sup>2</sup> The adjustment consists in applying an adjustment factor to projections from Table 1. This factor is the ratio between total emissions in the reference year as reported in the 2008 GHG inventory report (or, if the reference year is the base-year under the Kyoto Protocol, in the report of the review of the initial report under the Kyoto Protocol) and total emissions in the reference year as reported by the country with projections (Table 1).



LIECHTENSTEIN

**Table 1. Summary of reported projections by sector and by gas in 2010 (Mt CO<sub>2</sub>-eq.)**

	Carbon dioxide			Methane			Nitrous oxide			F-gases			Total		
	Reference year	2010 WEM	2010 WAM	Reference year	2010 WEM	2010 WAM	Reference year	2010 WEM	2010 WAM	Reference year	2010 WEM	2010 WAM	Reference year	2010 WEM	2010 WAM
<b>Energy (excl. transport)</b>	0.140	0.148	NE	0.001	0.001	NE	0.000	0.000	NE	0.000	0.000	NE	0.141	0.149	NE
Energy supply	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Energy – industry, construction	0.063	0.067	NE	0.001	0.001	NE	0.000	0.000	NE	0.000	0.000	NE	0.063	0.068	NE
Energy – other (commercial, residential, agriculture)	0.077	0.081	NE	NE	0.000	NE	0.000	0.000	NE	0.000	0.000	NE	0.077	0.082	NE
<b>Transport (energy)</b>	0.088	0.090	NE	NE	0.000	NE	0.003	0.002	NE	0.000	0.000	NE	0.091	0.092	NE
<b>Industrial processes</b>	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
<b>Waste</b>	NO	NO	NE	NO	NO	NE	NO	NO	NE	0.000	0.000	NE	NO	NO	NE
<b>Agriculture</b>	NE	NE	NE	0.014	0.014	NE	0.005	0.005	NE	0.000	0.000	NE	0.019	0.018	NE
<b>Other</b>	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
<b>Total (excl. LULUCF)</b>	0.227	0.238	NE	0.015	0.015	NE	0.008	0.007	NE	0.000	0.000	NE	0.250	0.260	NE

**Key:**

Reference year: 1990

WEM: 'with existing measures' projection

WAM: 'with additional measures' projection

**Source:** Liechtenstein's 4NC, submitted in April 2006.

## LIECHTENSTEIN

**Table 2. Summary of projections by sector and by gas in 2010 compared to 1990 emissions (MtCO<sub>2</sub>-eq.)**

	Carbon dioxide			Methane			Nitrous oxide			F-gases			Total		
	1990	2010 WEM	2010 WAM	1990	2010 WEM	2010 WAM	1990	2010 WEM	2010 WAM	1990	2010 WEM	2010 WAM	1990	2010 WEM	2010 WAM
<b>Energy (excl. transport)</b>	0.126	0.136	NE	0.001	0.001	NE	0.000	0.000	NE	0.000	0.000	NE	0.127	0.137	NE
Energy supply	0.000	NE	NE	0.000	NE	NE	0.000	NE	NE	NA, NO	NE	NE	0.000	NE	NE
Energy – industry, construction	0.035	0.061	NE	0.000	0.001	NE	0.000	0.000	NE	NA, NO	0.000	NE	0.035	0.062	NE
Energy – other (commercial, residential, agriculture)	0.091	0.074	NE	0.000	0.000	NE	0.000	0.000	NE	NA, NO	0.000	NE	0.091	0.075	NE
<b>Transport (energy)</b>	0.075	0.083	NE	0.000	0.000	NE	0.001	0.002	NE	NA, NO	0.000	NE	0.076	0.085	NE
<b>Industrial processes</b>	0.000	NE	NE	0.000	NE	NE	0.000	NE	NE	0.000	NE	NE	0.000	NE	NE
<b>Waste</b>	0.000	NO	NE	0.001	NO	NE	0.001	NO	NE	NA, NO	0.000	NE	0.002	NO	NE
<b>Agriculture</b>	NE	NE	NE	0.012	0.013	NE	0.011	0.004	NE	NA, NO	0.000	NE	0.023	0.017	NE
<b>Other</b>	0.000	NE	NE	0.000	NE	NE	0.000	NE	NE	NA, NO	NE	NE	0.002	NE	NE
<b>Total (excl. LULUCF)</b>	0.202	0.218	NE	0.013	0.014	NE	0.013	0.006	NE	0.000	0.000	NE	0.230	0.238	NE

**Key:**

WEM: 'with existing measures' projection

WAM: 'with additional measures' projection

**Source:** Liechtenstein's 4NC, submitted in April 2006, and Annual greenhouse gas inventory 1990 - 2006, February 2008.

## LIECHTENSTEIN

**Table 3. Summary of projections by sector and by gas in 2010 compared to 1990 emissions (index 100 = 1990)**

	Carbon dioxide			Methane			Nitrous oxide			F-gases			Total		
	1990	2010 WEM	2010 WAM	1990	2010 WEM	2010 WAM	1990	2010 WEM	2010 WAM	1990	2010 WEM	2010 WAM	1990	2010 WEM	2010 WAM
<b>Energy (excl. transport)</b>	100	107.5	NE	100	168.8	NE	100	116.4	NE	100	0.0	NE	100	107.7	NE
Energy supply	100	NE	NE	100	NE	NE	100	NE	NE	100	NE	NE	100	NE	NE
Energy – industry, construction	100	173.9	NE	100	1595.3	NE	100	145.8	NE	100	0.0	NE	100	175.5	NE
Energy – other (commercial, residential, agriculture)	100	81.9	NE	100	130.7	NE	100	110.0	NE	100	0.0	NE	100	82.1	NE
<b>Transport (energy)</b>	100	109.8	NE	100	24.0	NE	100	336.9	NE	100	0.0	NE	100	110.8	NE
<b>Industrial processes</b>	100	NE	NE	100	NE	NE	100	NE	NE	100	NE	NE	100	NE	NE
<b>Waste</b>	100	NO	NE	100	NO	NE	100	NO	NE	100	0.0	NE	100	NO	NE
<b>Agriculture</b>	100	NE	NE	100	107.5	NE	100	38.8	NE	100	0.0	NE	100	74.5	NE
<b>Other</b>	100	NE	NE	100	NE	NE	100	NE	NE	100	NE	NE	100	NE	NE
<b>Total (excl. LULUCF)</b>	100	108.4	NE	100	101.7	NE	100	50.2	NE	100	0.0	NE	100	103.8	NE

**Key:**

WEM: 'with existing measures' projection

WAM: 'with additional measures' projection

**Source:** Liechtenstein's 4NC, submitted in April 2006, and Annual greenhouse gas inventory 1990 - 2006, February 2008.

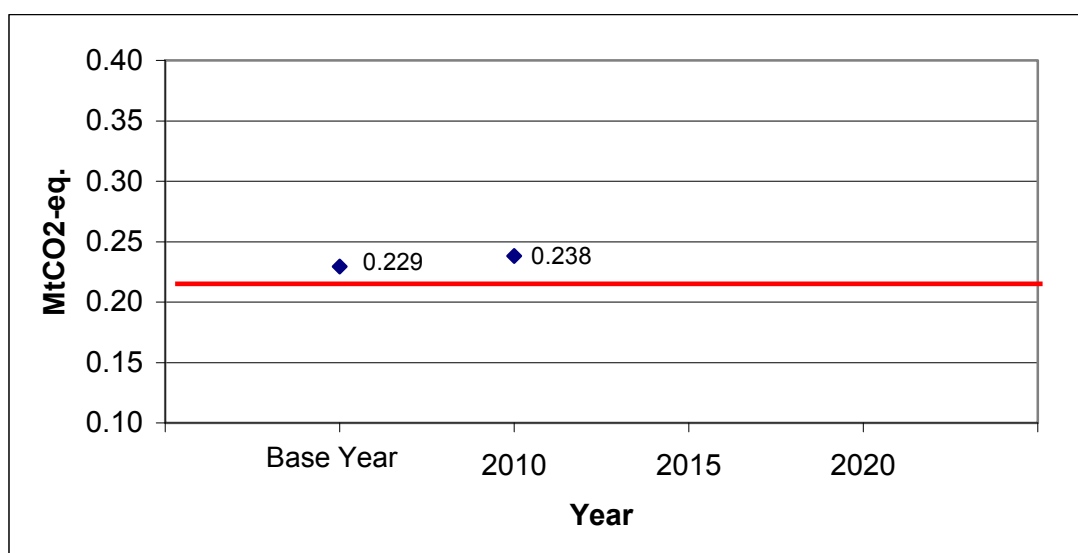
**Table 4. Summary of projections in 2010 compared to base year emissions under the Kyoto Protocol**

	Unit	Base-year emissions under the Kyoto Protocol	2010 projections 'with existing measures'	2010 projections 'with additional measures'
Total GHG emissions (excluding LULUCF)	Mt CO <sub>2</sub> -eq.	0.229	0.238	NE
	Index (base-year emissions = 100)	100	103.9	NE

**Source:** Liechtenstein's 4NC, submitted in April 2006, and Annual greenhouse gas inventory 1990 - 2006, February 2008.

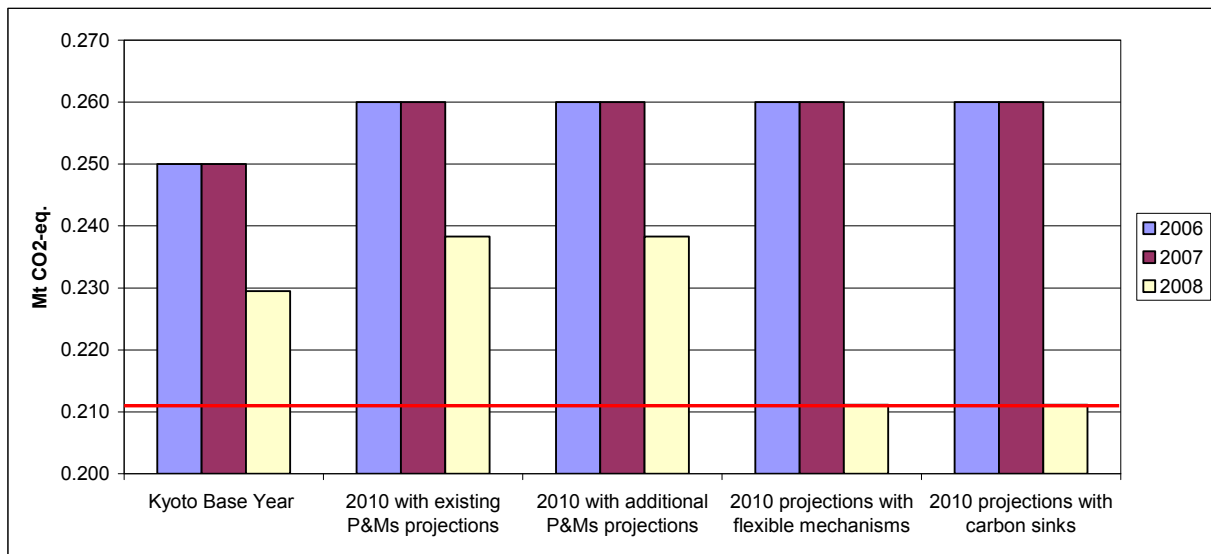
In Figure 1, the same correction factor used in Table 2 has been applied to the 2010 projection for the "with existing measures" scenario. 2015 and 2020 projections were not reported in Liechtenstein's 4NC or DPR.

The red lines in Figure 1 and 2 indicate the Kyoto target of 0.21 Mt CO<sub>2</sub>-eq.

**Figure 1. Greenhouse gas projections in 2010, 2015 and 2020 (Mt CO<sub>2</sub>-eq.)**

Source: Liechtenstein's 4NC, submitted in April 2006.



**Figure 2. Comparison of 2010 projections reported in 2006, 2007 and 2008**

Source: Liechtenstein's 4NC, submitted in April 2006.

In Figure 2 it should be noted that the same source (4NC) was used for the 2006, 2007 and 2008 Country Profiles and so the difference in Figure 2 between 2006/2007 and 2008 is the result of the correction factor applied in 2008 as well as the inclusion of Kyoto flexible mechanisms to meet the target.

Concerning the use of Kyoto mechanisms, Liechtenstein signed a Memorandum of Understanding (MoU) with a project developing agency from Switzerland. The MoU sets up the framework in which an Emission Reduction Purchase Agreement will be signed. In the National Climate Protection Strategy (September 2007) the Government of Liechtenstein established certain quality standards to ensure that projects to be financed will contribute to social and sustainable development. The Parliament of Liechtenstein has approved a budget of CHF 7'920'000 for the purchase of CERs and ERUs. The Government favours an engagement in developing countries, thus the purchase of credits generated by CDM projects.

### 3. CLIMATE CHANGE MITIGATION POLICIES AND MEASURES

Liechtenstein's 4NC outlines a range of existing policies and measures (PAMs) in the energy, transport, agriculture and forestry sectors. However as the expected emission reductions are only quantified for PAMs in the energy sector, it is difficult to draw conclusions about the relative contributions of different sectoral PAMs towards meeting Liechtenstein's Kyoto commitments.

**Table 5. Summary of the effect of policies and measures included in the 2010 projections (Mt CO<sub>2</sub>-eq.)**

	Top down calculation		Bottom Up calculation	
	Existing Measures	Planned Measures	Existing Measures	Planned Measures
<b>Energy (total, including transport)</b>	NE	NE	0.049	0.151
Energy supply	NE	NE	NE	NE
Energy – industry, construction	NE	NE	NE	NE
Energy – other (commercial, residential, agriculture)	NE	NE	NE	NE
<b>Transport (energy)</b>	NE	NE	NE	NE
<b>Industrial processes</b>	NE	NE	NE	NE
<b>Waste</b>	NE	NE	NE	NE
<b>Agriculture</b>	NE	NE	NE	NE
<b>Cross-sectoral</b>	NE	NE	NE	NE
<b>Total (excluding LULUCF)</b>	NE	NE	0.049	0.151

Note: The effects of measures detailed above are calculated firstly by determining the difference between total projections in each scenario ('top down calculation') and secondly by summing the reported effect of individual measures ('bottom up calculation'). Top down calculations were not possible for Liechtenstein as the 4NC provides only a "with existing measures" projection.

Source for bottom up calculation: Information provided by Liechtenstein's Office for Environmental Protection, July 2007 (see Tables 6 and 7).

### Detailed information on Existing Policies and measures

The expected emission reductions due to policies and measures are not quantified, either individually or by sector, in the 4<sup>th</sup> National Communication or Demonstrable Progress Report. However in July 2008 Liechtenstein's Office for Environmental Protection provided data for policies and measures adopted under the Climate Protection Strategy of March 2008. These data are summarized in Table 6.

**Table 6. Summary of the effect of existing policies and measures in 2010 (t CO<sub>2</sub>-eq.)**

Policies and measures	Effect (tCO <sub>2</sub> -eq.)
Restoration of old buildings	2000
Substitution of old buildings	185
Substitution of old combustion installations	400
Promotion of renewable energy	
- private households	300
- public buildings	900
Promotion of solar technology	1000
Promotion of natural gas as fuel subsidy	100
<b>TOTAL</b>	<b>4885</b>

Source: Personal communications, July 2008 (based on Climate Protection Strategy, March 2008).

In addition Liechtenstein provided the following table of existing (implemented and adopted) policies and measures on the occasion of the UNFCCC centralised review of the National Communication Report 4, May 2008.

## LIECHTENSTEIN

Policy / Measure	Goals / Approach	Affected climate gas	Type of instrument	Status	Responsible institution	Implementation indicators
a) Energy						
Energy Conservation Act	Promotion of heat insulation (renovation of old buildings), residential technical installations (room heating and non-potable warm water), solar energy (thermal solar collectors and photovoltaics), and demonstration facilities.	CO <sub>2</sub>	Fiscal measure (subsidy)	In force since 1996	Office of Economic Affairs	Substitution of approx. 850,000 liters of heating oil per year
Energy Efficiency Act	Aims for the reduction of energy, the intelligent and economic use of energy as well as the promotion of renewable energies.	CO <sub>2</sub>	Fiscal measure (subsidy)	April 2008: Adopted by parliament Coming into force: 1. June 2008 and displaces the Energy Conservation Act from 1996	Office of Economic Affairs	
Heating regulations	Heated outdoor areas and ramps, outdoor heating and warm air curtains, electric room heating, and other stationary resistance heating of over 3kW are prohibited. Heating costs calculated according to consumption. Periodic monitoring of ventilation systems.	CO <sub>2</sub>	Regulation	Implemented since 1993 New Energy Ordinance since 2003	Building and Fire Authority	
Heat insulation regulations	Buildings and installations must be planned as energy-efficient as possible (minimum insulation values), according to Ordinance / SIA Norm 380/1. If the building volume exceeds 2000 m <sup>3</sup> , the heating requirements may not exceed 80% of the SIA value.	CO <sub>2</sub>	Regulation	Implemented since 1993 New Energy Ordinance since 2003	Building and Fire Authority	
Minergy standard for State buildings	Requirement that all new State buildings be constructed according to the Minergy standard.	CO <sub>2</sub>	Regulation	Implementation since 2003	Building and Fire Authority	Energy savings of 30% per building
Supply requirements	Determination of energy supply areas with requirement to join a district heating network.	CO <sub>2</sub>	Planning measure	Implemented since 1995 (Energy Ordinance)	Building and Fire Authority	
Liechtenstein Energy Concept 2013	Reduction of CO <sub>2</sub> emissions through appropriate measures. The Minergy standard now includes a	CO <sub>2</sub>	Program	Adopted by the Government in 2004	Office of Economic Affairs	

## LIECHTENSTEIN

Policy / Measure	Goals / Approach	Affected climate gas	Type of instrument	Status	Responsible institution	Implementation indicators
	<p>subsidy, supplementing the Energy Conservation Act. Stronger promotion of heat insulation in old buildings and of photovoltaics.</p> <p>An additional measure is the construction of a biogas facility for the fermentation of biomass. The biogas generated will be refined to natural gas quality and used as fuel.</p>			Revision in process.		
Green electricity (LiStrom Öko)	Auditing (SQS) and certification (VUE) of all domestic production sites according to "naturemade" product mixture of renewable energy sources (drinking water power plants) and new renewable energy sources (photovoltaic systems).	CO <sub>2</sub>	Market-oriented supply, demand for ecological products (voluntary basis)	Since the beginning of 2004 (open-ended)	Liechtenstein Power Authority	
Promotion of photovoltaic systems of private owners	Through the sale of green electricity, the Liechtenstein Power Authority (LPA) pays 80 cents / kWh for energy generated from photovoltaic systems certified as "naturemade star" from 2004-2009.	CO <sub>2</sub>	Promotion by the LPA	Since the beginning of 2004		
Promotion of energy generated by systems for efficient energy production	The conveyance price for the energy volume for own use may be waived in the case of production systems based on renewable energies or systems for efficient energy use.	CO <sub>2</sub>	Electricity Market Act	In force since 2002		
Intelligent Energy Europe	Sustainable development in the field of energy, by making a balanced contribution to the attainment of the following general goals: energy supply security, competitiveness, and environmental protection.	CO <sub>2</sub>	EU program	Since 2003		
Energy Star (labeling program for energy-saving office appliances)	The Energy Star label has already attained international significance. Appliances with the Energy Star label have a competitive advantage compared with non-labeled appliances. In a simple way, the label provides information to the consumer on the energy efficiency of the appliances.	CO <sub>2</sub>	Agreement between the US and the EU	In force		

LIECHTENSTEIN

Policy / Measure	Goals / Approach	Affected climate gas	Type of instrument	Status	Responsible institution	Implementation indicators
	Reduction of CO <sub>2</sub> emissions by preventing unnecessary stand-by of electric appliances. Stand-by accounts for about 10% of energy use of appliances.					
Participation of municipalities in the Energy City label	Reduction of CO <sub>2</sub> emissions on the level of municipalities by increased use of renewable energies and high energy-efficient technologies for all premises.	CO <sub>2</sub> , precursor gases	Label	Award of the label to the first municipality (Triesen) 2007: two additional municipalities reached the requirements of the label (Schaan, Planken) 2008: Municipality of Balzers, Eschen, Mauren-Schaanwald, Ruggell and Vaduz in evaluation process		
Climate protection and energy platform, as part of the Environment Commission of the International Lake Constance Conference	Coordination, exchange of experiences, information	all	Data collection	2005: Status report on climate protection on Lake Constance, with recommendations for activities 2005: Guidelines with practical examples 2007: Status report on Impact on Climate Change and potential adaptation strategies 2008: Planned status report on renewable energies.	Office of Environmental Protection	
Elaboration of a hydrogeological map as a basis for using near-surface geothermal heat	Use of near-surface geothermal energy for heating purposes	CO <sub>2</sub> , precursor gases	Foundations	2005: Completion of the map In force since March 2006 Revision of Map in 2007 Amendment in force since April 2008	Office of Environmental Protection	
CO <sub>2</sub> Act	Implementation of ecological steering levy modeled by Switzerland, reduction of CO <sub>2</sub> emissions from fossil fuels and inducement for a economical use of energy and the	CO <sub>2</sub> , CH <sub>4</sub>	Steering levy	Enters into force during 2008	Office of Environmental Protection	

## LIECHTENSTEIN

Policy / Measure	Goals / Approach	Affected climate gas	Type of instrument	Status	Responsible institution	Implementation indicators
	use of renewable energies					
Steam Pipeline	Use of steam from waste incineration plant in Buchs (Switzerland) for manufacturing industry in Liechtenstein.	CO <sub>2</sub> ;	Planning measure	Start of construction: March 2008 Estimated completion date: spring 2009	Private	
Deep geothermy	Use of geological heat from deep thermal aquifers for electric power and heating.	CO <sub>2</sub> ;; precursor gases	Planning measure	Pilot study realized in early 2008. Further investigations planned for 2008/2009, 250 000 CHF has been budgeted	Office of Environmental Protection	
Hydro Power	Extension of share of hydropower	CO <sub>2</sub> ,	Planning measure	Planning phase for power plant Samina Planned coming into force: 2013	Liechtenstein Electric Power Company	
b) Transport						
Heavy Vehicle Fee	Relocation of goods transport from the road to railways, and reduction of transalpine road transport	CO <sub>2</sub> , precursor gases	Fiscal measure (internalization of external costs)	Implemented since 1.1.2001	Finance Administration	Expected reduction of 13.6-17.2% truck-kilometers 1/3 of revenue used for environment and transport
Promotion of solar, electric, natural gas, and/or hybrid vehicles	Vehicle tax waived for electric, natural gas, and/or hybrid vehicles	CO <sub>2</sub> , precursor gases	Fiscal measure	Implemented 1999	Driver and Vehicle Licensing Office	
Conversion from diesel buses to natural gas buses in public transport	Purchase of new natural gas buses	precursor gases (NO <sub>x</sub> , VOC, SO <sub>2</sub> )	Investment measure; Subsidy (using HFV funds)	Implemented 2001	Liechtenstein Bus Authority	Reduction of bus fleet emissions by approx. 40% (esp. NO <sub>x</sub> , VOC, SO <sub>2</sub> )
Subsidies of electric scooters and electric bicycles	Promotion of light electric vehicles used for personal transport instead of private automobiles.	CO <sub>2</sub> , precursor gases	Fiscal measure (subsidy)	Implemented 2002	Driver and Vehicle Licensing Office	
Construction and operation of a public natural gas fueling station	Infrastructure for providing fuel to private vehicles	CO <sub>2</sub>	Investment measure; Infrastructure measure	Implemented since 2001	Building and Fire Authority Bureau of Energy Consumption and Conservation	Approx. 20% fewer CO <sub>2</sub> emissions with a natural gas engine than with a petrol engine
Supply of biogas into the natural gas fueling station	Supply of CO <sub>2</sub> -free fuel for the natural gas fueling station	CO <sub>2</sub> , precursor	Investment measure; Infrastructure measure	Planned beginning 2006/07 Two evaluations in	Building and Fire Authority; Bureau of	

**LIECHTENSTEIN**

Policy / Measure	Goals / Approach	Affected climate gas	Type of instrument	Status	Responsible institution	Implementation indicators
		gases		progress: 2008	Energy Consumption and Conservation; Office of Environmental Protection	
Design of motor vehicle tax according to specific CO <sub>2</sub> emission	Incentive system for purchase of private vehicles with lower CO <sub>2</sub> emissions	CO <sub>2</sub>	Law, Fiscal measure	Planned beginning 2007 First draft realized in March 2008 Start of consultation process: 2008 Planned coming into force: 2009/2010	Driver and Vehicle Licensing Office Office of Environmental Protection	
Promotion of public transport	Establishment of the Liechtenstein Bus Authority and introduction of the "Liechtenstein Takt" regional train schedule	CO <sub>2</sub> , precursor gases	Institutional measure	Implemented since 2000	Finance Administration	
Exhaust regulations	Adoption of the European exhaust regulations (EURO norms) Fuel regulations	precursor gases	Regulation	Ongoing (since 1993)	Driver and Vehicle Licensing Office	Continuous reduction of all road traffic emissions
Promotion of slow transport	The bicycle and pedestrian network is being expanded continuously and made more attractive.	CO <sub>2</sub> , precursor gases	Institutional measure	Ongoing	Ministry of Transport and Telecommunications, Office of Civil Engineering	
Zoning requirements	Limitation of the number of parking spaces for construction projects, where justified by municipal or national planning.	CO <sub>2</sub> , precursor gases	Regulation	Implemented since 2003	Building and Fire Authority	
Internal Mobility Management for State Authorities	Efficient and environmentally suitable improvement of traffic volume by increased usage of public transport and bicycle	CO <sub>2</sub> , precursor gases	Institutional measure	In fore since 2008	Ministry of Transport and Telecommunications Finance Administration	
c) Stationary facilities and waste						
Emissions regulations	Emissions regulations for stationary facilities (heating, industry)	CO <sub>2</sub> , precursor gases	Regulation	Implemented since 1987 Revised 1992 and 2005	Office of Environmental Protection	
Emissions Trading Act	Implementation of Directive 2003/87/EC	CO <sub>2</sub> ;	Law	Implemented since 2008	Office of Environmental Protection	
Waste removal regulations in construction	Waste management: disposal concept and proof of recycling must	CH <sub>4</sub> , CO <sub>2</sub>	Regulation	Implemented 1993, (Ordinance on the	Building and Fire Authority	



## LIECHTENSTEIN

Policy / Measure	Goals / Approach	Affected climate gas	Type of instrument	Status	Responsible institution	Implementation indicators
	be provided before construction begins.			Construction Act)		
d) Agriculture						
Ecological equalization payments in agriculture	Product-independent contributions for conversions to ecological cultivation methods	CH <sub>4</sub> , N <sub>2</sub> O	Fiscal measure (direct payments)	Implemented since 1996	Office of Agriculture	Ecological Performance Certificate
Preservation of soil for agricultural use	Agriculture: permanent protection of soil for agricultural use from misuse	CH <sub>4</sub> , N <sub>2</sub> O	Regulation	Implemented since 1992	Office of Agriculture	
Water Protection Act	Cap on maximum number of cattle per land area	CH <sub>4</sub> , N <sub>2</sub> O	Regulation	Implemented since 2003	Office of Environmental Protection	
e) Planning						
Foundations for a register	Establishment of a national energy register	CO <sub>2</sub>	Planning measures	Planned starting 2002	Building and Fire Authority	
National guidance plan	Coordinated and sustainable development of the living and economic area of Liechtenstein on an inter-municipal and cross-border scale.	---	Planning measure, regulations, binding on State authorities	Planned (consultations beginning of 2006, adoption end of 2006)	Office of Land Use Planning	
f) Forests						
Cultivation regulations in the Forestry Act	Sustainable cultivation of forests	CO <sub>2</sub> (sinks)	Regulation	Implemented 1991	Office of Forests, Nature and Land Management	National Forest Inventory 1998
Ordinance on the scope and benefits of compensation and financial aid in the framework of the Forestry Act	Performance target	CO <sub>2</sub> (sinks)	Regulation	Implemented 1995	Office of Forests, Nature and Land Management	National Forest Inventory 1998
Ordinance on forest reserves and protected areas	Performance target	CO <sub>2</sub> (sinks)	Regulation	Implemented 2000	Office of Forests, Nature and Land Management	National Forest Inventory 1998
Forest Inventory 1998 and National Forest Program (2002-2012)	Binding specifications for future use of forests; development of a Forest Inventory 2010	CO <sub>2</sub> (sinks)	Planning measure, Regulations	Implemented 2001	Office of Forests, Nature and Land Management	
FSC certification of the entire forest stock	Performance target	CO <sub>2</sub> (sinks)	Operational planning	Implemented 2001	Office of Forests, Nature and Land Management; Forestry operations	Certification report
g) Comprehensive Measures						

## LIECHTENSTEIN

Policy / Measure	Goals / Approach	Affected climate gas	Type of instrument	Status	Responsible institution	Implementation indicators
Climate Protection Strategy	Definition of a clear and transparent strategy for climate policy in Liechtenstein with 10 precise action fields and measures to fulfill the requirements according to the Kyoto protocol	CO <sub>2</sub>	Planning measure	In force since 2007	Government of Liechtenstein	
Action Plan Air	Measure plan according to the Air Pollution Control Act to reduce or remove all kind of emissions	all	Planning measure	In force since 2007	Office of Environmental Protection	

Source: "Review 08 list of measures", update on policies and measures submitted to the UNFCCC in May 2008.

**Table 7. Detailed information on Planned Policies and measures**

Sector	Name	Type	GHG	Estimated savings (tCO <sub>2</sub> -eq.)		Costs (EUR/t)
				2010	2020	
Energy	Biogas Plant	Renewable Energy	Methane	400	1000	
Energy	Deep Geothermy	Renewable Energy	CO <sub>2</sub> , precursor gases		tbd	
Transport	CO <sub>2</sub> based Tax on vehicles	Financial Measure	CO <sub>2</sub>	tbd	tbd	
	Internal Mobility Management			1000		
	Steam Pipeline			11200		
	CO <sub>2</sub> Steering Levy		CO <sub>2</sub>	2500		

Source: Personal communications, July 2008 (based on Climate Protection Strategy, March 2008).

## 4. METADATA

### Sources of information

Liechtenstein's Fourth National Communication submitted to the UNFCCC, 2005 (submitted 7 April 2006).

Liechtenstein's Report on Demonstrable Progress under Article 3.2 of the Kyoto Protocol submitted to the UNFCCC, 2005 (submitted 25 September 2006).

Liechtenstein's Annual greenhouse gas inventory 1990 - 2006 and inventory report, 29 February 2008.

Base-year emissions from the UNFCCC website,  
[http://unfccc.int/ghg\\_data/kp\\_data\\_unfccc/base\\_year\\_data/items/4354.php](http://unfccc.int/ghg_data/kp_data_unfccc/base_year_data/items/4354.php)

National Climate Strategy for Liechtenstein, September 2007.

"CDM Highlights 52", monthly newsletter of the German GTZ Climate Protection Programme, September 2007.

"Review 08 list of measures", update on policies and measures submitted to the UNFCCC in May 2008.

Personal communications from Liechtenstein's Office for Environmental Protection, July 2007, June and July 2008.

### Kyoto base-year emissions

Kyoto base-year emissions are presented throughout, except Table 1 which presents projections reference year emissions (see below). Kyoto base year emissions of greenhouse gases were calculated using 1990 emissions for carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O) and fluorinated gases (SF<sub>6</sub>, HFCs and PFCs).

Kyoto base-year emissions have now been reviewed and set for all EEA countries.

### Projections reference year emissions

Projections reference year emissions are presented in Table 1.

Projections reference year emissions are defined as projections-consistent emissions data for a given historic year, as chosen by the Member State. Inventory recalculations from year to year may mean that latest inventory data cannot be compared with projections based on older inventory data. Where such an inconsistency has arisen, MS projections have been corrected by applying the following formula, in Table 2:

Corrected projection = reported projections \* latest inventory total GHG emissions / Table 1 reported total GHG emissions for the same reference year

## Quality of Reporting

National reporting in the sources detailed above was assessed semi-qualitatively. Scoring was attributed according to the level of detail and clarity: from 0 (representing not reported) to +++ (representing very detailed and/or clear reporting). Guidance used for this assessment included the reporting requirements laid down in the UNFCCC reporting guidelines for national communications available in English, French, Spanish ("Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications - FCCC/CP/1999/7").

The following tables detail reporting considered to be best practice for the purposes of this assessment.

Information provided	Example of good practice
Policy names	Clear names and description provided with unique identifier.
Objectives of policies	Good description of objectives
Types of policies	Type of policy instrument specified e.g. regulatory, fiscal
Which greenhouse gases?	Specifies which gases each PAM affects
Status of Implementation	Clear for each PAM: planned, adopted, implemented, expired
Implementation body	Clear which authorities are responsible for implementation
Quantitative assessment of emission reduction effect and cost of policies	Almost all PAMs are actually quantified. Total effect of all PAMs specified. WOM projection provided.
Interaction with other national and EU level policies	Detailed discussion and analysis of policy interactions.
Measures implementing community legislation	Report details which national policies are implementing individual pieces of EU legislation.
Arrangements for flexible mechanisms	Details arrangements for use of flexible mechanisms.
Balance between domestic action and flexible mechanisms	Regarding reductions required to meet Kyoto target, details proportion to result from domestic action and flexible mechanisms.

Category of Information	Example of good practice
Projection scenarios	"With existing measures" and "with additional measures" projections required, "without measures projection" optional.
Policies included in each projection	Clear presentation of the policies included in each projections scenario.
Expressed relative to historic reference year data	Projections are presented alongside consistent historic emissions.
Starting year	Starting year and emissions used as basis for projections is detailed.
Split of projections	Projection split by all 6 gases (or F-gases together), all sectors and years
Presentation of results	Clear, both tables and graphs provided and/or used excel reporting template.

LIECHTENSTEIN

Description of methodologies	Description of approach, model and assumptions
Sensitivity analysis	Was an analysis carried out to determine the sensitivity of projections to variance in the input parameters? Are high medium and low scenarios presented?
Discussion of uncertainty	Is an uncertainty range for the projections provided?
Details of parameters and assumptions	Are parameters as required under Monitoring Mechanism 280/2004/EC reported?
Indicators for projections	Are indicators for projections as required under Monitoring Mechanism 280/2004/EC reported?

**Table 8. Information provided on policies and Kyoto flexible mechanisms**

Information provided	Level of information provided	Comments
Policy names	+++	Clear names given
Objectives of policies	+++	Good description of objectives
Types of policies	+++	Types specified
Which greenhouse gases?	+++	Specifies which gases are affected by each PAM
Status of Implementation	+++	Clear for each PAM: implemented or planned
Implementation body	+++	Responsible authorities specified for nearly every PAM
Quantitative assessment of emission reduction effect and cost of policies	+	Limited quantification of PAMs in energy sector; indication of overall effect from graph of the effect of PAMs in DPR ("without measures" minus "with existing measures").
Interaction with other national level policies	0	Not discussed.
Arrangements for flexible mechanisms	++	No flexible mechanisms included in the 4NC/DPR. Some description of arrangements in subsequent documents.
Balance between domestic action and flexible mechanisms	++	Government has indicated priority for domestic action rather than flexible mechanisms, but balance is not explicitly stated.

**Table 9. Information provided on projections**

Category of Information	Level of information provided	Comments
Projection scenarios	++	"With existing measures". "Without measures" shown in graph of effect of PAMs/total GHG emissions in the DPR, but no values provided. Discussion of planned PAMs but no quantification or "with additional measures" projections.
Policies included in each projection	++	No WAM scenario so assume all policies are included in WEM.
Expressed relative to base year	+++	Relative to 1990 base year

## LIECHTENSTEIN

Starting year	2004	
Split of projections	++	By gas (CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O) and sector (industry; transport; residential, institutional, commercial; agriculture; waste). Projections in the year 2010 only.
Presentation of results	+++	Clear, with both tables and graphs; however values (numbers) used in the graph of the effect of PAMs were not provided.
Description of methodologies (approach, model and assumptions)	+	Some description; refers the reader to the Swiss 4NC for more detail.
Sensitivity analysis	0	Not reported
Discussion of uncertainty	0	Not reported
Details of parameters and assumptions	+	Outlines the main modelling parameters/assumptions.
Indicators for projections	0	Not provided

Parameters for projections are presented in Table 10.

**Table 10. Parameters for Projections**

<b>1. Mandatory parameters on projections</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>Units</b>
<b>Assumptions for general economic parameters</b>					
GDP (value at given years or annual growth rate and base year)	4335.9	4874.6	-	-	Mio CHF
Population (value at given years or annual growth rate and base year)	34,600				
International coal prices at given years in euro per tonne or GJ (Gigajoule)					
International oil prices at given years in euro per barrel or GJ					
International gas prices at given years in euro per m3 or GJ					
<b>Assumptions for the energy sector</b>					
Total gross inland consumption (PJ) (split by oil, gas, coal, renewables, nuclear, other)	1,373,526				MWh
Total electricity production by fuel type (oil, gas, coal, renewables, nuclear, other)	90,398				MWh
Energy demand by sector split by fuel (delivered)					
Assumptions on weather parameters, especially heating or cooling degree days					
<b>Assumptions for the industry sector</b>					
<i>For Member States using macroeconomic models:</i>					
The share of the industrial sector in GDP and growth rate					
<i>For Member States using other models:</i>					
The production index for industrial sector					
<b>Assumptions for the transport sector</b>					
<i>For Member States using macroeconomic models:</i>					
The growth of transport relative to GDP					
<i>For Member States using other models:</i>					
The growth of passenger person kilometres					
The growth of freight tonne kilometres					
<b>Assumptions for buildings (in residential and commercial or tertiary sector)</b>					
<i>For Member States using macroeconomic models:</i>					
The level of private consumption (excluding private transport)					
The share of the tertiary sector in GDP and the growth rate					
<i>For Member States using other models:</i>					
The rate of change of floor space for tertiary buildings and dwellings					
The number of dwellings and number of employees in the tertiary sector					
<b>Assumptions in the agriculture sector</b>					
<i>For Member States using macroeconomic models:</i>					
The share of the agriculture sector in GDP and relative growth					
<i>For Member States using other models:</i>					
Livestock numbers by animal type (for enteric fermentation beef, cows, sheep, for manure management pigs and poultry)					
The area of crops by crop type					
Emissions factors by type of livestock for enteric fermentation and manure management (t)					
<b>Assumptions in the waste sector</b>					
Waste generation per head of population or tonnes of municipal solid waste					

## LIECHTENSTEIN

The organic fractions of municipal solid waste					
Municipal solid waste disposed to landfills, incinerated or composted (in tonnes or %)					
<b>Assumptions in the forestry sector</b>					
Forest definitions					
Areas of:					
managed forests					
unmanaged forests					

<b>2. Recommended parameters on projections</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>Units</b>
<b>Assumptions for general economic parameters</b>					
GDP growth rates split by industrial sectors in relation to 2000					
Comparison projected data with official forecasts					
<b>Assumptions for the energy sector</b>					
National coal, oil and gas energy prices per sector (including taxes)					
National electricity prices per sector as above (may be model output)					
Total production of district heating by fuel type					
<b>Assumptions for the industry sector</b>					
Assumptions fluorinated gases:					
Aluminium production and emissions factors					
Magnesium production and emissions factors					
Foam production and emissions factors					
Stock of refrigerant and leakage rates					
<i>For Member States using macroeconomic models:</i>					
Share of GDP for different sectors and growth rates					
Rate of improvement of energy intensity (1990 = 100)					
<i>For Member States using other models:</i>					
Index of production for different sectors					
Rate of improvement or index of energy efficiency					
<b>Assumptions for buildings (in residential and commercial / tertiary sector)</b>					
<i>For Member States using macroeconomic models:</i>					
Share of tertiary and household sectors in GDP					
Rate of improvement of energy intensity					
<i>For Member States using other models:</i>					
Number of households					
Number of new buildings					
Rate of improvement of energy efficiency (1990 = 100)					
<b>Assumptions for the transport sector</b>					
<i>For Member States using econometric models:</i>					
Growth of transport relative to GDP split by passenger and freight					
Improvements in energy efficiency split by vehicle type					
Improvements in energy efficiency split by vehicle type, whole fleet/new cars					
Rate of change of modal split (passenger and freight)					
Growth of passenger road kilometres					
Growth of passenger rail kilometres					
Growth of passenger aviation kilometres					
Growth of freight tonne kilometres on road					
Growth of freight tonne kilometres by rail					



## LIECHTENSTEIN

Growth of freight tonne kilometres by navigation					
<b>Assumptions for the agriculture sector</b>					
<i>For Member States using econometric models:</i>					
Agricultural trade (import/export)					
Domestic consumption (e.g. milk/beef consumption)					
<i>For Member States using other models:</i>					
Development of area of crops, grassland, arable, set-aside, conversion to forests etc					
Macroeconomic assumptions behind projections of agricultural activity					
Description of livestock (e.g. by nutrient balance, output/animal production, milk production)					
Development of farming types (e.g. intensive conventional, organic farming)					
Distribution of housing/grazing systems and housing/grazing period					
Parameters of fertiliser regime:					
Details of fertiliser use (type of fertiliser, timing of application, inorganic/organic ratio)					
Volatilisation rate of ammonia, following spreading of manure on the soil					
Efficiency of manure use					
Parameters of manure management system:					
Distribution of storage facilities (e.g. with or without cover):					
Nitrogen excretion rate of manures					
Methods of application of manure					
Extent of introduction of control measures (storage systems, manure application), use of best available techniques					
Parameters related to nitrous oxide emissions from agricultural soils					
Amount of manure treatment					