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PRINCIPALITY OF LIECHTENSTEIN

# *Liechtenstein's Biennial Report 2*

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# *Liechtenstein's Biennial Report 2*

**January 2016**


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# 1. Introduction

With the adoption of the Paris agreement on December 12, 2015 Parties to the UNFCCC have agreed on a clear response towards climate change including a unified system for transparency. That transparency system has to be built on the existing framework for monitoring and reporting. The Government of Liechtenstein is pleased to present its second Biennial Report (BR2). This reporting obligation has been introduced in 2010 at the 16. Conference of the Parties to the United Nations Framework Convention on Climate Change (COP) 2010 in Cancun, Mexico.

The Biennial Report complements the existing national reports "GHG Inventory" and "National Communication", especially by putting a focus on achieved progress with regard to pledged reduction targets of Annex I parties within a 2 year time frequency.

Liechtenstein's second Biennial Report follows the UNFCCC biennial reporting guidelines for developed country Parties as agreed at COP 17 in 2011 in Durban, South Africa (FCCC/CP/2011/9/Add.1, Annex I).
The report provides information on Liechtenstein's

- greenhouse gas emission and trends,
- quantified economy-wide emission reduction target,
- progress in achievement of quantified economy-wide emission reduction targets and relevant information,
- projections,
- provisions of financial, technological and capacity-building support to developing country Parties.

Liechtenstein's First Biennial Report was prepared as Annex to Liechtenstein's Sixth National Communication. Due to the fact that both reports have to be submitted by 1st of January 2014 and considering the overlap of some information to be reported according to the respective guideline, Liechtenstein decided to refer to the respective section of its Sixth National Communication in those cases, where such overlap would occur within the Biennial Report.
Liechtenstein qualifies that approach as justified since it corresponds to the ratio of the UNFCCC Guidelines for the technical review of biennial reports from Parties included in Annex I to the Convention (Part IV) especially under paragraph 63 (d) as it states:
"The individual review will (…) serve as part of the review of the NC, where there is an overlap between the content of the BR and that of the NC."
This approach is now adjusted by submission of Liechtenstein's second Biennial Report as an independent report.
Liechtenstein's second Biennial Report has been prepared by:

Office of Environment Liechtenstein
Environmental Protection Division and the Legal and International Affairs Division
P.O. Box 684, 9490 Vaduz, Liechtenstein.

# 2. Information on GHG emissions and trends

**Summary from Liechtenstein's latest greenhouse gas inventory**

In 2013, Liechtenstein emitted 236.5 kt (kilotonnes) $CO_2$ equivalents (excluding LULUCF) to the atmosphere corresponding to 6.4 tonnes $CO_2$ equivalent per capita. About 80 % of all greenhouse gas emissions were caused by energy-related processes. Emissions within this sector are distributed as follows: 41.4 % by Transport, 12.9 % by Manufacturing Industries and Construction, and 43.5 % "Other sectors" (Residential, Institutional, and Commercial combustion). Compared to 1990, the emissions have decreased by 1.9 % in this sector and overall increased by 3.1 % (excluding LULUCF).

Carbon dioxide emissions ($CO_2$) account for 205.95 kt and for 82.3 % of total emissions in 2013. 43.5 % of these $CO_2$ emissions occur in in "Other sectors", 41.4 % in the Transport sector and 12.9% in Manufacturing Industries and Construction.

Methane emissions ($CH_4$) in 2013 amount to 0.77 kt – corresponding 19.2 kt $CO_2$ eq - and mainly occur in the Agriculture sector (83 %). Compared to 1990, methane emissions have increased by 0.4 %. The share of methane on the overall Greenhouse gas emissions (in $CO_2$ equivalent) is 8.1 %.

Nitrous oxide emissions ($N_2O$) in 2013 amount to 0.4 kt – corresponding 10.65 kt $CO_2$ eq - and arise primarily from Agriculture (77 %) with additional minor contribution from Transport (4.9 %) and Waste (11.8 %). The share of $N_2O$ on the overall GHG emissions (in $CO_2$ equivalent) is 4.3 %.

**National Inventory Arrangements**

The Government of Liechtenstein bears the overall responsibility for the National Inventory System (NIS). By Liechtenstein's Emission Trading Act, the Office of Environment (OE) is in charge of emission inventories and therefore also responsible for all aspects concerning the compilation of the NIS under the UN Framework Convention on Climate Change (UNFCCC) and under the Kyoto Protocol. The responsibility by OE for compiling the NIS is also described in the report of the Government to the parliament when the Kyoto Protocol was ratified. The Government mandated the realisation of the NIS to its Office for the Environment (OE). Please note that the Office for the Environment is reorganized since 2013. The Office of Agriculture (OA), the Office of Forest, Nature and Land Management (OFNLM) and the Office of Environmental Protection (OEP) have been merged to the Office for the Environment (OE).

The Office of Economic Affairs (OEA) and the Office of Land Use Planning (SLP) participate directly in the compilation of the inventory. Several other administrative and private institutions are involved in inventory preparation.

The Office for the Environment (OE) plays a major role in the National Inventory System and is acting as the National Registry Administrator. Its representative, the head of the OE, is the registered National Focal Point. He also coordinates in cooperation with the responsible head of the unit the data flow from the governmental data suppliers to the Inventory Group

## 2.1 Summary Tables

Summary tables of the national greenhouse gas inventory in the common reporting format are provided in Annex I.

## 2.2 Trends in greenhouse gas emissions and removals (1990-2013)

### 2.2.1 Aggregated greenhouse gas emissions 2013

In 2013, Liechtenstein emitted 236.5 kt $CO_2$ equivalent, or 0.0064 kt $CO_2$ equivalent per capita ($CO_2$ only: 0.0052 kt per capita) to the atmosphere excluding emissions and removals from sector 4 Land use, land-use change and forestry (LULUCF). At the beginning of the first compliance period (Kyoto) in 2008, the per capita emissions were 0.0071 kt. The emissions declined by 10.1% since 2008. Among the different greenhouse gases, $CO_2$ accounts for the largest share of total emissions. The most important sources of emissions are fuel combustion activities in the Energy sector. Table 2-1 shows the emissions for individual gases and sectors in Liechtenstein for the year 2013. Emissions of $CH_4$ and $N_2O$ originated mainly from the sector Agriculture, and the F-gas emissions originated by definition from the sector 2 Industrial processes and product use.

Table 2-1 Summary of Liechtenstein's GHG emissions in 2013 by gas and sector in $CO_2$ equivalent (kt). Numbers may not add to totals due to rounding.

| **Emissions 2013** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **HFCs** | **PFCs** | **$SF_6$** | **Total** |
|---|---|---|---|---|---|---|---|
| | **$CO_2$ equivalent (kt)** | | | | | | |
| 1 Energy | 194.6 | 2.2 | 0.9 | 0.0 | 0.0 | 0.0 | 197.8 |
| 2 IPPU | NO | NO | 0.2 | 12.2 | 0.1 | 0.2 | 12.7 |
| 3 Agriculture | 0.0 | 16.0 | 7.9 | 0.0 | 0.0 | 0.0 | 23.9 |
| 5 Waste | 0.0 | 1.0 | 1.2 | 0.0 | 0.0 | 0.0 | 2.3 |
| **Total (excluding LULUCF)** | **194.7** | **19.2** | **10.2** | **12.2** | **0.1** | **0.2** | **236.5** |
| 4 LULUCF | 11.3 | NO | 0.5 | 0.0 | 0.0 | 0.0 | 11.7 |
| **Total (including LULUCF)** | **206.0** | **19.2** | **10.6** | **12.2** | **0.1** | **0.2** | **248.3** |
| *International Bunkers* | *1.1* | *0.0* | *0.0* | *0.0* | *0.0* | *0.0* | *1.1* |

A breakdown of Liechtenstein's total emissions by gas is shown in Figure 2-1 below. Figure 2-2 is a bar chart of contributions to GHG emissions by gas and sector.

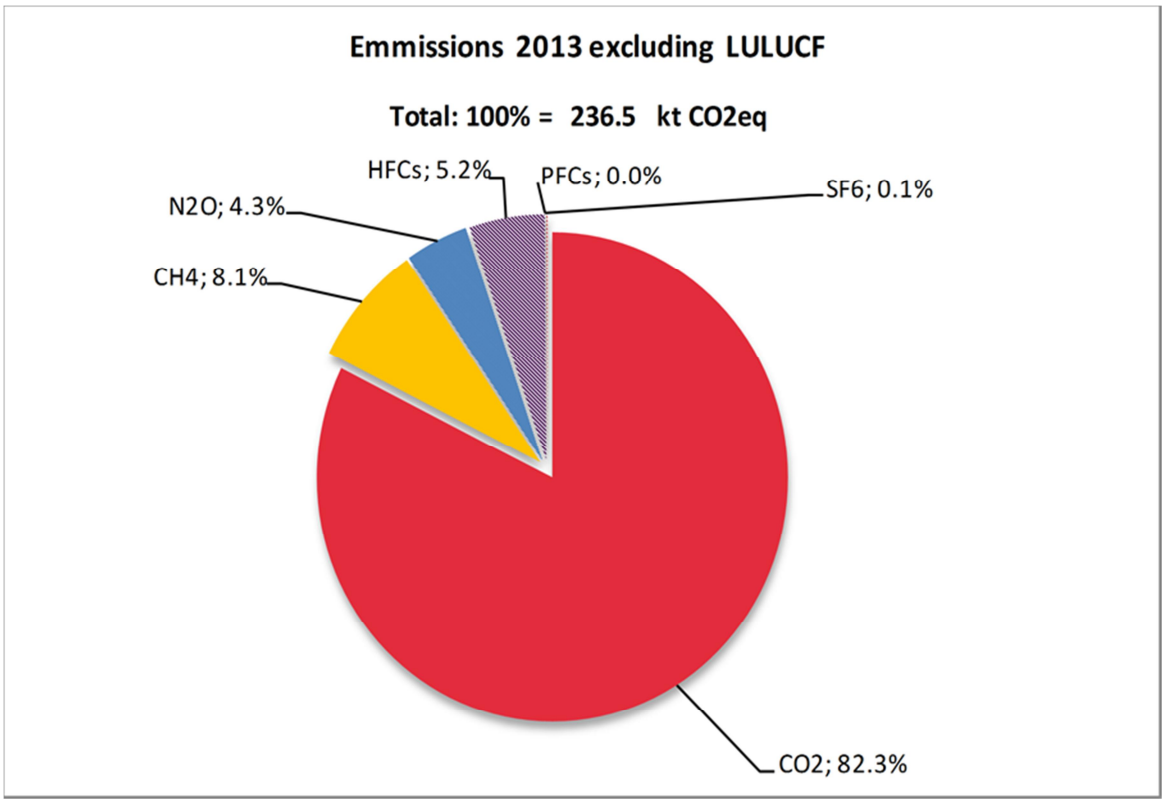


Figure 2-1 Liechtenstein's GHG emissions by gases excluding LULUCF emissions in 2013.

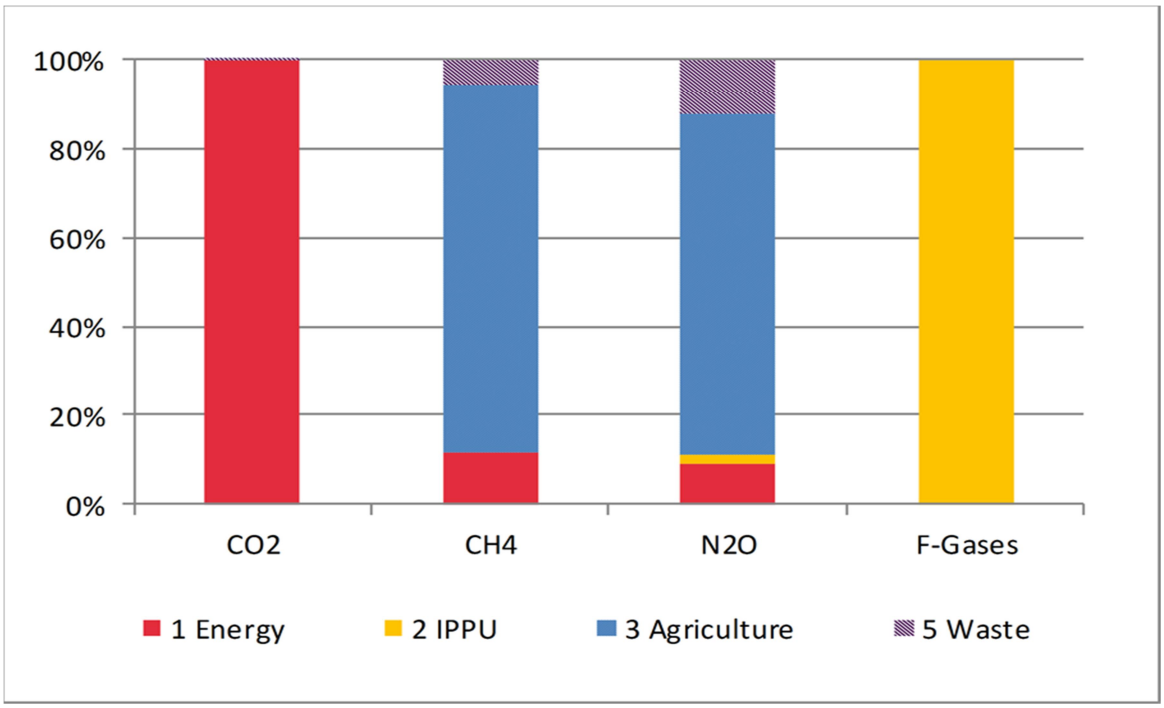


Figure 2-2 Relative contributions of the individual sectors (excluding LULUCF) to GHG emissions in 2013.

### 2.2.2 Emission trends by gas

Emission trends 1990–2013 by gas are summarised in Table 2-2 and in Figure 2-3.

Table 2-2 Summary of Liechtenstein's GHG emissions in $CO_2$ equivalent (kt) by gas, 1990-2013. The last column shows the percentage change in emissions in 2013 as compared to the base year 1990.

| Greenhouse Gas Emissions | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
|---|---|---|---|---|---|---|---|---|---|---|
| | $CO_2$ equivalent (kt) | | | | | | | | | |
| $CO_2$ emissions including net $CO_2$ from LULUCF | 203.6 | 213.8 | 214.3 | 222.9 | 209.4 | 211.7 | 214.0 | 227.2 | 237.9 | 236.7 |
| $CO_2$ emissions excluding net $CO_2$ from LULUCF | 199.3 | 206.6 | 207.2 | 215.4 | 201.4 | 204.5 | 206.2 | 218.7 | 229.6 | 228.5 |
| $CH_4$ emissions including $CH_4$ from LULUCF | 19.1 | 19.0 | 18.6 | 17.7 | 17.9 | 17.7 | 18.1 | 17.8 | 17.6 | 17.0 |
| $CH_4$ emissions excluding $CH_4$ from LULUCF | 19.1 | 19.0 | 18.6 | 17.7 | 17.9 | 17.7 | 18.1 | 17.8 | 17.6 | 17.0 |
| $N_2O$ emissions including $N_2O$ from LULUCF | 11.3 | 11.6 | 11.5 | 11.2 | 11.1 | 11.1 | 11.0 | 11.0 | 10.8 | 10.6 |
| $N_2O$ emissions excluding $N_2O$ from LULUCF | 10.9 | 11.3 | 11.2 | 10.8 | 10.8 | 10.8 | 10.7 | 10.6 | 10.5 | 10.3 |
| HFCs | 0.0 | 0.0 | 0.1 | 0.2 | 0.5 | 1.4 | 1.7 | 2.1 | 2.7 | 3.3 |
| PFCs | NO | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| $SF_6$ | NO | NO | NO | NO | NO | NO | NO | NO | NO | 0.0 |
| **Total (including LULUCF)** | 234.0 | 244.3 | 244.4 | 252.0 | 238.9 | 241.9 | 244.9 | 258.1 | 269.1 | 267.7 |
| **Total (excluding LULUCF)** | 229.4 | 236.9 | 237.1 | 244.1 | 230.6 | 234.4 | 236.8 | 249.3 | 260.5 | 259.1 |

| Greenhouse Gas Emissions | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|
| | $CO_2$ equivalent (Gg) | | | | | | | | | |
| $CO_2$ emissions including net $CO_2$ from LULUCF | 229.8 | 228.8 | 233.9 | 243.6 | 242.9 | 242.2 | 242.7 | 212.6 | 231.6 | 222.6 |
| $CO_2$ emissions excluding net $CO_2$ from LULUCF | 221.8 | 219.4 | 224.2 | 233.4 | 233.3 | 232.8 | 234.3 | 203.9 | 222.7 | 208.3 |
| $CH_4$ emissions including $CH_4$ from LULUCF | 16.8 | 17.4 | 17.7 | 17.9 | 17.9 | 18.6 | 19.3 | 19.8 | 20.1 | 19.8 |
| $CH_4$ emissions excluding $CH_4$ from LULUCF | 16.8 | 17.4 | 17.7 | 17.9 | 17.9 | 18.6 | 19.3 | 19.8 | 20.1 | 19.8 |
| $N_2O$ emissions including $N_2O$ from LULUCF | 10.5 | 10.6 | 10.6 | 10.6 | 10.3 | 10.5 | 10.7 | 10.8 | 10.8 | 10.7 |
| $N_2O$ emissions excluding $N_2O$ from LULUCF | 10.2 | 10.3 | 10.3 | 10.3 | 10.0 | 10.1 | 10.3 | 10.4 | 10.4 | 10.3 |
| HFCs | 4.1 | 4.9 | 5.5 | 6.1 | 7.0 | 7.4 | 7.9 | 8.6 | 9.5 | 9.6 |
| PFCs | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| $SF_6$ | 0.1 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.1 | 0.1 | 0.3 | 0.1 |
| **Total (including LULUCF)** | **261.3** | **261.9** | **268.0** | **278.5** | **278.5** | **279.1** | **280.8** | **252.0** | **272.4** | **262.9** |
| **Total (excluding LULUCF)** | **252.9** | **252.2** | **257.9** | **267.9** | **268.5** | **269.2** | **271.9** | **242.9** | **263.1** | **248.2** |

| Greenhouse Gas Emissions | 2010 | 2011 | 2012 | 2013 | 1990-2013 |
|---|---|---|---|---|---|
| | $CO_2$ equivalent (Gg) | | | | % |
| $CO_2$ emissions including net $CO_2$ from LULUCF | 207.8 | 190.4 | 199.2 | 206.0 | 1.2% |
| $CO_2$ emissions excluding net $CO_2$ from LULUCF | 193.5 | 179.3 | 187.9 | 194.7 | -2.3% |
| $CH_4$ emissions including $CH_4$ from LULUCF | 19.3 | 19.7 | 20.1 | 19.2 | 0.4% |
| $CH_4$ emissions excluding $CH_4$ from LULUCF | 19.3 | 19.7 | 20.1 | 19.2 | 0.4% |
| $N_2O$ emissions including $N_2O$ from LULUCF | 10.7 | 10.8 | 10.9 | 10.6 | -5.4% |
| $N_2O$ emissions excluding $N_2O$ from LULUCF | 10.3 | 10.4 | 10.4 | 10.2 | -6.9% |
| HFCs | 10.6 | 11.2 | 11.8 | 12.2 | |
| PFCs | 0.1 | 0.1 | 0.1 | 0.1 | |
| $SF_6$ | 0.0 | 0.0 | 0.0 | 0.2 | |
| **Total (including LULUCF)** | **248.5** | **232.2** | **242.1** | **248.3** | **6.1%** |
| **Total (excluding LULUCF)** | **233.7** | **220.6** | **230.3** | **236.5** | **3.1%** |

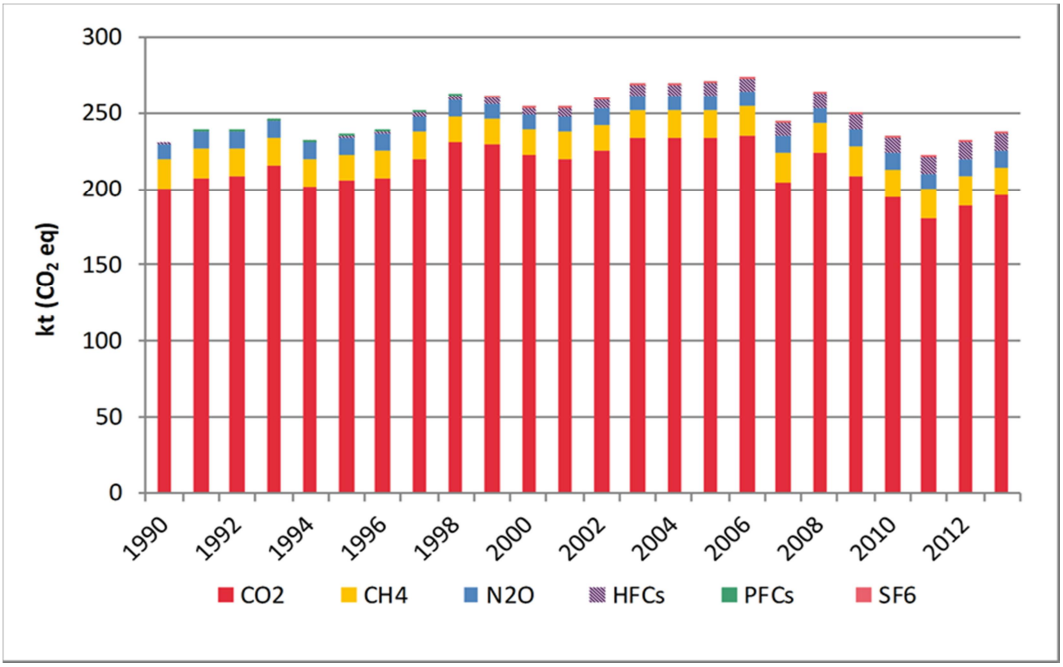


Figure 2-3 Trend of Liechtenstein's greenhouse gas emissions by gases 1990–2013. $CO_2$, $CH_4$ and $N_2O$ correspond to the respective total emissions excluding LULUCF.

Emission trends for the individual gases can be described as follows:

- Total emissions (in $CO_2$ equivalent) excluding LULUCF removals/emissions increased from 1990 to 2013 by 3.1%.
- Total emissions (in $CO_2$ equivalent) including LULUCF even increased by 6.1% compared to 1990 levels.
- Pure $CO_2$ emissions excluding net $CO_2$ emissions from LULUCF changed from 1990 to 2013 by -2.3%. $CO_2$ emissions accounted with about 82.3% for the largest share of total emissions in 2013. This is one of the smallest shares since 1990 which fluctuated between 81.3% (2011) and 88.2% (1993) within the period 1990–2013.
- $CO_2$ emissions excluding net $CO_2$ emissions from LULUCF indicate an increase between 2012 and 2013 of 3.6% due to a corresponding increase of heating degree days. In the period 2006-2011 a negative trend in $CO_2$ emissions can be observed which was caused by a combination of high fuel prices and warm winters.
- $CH_4$ emissions excluding $CH_4$ from LULUCF decreased in comparison to 2012 (-4.7%). However, compared to the 1990 emissions, an increase of 0.4% occurred. $CH_4$ emissions contribute to the total national emissions by 8.1% in 2013. This share is slightly below the 1990 share of 8.3%.
- Compared to 2012, $N_2O$ emissions (without LULUCF) have changed by -2.2% and by -6.9% when compared to 1990 levels. The contribution to the total national emissions decreased from 4.8% in 1990 to 4.3% in 2013.
- HFC emissions increased due to their role as substitutes for CFCs. $SF_6$ emissions originate from electrical transformation stations and play a minor role for the total of the synthetic gases (F-gases). PFC emissions are occurring since 1997 and are increasing on a low level. The share of the sum of all F-gases increased from 0.0% (1990) to 5.3% (2013).

### 2.2.3 Emission trends by sector

Table 2-3 shows emission trends for all major source and sink categories. As the largest share of emissions originated from the sector 1 Energy, the table also shows the contributions of the source categories attributed to the sector 1 Energy (1A1-1A5, 1B).

Table 2-3 Summary of Liechtenstein's GHG emissions by source and sink categories in $CO_2$ equivalent (kt), 1990–2013. The last column shows the percent change in emissions in 2013 compared to the base year 1990.

| Source and Sink Categories | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
|---|---|---|---|---|---|---|---|---|---|---|
| | $CO_2$ equivalent (kt) | | | | | | | | | |
| **1 Energy** | **201.6** | **209.1** | **209.9** | **218.1** | **204.1** | **207.3** | **209.1** | **221.7** | **232.6** | **231.5** |
| 1A1 Energy industries | 0.2 | 0.9 | 1.9 | 2.0 | 1.8 | 2.1 | 2.6 | 2.5 | 2.9 | 2.9 |
| 1A2 Manufacturing industries and construction | 36.4 | 35.6 | 35.5 | 36.8 | 35.0 | 35.0 | 34.9 | 36.8 | 39.4 | 38.9 |
| 1A3 Transport | 76.8 | 90.1 | 89.4 | 87.3 | 79.9 | 81.9 | 83.2 | 86.8 | 86.4 | 92.1 |
| 1A4 Other sectors | 88.0 | 82.1 | 82.6 | 91.5 | 86.9 | 87.7 | 87.8 | 94.9 | 103.1 | 96.8 |
| 1A5 Other | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| 1B Fugitive emissions from fuels | 0.4 | 0.4 | 0.5 | 0.5 | 0.6 | 0.6 | 0.7 | 0.7 | 0.7 | 0.8 |
| **2 IPPU** | **0.5** | **0.4** | **0.5** | **0.6** | **0.9** | **1.7** | **2.1** | **2.4** | **3.0** | **3.6** |
| **3 Agriculture** | **25.3** | **25.4** | **24.7** | **23.5** | **23.6** | **23.5** | **23.7** | **23.3** | **22.9** | **22.0** |
| **5 Waste** | **2.0** | **1.9** | **1.9** | **1.9** | **2.0** | **1.9** | **2.0** | **1.9** | **1.9** | **1.9** |
| ***Total (excluding LULUCF)*** | **229.4** | **236.9** | **237.1** | **244.1** | **230.6** | **234.4** | **236.8** | **249.3** | **260.5** | **259.1** |
| **4 LULUCF** | **4.6** | **7.4** | **7.4** | **7.9** | **8.2** | **7.5** | **8.1** | **8.8** | **8.6** | **8.6** |
| ***Total (including LULUCF)*** | **234.0** | **244.3** | **244.4** | **252.0** | **238.9** | **241.9** | **244.9** | **258.1** | **269.1** | **267.7** |

| Source and Sink Categories | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|
| | $CO_2$ equivalent (kt) | | | | | | | | | |
| **1 Energy** | **225.1** | **222.5** | **227.2** | **236.4** | **236.0** | **235.7** | **237.2** | **206.9** | **225.8** | **211.4** |
| 1A1 Energy industries | 2.8 | 2.9 | 2.5 | 2.8 | 3.0 | 3.1 | 2.9 | 2.6 | 2.9 | 3.0 |
| 1A2 Manufacturing industries and construction | 35.6 | 35.2 | 36.6 | 39.8 | 38.5 | 37.8 | 39.1 | 32.3 | 34.7 | 26.4 |
| 1A3 Transport | 96.1 | 92.5 | 87.9 | 87.4 | 85.9 | 85.4 | 82.4 | 86.6 | 91.0 | 84.9 |
| 1A4 Other sectors | 89.8 | 90.9 | 99.3 | 105.4 | 107.6 | 108.1 | 111.6 | 84.2 | 95.9 | 96.0 |
| 1A5 Other | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| 1B Fugitive emissions from fuels | 0.8 | 0.9 | 0.9 | 1.0 | 1.0 | 1.2 | 1.2 | 1.2 | 1.3 | 1.2 |
| **2 IPPU** | **4.5** | **5.3** | **6.0** | **6.7** | **7.5** | **8.0** | **8.3** | **9.0** | **10.1** | **10.0** |
| **3 Agriculture** | **21.3** | **22.5** | **22.7** | **22.8** | **22.9** | **23.4** | **24.4** | **24.8** | **24.9** | **24.8** |
| **5 Waste** | **2.1** | **1.9** | **2.0** | **2.1** | **2.0** | **2.2** | **2.1** | **2.1** | **2.3** | **2.0** |
| ***Total (excluding LULUCF)*** | **252.9** | **252.2** | **257.9** | **267.9** | **268.5** | **269.2** | **271.9** | **242.9** | **263.1** | **248.2** |
| **4 LULUCF** | **8.4** | **9.8** | **10.0** | **10.6** | **10.1** | **9.9** | **8.9** | **9.1** | **9.3** | **14.7** |
| ***Total (including LULUCF)*** | **261.3** | **261.9** | **268.0** | **278.5** | **278.5** | **279.1** | **280.8** | **252.0** | **272.4** | **262.9** |

| Source and Sink Categories | 2010 | 2011 | 2012 | 2013 | 1990-2013 |
|---|---|---|---|---|---|
| | $CO_2$ equivalent (kt) | | | | % |
| **1 Energy** | **196.6** | **182.4** | **191.1** | **197.8** | **-1.9%** |
| 1A1 Energy industries | 3.3 | 3.1 | 2.8 | 3.0 | 1630.9% |
| 1A2 Manufacturing industries and construction | 24.8 | 22.4 | 24.9 | 25.5 | -29.8% |
| 1A3 Transport | 80.4 | 79.5 | 82.5 | 82.0 | 6.8% |
| 1A4 Other sectors | 86.9 | 76.3 | 79.7 | 86.0 | -2.3% |
| 1A5 Other | NO | NO | NO | NO | |
| 1B Fugitive emissions from fuels | 1.2 | 1.2 | 1.2 | 1.3 | 240.8% |
| **2 IPPU** | **10.9** | **11.4** | **12.1** | **12.7** | **2697.3%** |
| **3 Agriculture** | **24.2** | **24.6** | **24.9** | **23.9** | **-5.6%** |
| **5 Waste** | **2.0** | **2.2** | **2.2** | **2.3** | **11.3%** |
| ***Total (excluding LULUCF)*** | **233.7** | **220.6** | **230.3** | **236.5** | **3.1%** |
| **4 LULUCF** | **14.8** | **11.5** | **11.8** | **11.7** | **156.1%** |
| ***Total (including LULUCF)*** | **248.5** | **232.2** | **242.1** | **248.3** | **6.1%** |

A graphical representation of the data in the table above is given in Figure 2-5.

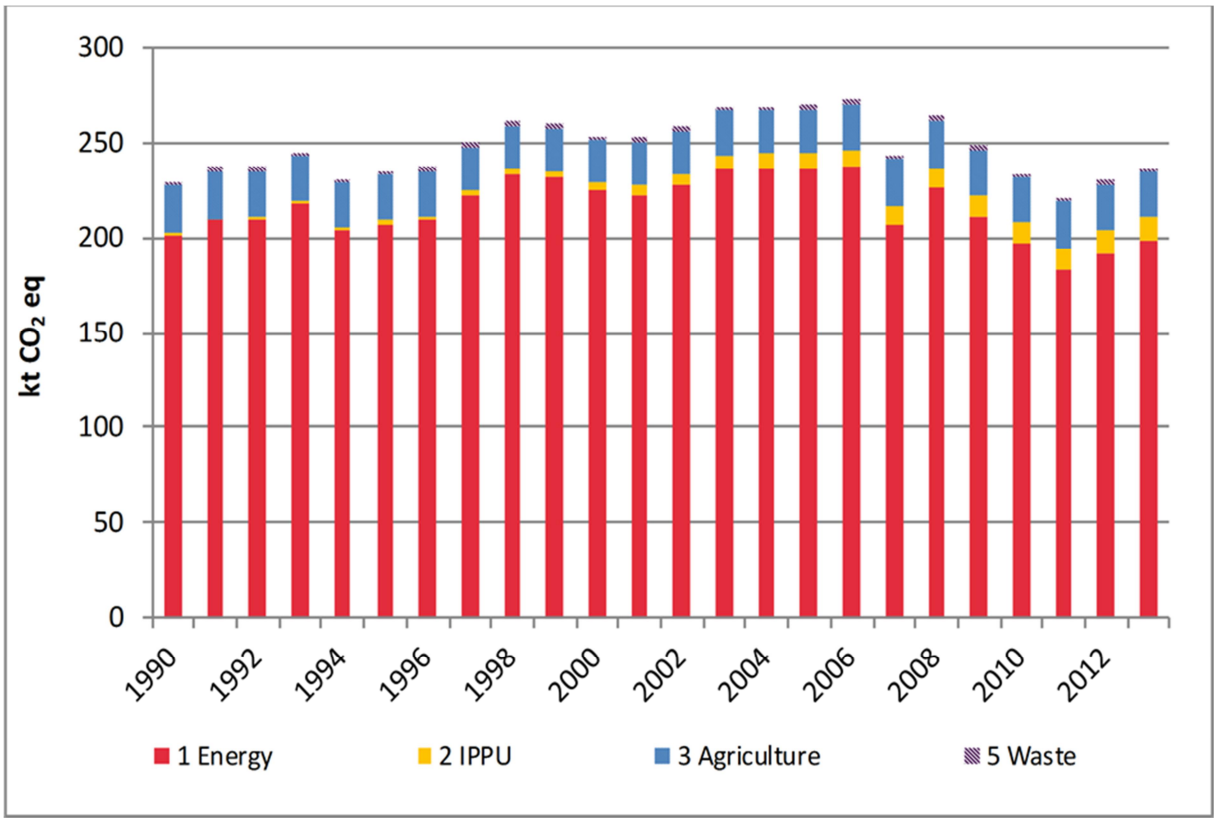


Figure 2-4 Trend of Liechtenstein's greenhouse gas emissions by main source categories in $CO_2$ equivalent (kt), 1990–2013 (excl. net $CO_2$ from LULUCF).

The emission trends can be characterized as follows:

**Sector 1 Energy:** 83.6% (excluding LULUCF) of Liechtenstein's GHG emissions originate from the sector 1 Energy, which is 0.6% more than in 2012.The share of sector 1 Energy in the total emissions changed by -4.3% since 1990. The total emissions of the sector 1Energy decreased in comparison to 1990 level (-1.9%). The source categories within the sector 1 Energy show following trends between 1990 and 2013:

- 1A1: Since 1990 Liechtenstein's gas-grid has been extended and natural gas has replaced gas oil as the main heating fuel in buildings.
- 1A2: Since 1990 the total emissions from this source category have changed by -29.8%. The consumption of gaseous fuels is the dominant energy carrier. Its emissions changed by -28.9%. Liquid fuel use even increased in the same time by 5.1%. Compared to 2012 the gaseous fuels consumption slightly decreased (-0.6%).
- 1A3: In line with a general increase of road-vehicle kilometres of all vehicle categories, the fuel consumption and total emissions have increased since 1990 by 6.8%. But the emissions in the transport sector show a slightly negative trend of -0.6% compared to 2012 levels.
- 1A4: Since 1990, the number of Inhabitants increased by 27.9% whereas the number of employees (in the secondary and tertiary sector) has increased by 83.8%. This is reflected in a similar increase of energy consumption and GHG emissions by 26.8% until 2006 with several fluctuations caused by warm and cold winter periods. From 2006 to 2007 a pronounced sudden decline of almost one forth is observed due to high oil gas prices and warm winters. Both influenced the stocking behaviours for private households and caused higher apparent consumption in 2008, when fuel tanks were refilled. Since 2008, GHG emissions in source category 1A4 have

decreased to 86.0 kt $CO_2$ eq in 2013 (increase of 7.9% compared to 2012 emissions). This negative trend can partly be attributed to the installation of a district heating pipeline, providing heat from a waste incineration plant in Switzerland that was constructed in 2009 and 2010. Furthermore, the various emission reduction measures in Liechtenstein, such as the increase of the $CO_2$-tax in 2010, might have resulted in a respective decrease. However, emissions are again increasing since 2011 due to annual variations in the number of heating degree days. A comparison of the heating degree days in the period 1990–2013 reveals: from 2000 up to 2009 the correlation between fuel combustion and winter climatic conditions was relatively high (coefficient of determination of 0.66). Although the overall correlation coefficient between 1990 and 2013 is only 0.38 (0.38 between 2009 and 2013), weather and climate conditions were clearly relevant for the residential sector and are responsible for the increase of emissions between 2011 and 2013.

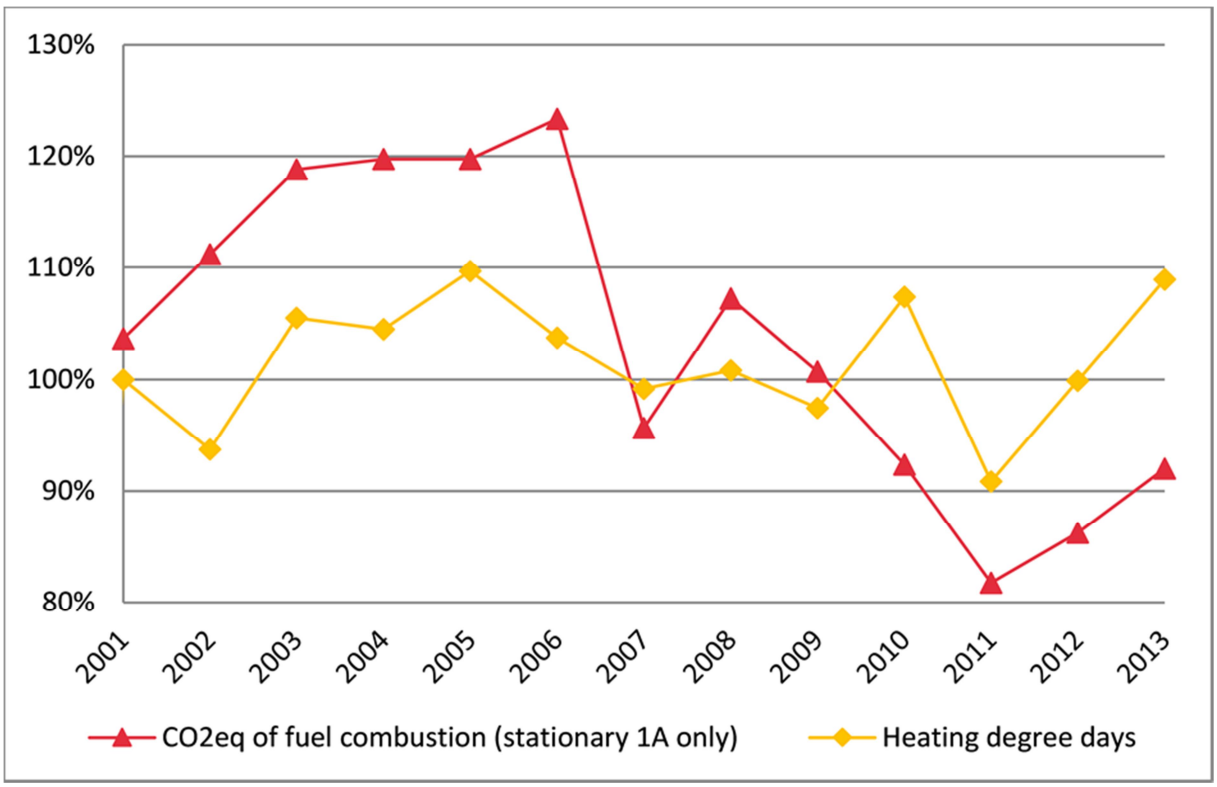


Figure 2-5 Relative trend for $CO_2$ emissions from 1A Fuel Combustion compared with the number of heating degree days. The drop in 2007 is due to high oil and gas prices and warm winters.

- 1A5: Liechtenstein does not have any emissions under source category 1A5 because Liechtenstein has no army.
- 1B: In parallel with the build-up of Liechtenstein's gas supply network since 1990, the fugitive emissions have strongly increased over the period 1990-2013 (240.8%).

**Sector 2 Industrial processes and product use:** Due to the lack of heavy industry within the borders of Liechtenstein, only small contributors, in particular F-gases and asphalt roofing are relevant sources. The emissions in sector 2 therefore strongly increased between 1990 and 2013 by 2697.3% mainly due to increasing F-gas emissions. Please note that the emissions reported under sector 2 IPPU are still on a low level.

**Sector Agriculture:** The emissions show a minimum around the year 2000 due to changes in the animal numbers. In 2013, the emissions are slightly below the 1990 level (-5.6%).

**Sector 4 LULUCF:** Figure 2-6 shows the net emissions by sources and sinks from LULUCF categories in Liechtenstein. The dominant category when looking at the changes in net $CO_2$ emissions are source category 4C Grassland and 4G Harvested wood products. The total net emissions increased by 163.9% between 1990 and 2013.

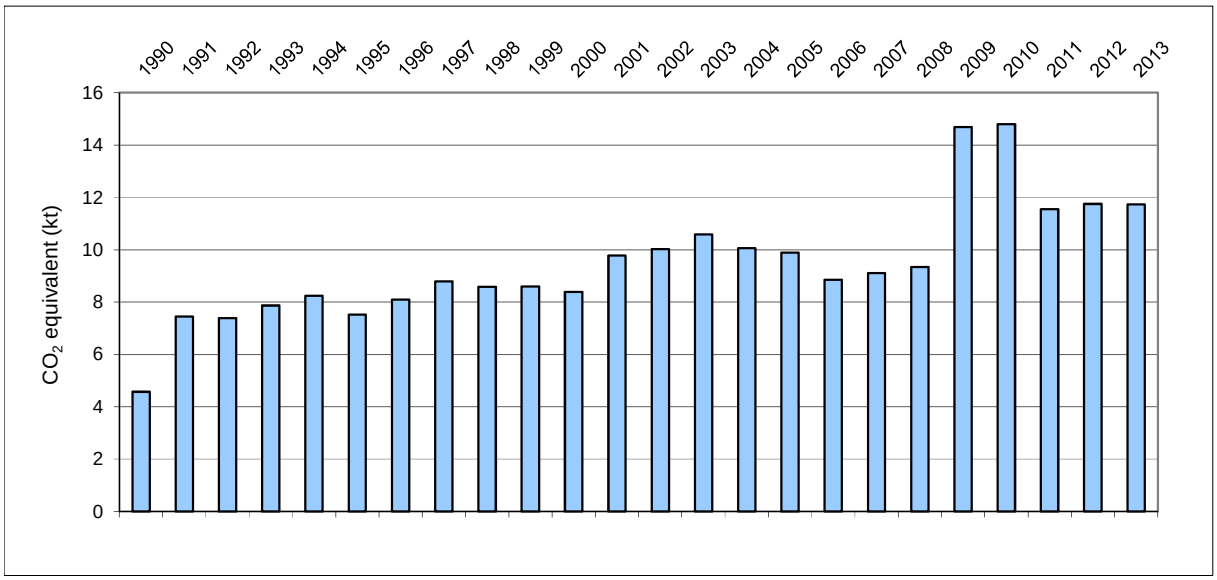


Figure 2-6 Net emissions of $CO_2$ of source category 4 LULUCF 1990–2013 in kt $CO_2$ equivalent.

**Sector 5 Waste:** In Liechtenstein, only few emissions occur from the sector Waste since all municipal solid waste is exported to a Swiss incineration plant. The increasing trend of the emissions compared to 1990 (11.3%) is due to increasing composting activities and a slight increase in emissions from waste water handling.

### 2.2.4 Emission trends for indirect greenhouse gases and $SO_2$

Liechtenstein is member to the UNECE Convention on Long-range Transboundary Air Pollution (CLRTAP) and submits data on air pollutants including indirect GHG. For the precursor substances $NO_x$, CO and NMVOC as well as for the gas $SO_2$, data from the 2015 submission is shown in Table 2-4 (OE 2015). Note that the system boundaries for the transportation sector are not the same as under the UNFCCC Reporting since the CLRTAP uses the territorial principle, which restricts the comparability of the two data sets.

Table 2-4: Development of the emissions of $NO_x$, CO, NMVOC (in t) and $SO_x$ 1990-2013.

| Indirect Greenhouse Gasses and $SO_2$ | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
|---|---|---|---|---|---|---|---|---|---|---|
| | tonnes | | | | | | | | | |
| $NO_x$ | 766 | 795 | 785 | 735 | 709 | 687 | 678 | 696 | 720 | 723 |
| CO | 2'231 | 2'138 | 1'958 | 1'772 | 1'638 | 1'481 | 1'349 | 1'240 | 1'138 | 1'034 |
| NMVOC | 990 | 987 | 881 | 822 | 700 | 677 | 563 | 550 | 543 | 533 |
| $SO_x$ | 71 | 66 | 64 | 62 | 47 | 44 | 43 | 47 | 51 | 49 |

| Indirect Greenhouse Gasses and $SO_2$ | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|
| | tonnes | | | | | | | | | |
| $NO_x$ | 704 | 657 | 663 | 709 | 668 | 694 | 691 | 656 | 654 | 654 |
| CO | 982 | 826 | 753 | 736 | 682 | 664 | 626 | 649 | 621 | 652 |
| NMVOC | 525 | 448 | 437 | 439 | 425 | 424 | 419 | 414 | 413 | 413 |
| $SO_x$ | 42 | 38 | 41 | 43 | 36 | 36 | 38 | 27 | 32 | 35 |

| Indirect Greenhouse Gasses and $SO_2$ | 2010 | 2011 | 2012 | 2013 | 1990-2013 |
|---|---|---|---|---|---|
| | tonnes | | | | % |
| $NO_x$ | 631 | 650 | 696 | 704 | -8% |
| CO | 656 | 674 | 691 | 692 | -69% |
| NMVOC | 410 | 414 | 422 | 417 | -58% |
| $SO_x$ | 31 | 30 | 32 | 28 | -61% |

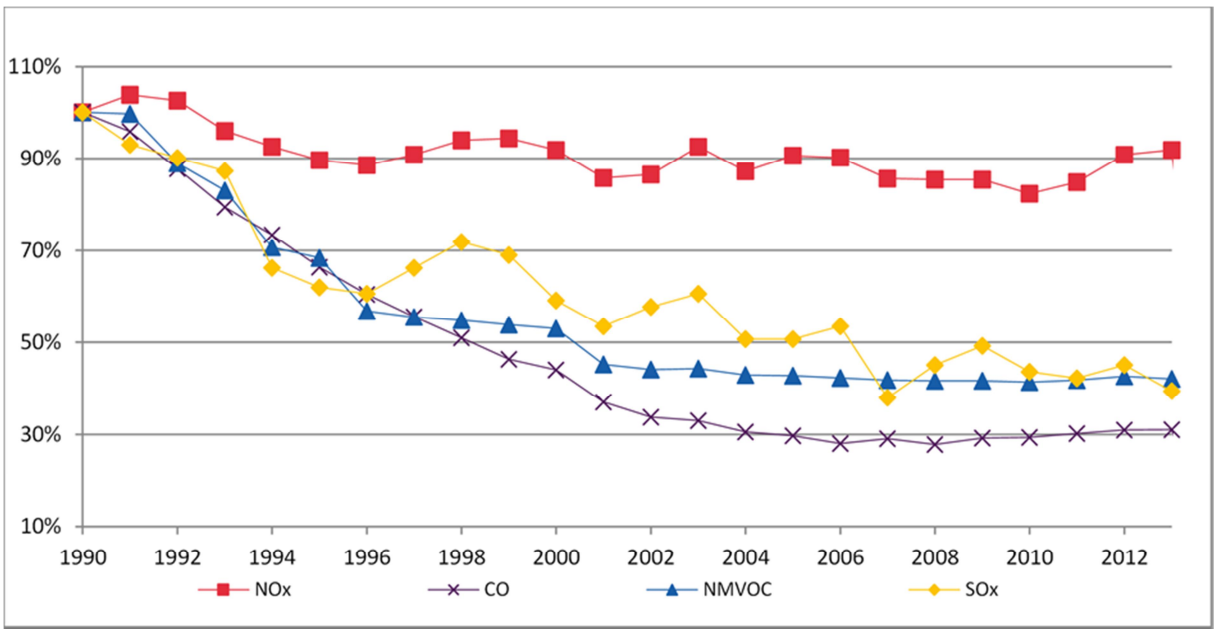


Figure 2-7 Trend of emissions of $NO_x$, CO, NMVOC and $SO_x$ 1990-2013.

The complete CLRTAP Inventory data may be found on the internet (see OE 2015): http://www.ceip.at/ms/ceip_home1/ceip_home/status_reporting/2015_submissions/

### 2.2.5 Emission trends in KP-LULUCF inventory

Table 2-5 illustrates the total net emissions occurring from activities under KP-LULUCF. De-forestation and emissions of forest management are responsible for 6.878 kt $CO_2$ equivalent in 2013. Removals originate from afforestation and reforestation activities as well as from

forest management reference level (FMRL) and HWP activities. The total net $CO_2$ eq removals add up to -1.806 kt. In total, net emissions of 5.072 kt occurred in 2013.

Table 2-5: Summary table afforestation and reforestation, deforestation, forest management and HWP.

| **Activity year 2013** | **Area** kha | **Net $CO_2$ emission/removal** 2013 kt $CO_2$ eq |
|---|---|---|
| A.1 Afforestation and reforestation | 0.036 | -0.261 |
| A.2 Deforestation | 0.171 | 4.450 |
| B.1 Forest management (FM) | 6.125 | 2.429 |
| *B.1.1 minus FMRL** | --- | -0.119 |
| 4.C HWP from FM | --- | -1.426 |
| **Total net emission/removal** | | **5.072** |

**FMRL: Forest Management Reference Level, incl. Technical corrections*

## Section CTF Tables:

CTF Table 1: Summary of emission trends from 1990-2011 and by gases

Table 1 LIE_BR2_v0.1

**Emission trends: summary** [(1)]
**(Sheet 1 of 3)**

| *GREENHOUSE GAS EMISSIONS* | Base year[a] | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|
| | *kt $CO_2$ eq* | | | | | | | | |
| $CO_2$ emissions without net $CO_2$ from LULUCF | 199.32 | 199.32 | 206.63 | 207.24 | 215.38 | 201.44 | 204.52 | 206.24 | 218.72 |
| $CO_2$ emissions with net $CO_2$ from LULUCF | 203.59 | 203.59 | 213.78 | 214.33 | 222.94 | 209.37 | 211.74 | 214.04 | 227.20 |
| $CH_4$ emissions without $CH_4$ from LULUCF | 19.11 | 19.11 | 18.96 | 18.55 | 17.68 | 17.87 | 17.73 | 18.15 | 17.82 |
| $CH_4$ emissions with $CH_4$ from LULUCF | 19.11 | 19.11 | 18.96 | 18.55 | 17.68 | 17.87 | 17.73 | 18.15 | 17.82 |
| $N_2O$ emissions without $N_2O$ from LULUCF | 10.95 | 10.95 | 11.29 | 11.17 | 10.85 | 10.82 | 10.79 | 10.72 | 10.65 |
| $N_2O$ emissions with $N_2O$ from LULUCF | 11.26 | 11.26 | 11.59 | 11.47 | 11.15 | 11.13 | 11.10 | 11.03 | 10.96 |
| HFCs | 0.00 | 0.00 | 0.01 | 0.09 | 0.20 | 0.51 | 1.35 | 1.72 | 2.11 |
| PFCs | NO | NO | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Unspecified mix of HFCs and PFCs | | | | | | | | | |
| $SF_6$ | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| NF3 | | | | | | | | | |
| **Total (without LULUCF)** | 229.39 | 229.39 | 236.89 | 237.05 | 244.11 | 230.64 | 234.40 | 236.83 | 249.31 |
| **Total (with LULUCF)** | 233.97 | 233.97 | 244.34 | 244.44 | 251.98 | 238.88 | 241.93 | 244.94 | 258.10 |
| **Total (without LULUCF, with indirect)** | 229.39 | 229.39 | 236.89 | 237.05 | 244.11 | 230.64 | 234.40 | 236.83 | 249.31 |
| **Total (with LULUCF, with indirect)** | 233.97 | 233.97 | 244.34 | 244.44 | 251.98 | 238.88 | 241.93 | 244.94 | 258.10 |

| *GREENHOUSE GAS SOURCE AND SINK CATEGORIES* | Base year[a] | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|
| | *kt $CO_2$ eq* | | | | | | | | |
| 1. Energy | 201.64 | 201.64 | 209.13 | 209.93 | 218.11 | 204.12 | 207.26 | 209.07 | 221.69 |
| 2. Industrial processes and product use | 0.45 | 0.45 | 0.45 | 0.51 | 0.60 | 0.90 | 1.72 | 2.06 | 2.43 |
| 3. Agriculture | 25.26 | 25.26 | 25.38 | 24.69 | 23.51 | 23.64 | 23.54 | 23.69 | 23.25 |
| 4. Land Use, Land-Use Change and Forestry[b] | 4.58 | 4.58 | 7.45 | 7.39 | 7.87 | 8.24 | 7.52 | 8.10 | 8.79 |
| 5. Waste | 2.03 | 2.03 | 1.92 | 1.93 | 1.88 | 1.99 | 1.89 | 2.01 | 1.93 |
| 6. Other | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **Total (including LULUCF)** | 233.97 | 233.97 | 244.34 | 244.44 | 251.98 | 238.88 | 241.93 | 244.94 | 258.10 |

**Note:** All footnotes for this table are given on sheet 3.

[1] The common tabular format will be revised, in accordance with relevant decisions of the Conference of the Parties and, where applicable, with decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol."

Table 1 LIE_BR2_v0.1

**Emission trends: summary [(1)]**

**(Sheet 2 of 3)**

| *GREENHOUSE GAS EMISSIONS* | *1998* | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|---|---|---|---|---|
| $CO_2$ emissions without net $CO_2$ from LULUCF | 229.65 | 228.47 | 221.80 | 219.39 | 224.24 | 233.37 | 233.25 | 232.75 | 234.28 | 203.89 |
| $CO_2$ emissions with net $CO_2$ from LULUCF | 237.91 | 236.72 | 229.84 | 228.80 | 233.90 | 243.57 | 242.92 | 242.25 | 242.74 | 212.59 |
| $CH_4$ emissions without $CH_4$ from LULUCF | 17.61 | 16.97 | 16.76 | 17.39 | 17.68 | 17.87 | 17.94 | 18.62 | 19.34 | 19.79 |
| $CH_4$ emissions with $CH_4$ from LULUCF | 17.61 | 16.97 | 16.76 | 17.39 | 17.68 | 17.87 | 17.94 | 18.62 | 19.34 | 19.79 |
| $N_2O$ emissions without $N_2O$ from LULUCF | 10.49 | 10.31 | 10.16 | 10.27 | 10.27 | 10.26 | 9.96 | 10.11 | 10.26 | 10.39 |
| $N_2O$ emissions with $N_2O$ from LULUCF | 10.81 | 10.64 | 10.51 | 10.63 | 10.64 | 10.64 | 10.35 | 10.50 | 10.66 | 10.79 |
| HFCs | 2.73 | 3.34 | 4.10 | 4.93 | 5.46 | 6.13 | 7.00 | 7.42 | 7.91 | 8.63 |
| PFCs | 0.00 | 0.01 | 0.01 | 0.02 | 0.02 | 0.04 | 0.05 | 0.07 | 0.08 | 0.08 |
| Unspecified mix of HFCs and PFCs | | | | | | | | | | |
| $SF_6$ | NO | 0.00 | 0.09 | 0.17 | 0.24 | 0.25 | 0.26 | 0.26 | 0.06 | 0.11 |
| NF3 | | | | | | | | | | |
| **Total (without LULUCF)** | 260.48 | 259.09 | 252.92 | 252.16 | 257.92 | 267.92 | 268.46 | 269.22 | 271.92 | 242.90 |
| **Total (with LULUCF)** | 269.07 | 267.69 | 261.31 | 261.93 | 267.95 | 278.50 | 278.52 | 279.11 | 280.78 | 252.00 |
| **Total (without LULUCF, with indirect)** | 260.48 | 259.09 | 252.92 | 252.16 | 257.92 | 267.92 | 268.46 | 269.22 | 271.92 | 242.90 |
| **Total (with LULUCF, with indirect)** | 269.07 | 267.69 | 261.31 | 261.93 | 267.95 | 278.50 | 278.52 | 279.11 | 280.78 | 252.00 |

| *GREENHOUSE GAS SOURCE AND SINK CATEGORIES* | *1998* | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Energy | 232.61 | 231.51 | 225.07 | 222.46 | 227.22 | 236.38 | 236.03 | 235.66 | 237.21 | 206.91 |
| 2. Industrial processes and product use | 3.04 | 3.63 | 4.46 | 5.35 | 5.96 | 6.66 | 7.54 | 7.97 | 8.26 | 9.04 |
| 3. Agriculture | 22.92 | 22.02 | 21.34 | 22.48 | 22.70 | 22.82 | 22.85 | 23.39 | 24.40 | 24.81 |
| 4. Land Use, Land-Use Change and Forestry[b] | 8.59 | 8.60 | 8.39 | 9.78 | 10.03 | 10.58 | 10.06 | 9.88 | 8.86 | 9.10 |
| 5. Waste | 1.91 | 1.93 | 2.05 | 1.88 | 2.05 | 2.06 | 2.04 | 2.21 | 2.05 | 2.14 |
| 6. Other | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **Total (including LULUCF)** | 269.07 | 267.69 | 261.31 | 261.93 | 267.95 | 278.50 | 278.52 | 279.11 | 280.78 | 252.00 |

Table 1 LIE_BR2_v0.1

**Emission trends: summary [(1)]**

**(Sheet 3 of 3)**

| *GREENHOUSE GAS EMISSIONS* | *2008* | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | Change from base to latest reported year (%) |
|---|---|---|---|---|---|---|---|---|
| $CO_2$ emissions without net $CO_2$ from LULUCF | 222.66 | 208.32 | 193.45 | 179.31 | 187.89 | 194.68 | | -2.33 |
| $CO_2$ emissions with net $CO_2$ from LULUCF | 231.60 | 222.59 | 207.83 | 190.42 | 199.19 | 205.95 | | 1.16 |
| $CH_4$ emissions without $CH_4$ from LULUCF | 20.07 | 19.80 | 19.26 | 19.71 | 20.13 | 19.20 | | 0.42 |
| $CH_4$ emissions with $CH_4$ from LULUCF | 20.07 | 19.80 | 19.26 | 19.71 | 20.13 | 19.20 | | 0.42 |
| $N_2O$ emissions without $N_2O$ from LULUCF | 10.43 | 10.32 | 10.26 | 10.36 | 10.42 | 10.19 | | -6.93 |
| $N_2O$ emissions with $N_2O$ from LULUCF | 10.84 | 10.74 | 10.69 | 10.79 | 10.87 | 10.65 | | -5.43 |
| HFCs | 9.49 | 9.57 | 10.64 | 11.16 | 11.81 | 12.22 | | 11,704,810.76 |
| PFCs | 0.08 | 0.07 | 0.07 | 0.06 | 0.06 | 0.06 | | |
| Unspecified mix of HFCs and PFCs | | | | | | | | |
| $SF_6$ | 0.35 | 0.14 | 0.02 | 0.01 | 0.00 | 0.17 | | |
| NF3 | | | | | | | | |
| **Total (without LULUCF)** | 263.07 | 248.22 | 233.71 | 220.61 | 230.31 | 236.53 | | 3.11 |
| **Total (with LULUCF)** | 272.42 | 262.91 | 248.52 | 232.16 | 242.06 | 248.25 | | 6.11 |
| **Total (without LULUCF, with indirect)** | 263.07 | 248.22 | 233.71 | 220.61 | 230.31 | 236.53 | | 3.11 |
| **Total (with LULUCF, with indirect)** | 272.42 | 262.91 | 248.52 | 232.16 | 242.06 | 248.25 | | 6.11 |

| *GREENHOUSE GAS SOURCE AND SINK CATEGORIES* | *2008* | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | Change from base to latest reported year (%) |
|---|---|---|---|---|---|---|---|---|
| 1. Energy | 225.79 | 211.43 | 196.57 | 182.42 | 191.07 | 197.76 | | -1.92 |
| 2. Industrial processes and product use | 10.12 | 9.98 | 10.94 | 11.43 | 12.07 | 12.65 | | 2,697.27 |
| 3. Agriculture | 24.90 | 24.78 | 24.18 | 24.59 | 24.92 | 23.85 | | -5.59 |
| 4. Land Use, Land-Use Change and Forestry[b] | 9.35 | 14.69 | 14.80 | 11.55 | 11.75 | 11.73 | | 156.08 |
| 5. Waste | 2.27 | 2.03 | 2.03 | 2.17 | 2.24 | 2.26 | | 11.28 |
| 6. Other | NO | NO | NO | NO | NO | NO | | |
| **Total (including LULUCF)** | 272.42 | 262.91 | 248.52 | 232.16 | 242.06 | 248.25 | | 6.11 |

*Notes:*

(1) Further detailed information could be found in the common reporting format tables of the Party's greenhouse gas inventory, namely "Emission trends ($CO_2$)", "Emission trends ($CH_4$)", "Emission trends ($N_2O$)" and "Emission trends (HFCs, PFCs and $SF_6$)", which is included in an annex to this biennial report.

(2) 2011 is the latest reported inventory year.

(3) 1 kt $CO_2$ eq equals 1 Gg $CO_2$ eq.

*Abbreviation:* LULUCF = land use, land-use change and forestry.

[a] The column "Base year" should be filled in only by those Parties with economies in transition that use a base year different from 1990 in accordance with the relevant decisions of the Conference of the Parties. For these Parties, this different base year is used to calculate the percentage change in the final column of this table.

[b] Includes net $CO_2$, $CH_4$ and $N_2O$ from LULUCF.

Table 1 (a) LIE_BR2_v0.1

**Emission trends ($CO_2$)**

**(Sheet 1 of 3)**

| *GREENHOUSE GAS SOURCE AND SINK CATEGORIES* | *Base year*[a] | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|
| | *kt* | | | | | | | | |
| **1. Energy** | 199.24 | 199.24 | 206.55 | 207.16 | 215.30 | 201.36 | 204.45 | 206.17 | 218.66 |
| A. Fuel combustion (sectoral approach) | 199.24 | 199.24 | 206.55 | 207.16 | 215.30 | 201.36 | 204.45 | 206.17 | 218.66 |
| 1. Energy industries | 0.12 | 0.12 | 0.79 | 1.82 | 1.88 | 1.76 | 2.00 | 2.50 | 2.44 |
| 2. Manufacturing industries and construction | 36.23 | 36.23 | 35.51 | 35.39 | 36.69 | 34.83 | 34.84 | 34.75 | 36.62 |
| 3. Transport | 75.37 | 75.37 | 88.54 | 87.76 | 85.66 | 78.37 | 80.32 | 81.59 | 85.18 |
| 4. Other sectors | 87.52 | 87.52 | 81.72 | 82.19 | 91.07 | 86.41 | 87.30 | 87.33 | 94.41 |
| 5. Other | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| B. Fugitive emissions from fuels | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA |
| 1. Solid fuels | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| 2. Oil and natural gas and other emissions from energy production | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA |
| C. CO2 transport and storage | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **2. Industrial processes** | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| A. Mineral industry | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| B. Chemical industry | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| C. Metal industry | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| D. Non-energy products from fuels and solvent use | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| E. Electronic industry | | | | | | | | | |
| F. Product uses as ODS substitutes | | | | | | | | | |
| G. Other product manufacture and use | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| H. Other | | | | | | | | | |
| **3. Agriculture** | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.04 | 0.04 | 0.04 | 0.04 |
| A. Enteric fermentation | | | | | | | | | |
| B. Manure management | | | | | | | | | |
| C. Rice cultivation | | | | | | | | | |
| D. Agricultural soils | | | | | | | | | |
| E. Prescribed burning of savannas | | | | | | | | | |
| F. Field burning of agricultural residues | | | | | | | | | |
| G. Liming | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| H. Urea application | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.04 | 0.04 | 0.04 | 0.04 |
| I. Other carbon-containing fertilizers | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| J. Other | | | | | | | | | |
| **4. Land Use, Land-Use Change and Forestry** | 4.27 | 4.27 | 7.15 | 7.09 | 7.56 | 7.94 | 7.22 | 7.80 | 8.47 |
| A. Forest land | -1.07 | -1.07 | -1.07 | -1.07 | -1.07 | -1.07 | -1.06 | -1.06 | -1.09 |
| B. Cropland | 4.45 | 4.45 | 4.44 | 4.44 | 4.43 | 4.43 | 4.42 | 4.41 | 4.41 |
| C. Grassland | 1.80 | 1.80 | 1.79 | 1.78 | 1.77 | 1.76 | 1.75 | 1.73 | 1.94 |
| D. Wetlands | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.18 |
| E. Settlements | 3.19 | 3.19 | 3.19 | 3.19 | 3.19 | 3.19 | 3.19 | 3.19 | 3.23 |
| F. Other land | 0.44 | 0.44 | 0.44 | 0.44 | 0.44 | 0.44 | 0.44 | 0.44 | 0.53 |
| G. Harvested wood products | -4.70 | -4.70 | -1.81 | -1.85 | -1.36 | -0.97 | -1.67 | -1.08 | -0.71 |
| H. Other | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **5. Waste** | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| A. Solid waste disposal | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| B. Biological treatment of solid waste | | | | | | | | | |
| C. Incineration and open burning of waste | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| D. Waste water treatment and discharge | | | | | | | | | |
| E. Other | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **6. Other (as specified in the summary table in CRF)** | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **Memo items:** | | | | | | | | | |
| **International bunkers** | 0.43 | 0.43 | 0.43 | 0.43 | 0.43 | 0.43 | 0.43 | 0.44 | 0.45 |
| Aviation | 0.43 | 0.43 | 0.43 | 0.43 | 0.43 | 0.43 | 0.43 | 0.44 | 0.45 |
| Navigation | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **Multilateral operations** | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **CO2 emissions from biomass** | 5.67 | 5.67 | 4.48 | 5.84 | 5.46 | 6.58 | 5.17 | 5.04 | 5.76 |
| **CO2 captured** | 90.33 | 90.33 | 83.23 | 84.98 | 93.53 | 89.83 | 89.51 | 89.30 | 96.93 |
| **Long-term storage of C in waste disposal sites** | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| **Indirect N2O** | | | | | | | | | |
| **Indirect CO2 (3)** | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **Total CO2 equivalent emissions without land use, land-use change and forestry** | 199.32 | 199.32 | 206.63 | 207.24 | 215.38 | 201.44 | 204.52 | 206.24 | 218.72 |
| **Total CO2 equivalent emissions with land use, land-use change and forestry** | 203.59 | 203.59 | 213.78 | 214.33 | 222.94 | 209.37 | 211.74 | 214.04 | 227.20 |
| **Total CO2 equivalent emissions, including indirect CO2, without land use, land-use change and forestry** | 199.32 | 199.32 | 206.63 | 207.24 | 215.38 | 201.44 | 204.52 | 206.24 | 218.72 |
| **Total CO2 equivalent emissions, including indirect CO2, with land use, land-use change and forestry** | 203.59 | 203.59 | 213.78 | 214.33 | 222.94 | 209.37 | 211.74 | 214.04 | 227.20 |

**Note:** All footnotes for this table are given on sheet 3.

Table 1 (a) LIE_BR2_v0.1

**Emission trends ($CO_2$)**

**(Sheet 2 of 3)**

| *GREENHOUSE GAS SOURCE AND SINK CATEGORIES* | *1998* | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|---|---|---|---|---|
| **1. Energy** | 229.58 | 228.39 | 221.73 | 219.32 | 224.17 | 233.29 | 233.18 | 232.68 | 234.21 | 203.82 |
| A. Fuel combustion (sectoral approach) | 229.58 | 228.39 | 221.73 | 219.32 | 224.17 | 233.29 | 233.18 | 232.68 | 234.21 | 203.82 |
| 1. Energy industries | 2.83 | 2.83 | 2.67 | 2.83 | 2.42 | 2.73 | 2.85 | 3.03 | 2.75 | 2.48 |
| 2. Manufacturing industries and construction | 39.26 | 38.71 | 35.42 | 35.11 | 36.45 | 39.60 | 38.34 | 37.68 | 39.00 | 32.19 |
| 3. Transport | 84.92 | 90.62 | 94.54 | 91.00 | 86.58 | 86.29 | 85.09 | 84.64 | 81.75 | 85.88 |
| 4. Other sectors | 102.57 | 96.24 | 89.10 | 90.38 | 98.72 | 104.68 | 106.90 | 107.34 | 110.72 | 83.27 |
| 5. Other | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| B. Fugitive emissions from fuels | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA |
| 1. Solid fuels | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| 2. Oil and natural gas and other emissions from energy production | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA |
| C. CO2 transport and storage | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **2. Industrial processes** | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| A. Mineral industry | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| B. Chemical industry | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| C. Metal industry | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| D. Non-energy products from fuels and solvent use | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| E. Electronic industry | | | | | | | | | | |
| F. Product uses as ODS substitutes | | | | | | | | | | |
| G. Other product manufacture and use | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| H. Other | | | | | | | | | | |
| **3. Agriculture** | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 |
| A. Enteric fermentation | | | | | | | | | | |
| B. Manure management | | | | | | | | | | |
| C. Rice cultivation | | | | | | | | | | |
| D. Agricultural soils | | | | | | | | | | |
| E. Prescribed burning of savannas | | | | | | | | | | |
| F. Field burning of agricultural residues | | | | | | | | | | |
| G. Liming | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| H. Urea application | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 |
| I. Other carbon-containing fertilizers | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| J. Other | | | | | | | | | | |
| **4. Land Use, Land-Use Change and Forestry** | 8.26 | 8.26 | 8.04 | 9.41 | 9.66 | 10.20 | 9.67 | 9.49 | 8.46 | 8.70 |
| A. Forest land | -1.12 | -1.14 | -1.17 | -1.20 | -1.22 | -1.17 | -1.13 | -1.08 | -1.03 | -0.98 |
| B. Cropland | 4.40 | 4.39 | 4.39 | 4.38 | 4.37 | 4.35 | 4.33 | 4.31 | 4.29 | 4.27 |
| C. Grassland | 2.15 | 2.35 | 2.56 | 2.76 | 2.97 | 3.08 | 3.19 | 3.30 | 3.41 | 3.52 |
| D. Wetlands | 0.20 | 0.22 | 0.24 | 0.26 | 0.29 | 0.29 | 0.30 | 0.30 | 0.31 | 0.31 |
| E. Settlements | 3.26 | 3.30 | 3.34 | 3.38 | 3.42 | 3.43 | 3.44 | 3.45 | 3.46 | 3.48 |
| F. Other land | 0.61 | 0.69 | 0.77 | 0.85 | 0.94 | 0.97 | 1.00 | 1.03 | 1.06 | 1.09 |
| G. Harvested wood products | -1.24 | -1.56 | -2.10 | -1.03 | -1.11 | -0.74 | -1.45 | -1.82 | -3.03 | -2.97 |
| H. Other | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **5. Waste** | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| A. Solid waste disposal | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| B. Biological treatment of solid waste | | | | | | | | | | |
| C. Incineration and open burning of waste | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| D. Waste water treatment and discharge | | | | | | | | | | |
| E. Other | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **6. Other (as specified in the summary table in CRF)** | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **Memo items:** | | | | | | | | | | |
| **International bunkers** | 0.46 | 0.48 | 0.49 | 0.50 | 0.45 | 0.49 | 0.35 | 0.48 | 0.77 | 0.76 |
| Aviation | 0.46 | 0.48 | 0.49 | 0.50 | 0.45 | 0.49 | 0.35 | 0.48 | 0.77 | 0.76 |
| Navigation | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **Multilateral operations** | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **CO2 emissions from biomass** | 6.38 | 6.96 | 10.60 | 7.25 | 7.40 | 9.21 | 9.97 | 10.72 | 12.12 | 15.65 |
| **CO2 captured** | 105.64 | 99.62 | 96.19 | 94.14 | 102.71 | 110.31 | 113.15 | 114.57 | 119.12 | 94.89 |
| **Long-term storage of C in waste disposal sites** | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| **Indirect N2O** | | | | | | | | | | |
| **Indirect CO2 (3)** | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **Total CO2 equivalent emissions without land use, land-use change and forestry** | 229.65 | 228.47 | 221.80 | 219.39 | 224.24 | 233.37 | 233.25 | 232.75 | 234.28 | 203.89 |
| **Total CO2 equivalent emissions with land use, land-use change and forestry** | 237.91 | 236.72 | 229.84 | 228.80 | 233.90 | 243.57 | 242.92 | 242.25 | 242.74 | 212.59 |
| **Total CO2 equivalent emissions, including indirect CO2, without land use, land-use change and forestry** | 229.65 | 228.47 | 221.80 | 219.39 | 224.24 | 233.37 | 233.25 | 232.75 | 234.28 | 203.89 |
| **Total CO2 equivalent emissions, including indirect CO2, with land use, land-use change and forestry** | 237.91 | 236.72 | 229.84 | 228.80 | 233.90 | 243.57 | 242.92 | 242.25 | 242.74 | 212.59 |

**Note:** All footnotes for this table are given on sheet 3.

Table 1(a) LIE_BR2_v0.1

**Emission trends ($CO_2$)**

**(Sheet 3 of 3)**

| *GREENHOUSE GAS SOURCE AND SINK CATEGORIES* | *2008* | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | Change from base to latest reported year |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | % |
| **1. Energy** | 222.59 | 208.25 | 193.38 | 179.24 | 187.82 | 194.61 | | -2.32 |
| A. Fuel combustion (sectoral approach) | 222.59 | 208.25 | 193.38 | 179.24 | 187.82 | 194.61 | | -2.32 |
| 1. Energy industries | 2.81 | 2.87 | 3.15 | 2.95 | 2.71 | 2.93 | | 2,316.67 |
| 2. Manufacturing industries and construction | 34.54 | 26.31 | 24.67 | 22.26 | 24.75 | 25.39 | | -29.92 |
| 3. Transport | 90.27 | 84.17 | 79.74 | 78.82 | 81.87 | 81.34 | | 7.92 |
| 4. Other sectors | 94.96 | 94.90 | 85.82 | 75.21 | 78.50 | 84.95 | | -2.93 |
| 5. Other | NO | NO | NO | NO | NO | NO | | |
| B. Fugitive emissions from fuels | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | | |
| 1. Solid fuels | NO | NO | NO | NO | NO | NO | | |
| 2. Oil and natural gas and other emissions from energy production | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | | |
| C. CO2 transport and storage | NO | NO | NO | NO | NO | NO | | |
| **2. Industrial processes** | NO | NO | NO | NO | NO | NO | | |
| A. Mineral industry | NO | NO | NO | NO | NO | NO | | |
| B. Chemical industry | NO | NO | NO | NO | NO | NO | | |
| C. Metal industry | NO | NO | NO | NO | NO | NO | | |
| D. Non-energy products from fuels and solvent use | NO | NO | NO | NO | NO | NO | | |
| E. Electronic industry | | | | | | | | |
| F. Product uses as ODS substitutes | | | | | | | | |
| G. Other product manufacture and use | NO | NO | NO | NO | NO | NO | | |
| H. Other | | | | | | | | |
| **3. Agriculture** | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | | -26.07 |
| A. Enteric fermentation | | | | | | | | |
| B. Manure management | | | | | | | | |
| C. Rice cultivation | | | | | | | | |
| D. Agricultural soils | | | | | | | | |
| E. Prescribed burning of savannas | | | | | | | | |
| F. Field burning of agricultural residues | | | | | | | | |
| G. Liming | NO | NO | NO | NO | NO | NO | | |
| H. Urea application | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | | -26.07 |
| I. Other carbon-containing fertilizers | NO | NO | NO | NO | NO | NO | | |
| J. Other | | | | | | | | |
| **4. Land Use, Land-Use Change and Forestry** | 8.94 | 14.27 | 14.37 | 11.11 | 11.30 | 11.27 | | 163.97 |
| A. Forest land | -0.94 | -0.90 | -0.87 | -0.84 | -0.80 | -0.77 | | -28.18 |
| B. Cropland | 4.25 | 4.23 | 4.22 | 4.21 | 4.19 | 4.18 | | -6.06 |
| C. Grassland | 3.63 | 3.72 | 3.81 | 3.91 | 4.00 | 4.09 | | 126.99 |
| D. Wetlands | 0.32 | 0.34 | 0.35 | 0.37 | 0.39 | 0.41 | | 158.49 |
| E. Settlements | 3.49 | 3.50 | 3.47 | 3.47 | 3.46 | 3.45 | | 8.42 |
| F. Other land | 1.12 | 1.16 | 1.20 | 1.24 | 1.29 | 1.33 | | 199.42 |
| G. Harvested wood products | -2.91 | 2.23 | 2.18 | -1.25 | -1.22 | -1.43 | | -69.66 |
| H. Other | NO | NO | NO | NO | NO | NO | | |
| **5. Waste** | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | | 8.35 |
| A. Solid waste disposal | NO | NO | NO | NO | NO | NO | | |
| B. Biological treatment of solid waste | | | | | | | | |
| C. Incineration and open burning of waste | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | | 8.35 |
| D. Waste water treatment and discharge | | | | | | | | |
| E. Other | NO | NO | NO | NO | NO | NO | | |
| **6. Other (as specified in the summary table in CRF)** | NO | NO | NO | NO | NO | NO | | |
| **Memo items:** | | | | | | | | |
| **International bunkers** | 0.74 | 0.88 | 0.78 | 0.83 | 1.12 | 1.06 | | 147.40 |
| Aviation | 0.74 | 0.88 | 0.78 | 0.83 | 1.12 | 1.06 | | 147.40 |
| Navigation | NO | NO | NO | NO | NO | NO | | |
| **Multilateral operations** | NO | NO | NO | NO | NO | NO | | |
| **CO2 emissions from biomass** | 15.81 | 18.59 | 19.66 | 21.22 | 22.08 | 18.31 | | 222.70 |
| **CO2 captured** | 106.77 | 109.66 | 101.83 | 93.10 | 97.16 | 99.32 | | 9.96 |
| **Long-term storage of C in waste disposal sites** | NA | NA | NA | NA | NA | NA | | |
| **Indirect N2O** | | | | | | | | |
| **Indirect CO2 (3)** | NO | NO | NO | NO | NO | NO | | |
| **Total CO2 equivalent emissions without land use, land-use change and forestry** | 222.66 | 208.32 | 193.45 | 179.31 | 187.89 | 194.68 | | -2.33 |
| **Total CO2 equivalent emissions with land use, land-use change and forestry** | 231.60 | 222.59 | 207.83 | 190.42 | 199.19 | 205.95 | | 1.16 |
| **Total CO2 equivalent emissions, including indirect CO2, without land use, land-use change and forestry** | 222.66 | 208.32 | 193.45 | 179.31 | 187.89 | 194.68 | | -2.33 |
| **Total CO2 equivalent emissions, including indirect CO2, with land use, land-use change and forestry** | 231.60 | 222.59 | 207.83 | 190.42 | 199.19 | 205.95 | | 1.16 |

*Abbreviations*: CRF = common reporting format, LULUCF = land use, land-use change and forestry.

[a] The column "Base year" should be filled in only by those Parties with economies in transition that use a base year different from 1990 in accordance with the relevant decisions of the Conference of the Parties. For these Parties, this different base year is used to calculate the percentage change in the final column of this table.

[b] Fill in net emissions/removals as reported in CRF table Summary 1.A of the latest reported inventory year. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

***Custom Footnotes***

Table 1(b) LIE_BR2_v0.1

**Emission trends ($CH_4$)**

**(Sheet 1 of 3)**

| *GREENHOUSE GAS SOURCE AND SINK CATEGORIES* | *Base year*[a] | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|
| | *kt* | | | | | | | | |
| **1. Energy** | 0.05 | 0.05 | 0.05 | 0.06 | 0.06 | 0.05 | 0.05 | 0.06 | 0.06 |
| A. Fuel combustion (sectoral approach) | 0.04 | 0.04 | 0.04 | 0.04 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| 1. Energy industries | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2. Manufacturing industries and construction | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3. Transport | 0.03 | 0.03 | 0.03 | 0.03 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| 4. Other sectors | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| 5. Other | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| B. Fugitive emissions from fuels | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 | 0.03 |
| 1. Solid fuels | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| 2. Oil and natural gas and other emissions from energy production | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 | 0.03 |
| C. CO2 transport and storage | | | | | | | | | |
| **2. Industrial processes** | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| A. Mineral industry | | | | | | | | | |
| B. Chemical industry | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| C. Metal industry | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| D. Non-energy products from fuels and solvent use | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| E. Electronic industry | | | | | | | | | |
| F. Product uses as ODS substitutes | | | | | | | | | |
| G. Other product manufacture and use | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| H. Other | | | | | | | | | |
| **3. Agriculture** | 0.67 | 0.67 | 0.67 | 0.65 | 0.61 | 0.62 | 0.62 | 0.63 | 0.62 |
| A. Enteric fermentation | 0.55 | 0.55 | 0.54 | 0.53 | 0.50 | 0.51 | 0.51 | 0.52 | 0.51 |
| B. Manure management | 0.12 | 0.12 | 0.12 | 0.12 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 |
| C. Rice cultivation | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA |
| D. Agricultural soils | NA, NO | NA, NO | NA, NO | NA, NO | NA, NO | NA, NO | NA, NO | NA, NO | NA, NO |
| E. Prescribed burning of savannas | | | | | | | | | |
| F. Field burning of agricultural residues | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA |
| G. Liming | | | | | | | | | |
| H. Urea application | | | | | | | | | |
| I. Other carbon-containing fertilizers | | | | | | | | | |
| J. Other | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| **4. Land use, land-use change and forestry** | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| A. Forest land | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| B. Cropland | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| C. Grassland | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| D. Wetlands | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| E. Settlements | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| F. Other land | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| G. Harvested wood products | | | | | | | | | |
| H. Other | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **5. Waste** | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 |
| A. Solid waste disposal | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 |
| B. Biological treatment of solid waste | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 | 0.02 |
| C. Incineration and open burning of waste | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| D. Waste water treatment and discharge | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E. Other | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **6. Other (as specified in the summary table in CRF)** | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **Total CH4 emissions without CH4 from LULUCF** | 0.76 | 0.76 | 0.76 | 0.74 | 0.71 | 0.71 | 0.71 | 0.73 | 0.71 |
| **Total CH4 emissions with CH4 from LULUCF** | 0.76 | 0.76 | 0.76 | 0.74 | 0.71 | 0.71 | 0.71 | 0.73 | 0.71 |
| **Memo items:** | | | | | | | | | |
| **International bunkers** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Aviation | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Navigation | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **Multilateral operations** | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **CO2 emissions from biomass** | | | | | | | | | |
| **CO2 captured** | | | | | | | | | |
| **Long-term storage of C in waste disposal sites** | | | | | | | | | |
| **Indirect N2O** | | | | | | | | | |
| **Indirect CO2 (3)** | | | | | | | | | |

**Note:** All footnotes for this table are given on sheet 3.

Table 1(b) LIE_BR2_v0.1

**Emission trends ($CH_4$)**

**(Sheet 2 of 3)**

| *GREENHOUSE GAS SOURCE AND SINK CATEGORIES* | *1998* | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|---|---|---|---|---|
| **1. Energy** | 0.06 | 0.06 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.08 | 0.08 | 0.09 |
| A. Fuel combustion (sectoral approach) | 0.03 | 0.03 | 0.04 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.04 |
| 1. Energy industries | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2. Manufacturing industries and construction | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3. Transport | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| 4. Other sectors | 0.01 | 0.01 | 0.02 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 |
| 5. Other | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| B. Fugitive emissions from fuels | 0.03 | 0.03 | 0.03 | 0.04 | 0.04 | 0.04 | 0.04 | 0.05 | 0.05 | 0.05 |
| 1. Solid fuels | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| 2. Oil and natural gas and other emissions from energy production | 0.03 | 0.03 | 0.03 | 0.04 | 0.04 | 0.04 | 0.04 | 0.05 | 0.05 | 0.05 |
| C. CO2 transport and storage | | | | | | | | | | |
| **2. Industrial processes** | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| A. Mineral industry | | | | | | | | | | |
| B. Chemical industry | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| C. Metal industry | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| D. Non-energy products from fuels and solvent use | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| E. Electronic industry | | | | | | | | | | |
| F. Product uses as ODS substitutes | | | | | | | | | | |
| G. Other product manufacture and use | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| H. Other | | | | | | | | | | |
| **3. Agriculture** | 0.61 | 0.58 | 0.56 | 0.60 | 0.60 | 0.60 | 0.61 | 0.62 | 0.65 | 0.66 |
| A. Enteric fermentation | 0.50 | 0.48 | 0.46 | 0.49 | 0.50 | 0.50 | 0.51 | 0.52 | 0.54 | 0.55 |
| B. Manure management | 0.11 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.11 | 0.11 |
| C. Rice cultivation | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA |
| D. Agricultural soils | NA, NO | NA, NO | NA, NO | NA, NO | NA, NO | NA, NO | NA, NO | NA, NO | NA, NO | NA, NO |
| E. Prescribed burning of savannas | | | | | | | | | | |
| F. Field burning of agricultural residues | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA |
| G. Liming | | | | | | | | | | |
| H. Urea application | | | | | | | | | | |
| I. Other carbon-containing fertilizers | | | | | | | | | | |
| J. Other | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| **4. Land use, land-use change and forestry** | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| A. Forest land | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| B. Cropland | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| C. Grassland | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| D. Wetlands | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| E. Settlements | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| F. Other land | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| G. Harvested wood products | | | | | | | | | | |
| H. Other | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **5. Waste** | 0.04 | 0.04 | 0.04 | 0.03 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 |
| A. Solid waste disposal | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 |
| B. Biological treatment of solid waste | 0.02 | 0.02 | 0.03 | 0.02 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| C. Incineration and open burning of waste | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| D. Waste water treatment and discharge | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E. Other | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **6. Other (as specified in the summary table in CRF)** | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **Total CH4 emissions without CH4 from LULUCF** | 0.70 | 0.68 | 0.67 | 0.70 | 0.71 | 0.71 | 0.72 | 0.74 | 0.77 | 0.79 |
| **Total CH4 emissions with CH4 from LULUCF** | 0.70 | 0.68 | 0.67 | 0.70 | 0.71 | 0.71 | 0.72 | 0.74 | 0.77 | 0.79 |
| **Memo items:** | | | | | | | | | | |
| **International bunkers** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Aviation | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Navigation | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **Multilateral operations** | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **CO2 emissions from biomass** | | | | | | | | | | |
| **CO2 captured** | | | | | | | | | | |
| **Long-term storage of C in waste disposal sites** | | | | | | | | | | |
| **Indirect N2O** | | | | | | | | | | |
| **Indirect CO2 (3)** | | | | | | | | | | |

**Note:** All footnotes for this table are given on sheet 3.

Table 1(b) LIE_BR2_v0.1

**Emission trends ($CH_4$)**

**(Sheet 3 of 3)**

| *GREENHOUSE GAS SOURCE AND SINK CATEGORIES* | *2008* | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | Change from base to latest reported year |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | % |
| **1. Energy** | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | | 71.40 |
| A. Fuel combustion (sectoral approach) | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | | 4.25 |
| 1. Energy industries | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 884.11 |
| 2. Manufacturing industries and construction | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | -29.79 |
| 3. Transport | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | | -78.06 |
| 4. Other sectors | 0.03 | 0.03 | 0.03 | 0.03 | 0.04 | 0.03 | | 237.66 |
| 5. Other | NO | NO | NO | NO | NO | NO | | |
| B. Fugitive emissions from fuels | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | | 240.78 |
| 1. Solid fuels | NO | NO | NO | NO | NO | NO | | |
| 2. Oil and natural gas and other emissions from energy production | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | | 240.78 |
| C. CO2 transport and storage | | | | | | | | |
| **2. Industrial processes** | NO | NO | NO | NO | NO | NO | | |
| A. Mineral industry | | | | | | | | |
| B. Chemical industry | NO | NO | NO | NO | NO | NO | | |
| C. Metal industry | NO | NO | NO | NO | NO | NO | | |
| D. Non-energy products from fuels and solvent use | NO | NO | NO | NO | NO | NO | | |
| E. Electronic industry | | | | | | | | |
| F. Product uses as ODS substitutes | | | | | | | | |
| G. Other product manufacture and use | NO | NO | NO | NO | NO | NO | | |
| H. Other | | | | | | | | |
| **3. Agriculture** | 0.67 | 0.67 | 0.64 | 0.66 | 0.67 | 0.64 | | -4.55 |
| A. Enteric fermentation | 0.56 | 0.55 | 0.54 | 0.55 | 0.56 | 0.53 | | -2.77 |
| B. Manure management | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | | -12.50 |
| C. Rice cultivation | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | | |
| D. Agricultural soils | NA, NO | NA, NO | NA, NO | NA, NO | NA, NO | NA, NO | | |
| E. Prescribed burning of savannas | | | | | | | | |
| F. Field burning of agricultural residues | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | | |
| G. Liming | | | | | | | | |
| H. Urea application | | | | | | | | |
| I. Other carbon-containing fertilizers | | | | | | | | |
| J. Other | NA | NA | NA | NA | NA | NA | | |
| **4. Land use, land-use change and forestry** | NO | NO | NO | NO | NO | NO | | |
| A. Forest land | NO | NO | NO | NO | NO | NO | | |
| B. Cropland | NO | NO | NO | NO | NO | NO | | |
| C. Grassland | NO | NO | NO | NO | NO | NO | | |
| D. Wetlands | NO | NO | NO | NO | NO | NO | | |
| E. Settlements | NO | NO | NO | NO | NO | NO | | |
| F. Other land | NO | NO | NO | NO | NO | NO | | |
| G. Harvested wood products | | | | | | | | |
| H. Other | NO | NO | NO | NO | NO | NO | | |
| **5. Waste** | 0.04 | 0.04 | 0.03 | 0.04 | 0.04 | 0.04 | | -7.47 |
| A. Solid waste disposal | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | -86.20 |
| B. Biological treatment of solid waste | 0.04 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | | 75.95 |
| C. Incineration and open burning of waste | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 8.35 |
| D. Waste water treatment and discharge | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 56.24 |
| E. Other | NO | NO | NO | NO | NO | NO | | |
| **6. Other (as specified in the summary table in CRF)** | NO | NO | NO | NO | NO | NO | | |
| **Total CH4 emissions without CH4 from LULUCF** | 0.80 | 0.79 | 0.77 | 0.79 | 0.81 | 0.77 | | 0.42 |
| **Total CH4 emissions with CH4 from LULUCF** | 0.80 | 0.79 | 0.77 | 0.79 | 0.81 | 0.77 | | 0.42 |
| **Memo items:** | | | | | | | | |
| **International bunkers** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 147.40 |
| Aviation | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 147.40 |
| Navigation | NO | NO | NO | NO | NO | NO | | |
| **Multilateral operations** | NO | NO | NO | NO | NO | NO | | |
| **CO2 emissions from biomass** | | | | | | | | |
| **CO2 captured** | | | | | | | | |
| **Long-term storage of C in waste disposal sites** | | | | | | | | |
| **Indirect N2O** | | | | | | | | |
| **Indirect CO2 (3)** | | | | | | | | |

*Abbreviations* : CRF = common reporting format, LULUCF = land use, land-use change an

[a] The column "Base year" should be filled in only by those Parties with economies in transition that use a base year different from 1990 in accordance with the relevant decisions of the Conference of the Parties. For these Parties, this different base year is used to calculate the percentage change in the final column of this table.



***Custom Footnotes***

Table 1(c) LIE_BR2_v0.1

**Emission trends ($N_2O$)**

**(Sheet 1 of 3)**

| *GREENHOUSE GAS SOURCE AND SINK CATEGORIES* | *Base year* [a] | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|
| | *kt* | | | | | | | | |
| **1. Energy** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 |
| A. Fuel combustion (sectoral approach) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 |
| 1. Energy industries | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2. Manufacturing industries and construction | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3. Transport | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4. Other sectors | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5. Other | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| B. Fugitive emissions from fuels | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA |
| 1. Solid fuels | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| 2. Oil and natural gas and other emissions from energy production | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA |
| C. CO2 transport and storage | | | | | | | | | |
| **2. Industrial processes** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| A. Mineral industry | | | | | | | | | |
| B. Chemical industry | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| C. Metal industry | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| D. Non-energy products from fuels and solvent use | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| E. Electronic industry | | | | | | | | | |
| F. Product uses as ODS substitutes | | | | | | | | | |
| G. Other product manufacture and use | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| H. Other | | | | | | | | | |
| **3. Agriculture** | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| A. Enteric fermentation | | | | | | | | | |
| B. Manure management | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C. Rice cultivation | | | | | | | | | |
| D. Agricultural soils | 0.02 | 0.02 | 0.03 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| E. Prescribed burning of savannas | | | | | | | | | |
| F. Field burning of agricultural residues | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA |
| G. Liming | | | | | | | | | |
| H. Urea application | | | | | | | | | |
| I. Other carbon containing fertlizers | | | | | | | | | |
| J. Other | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| **4. Land use, land-use change and forestry** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| A. Forest land | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| B. Cropland | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C. Grassland | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| D. Wetlands | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E. Settlements | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| F. Other land | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| G. Harvested wood products | | | | | | | | | |
| H. Other | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **5. Waste** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| A. Solid waste disposal | | | | | | | | | |
| B. Biological treatment of solid waste | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C. Incineration and open burning of waste | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| D. Waste water treatment and discharge | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E. Other | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **6. Other (as specified in the summary table in CRF)** | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **Total direct N2O emissions without N2O from LULUCF** | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 |
| **Total direct N2O emissions with N2O from LULUCF** | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 |
| **Memo items:** | | | | | | | | | |
| **International bunkers** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Aviation | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Navigation | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **Multilateral operations** | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **CO2 emissions from biomass** | | | | | | | | | |
| **CO2 captured** | | | | | | | | | |
| **Long-term storage of C in waste disposal sites** | | | | | | | | | |
| **Indirect N2O** | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **Indirect CO2 (3)** | | | | | | | | | |

**Note:** All footnotes for this table are given on sheet 3.

Table 1(c) LIE_BR2_v0.1

**Emission trends ($N_2O$)**

**(Sheet 2 of 3)**

| *GREENHOUSE GAS SOURCE AND SINK CATEGORIES* | *1998* | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|---|---|---|---|---|
| **1. Energy** | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| A. Fuel combustion (sectoral approach) | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1. Energy industries | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2. Manufacturing industries and construction | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3. Transport | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4. Other sectors | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5. Other | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| B. Fugitive emissions from fuels | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA |
| 1. Solid fuels | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| 2. Oil and natural gas and other emissions from energy production | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA |
| C. CO2 transport and storage | | | | | | | | | | |
| **2. Industrial processes** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| A. Mineral industry | | | | | | | | | | |
| B. Chemical industry | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| C. Metal industry | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| D. Non-energy products from fuels and solvent use | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| E. Electronic industry | | | | | | | | | | |
| F. Product uses as ODS substitutes | | | | | | | | | | |
| G. Other product manufacture and use | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| H. Other | | | | | | | | | | |
| **3. Agriculture** | 0.03 | 0.03 | 0.02 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| A. Enteric fermentation | | | | | | | | | | |
| B. Manure management | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C. Rice cultivation | | | | | | | | | | |
| D. Agricultural soils | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| E. Prescribed burning of savannas | | | | | | | | | | |
| F. Field burning of agricultural residues | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA |
| G. Liming | | | | | | | | | | |
| H. Urea application | | | | | | | | | | |
| I. Other carbon containing fertlizers | | | | | | | | | | |
| J. Other | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| **4. Land use, land-use change and forestry** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| A. Forest land | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| B. Cropland | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C. Grassland | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| D. Wetlands | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E. Settlements | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| F. Other land | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| G. Harvested wood products | | | | | | | | | | |
| H. Other | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **5. Waste** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| A. Solid waste disposal | | | | | | | | | | |
| B. Biological treatment of solid waste | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C. Incineration and open burning of waste | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| D. Waste water treatment and discharge | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E. Other | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **6. Other (as specified in the summary table in CRF)** | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **Total direct N2O emissions without N2O from LULUCF** | 0.04 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| **Total direct N2O emissions with N2O from LULUCF** | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.03 | 0.04 | 0.04 | 0.04 |
| **Memo items:** | | | | | | | | | | |
| **International bunkers** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Aviation | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Navigation | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **Multilateral operations** | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **CO2 emissions from biomass** | | | | | | | | | | |
| **CO2 captured** | | | | | | | | | | |
| **Long-term storage of C in waste disposal sites** | | | | | | | | | | |
| **Indirect N2O** | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **Indirect CO2 (3)** | | | | | | | | | | |

**Note:** All footnotes for this table are given on sheet 3.

Table 1(c) LIE_BR2_v0.1

**Emission trends ($N_2O$)**

**(Sheet 3 of 3)**

| *GREENHOUSE GAS SOURCE AND SINK CATEGORIES* | *2008* | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | Change from base to latest reported year |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | % |
| **1. Energy** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | -15.75 |
| A. Fuel combustion (sectoral approach) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | -15.75 |
| 1. Energy industries | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 59.08 |
| 2. Manufacturing industries and construction | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 2.81 |
| 3. Transport | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | -35.40 |
| 4. Other sectors | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 24.08 |
| 5. Other | NO | NO | NO | NO | NO | NO | | |
| B. Fugitive emissions from fuels | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | | |
| 1. Solid fuels | NO | NO | NO | NO | NO | NO | | |
| 2. Oil and natural gas and other emissions from energy production | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | | |
| C. CO2 transport and storage | | | | | | | | |
| **2. Industrial processes** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | -56.24 |
| A. Mineral industry | | | | | | | | |
| B. Chemical industry | NO | NO | NO | NO | NO | NO | | |
| C. Metal industry | NO | NO | NO | NO | NO | NO | | |
| D. Non-energy products from fuels and solvent use | NO | NO | NO | NO | NO | NO | | |
| E. Electronic industry | | | | | | | | |
| F. Product uses as ODS substitutes | | | | | | | | |
| G. Other product manufacture and use | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | -56.24 |
| H. Other | | | | | | | | |
| **3. Agriculture** | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | | -7.54 |
| A. Enteric fermentation | | | | | | | | |
| B. Manure management | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 16.48 |
| C. Rice cultivation | | | | | | | | |
| D. Agricultural soils | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | | -11.33 |
| E. Prescribed burning of savannas | | | | | | | | |
| F. Field burning of agricultural residues | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | | |
| G. Liming | | | | | | | | |
| H. Urea application | | | | | | | | |
| I. Other carbon containing fertlizers | | | | | | | | |
| J. Other | NA | NA | NA | NA | NA | NA | | |
| **4. Land use, land-use change and forestry** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 47.57 |
| A. Forest land | NO | NO | NO | NO | NO | NO | | |
| B. Cropland | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 47.68 |
| C. Grassland | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 385.66 |
| D. Wetlands | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 637.74 |
| E. Settlements | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 6.72 |
| F. Other land | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 235.53 |
| G. Harvested wood products | | | | | | | | |
| H. Other | NO | NO | NO | NO | NO | NO | | |
| **5. Waste** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 34.11 |
| A. Solid waste disposal | | | | | | | | |
| B. Biological treatment of solid waste | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 75.95 |
| C. Incineration and open burning of waste | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 8.35 |
| D. Waste water treatment and discharge | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 30.04 |
| E. Other | NO | NO | NO | NO | NO | NO | | |
| **6. Other (as specified in the summary table in CRF)** | NO | NO | NO | NO | NO | NO | | |
| **Total direct N2O emissions without N2O from LULUCF** | 0.04 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | | -6.93 |
| **Total direct N2O emissions with N2O from LULUCF** | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | | -5.43 |
| **Memo items:** | | | | | | | | |
| **International bunkers** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 147.40 |
| Aviation | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 147.40 |
| Navigation | NO | NO | NO | NO | NO | NO | | |
| **Multilateral operations** | NO | NO | NO | NO | NO | NO | | |
| **CO2 emissions from biomass** | | | | | | | | |
| **CO2 captured** | | | | | | | | |
| **Long-term storage of C in waste disposal sites** | | | | | | | | |
| **Indirect N2O** | NO | NO | NO | NO | NO | NO | | |
| **Indirect CO2 (3)** | | | | | | | | |

*Abbreviations* : CRF = common reporting format, LULUCF = land use, land-use change an

[a] The column "Base year" should be filled in only by those Parties with economies in transition that use a base year different from 1990 in accordance with the relevant decisions of the Conference of the Parties. For these Parties, this different base year is used to calculate the percentage change in the final column of this table.

Table 1(c) LIE_BR2_v0.1

**Emission trends ($N_2O$)**

**(Sheet 3 of 3)**

| *GREENHOUSE GAS SOURCE AND SINK CATEGORIES* | *2008* | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | Change from base to latest reported year |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | % |
| **1. Energy** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | -15.75 |
| A. Fuel combustion (sectoral approach) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | -15.75 |
| 1. Energy industries | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 59.08 |
| 2. Manufacturing industries and construction | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 2.81 |
| 3. Transport | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | -35.40 |
| 4. Other sectors | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 24.08 |
| 5. Other | NO | NO | NO | NO | NO | NO | | |
| B. Fugitive emissions from fuels | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | | |
| 1. Solid fuels | NO | NO | NO | NO | NO | NO | | |
| 2. Oil and natural gas and other emissions from energy production | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | | |
| C. CO2 transport and storage | | | | | | | | |
| **2. Industrial processes** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | -56.24 |
| A. Mineral industry | | | | | | | | |
| B. Chemical industry | NO | NO | NO | NO | NO | NO | | |
| C. Metal industry | NO | NO | NO | NO | NO | NO | | |
| D. Non-energy products from fuels and solvent use | NO | NO | NO | NO | NO | NO | | |
| E. Electronic industry | | | | | | | | |
| F. Product uses as ODS substitutes | | | | | | | | |
| G. Other product manufacture and use | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | -56.24 |
| H. Other | | | | | | | | |
| **3. Agriculture** | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | | -7.54 |
| A. Enteric fermentation | | | | | | | | |
| B. Manure management | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 16.48 |
| C. Rice cultivation | | | | | | | | |
| D. Agricultural soils | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | | -11.33 |
| E. Prescribed burning of savannas | | | | | | | | |
| F. Field burning of agricultural residues | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | NO, NA | | |
| G. Liming | | | | | | | | |
| H. Urea application | | | | | | | | |
| I. Other carbon containing fertlizers | | | | | | | | |
| J. Other | NA | NA | NA | NA | NA | NA | | |
| **4. Land use, land-use change and forestry** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 47.57 |
| A. Forest land | NO | NO | NO | NO | NO | NO | | |
| B. Cropland | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 47.68 |
| C. Grassland | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 385.66 |
| D. Wetlands | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 637.74 |
| E. Settlements | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 6.72 |
| F. Other land | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 235.53 |
| G. Harvested wood products | | | | | | | | |
| H. Other | NO | NO | NO | NO | NO | NO | | |
| **5. Waste** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 34.11 |
| A. Solid waste disposal | | | | | | | | |
| B. Biological treatment of solid waste | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 75.95 |
| C. Incineration and open burning of waste | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 8.35 |
| D. Waste water treatment and discharge | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 30.04 |
| E. Other | NO | NO | NO | NO | NO | NO | | |
| **6. Other (as specified in the summary table in CRF)** | NO | NO | NO | NO | NO | NO | | |
| **Total direct N2O emissions without N2O from LULUCF** | 0.04 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | | -6.93 |
| **Total direct N2O emissions with N2O from LULUCF** | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | | -5.43 |
| **Memo items:** | | | | | | | | |
| **International bunkers** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 147.40 |
| Aviation | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 147.40 |
| Navigation | NO | NO | NO | NO | NO | NO | | |
| **Multilateral operations** | NO | NO | NO | NO | NO | NO | | |
| **CO2 emissions from biomass** | | | | | | | | |
| **CO2 captured** | | | | | | | | |
| **Long-term storage of C in waste disposal sites** | | | | | | | | |
| **Indirect N2O** | NO | NO | NO | NO | NO | NO | | |
| **Indirect CO2 (3)** | | | | | | | | |

*Abbreviations* : CRF = common reporting format, LULUCF = land use, land-use change an

[a] The column "Base year" should be filled in only by those Parties with economies in transition that use a base year different from 1990 in accordance with the relevant decisions of the Conference of the Parties. For these Parties, this different base year is used to calculate the percentage change in the final column of this table.

Table 1(d) LIE_BR2_v0.1

**Emission trends (HFCs, PFCs and $SF_6$)**
**(Sheet 2 of 3)**

| *GREENHOUSE GAS SOURCE AND SINK CATEGORIES* | *1998* | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Emissions of HFCs and PFCs - (kt CO2 equivalent)** | 2.74 | 3.35 | 4.11 | 4.94 | 5.48 | 6.17 | 7.05 | 7.48 | 7.98 | 8.72 |
| **Emissions of HFCs - (kt CO2 equivalent)** | 2.73 | 3.34 | 4.10 | 4.93 | 5.46 | 6.13 | 7.00 | 7.42 | 7.91 | 8.63 |
| HFC-23 | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| HFC-32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| HFC-41 | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| HFC-43-10mee | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| HFC-125 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| HFC-134 | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| HFC-134a | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| HFC-143 | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| HFC-143a | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| HFC-152 | | | | | | | | | | |
| HFC-152a | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| HFC-161 | | | | | | | | | | |
| HFC-227ea | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| HFC-236cb | | | | | | | | | | |
| HFC-236ea | | | | | | | | | | |
| HFC-236fa | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| HFC-245ca | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| HFC-245fa | | | | | | | | | | |
| HFC-365mfc | NO | NO | NO | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Unspecified mix of HFCs(4) - (kt $CO_2$ equivalent) | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **Emissions of PFCs - (kt CO2 equivalent)** | 0.00 | 0.01 | 0.01 | 0.02 | 0.02 | 0.04 | 0.05 | 0.07 | 0.08 | 0.08 |
| $CF_4$ | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| $C_2F_6$ | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| $C_3F_8$ | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| $C_4F_{10}$ | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| c-$C_4F_8$ | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| $C_5F_{12}$ | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| $C_6F_{14}$ | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| C10F18 | | | | | | | | | | |
| c-C3F6 | | | | | | | | | | |
| Unspecified mix of PFCs(4) - (kt $CO_2$ equivalent) | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **Unspecified mix of HFCs and PFCs - (kt CO2 equivalent)** | | | | | | | | | | |
| **Emissions of SF6 - (kt CO2 equivalent)** | NO | 0.00 | 0.09 | 0.17 | 0.24 | 0.25 | 0.26 | 0.26 | 0.06 | 0.11 |
| $SF_6$ | NO | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Emissions of NF3 - (kt CO2 equivalent)** | | | | | | | | | | |
| NF3 | | | | | | | | | | |

**Note:** All footnotes for this table are given on sheet 3.

Table 1(d) LIE_BR2_v0.1

**Emission trends (HFCs, PFCs and $SF_6$)**

**(Sheet 3 of 3)**

| *GREENHOUSE GAS SOURCE AND SINK CATEGORIES* | *2008* | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | Change from base to latest reported year |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | % |
| **Emissions of HFCs and PFCs - (kt CO2 equivalent)** | 9.57 | 9.64 | 10.71 | 11.22 | 11.87 | 12.28 | | 11,763,068.02 |
| **Emissions of HFCs - (kt CO2 equivalent)** | 9.49 | 9.57 | 10.64 | 11.16 | 11.81 | 12.22 | | 11,704,810.76 |
| HFC-23 | NO | NO | NO | NO | NO | NO | | |
| HFC-32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| HFC-41 | NO | NO | NO | NO | NO | NO | | |
| HFC-43-10mee | NO | NO | NO | NO | NO | NO | | |
| HFC-125 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| HFC-134 | NO | NO | NO | NO | NO | NO | | |
| HFC-134a | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 4,410,184.12 |
| HFC-143 | NO | NO | NO | NO | NO | NO | | |
| HFC-143a | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| HFC-152 | | | | | | | | |
| HFC-152a | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| HFC-161 | | | | | | | | |
| HFC-227ea | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| HFC-236cb | | | | | | | | |
| HFC-236ea | | | | | | | | |
| HFC-236fa | NO | NO | NO | NO | NO | NO | | |
| HFC-245ca | NO | NO | NO | NO | NO | NO | | |
| HFC-245fa | | | | | | | | |
| HFC-365mfc | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| Unspecified mix of HFCs(4) - (kt $CO_2$ equivalent) | NO | NO | NO | NO | NO | NO | | |
| **Emissions of PFCs - (kt CO2 equivalent)** | 0.08 | 0.07 | 0.07 | 0.06 | 0.06 | 0.06 | | |
| $CF_4$ | NO | NO | NO | NO | NO | NO | | |
| $C_2F_6$ | NO | NO | NO | NO | NO | NO | | |
| $C_3F_8$ | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| $C_4F_{10}$ | NO | NO | NO | NO | NO | NO | | |
| c-$C_4F_8$ | NO | NO | NO | NO | NO | NO | | |
| $C_5F_{12}$ | NO | NO | NO | NO | NO | NO | | |
| $C_6F_{14}$ | NO | NO | NO | NO | NO | NO | | |
| C10F18 | | | | | | | | |
| c-C3F6 | | | | | | | | |
| Unspecified mix of PFCs(4) - (kt $CO_2$ equivalent) | NO | NO | NO | NO | NO | NO | | |
| **Unspecified mix of HFCs and PFCs - (kt CO2 equivalent)** | | | | | | | | |
| **Emissions of SF6 - (kt CO2 equivalent)** | 0.35 | 0.14 | 0.02 | 0.01 | 0.00 | 0.17 | | |
| $SF_6$ | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| **Emissions of NF3 - (kt CO2 equivalent)** | | | | | | | | |
| NF3 | | | | | | | | |

*Abbreviations*: CRF = common reporting format, LULUCF = land use, land-use change and forestry.

[a] The column "Base year" should be filled in only by those Parties with economies in transition that use a base year different from 1990 in accordance with the relevant decisions of the Conference of the Parties. For these Parties, this different base year is used to calculate the percentage change in the final column of this table.

[c]Enter actual emissions estimates. If only potential emissions estimates are available, these should be reported in this table and an indication for this be provided in the documentation box. Only in these rows are the emissions expressed as CO2 equivalent emissions.

[d]In accordance with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories", HFC and PFC emissions should be reported for each relevant chemical. However, if it is not possible to report values for each chemical (i.e. mixtures, confidential data, lack of disaggregation), this row could be used for reporting aggregate figures for HFCs and PFCs, respectively. Note that the unit used for this row is kt of CO2 equivalent and that appropriate notation keys should be entered in the cells for the individual chemicals.)

***Custom Footnotes***

# 3. Quantified Economy-wide Emission Reduction Target (QEWER)

**Liechtenstein's quantified economy-wide emission reduction target**

Liechtenstein quantified economy-wide emission reduction target is -20% of its 1990 total GHG emissions by 2020. Optionally, to increase its ambitions to -30%, if other developed countries commit themselves to comparable emissions reduction efforts and if economically more advanced developing countries take appropriate mitigation actions. Liechtenstein submitted in April 2014 its national information relating the ambition of its commitment under the 2nd commitment period of the Kyoto Protocol in accordance with Decision FCCC/KP/CMP/2012/L.9. The submission follows the content of paragraph 9 of that decision.

With respect to a possible increase of Liechtenstein's commitment under the second period of the Kyoto Protocol the Government has carefully examined the option and decided not to increase its ambition over the communicated commitment of -20% compared to 1990. The Government is of the view that the current commitment already states a very ambitious goal – which will require a considerable effort to be achieved by domestic measures only.

At the current stage an increase of ambition would correspond automatically with a respective increase of acquisition of emission reductions abroad. Such situation would indirectly contradict Liechtenstein's legal framework that requires the Government to primarily focus on domestic greenhouse gas reductions.

In April 2015 the Liechtenstein Government submitted its Intended Nationally Determined Contribution (INDC) to the Secretariat of the UNFCCC. The INDC includes a quantified economy-wide emission reduction target for 2030. The assumptions underlying Liechtenstein's INDC are based on the possibility to achieve emission reductions abroad which may be accounted towards Liechtenstein's reduction target in 2030. However, primary focus will be on domestic emission reductions. Liechtenstein aims at a reduction of greenhouse gases by 40 % compared to 1990 by 2030. The reduction target will be subject to the approval of the Liechtenstein Parliament.

Table 2(a) LIE_BR2_v0.1

**Description of quantified economy-wide emission reduction target: base year**[a]

| *Party* | *Liechtenstein* | |
|---|---|---|
| Base year /base period | 1990 | |
| Emission reduction target | % of base year/base period | % of 1990 [b] |
| | | 20.00 |
| Period for reaching target | BY-2020 | |

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

[b] Optional.

Table 2(b) LIE_BR2_v0.1

**Description of quantified economy-wide emission reduction target: gases and sectors covered**[a]

| *Gases covered* | | *Base year for each gas (year):* |
|---|---|---|
| $CO_2$ | | 1990 |
| $CH_4$ | | 1990 |
| $N_2O$ | | 1990 |
| HFCs | | 1990 |
| PFCs | | 1990 |
| $SF_6$ | | 1990 |
| $NF_3$ | | |
| Other Gases (specify) | | |
| Sectors covered[b] | Energy | Yes |
| | Transport[f] | Yes |
| | Industrial processes[g] | Yes |
| | Agriculture | Yes |
| | LULUCF | Yes |
| | Waste | Yes |
| | Other Sectors (specify) | |

*Abbreviations* : LULUCF = land use, land-use change and forestry.

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

[b] More than one selection will be allowed. If Parties use sectors other than those indicated above, the explanation of how these sectors relate to the sectors defined by the IPCC should be provided.

[f] Transport is reported as a subsector of the energy sector.

[g] Industrial processes refer to the industrial processes and solvent and other product use sectors.

Table 2(c) LIE_BR2_v0.1

**Description of quantified economy-wide emission reduction target: global warming potential values (GWP)**[a]

| *Gases* | *GWP values* [b] |
|---|---|
| $CO_2$ | 4th AR |
| $CH_4$ | 4th AR |
| $N_2O$ | 4th AR |
| HFCs | 4th AR |
| PFCs | 4th AR |
| $SF_6$ | 4th AR |
| $NF_3$ | 2nd AR |
| Other Gases (specify) | |

*Abbreviations* : GWP = global warming potential

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

[b] Please specify the reference for the GWP: Second Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) or the Fourth Assessment Report of the IPCC.

Table 2(d) LIE_BR2_v0.1

**Description of quantified economy-wide emission reduction target: approach to counting emissions and removals from the LULUCF sector**[a]

| | | |
|---|---|---|
| **Role of LULUCF** | LULUCF in base year level and target | Included |
| | Contribution of LULUCF is calculated using | Land-based approach |

*Abbreviation*: LULUCF = land use, land-use change and forestry.

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

## Use of international market based mechanisms

Liechtenstein will continue the use of carbon credits generated from the flexible mechanisms of the Kyoto Protocol and from new market based mechanisms under the Convention in order to ensure the achievement of the abovementioned reduction target. Current projections, as contained in Liechtenstein's 6th National Communication (Chapter 5.3), forecast an annual demand of around 22'000 t $CO_2$ eq to be reduced abroad. This number is based on annual emissions estimates of 193.99 Gg $CO_2$.

However, in order to calculate the exact amount of carbon credits until 2020 the Government will have to conclude further estimations and projections, based on the effective implementation of policy measures which have been proposed in the Government's Energy Strategy 2020.

As described above Liechtenstein has not yet calculated the exact amount of required carbon credits from abroad (2013). During COP 18 in 2012 in Doha, Qatar Liechtenstein declared not to acquire AAUs for compliance purposes under the second commitment period of the Kyoto Protocol (FCCC/KP/CMP/2012/L.9). Liechtenstein use a limited amount of its own AAUs to be carried over in the second commitment period.

With regard to Liechtenstein's emission reduction target in 2030 Liechtenstein may take advantage of the possibility to achieve emission reductions abroad which may be accounted towards Liechtenstein's reduction target in 2030. To this respect it is envisaged to make use of the respective mechanisms described in Art. 6 of the Paris Agreement.

Liechtenstein requests to carry-over from the first commitment period of the Kyoto protocol 42'984 AAUs to the second commitment period. A first estimation of the target gap for the second commitment period was conducted in 2015 for two assumptions. One assumption was for constant emissions based on the 2012 emissions and the other assumption was considering the projections based on the NC6 WM scenario (refer to Table 3-1). Liechtenstein will still put every effort in reaching its goal with domestic measures. Both assumptions should show the minimum and maximum of the target gap using market based mechanisms. Therefore, the minimum amount for CP2 would be 123'614 t $CO_2$eq and a maximum of 227'384 t $CO_2$eq. Please note, as Liechtenstein has not submitted its initial report yet, the presented data are only preliminary estimations. Better estimates will be available when the initial report is final in 2016.The amount in CTF Table 2(e)I is an estimation and reflects the mean value of both assumptions.

Table 3-1 Estimation of target gap using market based mechanisms

| | **constant emissions** | **Emissions NC6 WM** |
|---|---|---|
| **total emissions (2013-2020)** | **1'803'200** | **1'699'430** |
| Kyoto 2 target | 1'532'832 | 1'532'832 |
| total target gap | 270'368 | 166'598 |
| Carry-over from CP1 | 42'984 | 42'984 |
| **target gap including carry-over** | **227'384** | **123'614** |

Table 2(e)I LIE_BR2_v0.1

**Description of quantified economy-wide emission reduction target: market-based mechanisms under the Convention**[a]

| *Market-based mechanisms under the Convention* | *Possible scale of contributions (estimated kt $CO_2$ eq)* |
|---|---|
| CERs | 170.00 |
| ERUs | 0.00 |
| AAUs[i] | 0.00 |
| Carry-over units[j] | 42.98 |
| Other mechanism units under the Convention (specify)[d] | |

*Abbreviations* : AAU = assigned amount unit, CER = certified emission reduction, ERU = emission reduction unit.

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

[d] As indicated in paragraph 5(e) of the guidelines contained in annex I of decision 2/CP.17 .

[i] AAUs issued to or purchased by a Party.

[j] Units carried over from the first to the second commitment periods of the Kyoto Protocol, as described in decision 13/CMP.1 and consistent with decision 1/CMP.8.

Table 2(e)II LIE_BR2_v0.1

**Description of quantified economy-wide emission reduction target: other market-based mechanisms**[a]

| *Other market-based mechanisms (Specify)* | *Possible scale of contributions (estimated kt $CO_2$ eq)* |
|---|---|
| | |
| | |

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

**Description of quantified economy-wide emission reduction target: any other information**[a,b]

| |
|---|
| |

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

[b] This information could include information on the domestic legal status of the target or the total assigned amount of emission units for the period for reaching a target. Some of this information is presented in the narrative part of the biennial report.

***Custom Footnotes***

# 4. Progress in achievement of QEWER target

**Mitigation actions and their effects in Liechtenstein**

Liechtenstein has implemented its climate related policies and measures strongly into individual sectorial policies. The responsibility of monitoring the effects of individual measures or policies is therefore beard by the respective administration offices that are in charge of the execution of the individual measure. These authorities provide an annual report of their activities (not only climate change related) which will be forwarded to the Liechtenstein Parliament. The reports are publicly available.

In order to set the path with regard to the fulfilment of Liechtenstein's INDC in 2030, the Government of Liechtenstein has passed a revised Climate Strategy in September 2015. The strategy provides a policy framework with regard to the specific policy sectors environment, energy, infrastructure, transportation, agriculture and forestry. Based on that framework new measures will be implemented and existing measures may be prolonged. Liechtenstein envisages to implement its targets for 2030 into national law and to ratify the Paris Agreement as soon as possible. Liechtenstein's legislative and administrative main arrangements to meet its current commitments under the Kyoto Protocol are to be found in the Emissions Trading Act and the $CO_2$ Act.

The Emissions Trading Act (EHG) sets up the general framework for the fulfilment of Liechtenstein's reduction obligations originating from the respective ratification of the Kyoto Protocol. In 2012 the Government introduced a legally binding greenhouse gas reduction target from at least 20 % compared to 1990 until 2020. In addition the EHG states that emission reductions are first and foremost to be reduced by domestic measures. If the reduction obligations cannot be fulfilled through domestic measures the government may participate in project activities abroad or in international emissions trading. Besides this the EHG implements Directive 2003/87/EC (Emissions Trading Directive) into national law and obliges two industrial installations (2013) to participate within the European Emissions Trading Scheme. Due to comprehensive amendments of Directive 2003/87/EC the EHG has been revised in 2012. The regulations of the EHG with respect to the participation of Liechtenstein in the Kyoto Protocols flexible mechanisms as well as with respect to domestic emissions trading are executed by the Office of Environment.

The $CO_2$ Act corresponds with the $CO_2$ Act of Switzerland (in force since 2008) and introduces a levy on the consumption of fossil fuel (oil and natural gas). In 2013 the CO2 Act has been revised. Besides the levy on fossil fuel an obligation to compensate $CO_2$ emissions from the use of motor fuels (gasoline and diesel) as well as emission regulations for passenger cars has been introduced. The $CO_2$ Act is part of "The bilateral Agreement between the Principality of Liechtenstein and the Swiss Confederation on Environmental Levies within the Principality of Liechtenstein".

From 2016 onwards the levy will be increased from CHF 60,- to CHF 84,- per ton of $CO_2$.

In terms of measurable mitigation actions the most relevant measures are to be found in the energy sector, since over 80 % of Liechtenstein's $CO_2$ emissions are energy related. To this

regard the Energy Efficiency Act and the Energy Strategy 2020 serve as central drivers for the achievement of Liechtenstein's GHG reduction targets until 2020:

The **Energy Efficiency Act** (2008) and the relevant Ordinance (2008) as well as the Energy Ordinance (2007) on the Construction Act constitute the legal framework for the implementation of measures relating to buildings. A gratifying development is also that municipalities now supplement national Energy Conservation Act subsidies with their own funds. The Government intends to promote the measures for implementing the objectives laid down in the energy strategy with financial resources and advice. The increase of energy efficiency and in particular the increased use of renewable energies are of central importance for the reduction of greenhouse gas emissions and accordingly for a long-term climate policy. The concrete provisions are to be found in the relevant Ordinance which is revised on an ongoing basis. The last revision took place in February 2015 and enhanced the financial support of specific industry installations.

In 2012 the Government adopted the "**Energy Strategy 2020**". The strategy provides future-oriented impulses for the national energy policy. The focus areas of the concept are the promotion of efficient energy use, the use of renewable energies, and energy conservation. These goals correspond to the aims of the EU's 20-20-20 climate package from 2008. Increase the share of renewable energy in total energy use from 8% to 20% by 2020. Increase the energy efficiency to 20% to stabilize the energy consumption on the level of 2008 by 2020 and 20% reduction of the $CO_2$ emission by 2020. The Energy Strategy 2020 also addressed the need to minimize adverse effects of its proposed measures as required by Art. 2 paragraph 3 of the Kyoto Protocol. The proposed set of measures has been checked against its compatibility with economic as well as social requirements.

According to the revised Climate Strategy of 2015 the Government aims at a continuation of the path that was taken with the Energy Strategy 2020 until 2030 and beyond.

As there are **NO** other changes in PaMs nor changes in domestic institutional arrangements, including institutional, legal, administrative and procedural arrangements used for domestic compliance, monitoring, reporting, archiving of information and evaluation of progress towards the economy-wide reduction target compared to those reported in the previous NC6/BR2, only a summary of the already existing mitigation actions are provided in Table 4-1.

Table 4-1 Summary of information on reported mitigation actions

| Sectors affected | List of key policies and measures | Estimation of mitigation impact (kt $CO_2$ eq) |
|---|---|---|
| **Policy framework and cross-sectoral measures** | | |
| | Planned National Climate Strategy (2015) | NE |
| | Environmental Protection Act that provides the legal basis for emission limits for commercial and household and waste diversion measures, and establishes the Action Plan for Air | NE |
| | Environmental policy that includes environmental levies | NE |
| | Emissions regulations with regard to emission limits | NE |
| | Emissions Trading Act that governs involvement of two industrial facilities in the European Union Emissions Trading System | NE |
| **Energy** | | |
| | $CO_2$ Act that introduces levies to drive efficiencies in the consumption of energy | NE |
| Energy supply | Energy Strategy 2020 that promotes efficient use of energy and renewable energy | 6.89 |
| Renewable energy | Ordinance on the Liberalization of the Electricity Market including green electricity, hydropower and geothermal measures | |
| | Steam Pipeline | 2.2 |
| Energy efficiency | Energy Efficiency Act that covers promotion of energy efficiency in commercial, industrial, institutional and residential sectors | 2.89 |
| | Energy Ordinance (2008) | NE |
| Residential and commercial sectors | Building design and standards for public buildings | NE |
| | Promotion of photovoltaic systems through feed-in tariff system | NE |
| **Transport** | | |
| | National Transport Policy that includes measures to manage emissions from vehicles including an environment (fuel) levy on heavy-duty vehicles, adoption of European exhaust emission standards to limit CO2 emissions from passenger vehicles and promotion of green transportation | NE |
| | Integrated transport planning exploring increased usage of public transport and bicycles | NE |
| **Agriculture** | | |
| | Agriculture Law and related measures to promote sustainable agriculture practices | NE |
| **Forestry** | | |
| | Forestry Act and related measures to promote sustainable forest management | NE |
| **Waste management** | | |
| | Environmental Protection Act | NE |
| | Technical Ordinance on Waste | NE |
| | Registration, evaluation, authorization and restriction of chemicals | NE |

Note: The greenhouse gas reduction estimates, given for some measures (in parentheses) are reductions in carbon dioxide or carbon dioxide equivalent for 2020.

Abbreviation: NE = not estimated.

Recommendations from the TRR, Para13, 20 and provided information during the review.

1. According to the NC6/BR the legislative and administrative main arrangements can be found in the Emission Trading Act and in the $CO_2$ Act. Could you provide more information regarding these arrangements? And how these are being coordinated to monitoring the progress of the reduction target, and the success of each policy.

The Emissions Trading Act and the $CO_2$ Act are central but not the only important arrangements for domestic reductions of GHG. The Emissions Trading Act:

- establishes the legal obligation for the Government to reduce 20% GHG compared to 1990 levels by 2020, Art. 4 paragraph 1;
- contains the legal ground for the National Climate Strategy (coordination of climate policies throughout different sectors; framework for purchase of emission reductions abroad, basis for climate finance and adaptation approaches etc.), Art. 4 paragraph 4;
- implements the EU Emissions Trading Directive 2003/87/EC (EEA based reduction path of annual allocation by 1,74% from 2010) , Art. 5 – 18; the GHG reductions within the EU ETS are monitored on the basis of EU law – progress is monitored by comparing the annual allocation of EUAs (European Allowance Unit) with the respective submissions of EUAs by the operators of the 2 (!) installations;
- establishes the national framework for UN based (Monitoring and Reporting) obligations and (JI and CDM) mechanisms, Art. 22 lit. h und i and Art. 19.

The $CO_2$ Act:

- is coordinated on the basis of a bilateral treaty on environmental levies between Liechtenstein and Switzerland by the respective Swiss authorities;
- the progress of the effectiveness of the $CO_2$ Act is monitored by the Office of Environment in close collaboration with the Swiss Federal Office of the Environment (FOEN).

The incentive fee for fossil thermal fuels ($CO_2$ levy) provides an incentive to companies to operate as energy efficiently as possible. Liechtenstein companies that have committed to limit their greenhouse gases can be exempted from CO2 levy. Exemptions from the $CO_2$ levy for Liechtenstein based companies (that are not operating under the Emissions Trading Act) are carried out by the FOEN.

Examinations of GHG commitments are executed on an individual basis along parameters such as the relevant sectorial targets (see below) and feasibility and capabilities aspects of the examined request.

Approximately two-thirds of the $CO_2$ levy is distributed to the States budget. However, theses revenues are earmarked for the use of financing environmental policies (such as the feed-in tariffs ion renewable energy production since 2008).

Since the redistribution is carried out per capita or per franc of salary independently of consumption, all households and installations that consume low quantities of fossil thermal fuels. Around one-third is redistributed to the businesses through the “Old Age and Survivors Insurance” compensation offices. Since the redistribution is carried out per franc of

salary independently of consumption, all installations that consume low quantities of fossil thermal fuels benefit from it.

2. Regarding the $CO_2$ Act. Which is the reduction target of this act? Was this target modified after the review in 2013?

The $CO_2$ Act mainly follows the respective Act in Switzerland – to this regard Liechtenstein has incorporated the reduction targets of the Swiss $CO_2$ Act without explicitly refereeing to them in the Liechtenstein Act. This due to the fact that Switzerland's has several (intermediate) sectorial targets and not all of these targets do also apply for Liechtenstein; however, regarding Liechtenstein's $CO_2$ Act which is mainly coordinated by the FOEN the same targets as in Switzerland apply; the intermediate targets in the relevant sectors for 2015 compared to 1990 are:

- 22% in the building sector (housing);
- 0% or stabilization in the transportation (traffic) sector;
- 7 % in the sector Industry (target only applies for Liechtenstein's Non EU ETS industry).

No modifications of these targets were made after 2013.

3. Are the annual reports of activities, sent to the Liechtenstein Parliament, used to assess the success of each measure? Who is in charge of tracking the information presented in those reports? Is the information provided comparable?

The annual reports of activities (Rechenschaftbericht) are not explicitly used to assess the success of each measure. It is a general report that contains comprehensive information about the activities of the State's administration. However, each department provides information through its competent experts by updating and adding content to the previous year's report. The content is checked and approved by the competent Director of the respective office or department.

With respect to climate policy the report gives an overview of core information such as the establishment of new legal acts or regulations, annual revenues of environmental levies, amount of submitted EUAs, GHG emission developments, participation in UNFCCC negotiations etc. The legal ground for the obligation of the Government to publicly account for its activities is to be found in Art. 64 of the Liechtenstein Constitution. With respect to national climate policies under the responsibility of the Ministry of the Environment the respective activities are described annually and are being updated each year accordingly. The next comprehensive report of 2013 will be available by mid May 2014 (previous reports as well as further information available under http://www.llv.li/#/12281/rechenschaftsbericht German language only).

4. Environmental Protection Act: Could you provide more information in how this policy impact climate? Are you able to quantify this impact?

The Environmental Protection Act (EPA) serves as a framework for several environmental goals (f.e. waste, prevention of incidents of industrial installations, air quality etc.) by establishing respective legal grounds for detailed regulations within the environmental field concerned. With respect to climate related impacts the EPA forms the legal basis for the so

called Air Quality Ordinance. From 2007 to 2013 the Ordinance's emission limits (on particles etc) provided for the substation of around 2000 old oil/gas combustion installations. A general estimation by the Office of Environment estimated a reduction of around 1000 t CO2 eq per annum due to the Ordinance.

5. Do you have information related to the costs of PaMs, non-GHG mitigation benefits and how PaMs interact with other PaMs at the national level?

No, such information is currently not available.

6. Could you elaborate more about the status of the new National Climate Strategy? Is there an assessment of the results of the strategy from 2007?

The National Climate Strategy has its legal ground in Art. 4 paragraph 4. The updated Strategy will build up on the Strategy of 2007. In this context the Climate Strategy for 2020 will also contain some sort of assessment of the existing strategy.

## CTF Table 3

Table 3 LIE_BR2_v0.1

**Progress in achievement of the quantified economy-wide emission reduction target: information on mitigation actions and their effects**

| *Name of mitigation action* [a] | *Sector(s) affected* [b] | *GHG(s) affected* | *Objective and/or activity affected* | *Type of instrument* [c] | *Status of implementation* [d] | *Brief description* [e] | *Start year of implementation* | *Implementing entity or entities* | *Estimate of mitigation impact (not cumulative, in kt $CO_2$ eq)* | |
|---|---|---|---|---|---|---|---|---|---|---|
| Steam Pipeline | Energy | $CO_2$ | Acquisition of stem from a waste incineration plant in Buchs (Switzerland) to replace fossil fuels for manufactoring industries | Other (Other) | Implemented | | 2009 | Private | | 2.2 |
| Measures Buildings | Energy | $CO_2$ | Measures Buildings | Other (Other) | Implemented | Including energetic building restoration, home automation, solar panels, provisions reconstructions | 2012 | Office of Economic Affairs | | 38.1 |
| Measures Transportation | Transport | $CO_2$ | Measures Transportation | Other (Other) | Implemented | Indluding mobility and spatial planning, mobility management in companies, electic cars | ongoing | Office of Economic Affairs | | 8.2 |
| Measures Processes and machines | Industry/industrial processes, Energy | $CO_2$ | Measures Processes and machines | Other (Regulatory) | Implemented | Provisions machines, engines, lightning. Improvement in energy efficient economy, long distance heating | ongoing | Office of Economic Affairs | | 11.3 |
| Measures Energy production and supply | Energy, Waste management/waste, Forestry/LULUCF | $CO_2$ | Measures Energy production and supply | Voluntary Agreement | Implemented | Including wood fired power station, biogas usage, power generation from power-heat cogeneration. | ongoing | Office of Economic Affairs | | 4.5 |
| | | | | | | | | | | |
| | | | | | | | | | | |

*Note*: The two final columns specify the year identified by the Party for estimating impacts (based on the status of the measure and whether an ex post or ex ante estimation is available).

*Abbreviations*: GHG = greenhouse gas; LULUCF = land use, land-use change and forestry.

[a] Parties should use an asterisk (*) to indicate that a mitigation action is included in the 'with measures' projection.

[b] To the extent possible, the following sectors should be used: energy, transport, industry/industrial processes, agriculture, forestry/LULUCF, waste management/waste, other sectors, cross-cutting, as appropriate.

[c] To the extent possible, the following types of instrument should be used: economic, fiscal, voluntary agreement, regulatory, information, education, research, other.

[d] To the extent possible, the following descriptive terms should be used to report on the status of implementation: implemented, adopted, planned.

[e] Additional information may be provided on the cost of the mitigation actions and the relevant timescale.

[f] Optional year or years deemed relevant by the Party.

***Custom Footnotes***

The information provided in CTF Table 3 has been updated. For the basic calculations, done for Liechtenstein's INDCs, the estimations in reduction potentials for some measures of the energy strategy were revised. For more detailed information please refer to Table 5-1. In the course of 2016 the Energy Strategy 2020 will be updated and evaluated. During the preparations for Liechtenstein's INDCs the reduction potentials have been updated and were provided by the Office of Economic Affairs. Those estimations are preliminary and the reduction potential has not been included in the projections as this update of the Energy Strategy will be subject to a government decision.

Information on the effective quantity of units from market based mechanisms under the Convention will be available in the course of 2016. A first estimation on the range is provided in Table 3-1.

Table 4 LIE_BR2_v0.1

**Reporting on progress**[a, b]

| | *Total emissions excluding LULUCF* | *Contribution from LULUCF*[d] | *Quantity of units from market based mechanisms under the Convention* | | *Quantity of units from other market based mechanisms* | |
|---|---|---|---|---|---|---|
| *Year*[c] | *(kt $CO_2$ eq)* | *(kt $CO_2$ eq)* | *(number of units)* | *(kt $CO_2$ eq)* | *(number of units)* | *(kt $CO_2$ eq)* |
| (1990) | 229.39 | 4.58 | 0.00 | 0.00 | 0.00 | |
| 2010 | 233.71 | 14.81 | 18.50 | 18.50 | 0.00 | |
| 2011 | 220.61 | 11.55 | 4.99 | 4.99 | 0.00 | |
| 2012 | 230.31 | 11.75 | 14.17 | 14.17 | 0.00 | |
| 2013 | 236.53 | 11.73 | 51.71 | 51.71 | NE | |
| 2014 | NE | NE | NE | NE | NE | |

*Abbreviation* : GHG = greenhouse gas, LULUCF = land use, land-use change and forestry.

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

[b] For the base year, information reported on the emission reduction target shall include the following: (a) total GHG emissions, excluding emissions and removals from the LULUCF sector; (b) emissions and/or removals from the LULUCF sector based on the accounting approach applied taking into consideration any relevant decisions of the Conference of the Parties and the activities and/or land that will be accounted for; (c) total GHG emissions, including emissions and removals from the LULUCF sector. For each reported year, information reported on progress made towards the emission reduction targets shall include, in addition to the information noted in paragraphs 9(a–c) of the UNFCCC biennial reporting guidelines for developed country Parties, information on the use of units from market-based mechanisms.

[c] Parties may add additional rows for years other than those specified below.

[d] Information in this column should be consistent with the information reported in table 4(a)I or 4(a)II, as appropriate. The Parties for which all relevant information on the LULUCF contribution is reported in table 1 of this common tabular format can refer to table 1.

***Custom Footnotes***

The total numbers and LULUCF contribution correspond to the recent inventory 2013. The amount of market based mechanisms was calculated based on the recent published ARR 2014, Annex I and the initial amount. For the year 2014 NE is used as there are no data available within the submission deadline.For the estimations of market based mechanism for 2013 NE is used as the initial report is not published and reviewed yet.

Table 4(a)I LIE_BR2_v0.1

**Progress in achieving the quantified economy-wide emission reduction targets – further information on mitigation actions relevant to the contribution of the land use, land-use change and forestry sector in 2013 [a,b]**

| | *Net GHG emissions/removals from LULUCF categories* [c] | *Base year/period or reference level value* [d] | *Contribution from LULUCF for reported year* | *Cumulative contribution from LULUCF* [e] | *Accounting approach* [f] |
|---|---|---|---|---|---|
| | *(kt $CO_2$ eq)* | | | | |
| Total LULUCF | | | | | Land-based approach |
| A. Forest land | | | | | Land-based approach |
| 1. Forest land remaining forest land | | | | | Land-based approach |
| 2. Land converted to forest land | | | | | Land-based approach |
| 3. Other [g] | | | | | Land-based approach |
| B. Cropland | | | | | Land-based approach |
| 1. Cropland remaining cropland | | | | | Land-based approach |
| 2. Land converted to cropland | | | | | Land-based approach |
| 3. Other [g] | | | | | Land-based approach |
| C. Grassland | | | | | Land-based approach |
| 1. Grassland remaining grassland | | | | | Land-based approach |
| 2. Land converted to grassland | | | | | Land-based approach |
| 3. Other [g] | | | | | Land-based approach |
| D. Wetlands | | | | | Land-based approach |
| 1. Wetland remaining wetland | | | | | Land-based approach |
| 2. Land converted to wetland | | | | | Land-based approach |
| 3. Other [g] | | | | | Land-based approach |
| E. Settlements | | | | | Land-based approach |
| 1. Settlements remaining settlements | | | | | Land-based approach |
| 2. Land converted to settlements | | | | | Land-based approach |
| 3. Other [g] | | | | | Land-based approach |
| F. Other land | | | | | Land-based approach |
| 1. Other land remaining other land | | | | | Land-based approach |
| 2. Land converted to other land | | | | | Land-based approach |
| 3. Other [g] | | | | | Land-based approach |
| Harvested wood products | | | | | Land-based approach |

*Abbreviations*: GHG = greenhouse gas, LULUCF = land use, land-use change and forestry.

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

[b] Parties that use the LULUCF approach that is based on table 1 do not need to complete this table, but should indicate the approach in table 2. Parties should fill in a separate table for each year, namely 2011 and 2012, where 2014 is the reporting year.

[c] For each category, enter the net emissions or removals reported in the most recent inventory submission for the corresponding inventory year. If a category differs from that used for the reporting under the Convention or its Kyoto Protocol, explain in the biennial report how the value was derived.

[d] Enter one reference level or base year/period value for each category. Explain in the biennial report how these values have been calculated.

[e] If applicable to the accounting approach chosen. Explain in this biennial report to which years or period the cumulative contribution refers to.

[f] Label each accounting approach and indicate where additional information is provided within this biennial report explaining how it was implemented, including all relevant accounting parameters (i.e. natural disturbances, caps).

[g] Specify what was used for the category "other". Explain in this biennial report how each was defined and how it relates to the categories used for reporting under the Convention or its Kyoto Protocol.

***Custom Footnotes***

Table 4(a)I LIE_BR2_v0.1

**Progress in achieving the quantified economy-wide emission reduction targets – further information on mitigation actions relevant to the contribution of the land use, land-use change and forestry sector in 2014 [a, b]**

| | *Net GHG emissions/removals from LULUCF categories* [c] | *Base year/period or reference level value* [d] | *Contribution from LULUCF for reported year* | *Cumulative contribution from LULUCF* [e] | *Accounting approach* [f] |
|---|---|---|---|---|---|
| | *(kt $CO_2$ eq)* | | | | |
| Total LULUCF | | | | | Land-based approach |
| A. Forest land | | | | | Land-based approach |
| 1. Forest land remaining forest land | | | | | Land-based approach |
| 2. Land converted to forest land | | | | | Land-based approach |
| 3. Other [g] | | | | | Land-based approach |
| B. Cropland | | | | | Land-based approach |
| 1. Cropland remaining cropland | | | | | Land-based approach |
| 2. Land converted to cropland | | | | | Land-based approach |
| 3. Other [g] | | | | | Land-based approach |
| C. Grassland | | | | | Land-based approach |
| 1. Grassland remaining grassland | | | | | Land-based approach |
| 2. Land converted to grassland | | | | | Land-based approach |
| 3. Other [g] | | | | | Land-based approach |
| D. Wetlands | | | | | Land-based approach |
| 1. Wetland remaining wetland | | | | | Land-based approach |
| 2. Land converted to wetland | | | | | Land-based approach |
| 3. Other [g] | | | | | Land-based approach |
| E. Settlements | | | | | Land-based approach |
| 1. Settlements remaining settlements | | | | | Land-based approach |
| 2. Land converted to settlements | | | | | Land-based approach |
| 3. Other [g] | | | | | Land-based approach |
| F. Other land | | | | | Land-based approach |
| 1. Other land remaining other land | | | | | Land-based approach |
| 2. Land converted to other land | | | | | Land-based approach |
| 3. Other [g] | | | | | Land-based approach |
| Harvested wood products | | | | | Land-based approach |

*Abbreviations*: GHG = greenhouse gas, LULUCF = land use, land-use change and forestry.

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

[b] Parties that use the LULUCF approach that is based on table 1 do not need to complete this table, but should indicate the approach in table 2. Parties should fill in a separate table for each year, namely 2011 and 2012, where 2014 is the reporting year.

[c] For each category, enter the net emissions or removals reported in the most recent inventory submission for the corresponding inventory year. If a category differs from that used for the reporting under the Convention or its Kyoto Protocol, explain in the biennial report how the value was derived.

[d] Enter one reference level or base year/period value for each category. Explain in the biennial report how these values have been calculated.

[e] If applicable to the accounting approach chosen. Explain in this biennial report to which years or period the cumulative contribution refers to.

[f] Label each accounting approach and indicate where additional information is provided within this biennial report explaining how it was implemented, including all relevant accounting parameters (i.e. natural disturbances, caps).

[g] Specify what was used for the category "other". Explain in this biennial report how each was defined and how it relates to the categories used for reporting under the Convention or its Kyoto Protocol.

***Custom Footnotes***

**Progress in achievement of the quantified economy-wide emission reduction targets – further information on mitigation actions relevant to the counting of emissions and removals from the land use, land-use change and forestry sector in relation to activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol**[a,b,c]

| GREENHOUSE GAS SOURCE AND SINK ACTIVITIES | Base year[d] | Net emissions/removals[e] | | | | | | | | | <r xmlns="http://schemas.openxmlformats.org/sp | <r xmlns="http://schemas.openxmlformats.org/sp |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | Total[g] | | |
| | (kt $CO_2$ eq) | | | | | | | | | | | |
| **A. Article 3.3 activities** | | | | | | | | | | | | |
| **A.1. Afforestation/reforestation** | | -0.26 | | | | | | | | -0.26 | | -0.26 |
| **Excluded emissions from natural disturbances(5)** | | | | | | | | | | | | |
| **Excluded subsequent removals from land subject to natural disturbances(6)** | | | | | | | | | | | | |
| **A.2. Deforestation** | | 4.45 | | | | | | | | 4.45 | | 4.45 |
| **B. Article 3.4 activities** | | | | | | | | | | | | |
| **B.1. Forest management** | | | | | | | | | | 1.00 | | 0.88 |
| **Net emissions/removalse** | | 1.00 | | | | | | | | 1.00 | | |
| **Excluded emissions from natural disturbances(5)** | | | | | | | | | | | | |
| **Excluded subsequent removals from land subject to natural disturbances(6)** | | | | | | | | | | | | |
| **Any debits from newly established forest (CEF-ne)(7),(8)** | | | | | | | | | | | | |
| **Forest management reference level (FMRL)(9)** | | | | | | | | | | | 0.10 | |
| **Technical corrections to FMRL(10)** | | | | | | | | | | | 0.02 | |
| **Forest management capl** | | | | | | | | | | | 8.03 | 8.03 |
| **B.2. Cropland management (if elected)** | | | | | | | | | | | | |
| **B.3. Grazing land management (if elected)** | | | | | | | | | | | | |
| **B.4. Revegetation (if elected)** | | | | | | | | | | | | |
| **B.5. Wetland drainage and rewetting (if elected)** | | | | | | | | | | | | |

*Note:* 1 kt $CO_2$ eq equals 1 Gg $CO_2$ eq.

*Abbreviations*: CRF = common reporting format, LULUCF = land use, land-use change and forestry.

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

[b] Developed country Parties with a quantified economy-wide emission reduction target as communicated to the secretariat and contained in document FCCC/SB/2011/INF.1/Rev.1 or any update to that document, that are Parties to the Kyoto Protocol, may use table 4(a)II for reporting of accounting quantities if LULUCF is contributing to the attainment of that target.

[c] Parties can include references to the relevant parts of the national inventory report, where accounting methodologies regarding LULUCF are further described in the documentation box or in the biennial report.

[d] Net emissions and removals in the Party's base year, as established by decision 9/CP.2.

[e] All values are reported in the information table on accounting for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, of the CRF for the relevant inventory year as reported in the current submission and are automatically entered in this table.

[f] Additional columns for relevant years should be added, if applicable.

[g] Cumulative net emissions and removals for all years of the commitment period reported in the current submission.

[h] The values in the cells "3.3 offset" and "Forest management cap" are absolute values.

[i] The accounting quantity is the total quantity of units to be added to or subtracted from a Party's assigned amount for a particular activity in accordance with the provisions of Article 7, paragraph 4, of the Kyoto Protocol.

[j] In accordance with paragraph 4 of the annex to decision 16/CMP.1, debits resulting from harvesting during the first commitment period following afforestation and reforestation since 1990 shall not be greater than the credits accounted for on that unit of land.

[k] In accordance with paragraph 10 of the annex to decision 16/CMP.1, for the first commitment period a Party included in Annex I that incurs a net source of emissions under the provisions of Article 3 paragraph 3, may account for anthropogenic greenhouse gas emissions by sources and removals by sinks in areas under forest management under Article 3, paragraph 4, up to a level that is equal to the net source of emissions under the provisions of Article 3, paragraph 3, but not greater than 9.0 megatonnes of carbon times five, if the total anthropogenic greenhouse gas emissions by sources and removals by sinks in the managed forest since 1990 is equal to, or larger than, the net source of emissions incurred under Article 3, paragraph 3.

[l] In accordance with paragraph 11 of the annex to decision 16/CMP.1, for the first commitment period of the Kyoto Protocol only, additions to and subtractions from the assigned amount of a Party resulting from Forest management under Article 3, paragraph 4, after the application of paragraph 10 of the annex to decision 16/CMP.1 and resulting from forest management project activities undertaken under Article 6, shall not exceed the value inscribed in the appendix of the annex to decision 16/CMP.1, times five.

***Custom Footnotes***

Table 4(b) LIE_BR2_v0.1

**Reporting on progress**[a, b, c]

| *Units of market based mechanisms* | | | *Year* | |
|---|---|---|---|---|
| | | | *2013* | *2014* |
| *Kyoto Protocol units* [d] | *Kyoto Protocol units* | *(number of units)* | 51,715.20 | NE |
| | | *(kt $CO_2$ eq)* | 51.71 | NE |
| | *AAUs* | *(number of units)* | 42,984.00 | NE |
| | | *(kt CO2 eq)* | 42.98 | NE |
| | ERUs | *(number of units)* | 0.00 | NE |
| | | *(kt CO2 eq)* | 0.00 | NE |
| | CERs | *(number of units)* | 8,731.20 | NE |
| | | *(kt CO2 eq)* | 8.73 | NE |
| | tCERs | *(number of units)* | 0.00 | NE |
| | | *(kt CO2 eq)* | 0.00 | NE |
| | lCERs | *(number of units)* | 0.00 | NE |
| | | *(kt CO2 eq)* | 0.00 | NE |
| *Other units* [d,e] | *Units from market-based mechanisms under the Convention* | *(number of units)* | | |
| | | *(kt $CO_2$ eq)* | | |
| | | | | |
| | | | | |
| | *Units from other market-based mechanisms* | *(number of units)* | | |
| | | *(kt $CO_2$ eq)* | | |
| | | | | |
| | | | | |
| *Total* | | *(number of units)* | 51,715.20 | NE |
| | | *(kt $CO_2$ eq)* | 51.71 | NE |

*Abbreviations* : AAUs = assigned amount units, CERs = certified emission reductions, ERUs = emission reduction units, lCERs = long-term certified emission reductions, tCERs = temporary certified emission reductions.
Note: 2011 is the latest reporting year.

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

[b] For each reported year, information reported on progress made towards the emission reduction target shall include, in addition to the information noted in paragraphs 9(a-c) of the reporting guidelines, on the use of units from market-based mechanisms.

[c] Parties may include this information, as appropriate and if relevant to their target.

[d] Units surrendered by that Party for that year that have not been previously surrendered by that or any other Party.

[e] Additional rows for each market-based mechanism should be added, if applicable.

***Custom Footnotes***

Estimations for 2013 were based on the recent inventory data including LULUCF. As the initial report is not published nor reviewed those data are only estimates.NE was used for 2014 as there are no data available.

# 5. Projections

The starting point for Liechtenstein's projections is the Energy Strategy 2020. The strategy describes three different energy scenarios until 2020. Two of them have been used in order to define Liechtenstein's emission scenarios "with measures" (WM) and "with additional measures" (WAM) within the energy-related sectors

The projections presented for the years 2020 and 2030 rely on the latest emission and energy use data available for Liechtenstein, projections of reductions through measures implemented from the Bureau of Energy Consumption and Conservation as well as on comparisons and analogies with the projections and assumptions developed for Switzerland.

Based on various national acts a number of measures have already been or are currently planned to be implemented. This includes environmental levies, the package of energy related measures in the Energy Strategy 2020 and direct payments for agriculture.

Liechtenstein's financially most relevant and for projections most reliably quantifiable measures currently in place, focus on the refurbishment of old buildings, on solar collector systems and on substitutions towards heat pumps and wood heater induced under the Energy ordinance (EEG). Their effects are visible in a reduction in the consumption of heating fuels and finally in the reduction of emissions in the sectors Industry (1A2) and "Others" (1A4). The municipalities individually supplement the national subsidies with additional funds. Other measures, such as savings through more efficient new private heaters or recovery of steam in industry, are independent of the EEG but relevant for emission reduction.

In the course of 2016 the Energy Strategy 2020 will be updated and evaluated. During the preparations for Liechtenstein's INDCs the reduction potentials have been updated and were provided by the Office of Economic Affairs. Those estimations are preliminary and the reduction potential has not been included in the projections as this update of the Energy Strategy will be subject to government decision.

For some measures of the energy strategy, estimations in reduction potentials were revised. For more detailed information please refer to Table 5-1. Those estimations were used as basis for Liechtenstein's INDCs. Please note these estimations are preliminary and were not considered for the projections of Liechtenstein's BR2.

As there is **neither** aviation **nor** maritime transport in Liechtenstein, there are also no reports in tables 5-10 and Table 5-11 regarding aviation or maritime transport. Liechtenstein provides an answer with this information to the TRR recommendation 44 (b) (v).

Table 5-1 updated estimations for contributions of measures from Liechtenstein's Energy strategy 2020.

| Total Domestic Reductions until 2020 (Energy strategy, Table 28 updated) | | | |
|---|---|---|---|
| **Emissiones 1990 (Tons $CO_2$)** | | | **230'330** |
| **Emissions 2008 (Tons $CO_2$)** | **262'000** | **Reductions in % compared to 2008** | **Reductions in % compared to 1990** |
| Measures Buildings[1] | -38'100 | -14.54% | |
| Measures Transportation[2] | -8'200 | -3.13% | |
| Measures Processes and machines[3] | -11'300 | -4.31% | |
| Measures Energy prodution and supply[4] | -4'500 | -1.72% | |
| **Target 2020** | **199'900** | **-23.70%** | **-13.21%** |
| | | | |
| **Total Domestic Reductions from 2021 bis 2030** | **199'900** | | |
| Continuation Energy strategy* | | | |
| Measures Buildings (without heat pumps)[1] | -9'000 | -3.44% | |
| Measures Processes and machines[3] | -4'700 | -1.79% | |
| Measures Energy prodution and supply[4] | -1'880 | -0.72% | |
| Increased replacement of Oil-/Gas heating with heating pumps | -10'750 | -4.10% | |
| Reductions Transportation (Emissions regulations for cars)** | -11'550 | -4.41% | |
| **Target 2030** | **162'020** | **-14.46%** | **-29.66%** |
| F.L.A.CH. starting 2029 | -3'100 | -1.18% | |

*Assumption of a continuation of the energy strategy: Since ist implementaion in 2008 there will be an evaluation of the yearly reduction potential until 2020. For the period 2021-2030 the half potential will be ass assumed as target value.

**Assumption of emissions trens in Transportation sector . Based on the ES2050 CH, CH estimate a reduciton without measures between 2020-2035 of -42 % compared the year 2000. Adapted to Liechtenstein and for 2030 a reduction of -14 % compared to the 2012 emissions is assumed.

1 including energetic building restoration, home automation, solar panels, provisions reconstructions

2 indluding mogility and spatial planning, mobility management in companies, electic cars

3 Provisions machines, engines, lightning, improvement in energy efficient economy, long distance heating

4 including wood fired power station, biogas usage, power generation from power-heat cogeneration

## 5.1 Scenario "With Measures"

### Projection of $CO_2$ emissions for the scenarios WM

Figure 5-1**Fehler! Verweisquelle konnte nicht gefunden werden.** and Table5-2 show the development of $CO_2$ emissions between 1990 and 2030. From 1990 to 2013 $CO_2$ emissions decreased by 2.3%. It is expected that $CO_2$ emissions increase slightly until 2015 and then will decrease. The contributions of the respective sectors are described below (Projection of total GHG emissions in $CO_2$ equivalent, chapter 5.3). The scenario projects total emission levels of 157.41 Gg $CO_2$ by 2020 and 141.79 Gg $CO_2$ by 2030.

Table 5-2 Total GHG emissions in $CO_2$ equivalent by sector from 1990 to 230 "with measures implemented". The numbers 1990-2013 are taken from the inventory 2015. The numbers 2015-2030 are projected.

| | $CO_2$ in kt | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Inventories | | | | | | Projections | | | |
| IPCC | Source/Sink Categories | 1990 | 1995 | 2000 | 2005 | 2010 | 2013 | 2015 | 2020 | 2025 | 2030 |
| Total | Emissions without LULUCF WM | 199.52 | 204.80 | 222.22 | 232.31 | 193.52 | 194.68 | 202.42 | 157.41 | 150.55 | 141.79 |
| 1 | Energy | 199.45 | 204.74 | 222.16 | 232.24 | 193.46 | 194.61 | 202.35 | 157.34 | 150.48 | 141.71 |
| 1A | Fuel combustion | 199.45 | 204.74 | 222.16 | 232.24 | 193.46 | 194.61 | 202.35 | 157.34 | 150.48 | 141.71 |
| | 1 Energy industries | 0.169 | 2.001 | 2.664 | 3.015 | 3.138 | 2.928 | 3.490 | 4.257 | 4.733 | 5.209 |
| | 2 Manufacturing industries and construction | 36.19 | 34.80 | 35.39 | 37.65 | 24.66 | 25.39 | 24.77 | 18.79 | 18.79 | 18.79 |
| | 3 Transport | 76.18 | 81.26 | 95.39 | 84.77 | 79.78 | 81.34 | 90.01 | 84.35 | 77.01 | 67.77 |
| | 4 Other sectors | 86.91 | 86.68 | 88.71 | 106.80 | 85.88 | 84.95 | 84.08 | 49.94 | 49.94 | 49.94 |
| | 5 Other | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| 1B | Fugitive emissions from fuels | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| | 1 Solid fuels | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| | 2 Oil and natural gas | NO,NA | NO,NA | NO,NA | NO,NA | NO,NA | NO,NA | NO,NA | NO,NA | NO,NA | NO,NA |
| 2 | Industrial processes and product use | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| 3 | Agriculture | 0.04 | 0.04 | 0.03 | 0.04 | 0.04 | 0.04 | 0.04 | 0.03 | 0.03 | 0.03 |
| 4 | LULUCF | 4.40 | 7.23 | 8.06 | 9.50 | 14.22 | 11.27 | 11.81 | 11.79 | 11.76 | 11.74 |
| 5 | Waste | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.04 | 0.04 |
| Memo item | International bunkers (aviation) | 0.43 | 0.43 | 0.49 | 0.48 | 0.78 | 1.06 | 1.20 | 1.53 | 1.87 | 2.20 |

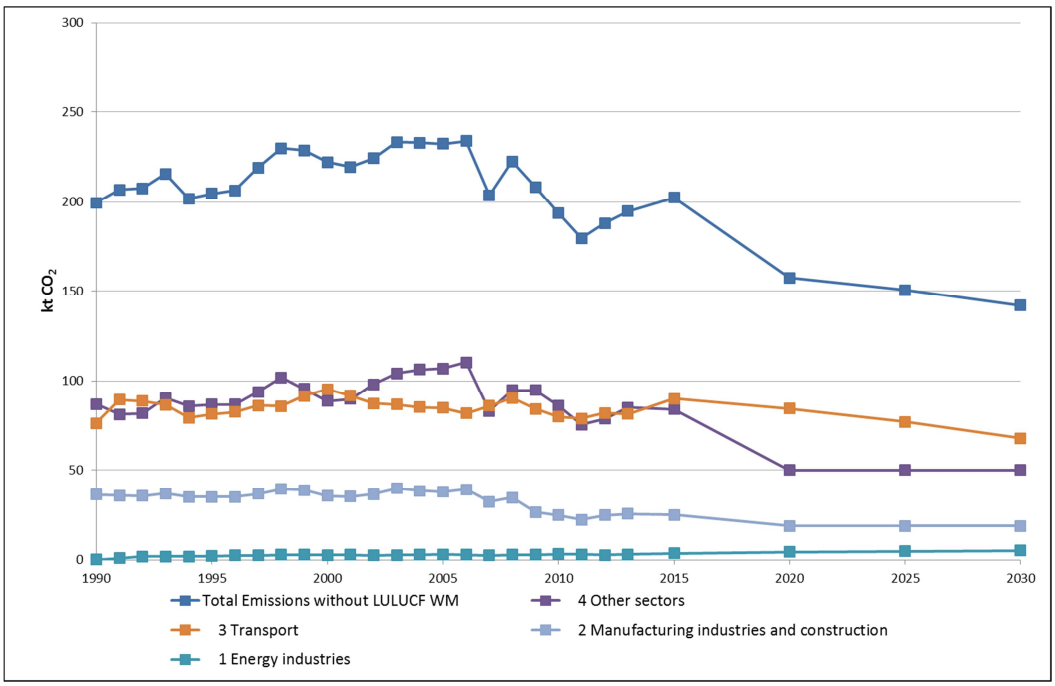


Figure 5-1 $CO_2$ emissions by sector (excl. LULUCF) from 1990 to 2030 for the WM scenario.

## Projection of $CH_4$ emissions for the scenario WM

Figure 5-2 and Table 5-3 show the development of $CH_4$ emissions between 1990 and 2030. Between 1990 and 2013 $CH_4$ emissions increased by 0.4%. The scenario predicts that $CH_4$ emissions will decrease slightly by 0.43 Gg (in $CO_2$ equivalent) by 2015 and will further decrease until 2030. Total emissions might reach levels of 17.74 Gg $CH_4$ (in $CO_2$ equivalent) by 2020 and 17.92 by 2030.

Table 5-3 $CH_4$ emissions by sector from 1990 to 2030 for the scenario WM. The numbers 1990-2013 are taken from the inventory 2015. The numbers 2015-2030 are projected.

| | $CH_4$ in kt $CO_2$ equivalent | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Inventories | | | | | | Projections | | | |
| IPCC | Source/Sink Categories | 1990 | 1995 | 2000 | 2005 | 2010 | 2013 | 2015 | 2020 | 2025 | 2030 |
| Total | Emissions without LULUCF WM | 19.14 | 18.19 | 17.07 | 19.00 | 19.28 | 19.20 | 18.77 | 17.74 | 17.83 | 17.92 |
| 1 | Energy | 1.32 | 1.59 | 1.87 | 2.36 | 2.19 | 2.22 | 2.21 | 1.90 | 1.90 | 1.89 |
| 1A | Fuel combustion | 0.95 | 0.98 | 1.03 | 1.18 | 0.97 | 0.97 | 0.98 | 0.67 | 0.66 | 0.65 |
| | 1 Energy industries | 0.002 | 0.025 | 0.033 | 0.037 | 0.039 | 0.036 | 0.043 | 0.053 | 0.059 | 0.065 |
| | 2 Manufacturing industries and construction | 0.05 | 0.05 | 0.05 | 0.05 | 0.03 | 0.03 | 0.03 | 0.02 | 0.02 | 0.02 |
| | 3 Transport | 0.13 | 0.14 | 0.17 | 0.15 | 0.14 | 0.14 | 0.16 | 0.15 | 0.14 | 0.12 |
| | 4 Other sectors | 0.77 | 0.77 | 0.79 | 0.95 | 0.76 | 0.75 | 0.75 | 0.44 | 0.44 | 0.44 |
| | 5 Other | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| 1B | Fugitive emissions from fuels | 0.37 | 0.60 | 0.83 | 1.17 | 1.22 | 1.25 | 1.23 | 1.23 | 1.24 | 1.24 |
| | 1 Solid fuels | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| | 2 Oil and natural gas | 0.37 | 0.60 | 0.83 | 1.17 | 1.22 | 1.25 | 1.23 | 1.23 | 1.24 | 1.24 |
| 2 | Industrial processes and product use | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| 3 | Agriculture | 16.91 | 15.75 | 14.28 | 15.65 | 16.18 | 15.96 | 15.63 | 14.79 | 14.79 | 14.79 |
| 4 | LULUCF | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| 5 | Waste | 0.91 | 0.85 | 0.92 | 0.99 | 0.91 | 1.02 | 0.93 | 1.04 | 1.14 | 1.23 |
| Memo item | International bunkers (aviation) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

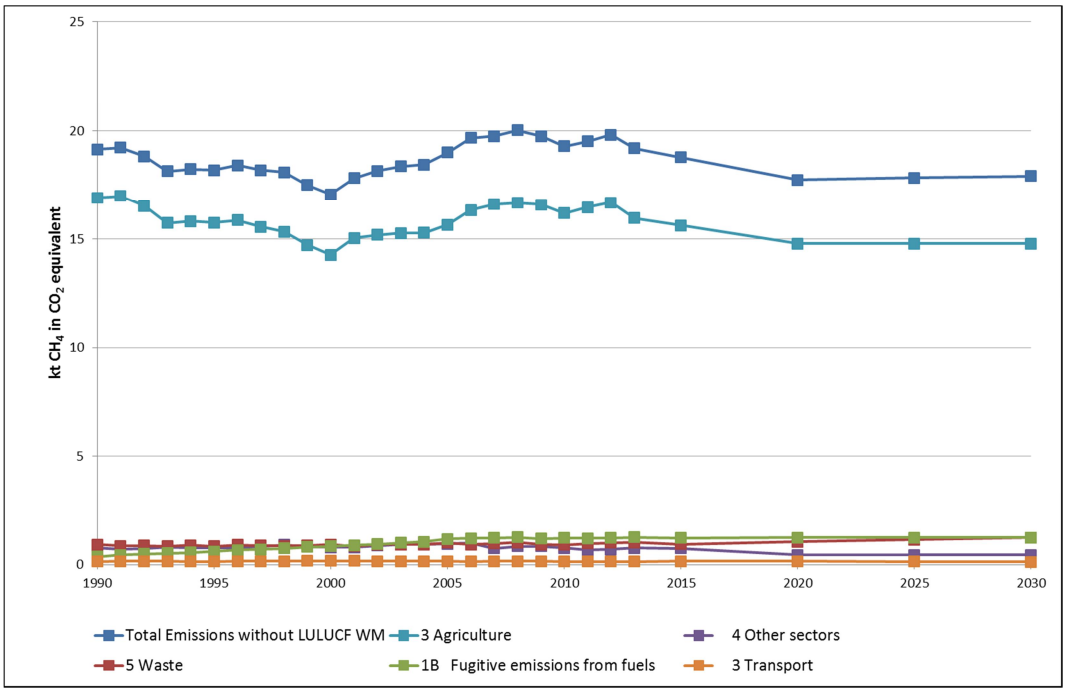


Figure 5-2 $CH_4$ emissions by sector (excl. LULUCF) from 1990-2030 for the WM scenario.

## Projection of $N_2O$ emissions for the scenario WM

Figure 5- and Table 5-4 show the development of $N_2O$ emissions between 1990 and 2030. From 1990 to 2013 $N_2O$ emissions decreased by 6.9%. It is expected that $N_2O$ emissions remain on a level of approximately 9.97 Gg (in $CO_2$ equivalent) until 2015. Emissions then reach levels of 9.51 Gg $N_2O$ (in $CO_2$ equivalent) by 2020 and 9.64 by 2030 respectively.

Table 5-4 $N_2O$ emissions by sector from 1990 to 2030 for the scenario WM. The numbers 1990-2013 are taken from the inventory 2015. The numbers 2015-2030 are projected.

| | $N_2O$ in kt $CO_2$ equivalent | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Inventories | | | | | | Projections | | | |
| IPCC | Source/Sink Categories | 1990 | 1995 | 2000 | 2005 | 2010 | 2013 | 2015 | 2020 | 2025 | 2030 |
| Total | Emissions without LULUCF WM | 10.28 | 9.72 | 9.24 | 10.07 | 10.14 | 10.19 | 9.97 | 9.51 | 9.58 | 9.64 |
| 1 | Energy | 0.86 | 0.94 | 1.05 | 1.06 | 0.92 | 0.93 | 0.99 | 0.84 | 0.81 | 0.77 |
| 1A | Fuel combustion | 0.86 | 0.94 | 1.05 | 1.06 | 0.92 | 0.93 | 0.99 | 0.84 | 0.81 | 0.77 |
| | 1 Energy industries | 0.00 | 0.06 | 0.07 | 0.08 | 0.09 | 0.08 | 0.10 | 0.12 | 0.13 | 0.14 |
| | 2 Manufacturing industries and construction | 0.12 | 0.12 | 0.12 | 0.13 | 0.08 | 0.08 | 0.08 | 0.06 | 0.06 | 0.06 |
| | 3 Transport | 0.45 | 0.48 | 0.56 | 0.50 | 0.47 | 0.48 | 0.53 | 0.49 | 0.45 | 0.40 |
| | 4 Other sectors | 0.29 | 0.29 | 0.30 | 0.36 | 0.29 | 0.28 | 0.28 | 0.17 | 0.17 | 0.17 |
| | 5 Other | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| 1B | Fugitive emissions from fuels | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| | 1 Solid fuels | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| | 2 Oil and natural gas | NO,NA | NO,NA | NO,NA | NO,NA | NO,NA | NO,NA | NO,NA | NO,NA | NO,NA | NO,NA |
| 2 | Industrial processes and product use | 0.01 | 0.03 | 0.07 | 0.12 | 0.17 | 0.20 | 0.18 | 0.15 | 0.13 | 0.12 |
| 3 | Agriculture | 8.32 | 7.75 | 7.02 | 7.70 | 7.96 | 7.85 | 7.69 | 7.28 | 7.28 | 7.28 |
| 4 | LULUCF | 0.18 | 0.29 | 0.33 | 0.39 | 0.58 | 0.46 | 0.48 | 0.48 | 0.48 | 0.48 |
| 5 | Waste | 1.09 | 1.01 | 1.10 | 1.19 | 1.09 | 1.21 | 1.11 | 1.25 | 1.36 | 1.47 |
| Memo item | International bunkers (aviation) | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 |

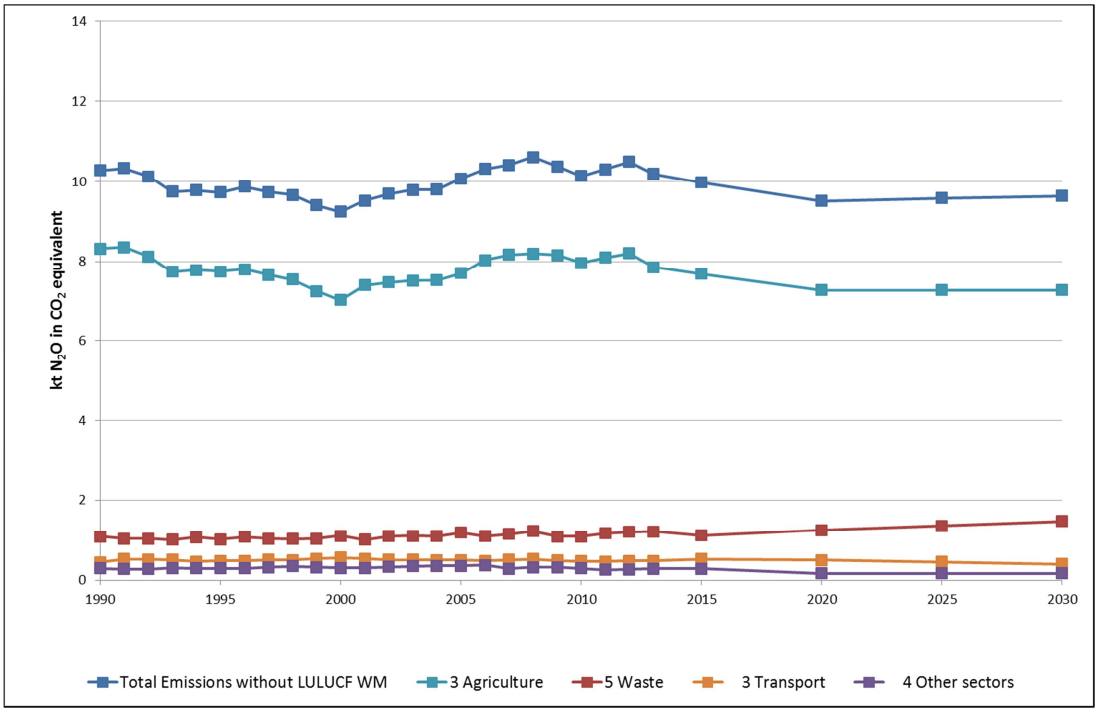


Figure 5-3 $N_2O$ emissions by sector (excl. LULUCF) from 1990 to 2030 for the scenario WM.

## Projection of Other GHG emissions (HFC's, PFC's, $SF_6$) for the scenario WM

Figure 5- and Table 5-5 show the development of F-gases between 1990 and 2030. From 1990 to 2013 emissions from F-Gases increased rapidly. However emissions should decrease to levels of 11.56 Gg (in $CO_2$ equivalent) until 2015. It is further projected that emission levels decrease to 9.3 Gg total HFC, PFC and $SF_6$ (in $CO_2$ equivalent) by 2020 and 7.59 Gg by 2030.

Table 5-5 HFC, PFC and $SF_6$ emissions by sector from 1990 to 2030 for the scenario WM. The numbers 1990-2013 are taken from the inventory 2015. The numbers 2015-2030 are projected.

| | HFC, PFC and $SF_6$ in kt $CO_2$ equivalent | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Inventories | | | | | | Projections | | | |
| IPCC | Source/Sink Categories | 1990 | 1995 | 2000 | 2005 | 2010 | 2013 | 2015 | 2020 | 2025 | 2030 |
| **Total** | **Emissions without LULUCF WM** | **0.45** | **1.69** | **4.39** | **7.85** | **10.77** | **12.46** | **11.56** | **9.30** | **8.44** | **7.59** |
| **2** | **Industrial processes and product use** | **0.45** | **1.69** | **4.39** | **7.85** | **10.77** | **12.46** | **11.56** | **9.30** | **8.44** | **7.59** |
| **2F & 2G** | Halocarbons and $SF_6$ | 0.45 | 1.69 | 4.39 | 7.85 | 10.77 | 12.46 | 11.56 | 9.30 | 8.44 | 7.59 |
| | HFC | 0.44 | 1.66 | 4.30 | 7.70 | 10.56 | 12.22 | 11.34 | 9.13 | 8.29 | 7.44 |
| | PFC | 0.00 | 0.01 | 0.02 | 0.04 | 0.05 | 0.06 | 0.06 | 0.05 | 0.04 | 0.04 |
| | $SF_6$ | 0.01 | 0.02 | 0.06 | 0.11 | 0.15 | 0.17 | 0.16 | 0.13 | 0.12 | 0.11 |

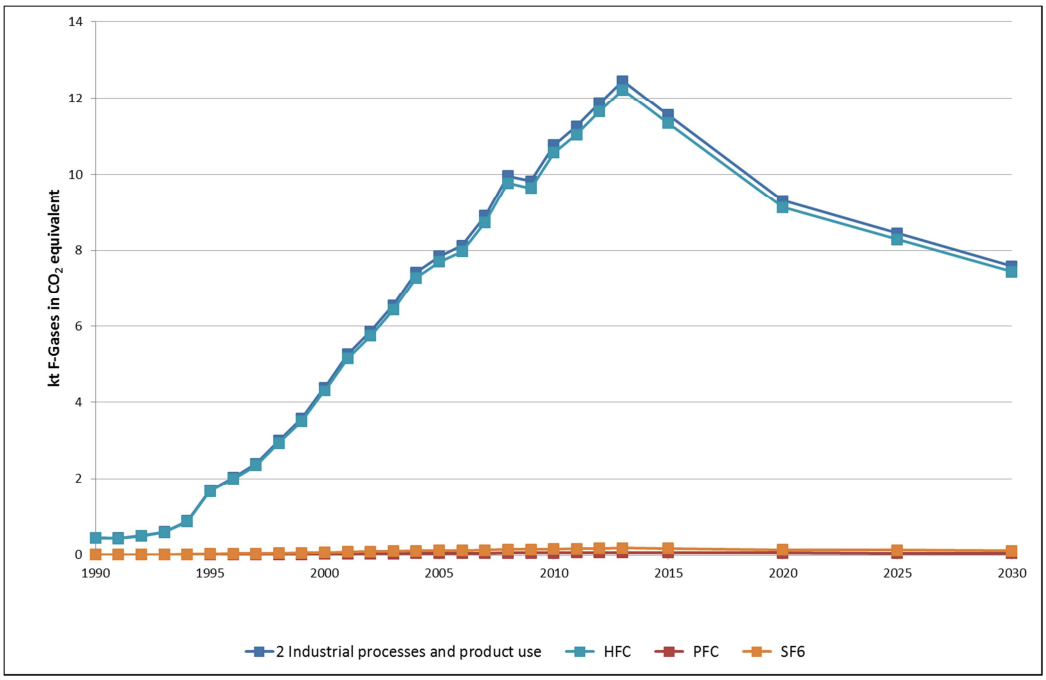


Figure 5-4 HFC, PFC and $SF_6$ emissions by sector (excl. LULUCF) from 1990 to 2030 for the scenario WM.

### Precursors and $SO_2$

No projections for precursor gases and $SO_2$ are available for Liechtenstein.

## 5.2 Scenario "With Additional Measures" WAM

According to the energy scenario 3 of the Energy Strategy 2020 a scenario "with additional measures" (WAM) was modelled. The scenario "with measures" (WM) was used as basis for the "with additional measure" scenario. The numbers of the WM scenario were multiplied by a factor of 1.56, in consideration of the theoretical potentials of each individual measure, in order to fulfill the Energy Strategy 2020 scenario 3 targets for the scenario WAM.

### Projection of $CO_2$ emissions for the scenario WAM

Figure 5-1 and Table 5-6 show the development of $CO_2$ emissions between 1990 and 2030 for the WAM scenario. The scenario projects total emission levels of 124.99 Gg $CO_2$ by 2020 and 109.81 Gg $CO_2$ by 2030.

Table 5-6 $CO_2$ emissions by sector from 1990 to 2030 for the scenario WAM. The numbers 1990-2013 are taken from the inventory 2015. The numbers 2015-2030 are projected.

| | $CO_2$ in kt | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Inventories | | | | | | Projections | | | |
| IPCC | Source/Sink Categories | 1990 | 1995 | 2000 | 2005 | 2010 | 2013 | 2015 | 2020 | 2025 | 2030 |
| Total | Emissions without LULUCF WAM | 199.52 | 204.80 | 222.22 | 232.31 | 193.52 | 194.68 | 195.01 | 124.99 | 117.30 | 109.81 |
| 1 | Energy | 199.45 | 204.74 | 222.16 | 232.24 | 193.46 | 194.61 | 194.94 | 124.92 | 117.23 | 109.74 |
| 1A | Fuel combustion | 199.45 | 204.74 | 222.16 | 232.24 | 193.46 | 194.61 | 194.94 | 124.92 | 117.23 | 109.74 |
| | 1 Energy industries | 0.169 | 2.001 | 2.664 | 3.015 | 3.138 | 2.928 | 3.745 | 5.512 | 5.413 | 5.512 |
| | 2 Manufacturing industries and construction | 36.19 | 34.80 | 35.39 | 37.65 | 24.66 | 25.39 | 23.74 | 14.11 | 14.11 | 14.11 |
| | 3 Transport | 76.18 | 81.26 | 95.39 | 84.77 | 79.78 | 81.34 | 88.66 | 79.85 | 72.26 | 64.66 |
| | 4 Other sectors | 86.91 | 86.68 | 88.71 | 106.80 | 85.88 | 84.95 | 78.80 | 25.45 | 25.45 | 25.45 |
| | 5 Other | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| 1B | Fugitive emissions from fuels | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| | 1 Solid fuels | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| | 2 Oil and natural gas | NO,NA | NO,NA | NO,NA | NO,NA | NO,NA | NO,NA | NO,NA | NO,NA | NO,NA | NO,NA |
| 2 | Industrial processes and product use | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| 3 | Agriculture | 0.04 | 0.04 | 0.03 | 0.04 | 0.04 | 0.04 | 0.04 | 0.03 | 0.03 | 0.03 |
| 4 | LULUCF | 4.40 | 7.23 | 8.06 | 9.50 | 14.22 | 11.27 | 11.81 | 11.79 | 11.76 | 11.74 |
| 5 | Waste | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.04 | 0.04 |
| Memo item | International bunkers (aviation) | 0.43 | 0.43 | 0.49 | 0.48 | 0.78 | 1.06 | 1.20 | 1.53 | 1.87 | 2.20 |

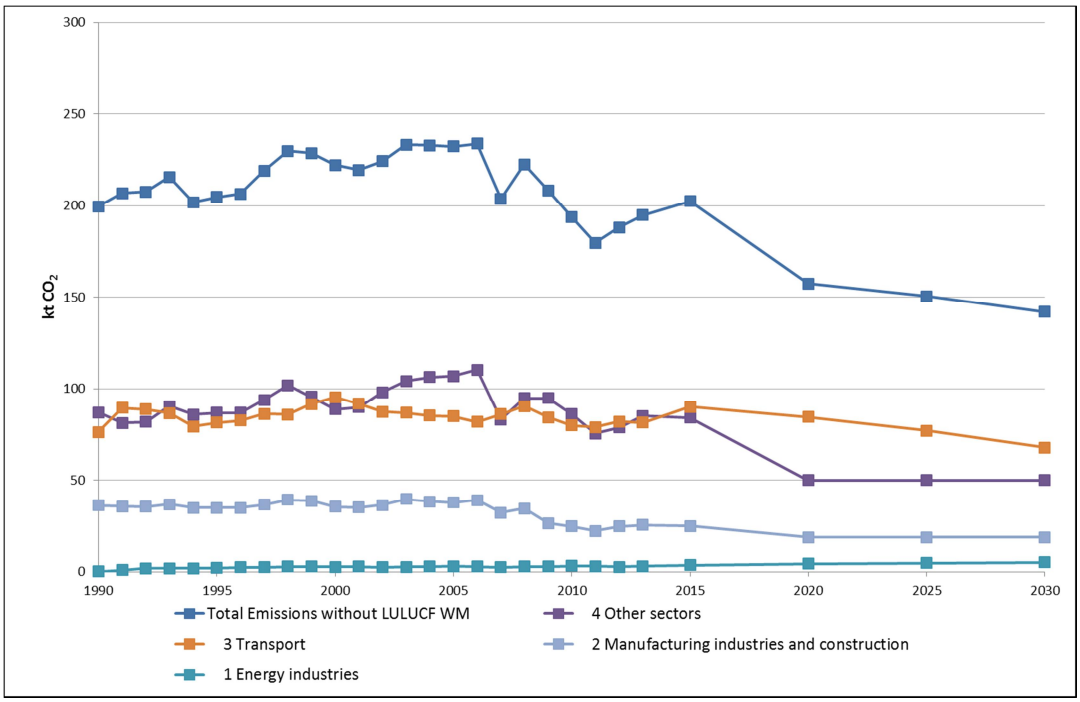


Figure 5-1 $CO_2$ emissions by sector (excl. LULUCF) from 1990 to 2030 for the scenario WAM.

## Projection of $CH_4$ emissions for the scenario WAM

Figure 5-2 and Table 5-7 show the development of $CH_4$ emissions between 1990 and 2030 for the WAM scenario. Total emissions might reach levels of 17.52 Gg $CH_4$ (in $CO_2$ equivalent) by 2020 and 15.74 by 2030.

Table 5-7 $CH_4$ emissions by sector from 1990 to 2030 for the scenario WAM. The numbers 1990-2013 are taken from the inventory 2015. The numbers 2015-2030 are projected.

| | $CH_4$ in kt $CO_2$ equivalent | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Inventories | | | | | | Projections | | | |
| IPCC | Source/Sink Categories | 1990 | 1995 | 2000 | 2005 | 2010 | 2013 | 2015 | 2020 | 2025 | 2030 |
| Total | Emissions without LULUCF WAM | 19.14 | 18.19 | 17.07 | 19.00 | 19.28 | 19.20 | 18.72 | 17.52 | 16.63 | 15.74 |
| 1 | Energy | 1.32 | 1.59 | 1.87 | 2.36 | 2.19 | 2.22 | 2.16 | 1.68 | 1.67 | 1.67 |
| 1A | Fuel combustion | 0.95 | 0.98 | 1.03 | 1.18 | 0.97 | 0.97 | 0.93 | 0.45 | 0.44 | 0.43 |
| | 1 Energy industries | 0.002 | 0.025 | 0.033 | 0.037 | 0.039 | 0.036 | 0.046 | 0.068 | 0.067 | 0.068 |
| | 2 Manufacturing industries and construction | 0.05 | 0.05 | 0.05 | 0.05 | 0.03 | 0.03 | 0.03 | 0.02 | 0.02 | 0.02 |
| | 3 Transport | 0.13 | 0.14 | 0.17 | 0.15 | 0.14 | 0.14 | 0.16 | 0.14 | 0.13 | 0.11 |
| | 4 Other sectors | 0.77 | 0.77 | 0.79 | 0.95 | 0.76 | 0.75 | 0.70 | 0.23 | 0.23 | 0.23 |
| | 5 Other | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| 1B | Fugitive emissions from fuels | 0.37 | 0.60 | 0.83 | 1.17 | 1.22 | 1.25 | 1.23 | 1.23 | 1.24 | 1.24 |
| | 1 Solid fuels | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| | 2 Oil and natural gas | 0.37 | 0.60 | 0.83 | 1.17 | 1.22 | 1.25 | 1.23 | 1.23 | 1.24 | 1.24 |
| 2 | Industrial processes and product use | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| 3 | Agriculture | 16.91 | 15.75 | 14.28 | 15.65 | 16.18 | 15.96 | 15.63 | 14.79 | 13.82 | 12.84 |
| 4 | LULUCF | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| 5 | Waste | 0.91 | 0.85 | 0.92 | 0.99 | 0.91 | 1.02 | 0.93 | 1.04 | 1.14 | 1.23 |
| Memo item | International bunkers (aviation) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

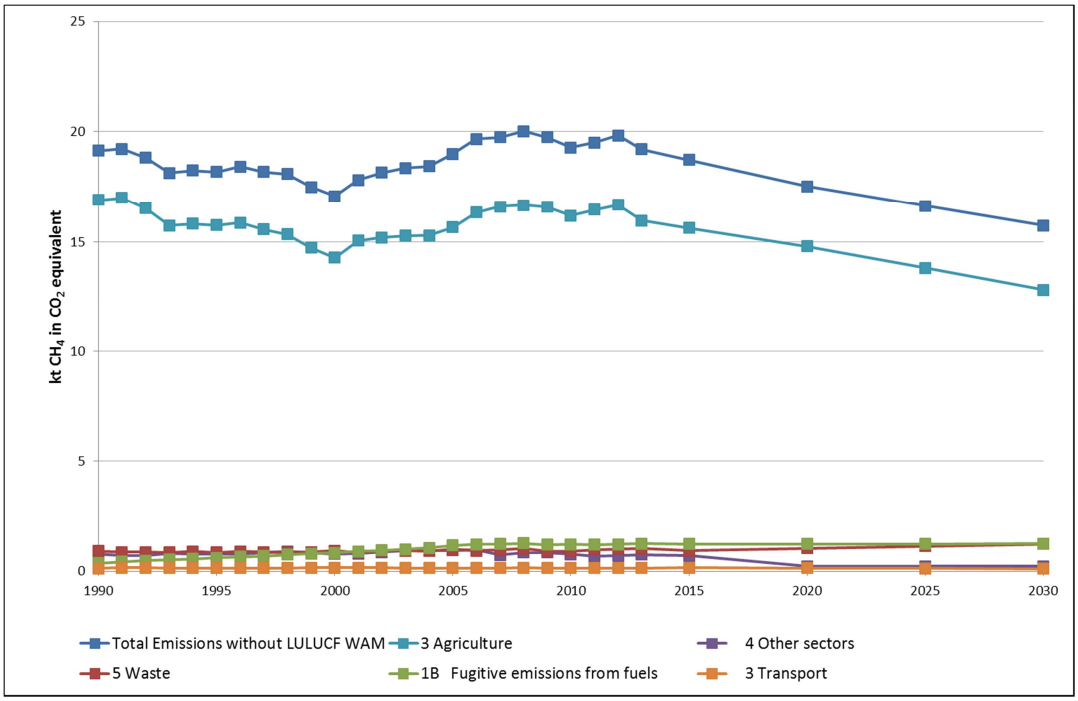


Figure 5-2 $CH_4$ emissions by sector (excl. LULUCF) from 1990 to 2030 for the scenario WAM.

## Projection of $N_2O$ emissions for the scenario WAM

Figure 5-3 and Table 5-8 show the development of $N_2O$ emissions between 1990 and 2030 for the WAM scenario. Emissions are projected to reach levels of 9.42 Gg $N_2O$ (in $CO_2$ equivalent) by 2020 and 8.56 by 2030 respectively.

Table 5-8 $N_2O$ emissions by sector from 1990 to 2030 for the scenario WAM. The numbers 1990-2013 are taken from the inventory 2015. The numbers 2015-2030 are projected.

| | $N_2O$ in kt $CO_2$ equivalent | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Inventories | | | | | | Projections | | | |
| IPCC | Source/Sink Categories | 1990 | 1995 | 2000 | 2005 | 2010 | 2013 | 2015 | 2020 | 2025 | 2030 |
| Total | Emissions without LULUCF WAM | 10.28 | 9.72 | 9.24 | 10.07 | 10.14 | 10.19 | 9.95 | 9.42 | 8.99 | 8.56 |
| 1 | Energy | 0.86 | 0.94 | 1.05 | 1.06 | 0.92 | 0.93 | 0.96 | 0.75 | 0.70 | 0.66 |
| 1A | Fuel combustion | 0.86 | 0.94 | 1.05 | 1.06 | 0.92 | 0.93 | 0.96 | 0.75 | 0.70 | 0.66 |
| | 1 Energy industries | 0.00 | 0.06 | 0.07 | 0.08 | 0.09 | 0.08 | 0.10 | 0.15 | 0.15 | 0.15 |
| | 2 Manufacturing industries and construction | 0.12 | 0.12 | 0.12 | 0.13 | 0.08 | 0.08 | 0.08 | 0.05 | 0.05 | 0.05 |
| | 3 Transport | 0.45 | 0.48 | 0.56 | 0.50 | 0.47 | 0.48 | 0.52 | 0.47 | 0.42 | 0.38 |
| | 4 Other sectors | 0.29 | 0.29 | 0.30 | 0.36 | 0.29 | 0.28 | 0.26 | 0.09 | 0.09 | 0.09 |
| | 5 Other | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| 1B | Fugitive emissions from fuels | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| | 1 Solid fuels | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| | 2 Oil and natural gas | NO,NA | NO,NA | NO,NA | NO,NA | NO,NA | NO,NA | NO,NA | NO,NA | NO,NA | NO,NA |
| 2 | Industrial processes and product use | 0.01 | 0.03 | 0.07 | 0.12 | 0.17 | 0.20 | 0.18 | 0.14 | 0.13 | 0.11 |
| 3 | Agriculture | 8.32 | 7.75 | 7.02 | 7.70 | 7.96 | 7.85 | 7.69 | 7.28 | 6.80 | 6.31 |
| 4 | LULUCF | 0.18 | 0.29 | 0.33 | 0.39 | 0.58 | 0.46 | 0.48 | 0.48 | 0.48 | 0.48 |
| 5 | Waste | 1.09 | 1.01 | 1.10 | 1.19 | 1.09 | 1.21 | 1.11 | 1.25 | 1.36 | 1.47 |
| Memo item | International bunkers (aviation) | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 |

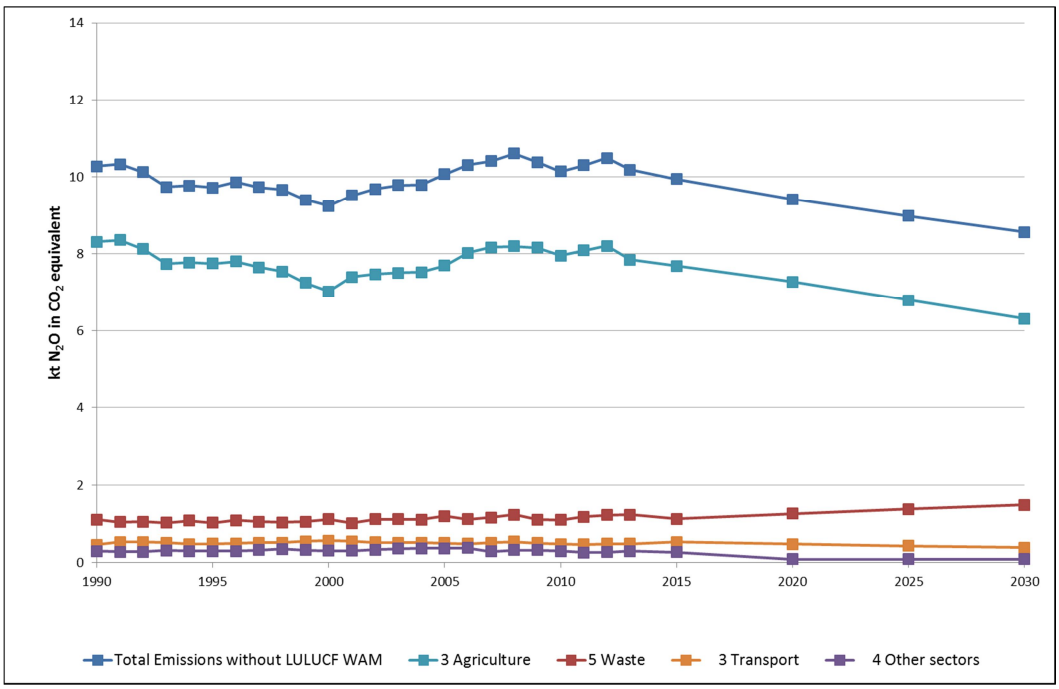


Figure 5-3 $N_2O$ emissions by sector (excl. LULUCF) from 1990 to 2030 for the scenario WAM.

## Projection of Other GHG emissions (HFC's, PFC's, $SF_6$) for the scenario WAM

Figure 5-4 and Table 5-9 show the development of F-gases between 1990 and 2030 for the WAM scenario. It is projected that emission levels decrease to 9.06 Gg total HFC, PFC and $SF_6$ (in $CO_2$ equivalent) by 2020 and 6.85 Gg by 2030.

Table 5-9 HFC, PFC and $SF_6$ emissions by sector from 1990 to 2030 for the scenario WAM. The numbers 1990-2013 are taken from the inventory 2015. The numbers 2015-2030 are projected.

| | HFC, PFC and $SF_6$ in kt $CO_2$ equivalent | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Inventories | | | | | | Projections | | | |
| IPCC | Source/Sink Categories | 1990 | 1995 | 2000 | 2005 | 2010 | 2013 | 2015 | 2020 | 2025 | 2030 |
| **Total** | **Emissions without LULUCF WAM** | **0.45** | **1.69** | **4.39** | **7.85** | **10.77** | **12.46** | **11.49** | **9.06** | **7.96** | **6.85** |
| **2** | **Industrial processes and product use** | **0.45** | **1.69** | **4.39** | **7.85** | **10.77** | **12.46** | **11.49** | **9.06** | **7.96** | **6.85** |
| **2F** | Halocarbons and $SF_6$ | 0.45 | 1.69 | 4.39 | 7.85 | 10.77 | 12.46 | 11.49 | 9.06 | 7.96 | 6.85 |
| | HFC | 0.44 | 1.66 | 4.30 | 7.70 | 10.56 | 12.22 | 11.27 | 8.89 | 7.80 | 6.72 |
| | PFC | 0.00 | 0.01 | 0.02 | 0.04 | 0.05 | 0.06 | 0.06 | 0.04 | 0.04 | 0.03 |
| | $SF_6$ | 0.01 | 0.02 | 0.06 | 0.11 | 0.15 | 0.17 | 0.16 | 0.13 | 0.11 | 0.10 |

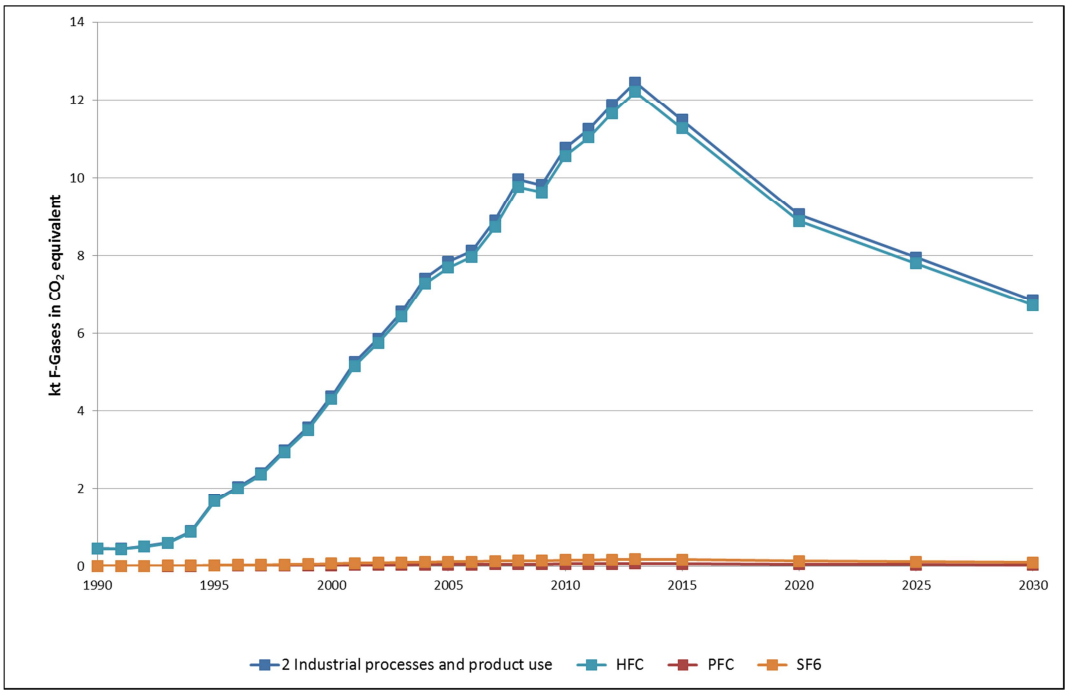


Figure 5-4 HFC, PFC and $SF_6$ emissions by sector (excl. LULUCF) from 1990 to 2030 for the scenario WAM.

### Precursors and $SO_2$

No projections for precursor gases and $SO_2$ are available for Liechtenstein.

## 5.3 Aggregated Projections

### Projection of total GHG emissions in $CO_2$ equivalents for the scenarios WM and WOM

Figure 5-9 and Table 5-10 show the development of total GHG emissions in $CO_2$ equivalent between 1990 and 2030. From 1990 to 2013 total emissions increased by 3.1%. It is expected that the total GHG emissions (in $CO_2$ equivalent) remain constant until approximately 2015 due to technical related reasons when combining inventory numbers with measures defined in the Energy Strategy 2020. After 2015 total GHG emissions start to decrease. Given the results from emission modeling for the period 2012-2020, Liechtenstein will not fully reach its emission target of total GHG emissions of 184 Gg $CO_2$ equivalent. The deviation from this target accounts for approximately 10 Gg $CO_2$ equivalent.

Table 5-10 Total GHG emissions in CO2 equivalent by sector from 1990-2030 “with measures implemented”. The numbers 1990-2013 are taken from the recent inventory 2015. The numbers 2015-230 are projected.

| | $CO_2$ in kt $CO_2$ equivalent | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Inventories | | | | | | Projections | | | |
| **IPCC** | **Source/Sink Categories** | **1990** | **1995** | **2000** | **2005** | **2010** | **2013** | **2015** | **2020** | **2025** | **2030** |
| **Total** | **Emissions without LULUCF WM** | **229.39** | **234.40** | **252.92** | **269.22** | **233.71** | **236.53** | **242.71** | **193.96** | **186.40** | **176.93** |
| **1** | **Energy** | **201.64** | **207.26** | **225.07** | **235.66** | **196.57** | **197.76** | **205.54** | **160.08** | **153.19** | **144.38** |
| **1A** | Fuel combustion | 201.27 | 206.66 | 224.24 | 234.48 | 195.35 | 196.51 | 204.32 | 158.85 | 151.95 | 143.14 |
| | 1 Energy industries | 0.18 | 2.08 | 2.77 | 3.14 | 3.26 | 3.05 | 3.63 | 4.43 | 4.92 | 5.42 |
| | 2 Manufacturing industries and construction | 36.36 | 34.96 | 35.56 | 37.83 | 24.77 | 25.51 | 24.89 | 18.88 | 18.88 | 18.88 |
| | 3 Transport | 76.76 | 81.87 | 96.11 | 85.41 | 80.39 | 81.96 | 90.69 | 84.99 | 77.60 | 68.28 |
| | 4 Other sectors | 87.97 | 87.74 | 89.79 | 108.11 | 86.93 | 85.99 | 85.11 | 50.55 | 50.55 | 50.55 |
| | 5 Other | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **1B** | Fugitive emissions from fuels | 0.37 | 0.60 | 0.83 | 1.17 | 1.22 | 1.25 | 1.23 | 1.23 | 1.24 | 1.24 |
| | 1 Solid fuels | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| | 2 Oil and natural gas | 0.37 | 0.60 | 0.83 | 1.17 | 1.22 | 1.25 | 1.23 | 1.23 | 1.24 | 1.24 |
| **2** | **Industrial processes and product use** | **0.45** | **1.72** | **4.46** | **7.97** | **10.94** | **12.65** | **11.74** | **9.45** | **8.58** | **7.71** |
| **3** | **Agriculture** | **25.26** | **23.54** | **21.34** | **23.39** | **24.18** | **23.85** | **23.35** | **22.10** | **22.10** | **22.10** |
| **4** | **LULUCF** | **4.58** | **7.52** | **8.39** | **9.88** | **14.80** | **11.73** | **12.29** | **12.27** | **12.24** | **12.22** |
| **5** | **Waste** | **2.03** | **1.89** | **2.05** | **2.21** | **2.03** | **2.26** | **2.08** | **2.33** | **2.53** | **2.74** |
| **Memo item** | **International bunkers (aviation)** | **0.43** | **0.43** | **0.49** | **0.48** | **0.78** | **1.07** | **1.21** | **1.55** | **1.88** | **2.22** |

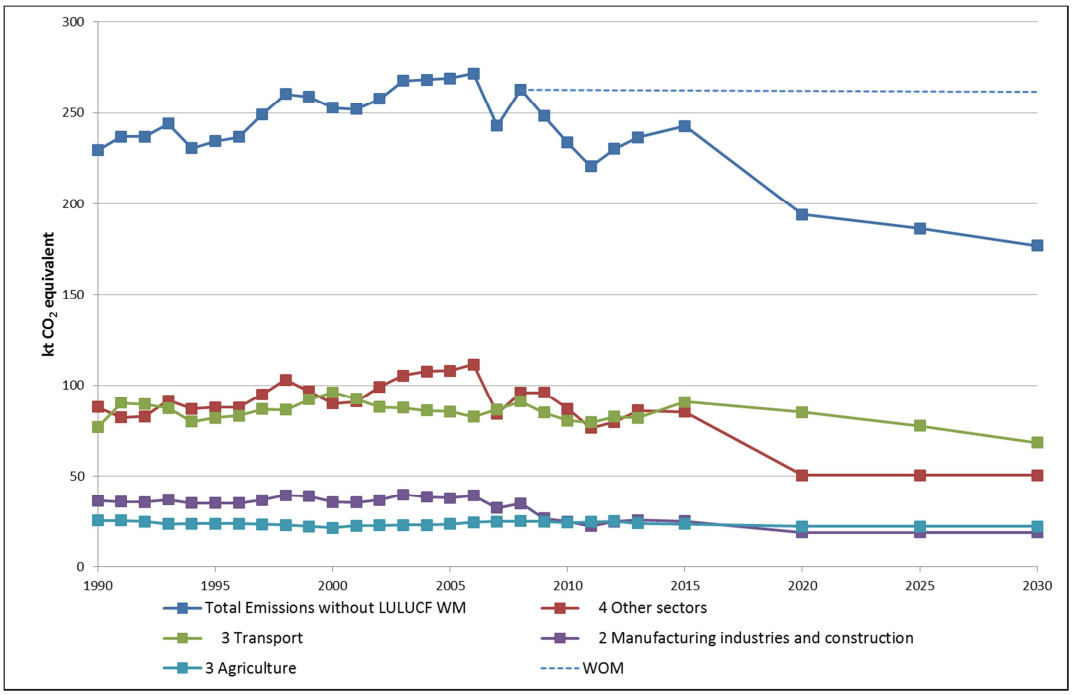


Figure 5-9 Total GHG emissions in CO2 equivalent by sector (excl. LULUCF) from 1990-2030 “with measures implemented” (main sectors) and “without measures” (only total emissions). For the Energy sector only the two most relevant contributors to total emissions from this sector are displayed, namely Transport and Other Sectors.

## Projection of total GHG emissions in $CO_2$ equivalent for the scenario WAM and WOM

Figure 5-5 and Table 5-11 show the development of total GHG emissions in $CO_2$ equivalent between 1990 and 2030 for the WAM scenario. Given the results from emission modeling for the year 2020, Liechtenstein will reach total GHG emissions of approximately 161.00 Gg $CO_2$ equivalent. The projected value for 2030 is 140.96 Gg $CO_2$ equivalent.

Table 5-11 Total GHG emissions in $CO_2$ equivalent by sector from 1990 to 2030 "with additional measures". The numbers 1990-2013 are taken from the inventory 2015. The numbers 2015-2030 are projected.

| | $CO_2$ in kt $CO_2$ equivalent | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Inventories | | | | | | Projections | | | |
| IPCC | Source/Sink Categories | 1990 | 1995 | 2000 | 2005 | 2010 | 2013 | 2015 | 2020 | 2025 | 2030 |
| Total | Emissions without LULUCF WAM | 229.39 | 234.40 | 252.92 | 269.22 | 233.71 | 236.53 | 235.17 | 160.98 | 150.87 | 140.96 |
| 1 | Energy | 201.64 | 207.26 | 225.07 | 235.66 | 196.57 | 197.76 | 198.07 | 127.36 | 119.61 | 112.07 |
| 1A | Fuel combustion | 201.27 | 206.66 | 224.24 | 234.48 | 195.35 | 196.51 | 196.84 | 126.12 | 118.37 | 110.83 |
| | 1 Energy industries | 0.18 | 2.08 | 2.77 | 3.14 | 3.26 | 3.05 | 3.90 | 5.73 | 5.63 | 5.73 |
| | 2 Manufacturing industries and construction | 36.36 | 34.96 | 35.56 | 37.83 | 24.77 | 25.51 | 23.85 | 14.18 | 14.18 | 14.18 |
| | 3 Transport | 76.76 | 81.87 | 96.11 | 85.41 | 80.39 | 81.96 | 89.34 | 80.45 | 72.81 | 65.16 |
| | 4 Other sectors | 87.97 | 87.74 | 89.79 | 108.11 | 86.93 | 85.99 | 79.76 | 25.76 | 25.76 | 25.76 |
| | 5 Other | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| 1B | Fugitive emissions from fuels | 0.37 | 0.60 | 0.83 | 1.17 | 1.22 | 1.25 | 1.23 | 1.23 | 1.24 | 1.24 |
| | 1 Solid fuels | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| | 2 Oil and natural gas | 0.37 | 0.60 | 0.83 | 1.17 | 1.22 | 1.25 | 1.23 | 1.23 | 1.24 | 1.24 |
| 2 | Industrial processes and product use | 0.45 | 1.72 | 4.46 | 7.97 | 10.94 | 12.65 | 11.67 | 9.20 | 8.08 | 6.96 |
| 3 | Agriculture | 25.26 | 23.54 | 21.34 | 23.39 | 24.18 | 23.85 | 23.35 | 22.10 | 20.64 | 19.18 |
| 4 | LULUCF | 4.58 | 7.52 | 8.39 | 9.88 | 14.80 | 11.73 | 12.29 | 12.27 | 12.24 | 12.22 |
| 5 | Waste | 2.03 | 1.89 | 2.05 | 2.21 | 2.03 | 2.26 | 2.08 | 2.33 | 2.53 | 2.74 |
| | | | | | | | | | | | |
| Memo item | International bunkers (aviation) | 0.43 | 0.43 | 0.49 | 0.48 | 0.78 | 1.07 | 1.21 | 1.55 | 1.88 | 2.22 |

Figure 5-5 illustrates the comparison of the two scenarios "with additional measures" (WAM) and "without measures" (WOM). The WOM projection was defined in Liechtenstein's 5th National Communication (OEP 2010) and was adopted from there. The WOM scenario predicts total greenhouse gas emissions of 262 Gg $CO_2$ equivalent in 2020. It was assumed that greenhouse gas emissions remain constant between 2020 and 2030.

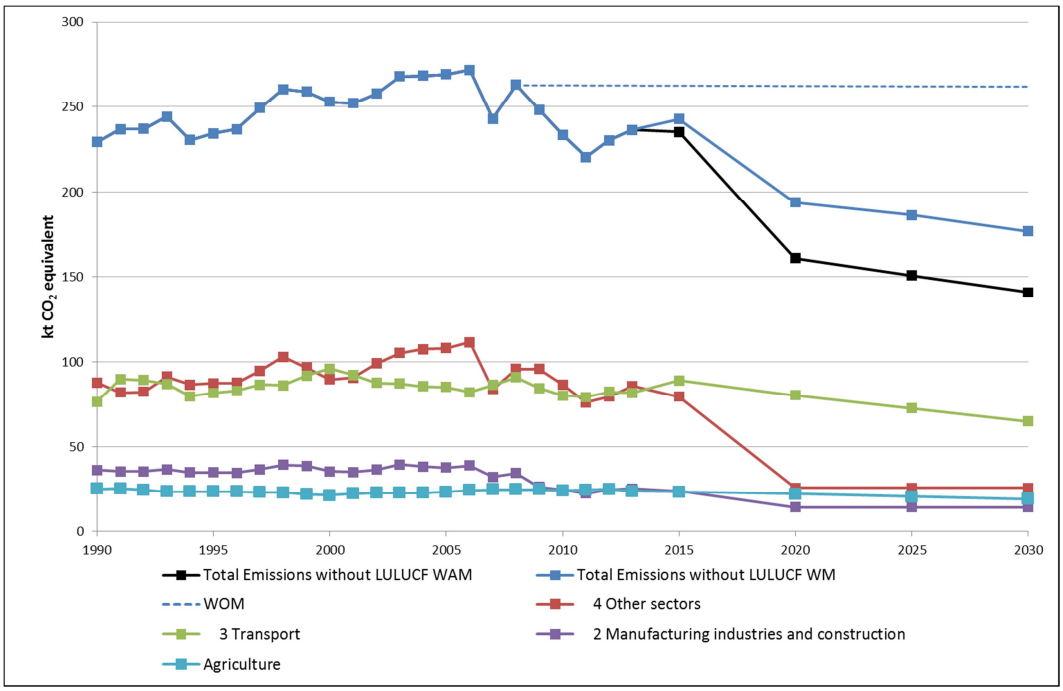


Figure 5-5 Total GHG emissions in $CO_2$ equivalent by sector (excl. LULUCF) from 1990 to 2030 "with additional measures" (main sectors), "without measures" and "with measures" (only total emissions).

Table 5 LIE_BR2_v0.1

**Summary of key variables and assumptions used in the projections analysis**[a]

| *Key underlying assumptions* | | *Historical*[b] | | | | | | | | | Projected | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Assumption* | *Unit* | *1990* | *1995* | 2000 | 2005 | 2010 | 2011 | 2012 | 2013 | 2015 | 2020 | 2025 | 2030 |
| *Population* | *thousands* | 29.03 | 30.92 | 32.86 | 34.90 | 36.14 | 36.47 | 36.83 | 37.12 | 38.03 | 39.59 | 40.99 | 42.18 |
| *Population growth* | *%* | | | | | | | | | | 1.55 | 1.55 | 1.55 |

[a] Parties should include key underlying assumptions as appropriate.

[b] Parties should include historical data used to develop the greenhouse gas projections reported.

***Custom Footnotes***

The 2015 population value is projected as no final data are available at the submission date.

Table 6(a) LIE_BR2_v0.1

**Information on updated greenhouse gas projections under a 'with measures' scenario**[a]

| | *GHG emissions and removals*[b] | | | | | | | GHG emission projections | |
|---|---|---|---|---|---|---|---|---|---|
| | *(kt $CO_2$ eq)* | | | | | | | (kt $CO_2$ eq) | |
| | *Base year (1990)* | 1990 | 1995 | 2000 | 2005 | 2010 | 2013 | 2020 | 2030 |
| ***Sector***[d,e] | | | | | | | | | |
| Energy | 201.64 | 201.64 | 207.26 | 225.07 | 235.66 | 196.57 | 197.76 | 160.08 | 144.38 |
| Transport | 76.76 | 76.76 | 81.87 | 96.11 | 85.41 | 80.39 | 81.96 | 84.99 | 68.28 |
| Industry/industrial processes | 0.45 | 0.45 | 1.72 | 4.46 | 7.97 | 10.94 | 12.65 | 9.45 | 7.71 |
| Agriculture | 25.26 | 25.26 | 23.54 | 21.34 | 23.39 | 24.18 | 23.85 | 22.10 | 22.10 |
| Forestry/LULUCF | 4.58 | 4.58 | 7.52 | 8.39 | 9.88 | 14.80 | 11.73 | 12.27 | 12.22 |
| Waste management/waste | 2.03 | 2.03 | 1.89 | 2.05 | 2.21 | 2.03 | 2.26 | 2.33 | 2.74 |
| Other (specify) | | | | | | | | | |
| ***Gas*** | | | | | | | | | |
| $CO_2$ emissions including net $CO_2$ from LULUCF | 203.59 | 203.59 | 211.74 | 229.84 | 242.25 | 207.83 | 205.95 | NE | NE |
| $CO_2$ emissions excluding net $CO_2$ from LULUCF | 199.32 | 199.32 | 204.52 | 221.80 | 232.75 | 193.45 | 194.68 | 157.41 | 141.79 |
| $CH_4$ emissions including $CH_4$ from LULUCF | 19.11 | 19.11 | 17.73 | 16.76 | 18.62 | 19.26 | 19.20 | NE | NE |
| $CH_4$ emissions excluding $CH_4$ from LULUCF | 19.11 | 19.11 | 17.73 | 16.76 | 18.62 | 19.26 | 19.20 | 17.74 | 17.92 |
| $N_2O$ emissions including $N_2O$ from LULUCF | 11.26 | 11.26 | 11.10 | 10.51 | 10.50 | 10.69 | 10.65 | NE | NE |
| $N_2O$ emissions excluding $N_2O$ from LULUCF | 10.95 | 10.95 | 10.79 | 10.16 | 10.11 | 10.26 | 10.19 | 9.51 | 9.64 |
| HFCs | 0.00 | 0.00 | 1.35 | 4.10 | 7.42 | 10.64 | 12.22 | 9.13 | 7.44 |
| PFCs | NO | NO | 0.00 | 0.01 | 0.07 | 0.07 | 0.06 | 0.05 | 0.04 |
| $SF_6$ | NO | NO | NO | 0.09 | 0.26 | 0.02 | 0.17 | 0.13 | 0.11 |
| Other (specify) | | | | | | | | | |
| **Total with LULUCF**[f] | 233.96 | 233.96 | 241.92 | 261.31 | 279.12 | 248.51 | 248.25 | 9.31 | 7.59 |
| **Total without LULUCF** | 229.38 | 229.38 | 234.39 | 252.92 | 269.23 | 233.70 | 236.52 | 193.97 | 176.94 |

*Abbreviations* : GHG = greenhouse gas, LULUCF = land use, land-use change and forestry.

[a] In accordance with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications", at a minimum Parties shall report a 'with measures' scenario, and may report 'without measures' and 'with additional measures' scenarios. If a Party chooses to report 'without measures' and/or 'with additional measures' scenarios they are to use tables 6(b) and/or 6(c), respectively. If a Party does not choose to report 'without measures' or 'with additional measures' scenarios then it should not include tables 6(b) or 6(c) in the biennial report.

[b] Emissions and removals reported in these columns should be as reported in the latest GHG inventory and consistent with the emissions and removals reported in the table on GHG emissions and trends provided in this biennial report. Where the sectoral breakdown differs from that reported in the GHG inventory Parties should explain in their biennial report how the inventory sectors relate to the sectors reported in this table.

[c] 20XX is the reporting due-date year (i.e. 2014 for the first biennial report).

[d] In accordance with paragraph 34 of the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications", projections shall be presented on a sectoral basis, to the extent possible, using the same sectoral categories used in the policies and measures section. This table should follow, to the extent possible, the same sectoral categories as those listed in paragraph 17 of those guidelines, namely, to the extent appropriate, the following sectors should be considered: energy, transport, industry, agriculture, forestry and waste management.

[e] To the extent possible, the following sectors should be used: energy, transport, industry/industrial processes, agriculture, forestry/LULUCF, waste management/waste, other sectors (i.e. cross-cutting), as appropriate.

[f] Parties may choose to report total emissions with or without LULUCF, as appropriate.

***Custom Footnotes***

# 6. Provision of financial, technological and capacity-building support to developing country Parties

According to the biennial reporting guidelines, the reporting obligations concerning financial, technological and capacity-building support to developing country parties only apply to Annex II Parties to the Convention (see FCCC/CP/2011/9/Add.1, Annex I, Chapter VI). Since Liechtenstein is not listed in Annex II of the Convention, the Government does not consider Liechtenstein to be bound by the respective provisions.

However, due to Liechtenstein's activities within the Fast Start Finance Period 2010 to 2012 as well as with regard to the Parliament's decision of 2012 to continue its engagement within the framework of international climate finance Liechtenstein has chosen to report these activities under paragraph 25, Chapter 7 "Other Reporting matters".

With respect to future submissions Liechtenstein aims at using that reporting format and opportunity to also address the request by Parties made in conjunction with the work program on long term finance at COP 19 in Warsaw.[1]

[1] see paragraph 10 http://unfccc.int/files/meetings/warsaw_nov_2013/decisions/application/pdf/cop19_ltf.pdf

# 7. Other reporting elements

**Liechtenstein's emissions measurements, reporting and verification and emission projections**

Liechtenstein accounts yearly for the national greenhouse gas inventory (NIR).

The annual publication of Liechtenstein's energy statistics, provided by the Office of Statistics, serves as a monitoring tool in order to evaluate the effect of the respective policies. Based on the Energy Strategy 2020 the Government has set up an administrative body that is responsible for the implementation and monitoring of measures set up by the Energy Strategy 2020.

**Liechtenstein's activities within international climate finance**

Liechtenstein has repeatedly underscored its commitment to achieving the international Official Development Assistance (ODA) target of 0.7%. Liechtenstein's most recent ODA percentage for the year 2013 is 0.65. As part of the global effort, Liechtenstein committed a respective climate finance contribution:

With calculations taking into account the national level of emissions, the financial capacity and the population size, the Liechtenstein Parliament decided in 2010 to introduce a new fast-start financing budget line of CHF 700'000 for the years 2011 and 2012. This budget was new and additional to the already existing IHCD budget. Liechtenstein's fast-start financing commitment was therefore not diverting from other important development priorities, but instead complemented and strengthened existing priorities. In 2012, the Parliament decided to extend its engagement in climate finance until 2015 with a total budget of CHF 600'000 on a voluntary basis. As a result, Liechtenstein has provided more than 1.5 Million USD of climate finance since 2011. In 2015, the Parliament decided to give permanence to the climate finance commitment and integrated climate finance into the regular budget of IHCD. As a result, the Government expects to support climate related projects with at least CHF 200'000 annually, starting from 2016.

Within its climate finance engagement Liechtenstein's primary concern is the delivery of effective results and benefits which address the sustainable development and climate change needs and priorities of developing countries. Moreover, Liechtenstein aims at providing support for planning and realising sustainable development by defining a responsible development framework, evaluating capacities, and making efficient and effective use of natural resources. To this end, Liechtenstein's climate finance not only aims to enhance good governance and capacity-building, but also to foster effects like improving living conditions and safeguarding subsistence, which is respecting dignity and creating additional sources of income and constant progress in the field of education and jobs.

Project actions and components covered by Liechtenstein's support under climate finance therefore need to:

- show a need driven approach, since they are developed by recipients and reflect their priorities;

- allow recipients to gain ownership of the processes and projects;
- activate the self-organisation of local populations;
- support socially, economically and environmentally friendly initiatives;
- contribute to promote gender equality, empowering women, raising awareness among young people and civil society and finally strengthening peace and security.

In general, support is given to developing country parties to support them in both adapting to and mitigating the effects of climate change. Support to developing country parties is provided through bilateral and multilateral channels.

With regards to the regional distribution of climate finance means, Liechtenstein's focus lies on the most vulnerable countries. 57% of the means since 2011 were used for climate projects in Africa, 36 % for projects in Asia (mainly South Caucasus), and 7 % were used for projects in the Pacific region.

Liechtenstein's **adaptation** assistance focuses on improving resilience to extreme weather conditions and other hazards, by investing in infrastructure which can better withstand climate change impacts, and through other practical measures to support local communities in enhancing preparedness.

With regards to **mitigation** of climate change, Liechtenstein is putting emphasis on supporting energy efficiency programmes and promoting renewable energy systems in the Caucasus, Central Asia and African countries. Liechtenstein strives to achieve a balance between adaptation and mitigation projects. However, every project is based on the needs of the respective developing country party.

The Liechtenstein Government is of the view that the involvement of the private sector in climate finance flows is crucial. Therefore, the Government is currently planning to enhance the cooperation with the private sector with regards to climate finance. It is worth to mention that private, non-profit foundations provide more than 100 Million USD for charitable projects annually. The Government is of the view, that through an enhanced and closer cooperation between the public and private sector, the mobilisation of climate finance can be further improved.

## 7.1 Financial resources and transfer of technology

The following chapter also serves to provide information as required by Art. 10 lit f) of the Kyoto Protocol.

### 7.1.1 Assistance to developing country Parties that are particularly vulnerable to climate change

Solidarity with developing countries and with countries affected by disasters and armed conflicts is a traditional focus of Liechtenstein's foreign policy. The operational tasks of International Humanitarian Cooperation and Development (IHCD) are carried out by the Office for Foreign Affairs, the Immigration and Passport Office and the Liechtenstein Development Service (LED). The overall coordination of the IHCD activities lies with the Office for Foreign Affairs.

IHCD encompasses all forms of humanitarian assistance and development cooperation of the State of Liechtenstein. These activities are set out in the Law on International Humanitarian Cooperation and Development (IHCD Act) of 2007. Liechtenstein's engagement focuses on emergency and reconstruction assistance, international refugee and migration assistance as well as bilateral and multilateral development cooperation.

Liechtenstein works closely together with the affected population and local organizations, with aid and development organisations in Liechtenstein, Switzerland, Austria and Germany as well as with European and international organisations. Liechtenstein, through its IHCD, maintains working relationships with a large number of partners. The bulk of Liechtenstein's support is provided in the form of financial resources. Nevertheless, the LED maintains three coordination offices on the ground, namely in Moldova, Bolivia and Zimbabwe from where it can directly supervise its projects.

**Emergency and reconstruction assistance** offers short-term, urgent assistance measures in the event of natural disasters, political crises, and armed conflicts. The focus is primarily on preserving human life and protecting the affected population. Additionally, the medium-term development of social structures and infrastructure is supported in order to facilitate a quick return to normal life. 10% of the IHCD resources are earmarked for this area. The urgency of the situation is the main criterion for Emergency and Reconstruction Assistance. There are accordingly no geographic priorities. However, special attention is paid to emergency situations that are largely ignored and underfunded by the international community.

**International Refugee and Migration Assistance** is based on a sustainable and comprehensive approach to dealing with global refugee and migration issues. This area also takes up 10% of the IHCD budget. Bilateral activities focus on the Balkan countries. People in need of protection, including minorities, receive support for local integration and long-term improvement of their living conditions. As part of a holistic view of the migration issue, possibilities of circular migration, readmission agreements, and visa questions are also discussed. At the multilateral level, compliance with international legal, human rights, and humanitarian standards for refugees, internally displaced persons, returnees, stateless persons, and other persons in need of international protection is promoted.

The largest pillar of IHCD is **Bilateral Development Cooperation**, which is the responsibility of the Liechtenstein Development Service (LED). For this purpose, LED receives about 65% of the overall resources each year, most of which is used for development projects with local partners (Southern partners) or partner organizations from Europe (Northern Partners). In Chişinău (Republic of Moldova), La Paz (Bolivia), and Harare (Zimbabwe), LED maintains its own local offices. LED is currently engaged in ten priority countries. These are Moldova, Bolivia, Peru, Senegal, Mali, Burkina Faso, Niger, Mozambique, Zimbabwe, and Zambia. Thematically, LED focuses on the development of rural regions and education. Human rights, social justice, equal rights, climate and the protection of the environment and resources are important horizontal topics. Since the Food Security and Intercultural Bilingual Education concepts and the Microfinance directive were adopted, these areas have been given greater consideration. LED funds placements of persons from Liechtenstein to development projects managed by other organizations, and it arranges internships. Further fields of its work are public relations and awareness rising through publications, exhibitions and educational work in public schools. The cooperation between the Liechtenstein Government and LED, a foun-

dation under private law, is governed by an owner's strategy, which is supplemented and further specified each year by performance mandates. The LED foundation council decides on individual projects.

**Multilateral Development Cooperation** is used to fund projects of international organizations or internationally operating non-governmental organizations. This type of engagement is useful especially for problems of a global or cross-border nature where the international community jointly seeks solutions. In contrast to LED projects, which act mainly at the local level, this track can also be used to improve national and international framework conditions. Special attention is paid to fostering good governance. This includes advocacy for human rights, strengthening the rule of law and democracy, and combating international crime. Key priorities of Liechtenstein's foreign policy, especially in the area of human rights, are additionally promoted in this way as part of IHCD, which in turn underscores Liechtenstein's credibility. Of note in this regard is for instance Liechtenstein's advocacy of better inclusion of women in peace-building processes and the protection of children in armed conflict. Other priorities are health and the fight against HIV/AIDS. An intact environment and the sustainable development and use of natural resources are necessary preconditions for the social and economic development of a region. Not only has the shortage of certain natural resources, but also the lack of access to these resources constituted a growing problem for many poor regions. IHCD seeks to protect the environment and natural resources as a basis of life also for coming generations. Of particular note from the perspective of environmental policy is Liechtenstein's engagement through financial and human resources, such as the provision of experts and the promotion of sustainable mountain region development in the Carpathians, the Caucasus, and Central Asia. 10% of the IHCD budget is available for Multilateral Development Cooperation.

### 7.1.2 Provision of financial resources, including financial resources under Article 11 of the Kyoto Protocol

In 2014, Liechtenstein's IHCD had a budget of about 23.9 million Swiss francs, corresponding to about 700 Swiss francs per capita. The total Official Development Assistance (ODA) amount was 25 million Swiss francs. The most recent ODA-percentage for the year 2013 is 0.65.

An overview of Liechtenstein's financial contributions as part of its International Humanitarian Cooperation and Development in 2014 can be found in the 2014 Annual Report of the Government to Parliament (pp. 99-105)[2]. The following table provides an overview of contributions related to the environment in 2014.

[2] See http://www.llv.li/files/srk/rb14-rechenschaftsbericht-2014-gesamt.pdf(in German).

Table 7-1: Overview of the most important contributions as part of Liechtenstein's international engagement in environmental protection, 2012

| **Type of contribution** | **Partner** | **Amount (CHF)** |
|---|---|---|
| Adaptation to climate change through the protection of forests and reforestation in Zimbabwe | SAFIRE | 58'590 |
| Basel Convention: annual contribution | UNEP | 494 |
| Climate Convention: annual contribution | UNFCCC | 1'626 |
| Construction of an energy efficient Kindergarten in Muzhava/Georgia (PPP) | Community & Environment, Medicor Foundation Liechtenstein | 42'320 |
| Contribution to International Renewable Energy Agency | IRENA | 1'790 |
| Contribution to the EMEP Trust Fund | UNECE | 860 |
| Contribution to the annual conference of AGOCA (Kirgizstan) | CAMP | 18'348 |
| Contribution to abate soil erosion through windbreaks in Georgia | Community & Environment | 97'856 |
| Contribution to abate soil erosion, reforestation and seedling nursery | Community & Environment | 50'722 |
| Convention on Biological Diversity: annual contribution | UNEP | 1'247 |
| Convention on Long-range Transboundary Air Pollution: annual contribution | UNECE | 362 |
| Convention on the Conservation of Migratory Species of Wild Animals (CMS): annual contribution | UNEP | 572 |
| Dissemination of energy efficient technologies in Kirgizstan and Tadzhikistan | CAMP Alatoo | 117'427 |
| Improvement of energy efficiency in Western Georgia | Community & Environment | 47'330 |
| International Council for Game and Wildlife Conservation (CIC): annual contribution | CIC | 1'980 |
| Kyoto Protocol: annual contribution | UNFCCC | 1'010 |
| Multilateral fund of the Montreal Protocol (Ozone Fund): annual contribution | UNEP | 13'791 |
| Permanent Secretariat of the Alpine Convention: annual contribution | Secretariat of the Alpine Convention | 21'440 |
| Ramsar Convention: annual contribution | IUCN | 1'000 |
| Rotterdam Convention: annual contribution | UNEP | 214 |
| Stockholm Convention: annual contribution | UNEP | 425 |
| UNCCD: annual contribution | UNCCD | 791 |
| UNEP: annual contribution / Environment Fund | UNEP | 8'108 |
| Water and Energy saving project in Tansania | Liechtenstein Development Service (LED) | 24'000 |
| World Conservation Union (IUCN): annual contribution | IUCN | 15'420 |
| **TOTAL** | | **543'142** |

Table 7-2: Multilateral contributions

**Multilateral contributions**

| | Multilateral contributions (CHF) (SDC only) | | | |
|---|---|---|---|---|
| | 2011 | 2012 | 2013 | 2014 |
| **Multilateral institutions:** | | | | |
| **1. European Bank for Reconstruction and Development (EBRD)** | **0** | **0** | **0** | **0** |
| **2. United Nations Development Programme (UNDP)** | **150'000** | **235'292** | **225'000** | **250'000** |
| **3. UNEP** | **31'545** | **25'580** | **25'089** | **24'851** |
| **4. UNFCCC (Kyoto Adaptation Fund)** | **2'145** | **2'633** | **2'612** | **2'636** |
| **5. UNCCD** | **5'955** | **5'780** | **822** | **791** |
| **6. International Union for the Conservation of Nature (IUCN)** | **15'991** | **16'096** | **15'420** | **15'420** |
| **Total** | **205'636** | **285'381** | **268'943** | **293'698** |

**Summary of information on financial resources and technology transfer**

| | |
|---|---|
| **Official development assistance (ODA in 2014)** | **25'021'456 CHF** |
| **Climate-related aid in bilateral ODA** | |
| **Climate-related support programmes** | |
| **Contributions to GEF (USD million)** | |
| **Pledge for third GEF replenishment** | |
| **Activities implemented jointly** | |
| **JI and CDM under the Kyoto Protocol (2008 – 2012)** | **7'920'000 CHF** |
| **JI and CDM under the Kyoto Protocol (2013 – 2020)** | **tbd** |
| **Other (bilateral/multilateral)** | |

Abbreviations: CDM = clean development mechanism, GEF = Global Environment Facility, JI = joint implementation.

### 7.1.3 Activities related to transfer of technology

In connection with the protection and preservation of the environment, Liechtenstein as an Alpine country is particularly engaged on behalf of the development of mountain regions. Under the umbrella of the Alpine Convention, Alpine countries cultivate a partnership with mountain regions in the Balkans, the Carpathians, the Caucasus, and Central Asia.

Table 7-3 Technology transfer Project supported by LED

**Project / programme title:** Water and Energy Saving Project, Tansania

**Goal:** Improvement of food security through adapted water and energy saving irrigation technologies

| Recipient country | Sector | Total funding | Years in operation |
|---|---|---|---|
| Tansania | Irrigation Technology | CHF 260'000 | 2 |

**Description:**

- Food security through small irrigation system (pepal pump)
- Provide access to so called swiss-PEP irrigation technology for local peasants

**Expected added value of the programme:**

- Pedal pumps are produced locally
- Operation of pedal pumps is largely $CO_2$ neutral
- Improvement of food security and reduction of $CO_2$ emissions

**Technology transferred:**

- Transfer of swiss-PEP irrigation technology

**Impact on greenhouse gas emissions/sinks:** Reduction of 5'850 t of $CO_2$ per year

Liechtenstein Development Service, LED (2014)

Please note the currency exchange rate of Swiss Francs to US Dollar is almost 1:1 at the date of submission.

# Annex I

Annex I: Summery and trend tables for Liechtenstein’s Greenhouse Gas Inventory

## SUMMARY 1.A SUMMARY REPORT FOR NATIONAL GREENHOUSE GAS INVENTORIES
## (Sheet 1 of 3)

Inventory 2013
Submission 2015 v1
LIECHTENSTEIN

| GREENHOUSE GAS SOURCE AND SINK CATEGORIES | Net $CO_2$ emissions/removals | $CH_4$ | $N_2O$ | HFCs[1] | PFCs[1] | Unspecified mix of HFCs and PFCs[1] | $SF_6$ | $NF_3$ | $NO_x$ | CO | NMVOC | $SO_2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (kt) | | | (kt $CO_2$ equivalent) | | | (kt) | | | | | |
| **Total national emissions and removals** | **205.95** | **0.77** | **0.04** | **12.22** | **0.06** | | **0.00** | | **NO,NA,NE** | **NO,NA,NE** | **0.16** | **NO,NA,NE** |
| **1. Energy** | **194.61** | **0.09** | **0.00** | | | | | | **NO,NA,NE** | **NO,NA,NE** | **NO,NA,NE** | **NO,NA,NE** |
| A. Fuel combustion Reference approach(2) | 194.74 | | | | | | | | | | | |
| Sectoral approach(2) | 194.61 | 0.04 | 0.00 | | | | | | NO,NE | NO,NE | NO,NE | NO,NE |
| 1. Energy industries | 2.93 | 0.00 | 0.00 | | | | | | NE,NO | NE,NO | NE,NO | NE,NO |
| 2. Manufacturing industries and construction | 25.39 | 0.00 | 0.00 | | | | | | NO,NE | NO,NE | NO,NE | NO,NE |
| 3. Transport | 81.34 | 0.01 | 0.00 | | | | | | NO,NE | NO,NE | NO,NE | NO,NE |
| 4. Other sectors | 84.95 | 0.03 | 0.00 | | | | | | NE | NE | NE | NE |
| 5. Other | NO | NO | NO | | | | | | NO | NO | NO | NO |
| B. Fugitive emissions from fuels | NO,NA | 0.05 | NO,NA | | | | | | NO,NA | NO,NA | NO,NA | NO,NA |
| 1. Solid fuels | NO,NA | NO,NA | NO,NA | | | | | | NO,NA | NO,NA | NO,NA | NO,NA |
| 2. Oil and natural gas and other emissions from energy production | NO,NA | 0.05 | NO,NA | | | | | | NO | NO | NO | NO |
| C. $CO_2$ Transport and storage | NO | | | | | | | | | | | |
| **2. Industrial processes and product use** | **NO** | **NO** | **0.00** | **12.22** | **0.06** | | **0.00** | | **NO,NA** | **NO,NA** | **0.16** | **NO,NA** |
| A. Mineral industry | NO | | | | | | | | NO | NO | NO | NO |
| B. Chemical industry | NO | NO | NO | NO | NO | | NO | | NO,NA | NO,NA | NO,NA | NO,NA |
| C. Metal industry | NO | NO | NO | | | | NO | | NO | NO | NO | NO |
| D. Non-energy products from fuels and solvent use | NO | NO | NO | | | | | | NO | NO | 0.16 | NO |
| E. Electronic industry | | | | NO | | | | | | | | |
| F. Product uses as substitutes for ODS | | | | 12.22 | 0.06 | | | | | | | |
| G. Other product manufacture and use | NO | NO | 0.00 | | | | 0.00 | | NO | NO | NO | NO |
| H. Other[3] | | | | | | | | | | | | |

**Note:** All footnotes for this table are given at the end of the table on sheet 3.

## SUMMARY 1.A SUMMARY REPORT FOR NATIONAL GREENHOUSE GAS INVENTORIES
## (Sheet 2 of 3)

Inventory 2013
Submission 2015 v1
LIECHTENSTEIN

| GREENHOUSE GAS SOURCE AND SINK CATEGORIES | $CO_2$ | $CH_4$ | $N_2O$ | HFCs [1] | PFCs[1] | Unspecified mix of | $SF_6$ | $NF_3$ | $NO_x$ | CO | NMVOC | $SO_2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (kt) | | | (kt $CO_2$ equivalent) | | | (kt) | | | | | |
| **3. Agriculture** | **0.04** | **0.64** | **0.03** | | | | | | **NE,NA,NO** | **NE,NA,NO** | **NO,NA,NE** | **NO** |
| A. Enteric fermentation | | 0.53 | | | | | | | | | | |
| B. Manure management | | 0.11 | 0.00 | | | | | | | | NO | |
| C. Rice cultivation | | NO,NA | | | | | | | | | NO,NA | |
| D. Agricultural soils | | NA,NO | 0.02 | | | | | | NE,NA,NO | NE,NA,NO | NE,NA,NO | |
| E. Prescribed burning of savannas | | | | | | | | | NO | NO | NO | |
| F. Field burning of agricultural residues | | NO,NA | NO,NA | | | | | | NA,NO | NA,NO | NA,NO | |
| G. Liming | NO | | | | | | | | | | | |
| H. Urea application | 0.04 | | | | | | | | | | | |
| I. Other carbon-contining fertilizers | NO | | | | | | | | | | | |
| J. Other | | NA | NA | | | | | | NA | NA | NA | NO |
| **4. Land use, land-use change and forestry [4]** | **11.27** | **NO** | **0.00** | | | | | | **NO,NE** | **NO,NE** | **NO,NE** | **NO** |
| A. Forest land [4] | -0.77 | NO | NO | | | | | | NO,NE | NO,NE | **NE** | |
| B. Cropland [4] | 4.18 | NO | 0.00 | | | | | | NO | NO | NE | |
| C. Grassland [4] | 4.09 | NO | 0.00 | | | | | | NO | NO | NE | |
| D. Wetlands [4] | 0.41 | NO | 0.00 | | | | | | NO | NO | NE | |
| E. Settlements [4] | 3.45 | NO | 0.00 | | | | | | NO | NO | NE | |
| F. Other land [4] | 1.33 | NO | 0.00 | | | | | | NO | NO | NE | |
| G. Harvested wood products | -1.43 | | | | | | | | | | | |
| H. Other [4] | NO | NO | NO | | | | | | NO | NO | NO | NO |
| **5. Waste** | **0.03** | **0.04** | **0.00** | | | | | | **NO,NA** | **NO,NA** | **NO,NA** | **NO,NA** |
| A. Solid waste disposal [5] | **NO** | **0.00** | | | | | | | **NO** | **NO** | **NO** | |
| B. Biological treatment of solid waste [5] | | 0.03 | **0.00** | | | | | | NO,NA | NO,NA | NO,NA | |
| C. Incineration and open burning of waste [5] | **0.03** | 0.00 | 0.00 | | | | | | NO,NA | NO,NA | NO,NA | |
| D. Wastewater treatment and discharge | | 0.00 | 0.00 | | | | | | NO,NA | NO,NA | NO,NA | |
| E. Other [5] | NO | NO | NO | | | | | | NA | NA | NA | NA |
| **6. Other *(please specify)* [6]** | **NO** | **NO** | **NO** | **NO** | **NO** | | **NO** | | **NO** | **NO** | **NO** | **NO** |

**Note:** All footnotes for this table are given at the end of the table on sheet 3

## SUMMARY 1.A SUMMARY REPORT FOR NATIONAL GREENHOUSE GAS INVENTORIES (IPCC TABLE 7A)
## (Sheet 3 of 3)



| GREENHOUSE GAS SOURCE AND SINK CATEGORIES | Net $CO_2$ emissions/removals | $CH_4$ | $N_2O$ | HFCs[(1)] | PFCs[(1)] | Unspecified mix of HFCs and PFCs[(1)] | $SF_6$ | $NF_3$ | $NO_x$ | CO | NMVOC | $SO_2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (kt) | | | (kt $CO_2$ equivalent) | | | | | (kt) | | | |
| **Memo items:[(7)]** | | | | | | | | | | | | |
| **International bunkers** | 1.06 | 0.00 | 0.00 | | | | | | NO,NE | NO,NE | NO,NE | NO,NE |
| Aviation | 1.06 | 0.00 | 0.00 | | | | | | NE | NE | NE | NE |
| Navigation | NO | NO | NO | | | | | | NO | NO | NO | NO |
| **Multilateral operations** | NO | NO | NO | | | | | | NO | NO | NO | NO |
| **$CO_2$ emissions from biomass** | 18.31 | | | | | | | | | | | |
| **$CO_2$ captured** | 99.32 | | | | | | | | | | | |
| **Long-term storage of C in waste disposal sites** | NA | | | | | | | | | | | |
| **Indirect $N_2O$** | | | NO | | | | | | | | | |
| | | | | | | | | | | | | |
| **Indirect $CO_2$** | NO | | | | | | | | | | | |

(1) The emissions of hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), unspecified mix of HFCs and PFCs and other fluorinated gases are to be expressed as carbon dioxide ($CO_2$) equivalent emissions. Data on disaggregated

(2) For verification purposes, Parties are requested to report the results of their calculations using the Reference approach and to explain any differences with the Sectoral approach in the documentation box to table 1.A(c). For

(3) 2.H. Other includes pulp and paper and food and beverages industry.

(4) For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(5) $CO_2$ from categories solid waste disposal on land and waste incineration should only be included if it stems from non-biogenic or inorganic waste streams. Only emissions from waste incineration without energy recovery are to be reported in the waste sector, whereas emissions from incineration with energy recovery are to be reported in the energy sector.

(6) If reporting any country-specific category under sector "6. Other", detailed explanations should be provided in Chapter 8: Other (CRF sector 6) of the national inventory report (NIR).

(7) Parties are asked to report emissions from international aviation and international navigation and multilateral operations, as well as $CO_2$ emissions from biomass and $CO_2$ captured, under Memo Items. These emissions should not be included in the national total emissions from the energy sector. Amounts of biomass used as fuel are included in the national energy consumption but the corresponding $CO_2$ emissions are not included in the national total as it is assumed that the biomass is produced in a sustainable manner. If the biomass is harvested at an unsustainable rate, net $CO_2$ emissions are accounted for as a loss of biomass stocks in the Land Use, Land-use Change and

# Summary 2: Summary Report for $CO_2$ Equivalent Emission (1990)

**SUMMARY 2 SUMMARY REPORT FOR $CO_2$ EQUIVALENT EMISSIONS**
**(Sheet 1 of 1)**

Inventory 1990
Submission 2015 v1
LIECHTENSTEIN

| GREENHOUSE GAS SOURCE AND SINK CATEGORIES | $CO_2$ [1] | $CH_4$ | $N_2O$ | HFCs | PFCs | $SF_6$ | Unspecified mix of HFCs and PFCs | $NF_3$ | Total |
|---|---|---|---|---|---|---|---|---|---|
| | $CO_2$ equivalent (kt ) | | | | | | | | |
| **Total (net emissions)[1]** | 203.59 | 19.11 | 11.26 | 0.00 | NO | NO | | | 233.97 |
| **1. Energy** | 199.24 | 1.29 | 1.10 | | | | | | 201.64 |
| A. Fuel combustion (sectoral approach) | 199.24 | 0.93 | 1.10 | | | | | | 201.27 |
| 1. Energy industries | 0.12 | 0.00 | 0.05 | | | | | | 0.18 |
| 2. Manufacturing industries and construction | 36.23 | 0.05 | 0.08 | | | | | | 36.36 |
| 3. Transport | 75.37 | 0.65 | 0.74 | | | | | | 76.76 |
| 4. Other sectors | 87.52 | 0.22 | 0.23 | | | | | | 87.97 |
| 5. Other | NO | NO | NO | | | | | | NO |
| B. Fugitive emissions from fuels | NO,NA | 0.37 | NO,NA | | | | | | 0.37 |
| 1. Solid fuels | NO,NA | NO,NA | NO,NA | | | | | | NO,NA |
| 2. Oil and natural gas | NO,NA | 0.37 | NO,NA | | | | | | 0.37 |
| C. $CO_2$ transport and storage | NO | | | | | | | | NO |
| **2. Industrial processes and product use** | NO | NO | 0.45 | 0.00 | NO | NO | | | 0.45 |
| A. Mineral industry | NO | | | | | | | | NO |
| B. Chemical industry | NO | NO | NO | NO | NO | NO | | | NO |
| C. Metal industry | NO | NO | NO | | | NO | | | NO |
| D. Non-energy products from fuels and solvent use | NO | NO | NO | | | | | | NO |
| E. Electronic Industry | | | | NO | | | | | NO |
| F. Product uses as ODS substitutes | | | | 0.00 | NO | | | | 0.00 |
| G. Other product manufacture and use | NO | NO | 0.45 | | | NO | | | 0.45 |
| H. Other | | | | | | | | | |
| **3. Agriculture** | 0.05 | 16.72 | 8.49 | | | | | | 25.26 |
| A. Enteric fermentation | | 13.66 | | | | | | | 13.66 |
| B. Manure management | | 3.06 | 1.16 | | | | | | 4.22 |
| C. Rice cultivation | | NO,NA | | | | | | | NO,NA |
| D. Agricultural soils | | NA,NO | 7.33 | | | | | | 7.33 |
| E. Prescribed burning of savannas | | | | | | | | | |
| F. Field burning of agricultural residues | | NO,NA | NO,NA | | | | | | NO,NA |
| G. Liming | NO | | | | | | | | NO |
| H. Urea application | 0.05 | | | | | | | | 0.05 |
| I. Other carbon-containing fertilizers | NO | | | | | | | | NO |
| J. Other | | NA | NA | | | | | | NA |
| **4. Land use, land-use change and forestry[1]** | 4.27 | NO | 0.31 | | | | | | 4.58 |
| A. Forest land | -1.07 | NO | NO | | | | | | -1.07 |
| B. Cropland | 4.45 | NO | 0.01 | | | | | | 4.46 |
| C. Grassland | 1.80 | NO | 0.01 | | | | | | 1.81 |
| D. Wetlands | 0.16 | NO | 0.00 | | | | | | 0.16 |
| E. Settlements | 3.19 | NO | 0.20 | | | | | | 3.38 |
| F. Other land | 0.44 | NO | 0.03 | | | | | | 0.47 |
| G. Harvested wood products | -4.70 | | | | | | | | -4.70 |
| H. Other | NO | NO | NO | | | | | | NO |
| **5. Waste** | 0.03 | 1.10 | 0.91 | | | | | | 2.03 |
| A. Solid waste disposal | NO | 0.56 | | | | | | | 0.56 |
| B. Biological treatment of solid waste | | 0.48 | 0.08 | | | | | | 0.56 |
| C. Incineration and open burning of waste | 0.03 | 0.01 | 0.00 | | | | | | 0.04 |
| D. Waste water treatment and discharge | | 0.05 | 0.82 | | | | | | 0.88 |
| E. Other | NO | NO | NO | | | | | | NO |
| **6. Other *(as specified in summary 1.A)*** | NO | NO | NO | NO | NO | NO | | | NO |
| | | | | | | | | | |

| **Memo items:[2]** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **International bunkers** | 0.43 | 0.00 | 0.00 | | | | | | 0.43 |
| Aviation | 0.43 | 0.00 | 0.00 | | | | | | 0.43 |
| Navigation | NO | NO | NO | | | | | | NO |
| **Multilateral operations** | NO | NO | NO | | | | | | NO |
| **$CO_2$ emissions from biomass** | 5.67 | | | | | | | | 5.67 |
| **$CO_2$ captured** | 90.33 | | | | | | | | 90.33 |
| **Long-term storage of C in waste disposal sites** | NA | | | | | | | | NA |
| **Indirect $N_2O$** | | | NO | | | | | | |

| **Indirect $CO_2$ [3]** | NO | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|

| | |
|---|---|
| **Total $CO_2$ equivalent emissions without land use, land-use change and forestry** | **229.39** |
| **Total $CO_2$ equivalent emissions with land use, land-use change and forestry** | **233.97** |
| **Total $CO_2$ equivalent emissions, including indirect $CO_2$, without land use, land-use change and forestry** | **229.39** |
| **Total $CO_2$ equivalent emissions, including indirect $CO_2$, with land use, land-use change and forestry** | **233.97** |

[1] For carbon dioxide ($CO_2$) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for

[2] See footnote 7 to table Summary 1.A.

[3] In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect $CO_2$, the national totals shall be provided with and without indirect $CO_2$.

# Summary 2: Summary Report for $CO_2$ Equivalent Emission (2013)

**SUMMARY 2 SUMMARY REPORT FOR $CO_2$ EQUIVALENT EMISSIONS**
**(Sheet 1 of 1)**

Inventory 2013
Submission 2015 v1
LIECHTENSTEIN

| GREENHOUSE GAS SOURCE AND SINK CATEGORIES | $CO_2$ [1] | $CH_4$ | $N_2O$ | HFCs | PFCs | $SF_6$ | Unspecified mix of HFCs and PFCs | $NF_3$ | Total |
|---|---|---|---|---|---|---|---|---|---|
| | $CO_2$ equivalent (kt ) | | | | | | | | |
| **Total (net emissions)[1]** | 205.95 | 19.20 | 10.65 | 12.22 | 0.06 | 0.17 | | | 248.25 |
| **1. Energy** | 194.61 | 2.22 | 0.93 | | | | | | 197.76 |
| A. Fuel combustion (sectoral approach) | 194.61 | 0.97 | 0.93 | | | | | | 196.51 |
| 1. Energy industries | 2.93 | 0.04 | 0.08 | | | | | | 3.05 |
| 2. Manufacturing industries and construction | 25.39 | 0.03 | 0.08 | | | | | | 25.51 |
| 3. Transport | 81.34 | 0.14 | 0.48 | | | | | | 81.96 |
| 4. Other sectors | 84.95 | 0.75 | 0.28 | | | | | | 85.99 |
| 5. Other | NO | NO | NO | | | | | | NO |
| B. Fugitive emissions from fuels | NO,NA | 1.25 | NO,NA | | | | | | 1.25 |
| 1. Solid fuels | NO,NA | NO,NA | NO,NA | | | | | | NO,NA |
| 2. Oil and natural gas | NO,NA | 1.25 | NO,NA | | | | | | 1.25 |
| C. $CO_2$ transport and storage | NO | | | | | | | | NO |
| **2. Industrial processes and product use** | NO | NO | 0.20 | 12.22 | 0.06 | 0.17 | | | 12.65 |
| A. Mineral industry | NO | | | | | | | | NO |
| B. Chemical industry | NO | NO | NO | NO | NO | NO | | | NO |
| C. Metal industry | NO | NO | NO | | | NO | | | NO |
| D. Non-energy products from fuels and solvent use | NO | NO | NO | | | | | | NO |
| E. Electronic Industry | | | | NO | | | | | NO |
| F. Product uses as ODS substitutes | | | | 12.22 | 0.06 | | | | 12.28 |
| G. Other product manufacture and use | NO | NO | 0.20 | | | 0.17 | | | 0.37 |
| H. Other | | | | | | | | | |
| **3. Agriculture** | 0.04 | 15.96 | 7.85 | | | | | | 23.85 |
| A. Enteric fermentation | | 13.29 | | | | | | | 13.29 |
| B. Manure management | | 2.68 | 1.35 | | | | | | 4.03 |
| C. Rice cultivation | | NO,NA | | | | | | | NO,NA |
| D. Agricultural soils | | NA,NO | 6.50 | | | | | | 6.50 |
| E. Prescribed burning of savannas | | | | | | | | | |
| F. Field burning of agricultural residues | | NO,NA | NO,NA | | | | | | NO,NA |
| G. Liming | NO | | | | | | | | NO |
| H. Urea application | 0.04 | | | | | | | | 0.04 |
| I. Other carbon-containing fertilizers | NO | | | | | | | | NO |
| J. Other | | NA | NA | | | | | | NA |
| **4. Land use, land-use change and forestry[1]** | 11.27 | NO | 0.46 | | | | | | 11.73 |
| A. Forest land | -0.77 | NO | NO | | | | | | -0.77 |
| B. Cropland | 4.18 | NO | 0.02 | | | | | | 4.20 |
| C. Grassland | 4.09 | NO | 0.04 | | | | | | 4.14 |
| D. Wetlands | 0.41 | NO | 0.03 | | | | | | 0.44 |
| E. Settlements | 3.45 | NO | 0.21 | | | | | | 3.67 |
| F. Other land | 1.33 | NO | 0.09 | | | | | | 1.42 |
| G. Harvested wood products | -1.43 | | | | | | | | -1.43 |
| H. Other | NO | NO | NO | | | | | | NO |
| **5. Waste** | 0.03 | 1.02 | 1.21 | | | | | | 2.26 |
| A. Solid waste disposal | NO | 0.08 | | | | | | | 0.08 |
| B. Biological treatment of solid waste | | 0.85 | 0.14 | | | | | | 0.99 |
| C. Incineration and open burning of waste | 0.03 | 0.01 | 0.00 | | | | | | 0.04 |
| D. Waste water treatment and discharge | | 0.08 | 1.07 | | | | | | 1.16 |
| E. Other | NO | NO | NO | | | | | | NO |
| **6. Other *(as specified in summary 1.A)*** | NO | NO | NO | NO | NO | NO | | | NO |
| | | | | | | | | | |

| **Memo items:[2]** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **International bunkers** | 1.06 | 0.00 | 0.01 | | | | | | 1.07 |
| Aviation | 1.06 | 0.00 | 0.01 | | | | | | 1.07 |
| Navigation | NO | NO | NO | | | | | | NO |
| **Multilateral operations** | NO | NO | NO | | | | | | NO |
| **$CO_2$ emissions from biomass** | 18.31 | | | | | | | | 18.31 |
| **$CO_2$ captured** | 99.32 | | | | | | | | 99.32 |
| **Long-term storage of C in waste disposal sites** | NA | | | | | | | | NA |
| **Indirect $N_2O$** | | | NO | | | | | | |

| **Indirect $CO_2$ [3]** | NO | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|

| | |
|---|---|
| **Total $CO_2$ equivalent emissions without land use, land-use change and forestry** | **236.53** |
| **Total $CO_2$ equivalent emissions with land use, land-use change and forestry** | **248.25** |
| **Total $CO_2$ equivalent emissions, including indirect $CO_2$, without land use, land-use change and forestry** | **236.53** |
| **Total $CO_2$ equivalent emissions, including indirect $CO_2$, with land use, land-use change and forestry** | **248.25** |

[1] For carbon dioxide ($CO_2$) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for

[2] See footnote 7 to table Summary 1.A.

[3] In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect $CO_2$, the national totals shall be provided with and without indirect $CO_2$.