Austria's Annual Greenhouse Gas Inventory 1990–2009

Submission under Decision 280/2004/EC

ENVIRONMENT AGENCY AUSTRIA umweltbundesamt

AUSTRIA'S ANNUAL GREENHOUSE GAS INVENTORY 1990–2009

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VORWORT

Dieser Bericht

Der vorliegende Bericht präsentiert die neuesten Daten der Treibhausgas- (THG-) Emissionen Österreichs. Diese Daten betreffen die Emissionen des Jahres 2009 sowie die aktualisierte Zeitreihe der Jahre 1990 bis 2008. Der Bericht liefert damit den THG Emissionswert für das zweite Jahr der Verpflichtungsperiode des Kyoto-Protokolls.

Er folgt in Format und Inhalt den verbindlichen Anforderungen des THG-Überwachungssystems 280/2004/EG[1] der EU zur Umsetzung des Kyoto-Protokolls. Dieses System umfasst die jährliche Übermittlung von aktualisierten THG-Emissionsdaten und einem dazugehörigen Kurzbericht („Short-NIR") mit 15. Jänner an die Europäische Kommission[2]. Eine detaillierte Darstellung der Daten wird der Europäischen Kommission in digitaler Form übermittelt.

Rechtlicher Hintergrund

Als Vertragsstaat der Klimarahmenkonvention (*Rahmenübereinkommens der Vereinten Nationen über Klimaänderungen* (UN Framework Convention on Climate Change – UNFCCC, BGBl. Nr. 414/1994)) ist Österreich verpflichtet, jährlich seine Emissionen und Senken bezüglich der direkten Treibhausgase CO_2, CH_4, N_2O, HFC, PFC und SF_6, sowie der indirekten Treibhausgase NO_x, NMVOC, CO und SO_2 zu erheben und zu berichten. Die dafür anzuwendende Methodik ist in einem umfassenden Regelwerk entsprechend den Beschlüssen der Vertragsstaatenkonferenz der UNFCCC festgelegt.

Auch die Europäische Union (EU) ist Vertragsstaat der Klimarahmenkonvention. Die EU Inventur wird aus der Summe der Mitgliedsstaaten-Inventuren errechnet. Deshalb hat die EU mit dem o. g. THG Überwachungssystem die Anforderungen, die an die EU gestellt werden an die Mitgliedsstaaten weitergegeben und diese dazu verpflichtet, Daten und Informationen, die für die Erstellung der EU Inventur benötigt werden, rechtzeitig zur Verfügung zu stellen. Mit dem vorliegenden Bericht kommt Österreich dieser Berichtspflicht nach.

Die Erhebung der Daten berücksichtigt außerdem die Ergebnisse der jährlichen Überprüfung durch die UNFCCC im Rahmen der so genannten UNFCCC-Tiefenprüfung. Ende August/Anfang September 2010 fand die letzte dieser Tiefenprüfungen der Österreichischen Treibhausgas-Inventur durch internationale Fachexperten statt. Die Ergebnisse dieser Prüfung werden im Frühjahr 2011 veröffentlicht. Die im Rahmen der Inventurprüfung eingebrachten Verbesserungsvorschläge wurden teilweise bereits in der diesjährigen Inventur berücksichtigt, teilweise fließen sie in das Inventurverbesserungsprogramm 2011 ein. (siehe Tabelle A).

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[1] Entscheidung Nr. 280/2004/EG des Europäischen Parlaments und des Rates vom 11. Februar 2004 über ein System zur Überwachung der Treibhausgasemissionen in der Gemeinschaft und zur Umsetzung des Kyoto-Protokolls.

[2] Der vorliegende Bericht beinhaltet die folgenden Elemente des THG-Überwachungssystems 280/2004/EG: Zusammenfassung des Nationalen Inventur-Berichtes im Sinne des Artikels 3 (1) f; Artikel 3 (1) i: methodische Verbesserungen („Recalculations"); Artikel 3 (1) j: Indikatoren; Artikel 3 (1) k: Informationen zu Änderungen des Nationalen Inventursystems; Artikel 3 (1) g: Informationen des Registers; und Artikel 3 (1) h: Informationen über juristische Personen, die befugt sind, sich an den Mechanismen nach den Artikeln 6, 12 und 17 des Kyoto-Protokolls unter Beachtung der einschlägigen nationalen oder gemeinschaftlichen Bestimmungen zu beteiligen.

Tabelle A: Jährlicher Prozess zur Erstellung und Überarbeitung der THG Inventur.

15. Jänner *(Jahr n)*	Übermittlung der THG Inventur an EK (für die Jahre 1990 bis zum Jahr n-2)
15. Jänner bis 28. Februar *(Jahr n)*	Überprüfung der Daten durch die EK
15. April *(Jahr n)*	Übermittlung der THG Inventur an die UNFCCC
Juni *(Jahr n)* bis März *(Jahr n+1)*	Überprüfung der Daten durch die UNFCCC: – Stufe 1: Initial Check – Stufe 2: Synthesis and Assessment – Stufe 3: Individual Review
bis 15. Januar *(Jahr n + 1)*	Berücksichtigung der Kommentare der EK und der UNFCCC bei der Erstellung und Überarbeitung der THG Inventur

Zur Erfüllung der Anforderungen, die sich aus der Klimarahmenkonvention und vor allem aus dem Inkrafttreten des Kyoto-Protokolls am 16. Februar 2005 ergeben haben, wurde entsprechend Artikel 5.1 des Kyoto-Protokolls ein Nationales System eingerichtet. Ziel ist es, die Qualität der Inventur sicherzustellen und kontinuierlich zu verbessern. Dazu wurde ein Gesamtkonzept für das Nationale Inventur System Austria (NISA) entwickelt, das auf der *Österreichischen Luftschadstoff-Inventur* (OLI) als zentralem Kern aufbaut. Ein umfassendes Inventurverbesserungsprogramm und ein Qualitätsmanagementsystem entsprechend ISO/IEC 17020 sind ein wesentlicher Teil des NISA[3].

Der vorliegende Bericht wurde vom Umweltbundesamt auf Grundlage des Umweltkontrollgesetzes BGBl. Nr. 152/1998 erstellt. Dem Umweltbundesamt wird in diesem Bundesgesetz in § 6 (2) Z.15 unter anderem die Aufgabe übertragen, fachliche Grundlagen zur Erfüllung des Rahmenübereinkommens der Vereinten Nationen über Klimaänderungen zu erstellen. In § 6 (2) Z.20 werden die Entwicklung und Führung von Inventuren und Bilanzen zur Dokumentation des Zustandes und der Entwicklung der Umwelt sowie der Umweltbelastungen und ihrer Ursachen ausdrücklich als besondere Aufgaben des Umweltbundesamtes genannt.

Dieser Aufgabe wird mit der Erstellung sowie der jährlichen Aktualisierung der *Österreichischen Luftschadstoff-Inventur* (OLI) gemäß den in den relevanten internationalen Übereinkommen vereinbarten Richtlinien vom Umweltbundesamt nachgekommen. Die OLI deckt sowohl Treibhausgasemissionen, als auch Emissionen sonstiger Luftschadstoffe ab und ist damit u. a. die Datenbasis für die Erstellung des vorliegenden Berichts.

Datengrundlage

Das Umweltbundesamt führt jährlich eine Inventur des Ausstoßes von Luftschadstoffen durch, die als Grundlage für die Erfüllung der nationalen und internationalen Berichtspflichten herangezogen wird. Diese *Österreichische Luftschadstoff-Inventur* (OLI) wird erforderlichenfalls auch für zurückliegende Jahre aktualisiert, um eine vergleichbare Zeitreihe zur Verfügung zu haben. Die in diesem Bericht dargestellten Emissionsdaten ersetzen somit die publizierten Daten vorhergehender Berichte.

Tabelle B: Datengrundlage des vorliegenden Berichts.

Inventur	**Datenstand**	**Berichtsformat**
OLI 2010	14. Jänner 2011	Common Reporting Format (CRF)

[3] UMWELTBUNDESAMT (2005): NISA National Inventory System Austria, Implementation Report, REP-0004; Umweltbundesamt, Vienna.

ZUSAMMENFASSUNG

Die hier dargestellte Entwicklung der Treibhausgase in Österreich folgt in der Einteilung den Sektoren der Klimastrategie 2007.[4]

Sinkender Trend der Treibhausgasemissionen hält an

Wien 12. Jänner 2011 – Die Ergebnisse der aktuellen Treibhausgas-Inventur des Umweltbundesamts zeigen im Jahr 2009 einen deutlichen Rückgang der Treibhausgasemissionen: Insgesamt wurden 2009 um 6,8 Mio. Tonnen weniger Treibhausgasemissionen für Österreich verzeichnet als 2008. Insgesamt wurden 80,1 Mio. Tonnen Kohlendioxid-Äquivalente emittiert. Unter Berücksichtigung der flexiblen Mechanismen sowie der Neubewaldung und Entwaldung ergibt sich damit für das zweite Jahr der Verpflichtungsperiode eine Abweichung von 5,1 Mio. Tonnen zum Kyoto-Ziel. 2008 betrug diese Abweichung noch 6,9 Mio. Tonnen Kohlendioxid-Äquivalente.

Umweltminister Niki Berlakovich sieht den deutlichen Rückgang und anhaltenden Trend der sinkenden Emissionen positiv, macht gleichzeitig aber deutlich, dass es keinen Grund zum Jubeln gibt: *„Wir haben in den vergangenen Jahren einige richtungsweisende Initiativen im Klimaschutz gesetzt – bei der Gebäudesanierung, der Förderung erneuerbarer Energieträger und im Verkehr, Stichwort Biokraftstoffe und Spreizung der Normverbrauchsabgabe (NOVA). Diese Maßnahmen sind nachweislich erfolgreich. Grund zum Ausruhen gibt es jedoch keinen: Es wird auch in den nächsten Jahren noch massive Kraftanstrengungen brauchen. Alle sind gefordert. Jeder muss in seinem Bereich seine Verantwortung wahrnehmen."*

Seit 2005 verzeichnet das Umweltbundesamt einen anhaltend sinkenden Trend der Treibhausgasemissionen in Österreich. „*Der sinkende Trend der vergangenen vier Jahre ist das Ergebnis vieler sektoraler Maßnahmen, die ihre Wirkung zeigen und noch zeigen werden.*" erklärt Umweltbundesamt-Geschäftsführer Georg Rebernig. „*2009 hat die Wirtschaftskrise Spuren hinterlassen, vor allem in den Sektoren, die dem Emissionshandel unterliegen.*"

Die Bilanz im Detail:

Industrie und Energieaufbringung

Der Einbruch der industriellen Produktion spiegelt sich in der Treibhausgasbilanz des Sektors Industrie mit einem deutlichen Rückgang um 14,0 % (-3,7 Mio. Tonnen) von 2008 auf 2009 wider. Bei kleineren, nicht am Emissionshandel beteiligten Industrie- und Gewerbebetrieben beträgt der Rückgang hingegen rund 2 % gegenüber 2008. Der Sektor Industrie ist im Jahr 2009 mit ca. 22,6 Mio. Tonnen Kohlendioxid-Äquivalenten der größte Emittent an Treibhausgasen in Österreich.

Im Sektor Energieaufbringung wurde 2009 im Vergleich zu 2008 ca. 1 Mio. Tonne Treibhausgase weniger emittiert; in Summe ca. 12,8 Mio. Tonnen. Im Krisenjahr 2009 ist die Inlandsstromnachfrage um 4 % gesunken. Die Reduktionen, die in diesem Sektor seit 1990 erzielt wurden, sind auf den Ersatz von Kohle und Heizöl durch Erdgas und Biomasse, den Ausbau erneuerbarer Energieträger auf Grund der Regelungen des Ökostromgesetzes sowie auf Effizienzsteigerungen zurückzuführen. Maßnahmen wie die Umweltförderung (UFI), der Ausbau erneuerbarer Energieträger und die Energiestrategie werden fortgeführt.

[4] Die Entsprechung der Klimastrategie-Sektoren mit den Sektoren des CRF-Formats wie sie für den englischsprachlichen Teil dieses Berichts verwendet wird, ist wie folgt – CRF Bezeichnung in Klammern: Raumwärme (1.A.4), Verkehr (1.A.3+1.A.5), Energieaufbringung (1.A.1), Industrie (1.A.2+2 ohne F-Gase), Landwirtschaft (4), Abfallwirtschaft (6), F-Gase (F-Gase aus 2), Sonstige (1.B+3);

Verkehr

Mit einem Plus von 54,4 % wird in diesem Sektor die mit Abstand höchste Zuwachsrate seit 1990 verzeichnet. Der Sektor Verkehr weist im Jahr 2009 ca 21,7 Mio. Tonnen auf. Im Vergleich zu 2008 sind die Emissionen im Verkehrssektor 2009 um 0,9 Mio. Tonnen niedriger. Wesentliche Ursachen dafür für die Abnahme war neben der verminderten Nachfrage nach Gütertransport der verstärkte Einsatz von Biokraftstoffen sowie Effizienzsteigerungen u. a. auf Grund der NOVA-Spreizung. Alleine durch den Einsatz von Biokraftstoffen konnten im Jahr 2009 insgesamt 1,7 Mio. Tonnen Kohlendioxid-Äquivalente eingespart werden. Die Forcierung alternativer Antriebe, von e-Mobilität und Biokraftstoffen bleiben Schwerpunkt des Umweltministeriums.

Raumwärme

Auf den Sektor Raumwärme entfallen 2009 ca. 11,3 Mio. Tonnen Treibhausgasemissionen. Der verstärkte Einsatz von Fernwärme und Erneuerbaren Energieträgern sowie die bessere thermische Qualität der Gebäude führten in den letzten Jahren zu kontinuierlichen Emissionsminderungen in diesem Sektor. Witterungsbedingt unterliegen die Emissionen in diesem Sektor jährlichen Schwankungen. Der rückläufige Verbrauch von Heizöl und Erdgas ist im Vergleich zu 2008 die wesentlichste Ursache für den Rückgang der Treibhausgasemissionen. Die thermische Sanierung als Maßnahme wird fortgeführt. 100 Mio stehen wieder zur Verfügung.

Abfallwirtschaft, Landwirtschaft, F-Gase

Die Sektoren Abfallwirtschaft (ca. 1,9 Mio Tonnen) und Landwirtschaft (ca. 7,6 Mio Tonnen) und F-Gase (ca. 1,4 Mio Tonnen) weisen im Vergleich zu 1990 deutlich geringere Emissionen auf. Insgesamt verursachen diese drei Sektoren 2009 weniger als 11 Mio. Tonnen der österreichischen Treibhausgasemissionen.

1 INTRODUCTION

This report updates the Austrian greenhouse gas inventory data for the years 1990 to 2008; it presents the greenhouse gas emission data for the first year of the first commitment period under the Kyoto-Protocol.

The greenhouse gas inventory is submitted to the European Commission by the Austrian Federal Government in fulfilment of Austria's obligations under Article 3 of Decision 280/2004/EC ("Monitoring Decision"; replacing Decision 389/1992/EEC amended by Decision 296/1999/EEC) concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol. The purpose of this decision is to monitor all anthropogenic greenhouse gas emissions not controlled by the Montreal Protocol and to evaluate the progress towards meeting the greenhouse gas reduction commitments under the UNFCCC and the Kyoto Protocol.

According to the above mentioned decision and guidelines and the reporting requirements, which are the same as under the United Nations Framework Convention on Climate Change (UNFCCC), Member States are obliged to determine their anthropogenic emissions by sources and removals by sinks in accordance with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the *Intergovernmental Panel on Climate Change (IPCC) Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, and the *IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry* as well as the Reporting Guidelines established by the Conference of the Parties to the UNFCCC and under the Kyoto Protocol.

The greenhouse gas inventory has to be submitted to the Commission every year no later than 15 January. Furthermore, Member States have to submit by 15 January elements of their National Inventory Reports (NIR) relevant for the preparation of the community inventory report (Article 3 (1) f). The elements of the so-called "Short-NIR" are further specified in Article 4 of the Implementing Provisions to 280/2004/EC (Commission Decision 2005/166/EC).

This report was prepared to fulfil the reporting obligations of Article 3 (1) f ("Short-NIR") and of Article 3 (1) i-k (Information on recalculations, reporting on indicators and information on changes of the national systems) of the Monitoring Decision. Since 2008 the reporting under Article 3 (1) g (information from the national registry) and 3 (1) h (information on legal entities authorised to participate in mechanisms of the Kyoto Protocol) is obligatory and is therefore also included in this report.

2 EMISSION TRENDS

Under the burden sharing agreement of the European Union, Austria is committed to a reduction of its greenhouse gases by 13% below 1990 levels by 2008–2012.

The following figure depicts the trend of Austria's GHG emissions and also shows Austria's Kyoto Target for 2008–2012. The figure excludes emission sources and sinks from the sector Land Use, Land Use Change and Forestry as reported under the UNFCCC.

It has to be noted that for judging the compliance under the Kyoto Protocol sources and sinks related to Article 3.3 of the Kyoto Protocol have to be considered, and also the use of flexible mechanisms under the Kyoto Protocol has to be accounted for.

In 2009 Austria's total greenhouse gas emissions (without LULUCF) amounted to 80.1 million tonnes CO_2 equivalents. Compared to the base year 1990 emissions increased by 2.5% (CO_2: +9.0%), compared to 2008 emissions decreased by 7.8% (CO_2: -8.5%). The trend is dominated by the trend of the most important sector – the energy sector.

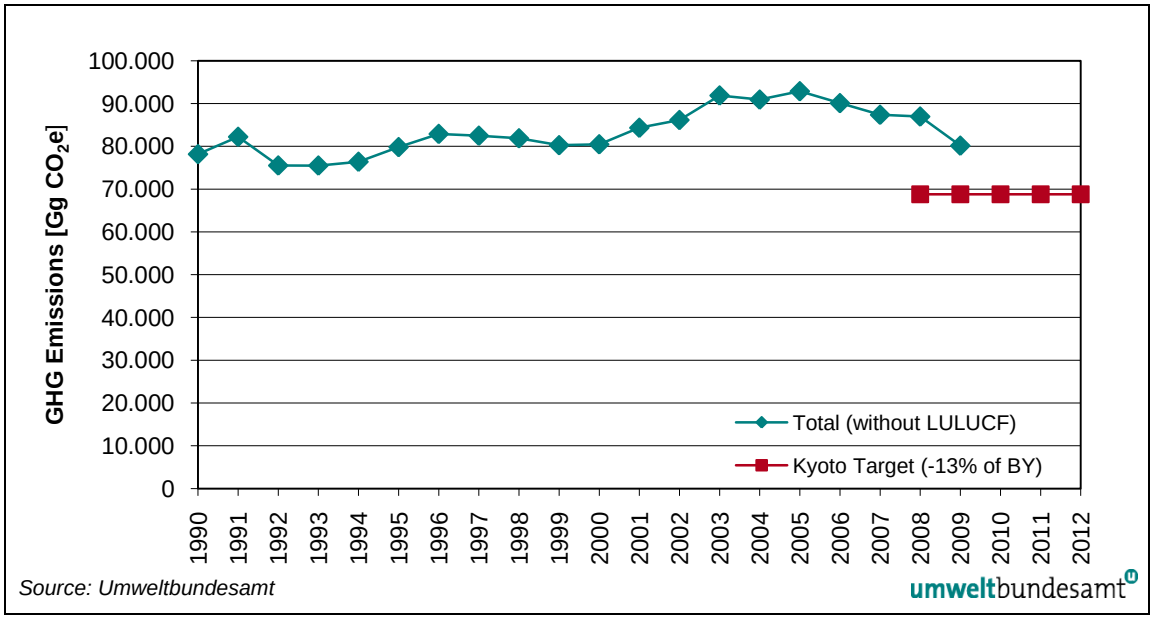

Figure 1: Trend in total GHG emissions 1990–2009 without LULUCF.

The key driver for the emissions decline between 2008 and 2009 was the weak economic situation in 2009 – resp. the decreasing amount of fuel consumed in the transport sector (freight transport on road), the reduced use of solid fuels for electrical power generation as well as the reduced industrial production of energy-intensive products (steel, cement) – but also the increased use of biofuels.

Compared to 2008, CO_2 emissions from road transport decreased by 3.3%. Besides the decreasing road freight activity – domestically as well as caused by fuel export – this decline is attributable to the gradually replacement of vehicles by newer, less consuming cars with less specific fuel consumption as well as to the increased use of biofuels. Between 2008 and 2009 the substitution of CO_2 by biofuels has risen by 25% (passenger cars) and 28% (duty vehicles).

CO_2 emissions from the sector energy decreased by 7.3% as a result of a reduced power generation on solid fuel basis and an increased use of renewable sources, especially hydro power. CO_2 emissions from industrial processes declined by 19.8% from 2008 to 2009, mainly due to

reductions in the iron and steel and cement industry. The falling emissions in the other sectors mainly occurred in the commercial/institutional sector and are due to a reduced of gas consumption and heating oil sales, which might be also be a consequence of the economic crisis. The number of heating degree days increased only slightly (+0.2%) from 2008 to 2009.

The sectors agriculture, waste and solvents showed decreasing emissions from 2008 to 2009.

Table 1: Summary of Austria's anthropogenic greenhouse gas emissions by sector.

GHG source and sink categories	1. Energy	2. Industry	3. Solvent	4. Agriculture	5. LULUCF*	6. Waste	7. Other
	CO_2 equivalents (Gg)						
1990	55 403	10 111	512	8 558	-13 735	3 587	NA
1995	57 677	9 897	422	8 718	-16 446	3 096	NA
2000	59 267	10 322	425	7 904	-17 471	2 551	NA
2001	63 385	10 174	425	7 855	-20 111	2 492	NA
2002	64 667	10 792	427	7 751	-16 357	2 509	NA
2003	70 622	10 744	419	7 543	-17 787	2 555	NA
2004	70 613	10 054	374	7 438	-17 743	2 438	NA
2005	72 126	10 627	387	7 398	-17 679	2 337	NA
2006	68 994	10 990	415	7 432	-17 668	2 264	NA
2007	65 859	11 466	389	7 497	-17 613	2 157	NA
2008	65 010	11 913	367	7 631	-17 587	2 033	NA
2009	60 704	9 606	299	7 615	-17 524	1 922	NA

** Net emissions*

The most important GHG in Austria is carbon dioxide (CO_2) with a share of 84% in 2009. The CO_2 emissions primarily result from combustion activities. Methane (CH_4), which mainly arises from stock farming and waste disposal, contributes 7.1% to national total GHG emissions, and nitrous oxide with agricultural soils as the main source adds another 6.8%. The remaining 1.8% is due to emissions of fluorinated compounds, which are mostly emitted from the use of these gases as substitutes for ozone depleting substances (ODS) in refrigeration equipment.

Table 2: Austria's anthropogenic greenhouse gas emissions by gas 1990–2009 without LULUCF.

Greenhouse gas emissions	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	Total (without LULUCF)
	CO_2 equivalents (Gg)						
1990	62 068	8 304	6 199	26	1 079	494	**78 171**
1995	63 951	7 616	6 607	412	71	1 154	**79 811**
2000	65 984	6 612	6 290	902	85	596	**80 469**
2001	70 009	6 473	6 176	925	96	652	**84 332**
2002	71 890	6 375	6 178	969	98	635	**86 146**
2003	77 773	6 376	6 101	950	116	567	**91 883**
2004	77 688	6 237	5 404	955	137	497	**90 917**
2005	79 719	6 093	5 436	986	134	507	**92 876**
2006	77 084	5 965	5 473	963	146	465	**90 096**
2007	74 377	5 861	5 503	1 062	190	375	**87 367**
2008	73 929	5 720	5 692	1 058	174	383	**86 955**
2009	67 627	5 662	5 417	1 056	35	349	**80 146**

The dominant sector regarding GHG emissions in Austria is *Energy*, which caused 76% of total greenhouse gas emissions in Austria in 2009 (71% in 1990), followed by the Sectors *Industrial Processes* (12% in 2009) and *Agriculture* (9.5% in 2009).

Table 3: Austria's greenhouse gas emissions by sector in the base year (1990) and in 2009 as well as their share and trend.

GHG	1990	2009	Trend 1990–2009	1990	2009
	Emissions [Gg CO_2e]			Share [%]	
Total	**78 171**	**80 146**	**2.5%**	**100%**	**100%**
1 Energy	55 403	60 704	9.6%	71%	76%
2 Industry	10 111	9 606	-5.0%	13%	12%
3 Solvent	512	299	-41.6%	1%	0%
4 Agriculture	8 558	7 615	-11.0%	11%	10%
5 LULUCF	-13 735	-17 524	27.6%	-	-
6 Waste	3 587	1 922	-46.4%	5%	2%

Total emissions without emissions from LULUCF

In 2009 emissions from *Energy* are 9.6% higher than in the base year. All the other sectors show decreasing GHG emissions. The most significant decreases in absolute terms occurred in the sectors *Waste* and *Agriculture*, but also *Industrial Processes* and *Solvents* showed significant reductions.

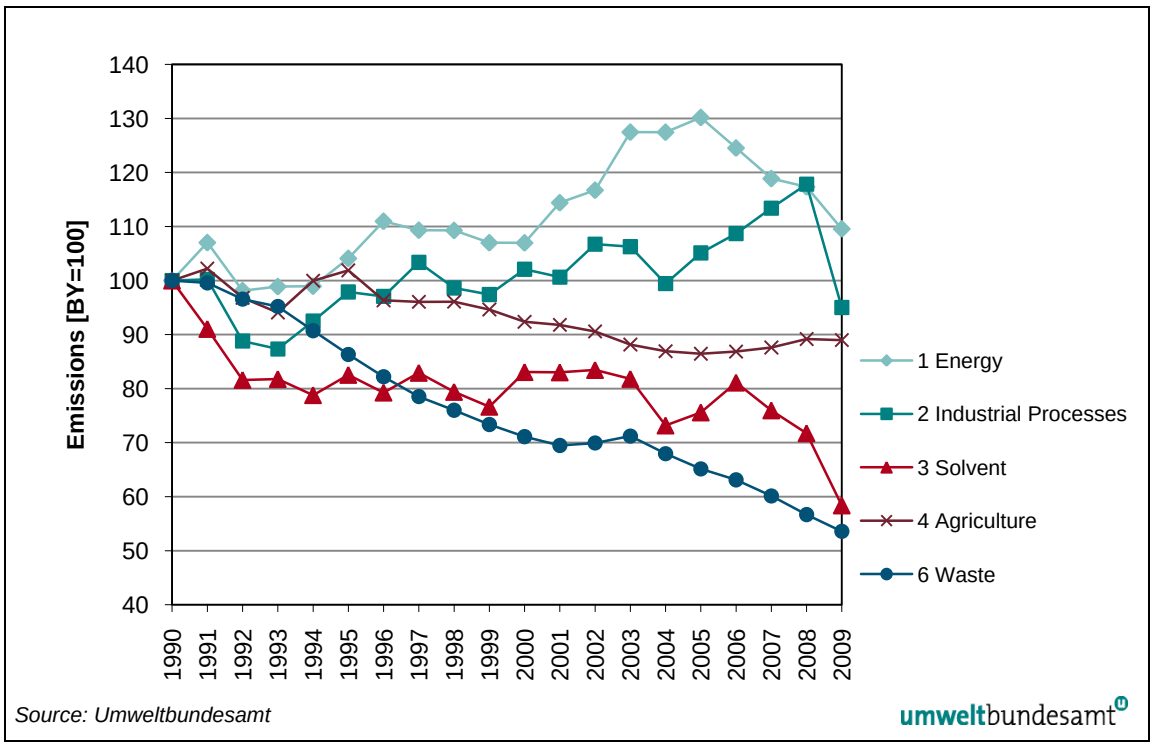

Figure 2: Trend in emissions 1990–2009 by sector in index form (base year 1990 = 100).

A description and interpretation of emissions trends per sector is given in the following subchapters.

2.1 Energy

The **overall trend** in greenhouse gas emissions from the sector *Energy* shows increasing emissions with a plus of 9.6% from 1990 to 2009. The **main driver** for this trend is the strong increase of emissions from road transport. The significant dips and jumps from year to year are mainly due to the weather circumstances in the corresponding years (in particular cold or mild winters, and/or dry or wet summers) which affect the heating demand, and the availability of climate change-friendly electricity from hydro plants.

From 2008 to 2009, emissions from the energy sector decreased by 6.6%.

In 2009, greenhouse gas emissions from the energy sector amounted to 60 704 Gg CO_2 equivalents which correspond to 76% of the total national emissions. 99% of the emissions from this sector originate from fossil fuel combustion; fugitive emissions from fuels are of minor importance.

CO_2 contributed 98% to the total **greenhouse gas** emissions from the energy sector, CH_4 0.8% and N_2O 1.2%.

The **most important sub-sector** of energy in 2009 was transport with a share of 36%, followed by manufacturing industries and construction (24%), energy industries (21%), and other sectors (19%).

The increased trend from 1990 to 2009 in this sector is mainly due to a strong rise in emissions from sub-sector **transport** (+54%) due to an increase of road performance (kilometres driven). In addition to the increase of road performance within Austria, the amount of fuel bought in Austria but driven elsewhere – an effect mainly caused by different fuel prices of neighbouring countries – increased considerably. However, from 2008 to 2009, total GHG emissions from transport decreased by 4.0%, mainly due to lower emissions from freight transport.

Energy related emissions from **manufacturing industries and construction** increased by 13% from 1990 to 2009. Fuel consumption increased by 35% in that period, mainly due to increased use of gas and especially biomass. As gas has a lower carbon content and CO_2 emissions from biomass combustion are not accounted for under the UNFCCC reporting framework, the increase in GHG emissions is significantly smaller compared to the increase in fuel combustion. From 2008 to 2009, emissions from this sub-source decreased by 9.7% due to the effects of the economic crisis (lower production output).

In 2009 emissions from sub-sector **energy industries** were 7.9% below the level of the base year. Since 2005 emissions are continuously decreasing basically because of the growing importance of renewable energy sources, the substitution of solid and liquid fuels by natural gas and biomass as well as improvements in efficiency. Since 1990 the share of biomass used as a fuel in this sector increased from 1% to 19% (2009), the contribution of hydro and wind power plants to total electricity production increased from 69% to 72% (2009).

From 2008 to 2009, emissions from energy industries decreased by 7.3%. Reasons for that are a decreased use of solid fuels for power generation (-32%), an increased output from hydro power plants and an in general curbed demand for electricity due to the weak economic situation.

The variation in demand for heating and hot water generation due to climatic circumstances and the shift in the fuel mix are the most important drivers for emissions from **other sectors**. Emissions in 2009 were 22% lower than in the base year, and 7.6% below the level of 2008. This reduction is mainly attributable to the commercial and institutional sector and is due to the declining consumption of heating oil and gas as a consequence of the economic crisis. Total fuel consumption of this sub sector decreased by 3.7% since 1990 and 5.3% compared to 2008.

2.2 Industrial Processes

The **overall trend** in greenhouse gas emissions from industrial processes shows decreasing emissions with a decrease of 5.0% from 1990 to 2009. Within this period emissions fluctuated showing a minimum in 1993. **Main drivers** for the trend in emissions from this sector were (i) the termination of primary aluminium production in 1993, (ii) the introduction of N_2O abatement techniques in the chemical industry in 2004 and again in 2009, (iii) increasing metal production resulting in 19% higher CO_2-emissions in 2009 compared to 1990 and (iv) a strong increase of HFC emissions in the period 1992 to 2009 from 32 to 1 056 Gg CO_2 equivalents.

From 2008 to 2009, emissions from this sector decreased by 19.4%, mainly due to the effects of the economic downturn on the industries, especially on the production of steel and cement.

In 2009, greenhouse gas emissions from industrial processes amounted to 9 606 Gg CO_2 equivalents, which corresponds to 12% of the total national emissions.

The most important **greenhouse gas** of this sector was carbon dioxide with 83% of emissions from this category, followed by HFCs with 11%, SF_6 with 3.6%, N_2O with 1.7%, PFCs with 0.4% and finally CH_4 with 0.2%.

The **most important sub-sectors** of the industrial processes sector are metal production and mineral products, which caused 46% and 31% of the emissions from this sector in 2009.

2.3 Solvent and Other Product Use

The **overall trend** in greenhouse gas emissions from solvent and other product use shows decreasing emissions, with a decrease of 42% from 1990 to 2009. The **main driver** is a decreasing use of solvents as a result of legal measures and decreasing N_2O use.

From 2008 to 2009 emissions decreased considerably by 19%.

In 2009, greenhouse gas emissions from solvent and other product use amounted to 299 Gg CO_2 equivalents, which corresponds to 0.4% of the total national emissions.

51% of these **greenhouse gas** emissions were indirect CO_2 emissions, 49% were contributed by N_2O emissions.

2.4 Agriculture

The **overall trend** in greenhouse gas emissions from agriculture shows decreasing emissions, with a decrease of 11% from 1990 to 2009. The **main drivers** for this trend are decreasing livestock numbers and lower amounts of N-fertilizers applied on agricultural soils. Fluctuations which can be seen in particular in the first half of the 1990s result from the variability of mineral fertilizer sales data related to volatility in prices.

From 2008 to 2009 emissions decreased by 0.2% mainly due to decreased mineral fertilizer sales. The lower emissions from agricultural soils were partly counter balanced by increasing emissions from enteric fermentation and manure management due to increased animal numbers of cattle and swine.

In 2009, emissions from agriculture amounted to 7 615 Gg CO_2 equivalent, which corresponds to 9.5% of the total national emissions.

In the Austrian **greenhouse gas** inventory the sector agriculture is the largest source for both N_2O and CH_4 emissions: In 2009 74% (13 Gg) of total N_2O emissions and 63% (171 Gg) of total CH_4 emissions in Austria originated from this sector. For N_2O this corresponds to 53% of the GHG emissions from agriculture and for methane to 47%.

The **most important sub-sectors** of agriculture are enteric fermentation, which contributed 43% of total greenhouse gas emissions from the agricultural sector, followed by agricultural soils with a contribution of 41%.

2.5 LULUCF

Land use, land-use change and forestry is a net sink in Austria. The **overall trend** in net removals from LULUCF is plus 34% over the observed period. The **main driver** for this trend is the increase of the carbon stock in forest land. Fluctuations are due to weather conditions which affect the growth rates on the one hand and wind throws on the other, as well as timber demand and prices.

In 2009, net removals from this category amounted to 17 524 Gg CO_2 equivalents, which corresponds to 22% of national total GHG emissions (without LULUCF) compared to 17% in the base year.[5]

The **most important sub-sector is** forest land with net removals of 19 235 Gg CO_2 in 2009. Small CO_2, CH_4 and N_2O emissions arise from the other sub-sectors, where total net emissions amounted to 1 711 Gg CO_2 equivalents in 2009.

The last available NFI for the estimates in the forest sector was the NFI 2000/02. For the years after 2000/02 the results for this period were extrapolated. In the meanwhile, the results of the NFI 2007/09 were published (but too late for the present submission). Due to the results of this recent NFI the net removals in the years after 2002 were clearly lower than these extrapolated values due to significantly higher harvest rates in the years after 2002. This will also lead to much lower overall net removals for the LULUCF sector. The data will be revised for the submission 2012.

[5] However, the LULUCF sector as described here is not included under the Kyoto Protocol, instead of that Article 3.3 KP activities are included: afforestation, reforestation and deforestation (Austria decided not to include activities under Article 3.4 of the KP).

2.6 Waste

The **overall trend** in greenhouse gas emissions from waste shows decreasing emissions, with a decrease of 46% from 1990 to 2009. The **main driver** for this trend is the implementation of waste management policies: Waste separation, reuse and recycling activities have increased from 1990 on and the amount of deposited waste has decreased especially since 2004 when pre-treatment of waste became obligatory. Furthermore, methane recovery has improved. The legal basis for the reduced deposition as well as the landfill gas recovery is the Landfill Ordinance. Since 2009 all of the waste generated has to be pre-treated before deposition.

From 2008 to 2009 GHG emissions decreased by 5.5% as a result of the implementation of the Landfill Ordinance described above as well as due to the declining emissions from waste being deposited in the past .

In 2009, greenhouse gas emissions from the waste sector amounted to 1 922 Gg CO_2 equivalents, which corresponds to 2.4% of the total national emissions.

The most important **greenhouse gas** of the waste sector is CH_4 with a share of 80% of the total GHG emissions from this sector in 2009, followed by N_2O with 19%, and CO_2 with 0.6%.

The **most important sub-sector** of the waste sector is solid waste disposal on land, which caused 76% of the emissions from this sector in 2009; the second largest source was waste water handling with 15%.

3 METHOD OF REPORTING AND DATA BASIS

The Austrian greenhouse gas inventory for the period 1990 to 2009 was compiled according to the recommendations for inventories as set out in the UNFCCC reporting guidelines according to Decision 18/CP.8, the Common Reporting Format (CRF), Decision 13/CP.9, the new CRF for the Land Use Change and Forestry Sector, the IPCC 1996 Guidelines for National Greenhouse Gas Inventories, which specify the reporting obligations according to Articles 4 and 12 of the UNFCCC as well as the IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories.

These regulations under the UNFCCC and the Kyoto Protocol define the standard for national emission inventories related to transparency, consistency, comparability, completeness and accuracy of inventories. Above this, each Party shall have in place a national system including all institutional, legal and procedural arrangements made within a Party for estimating anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, and for reporting and archiving inventory information.

To meet these requirements Austria has set up a national system – the National Inventory System Austria (NISA) – covering all aspects from establishing a legal basis for inventory preparation along with defining responsibilities, over availability of data, quality control and quality assurance to continuous improvement of the inventory (see Chapter 3.3).

In Austria, emissions of greenhouse gases are estimated together with emissions of air pollutants in a database based on the CORINAIR (CORe INventory AIR)/SNAP (Selected Nomenclature for sources of Air Pollution) system. This nomenclature is designed to estimate not only emissions of greenhouse gases but all kinds of air pollutants. To comply with the reporting obligations under the UNFCCC, emissions are transformed according to the IPCC Guidelines into the UNFCCC Common Reporting Format.

The Austrian greenhouse gas inventory is subject to continuous improvement, resulting in recalculations as outlined in Chapters 3.1 and 3.5. Issues identified in the inventory reviews by the UNFCCC are considered in the inventory improvement programme. The last in-depth review took place in September 2008.

Annex 1 to this report presents Austria's greenhouse gas inventory data (CO_2 emissions/CO_2 removals, CH_4, N_2O, HFC, PFC and SF_6) in the format of the CRF Summary Table 10 (Emission Trends).

The complete tables of the Common Reporting Format, including in particular Sectoral Reports, Sectoral Background Tables and the Reference Approach for CO_2 are submitted separately in digital form only.

Table 4: Status of the present report.

Reporting Obligation	Format	Inventory	Version
Mechanism for monitoring Community greenhouse gas emissions	Common Reporting Format (CRF)	OLI 2010	January 14th 2011

3.1 Relation with data reported earlier

As a result of the continuous improvement of Austria's GHG inventory, emissions of some sources have been recalculated on the basis of updated data or revised methodologies, thus emission data for 1990 to 2008 which are submitted this year differ slightly from data reported previously.

The following table presents the recalculation difference with respect to last year's submission for each gas (positive values indicate that this year's estimate is higher).

Table 5: Recalculation difference of Austria's greenhouse gas emissions compared to the previous submission.

	1990 (Base year)	2008
	Recalculation Difference [%]	
Total	**-0.0003%**	**0.36%**
CO_2	-0.0001%	0.41%
CH_4	-0.0175%	0.05%
N_2O	0.0210%	0.19%
HFC, PFC, SF_6	0.0000%	0.08%

Emissions without LULUCF

The national total emissions (excluding LULUCF) for the base year are fairly the same than those reported last year (-0.0003%). The value for 2008 estimated this year is 0.36% higher compared to last years' submission. However, the trend for 1990 to 2008 remains quite the same (+11%).

The slight higher emissions of the year 2008 are mainly attributable to recalculated CO_2 emissions in the energy sector, particularly in the sub-sectors energy industries (1A1) and other sectors (1A4). The updates of activity data and NCVs follow the updates of the IEA-compliant energy balance.

Revisions of CH_4 and N_2O are of minor importance, and mainly arise in the sectors *Energy* and *Waste*. A description of the recalculations is given by sector in Chapter 3.5.

Improvements made in response to the issues raised in the UNFCCC review process are summarized in Table 6.

Table 6: Improvements made in response to the UNFCCC review process.

Finding	Reference	Improvement made
General		
The ERT recommends to include all of the categories of the LULUCF sector in the uncertainty analysis.	ARR 2009 § 37 b	Austria will improve the estimations of uncertainties through the Monte Carlo simulations and will include the results in NIR 2011.
The ERT recommends to include a detailed description of category-specific QA/QC activities for all sectors.	ARR 2009 § 37 c	Sector-specific QA/QC discussions were included in NIR 2009 and 2010.
In order to show that neither omissions nor double-counting occur in Austria's reporting of the LULUCF sector a consistent and complete system of land representation for all land-use categories shall be developed.	ARR 2009 § 37 d	Austria has reported the area of „other land remaining other land" in the NIR 2010 and therewith provides a complete system of land representation for all land-use categories.

Finding	Reference	Improvement made
The structure of the Austrian NIR shall follow the annotated outline of the NIR, and the guidance contained therein (can be found on the UNFCCC website).	ARR 2009 § 37 e	The NIR 2010 already follows the structure of the annotated outline.
Energy		
Aviation – The Party has changed to a CORINAIR Tier 3a bottom up methodology: For the 2009 annual inventory submission the estimates of emissions from aviation for 2000 onwards were updated using detailed information from Statistik Austria. The ERT recommends that the Party provides explanations on how it has ensured consistency across the time-series when performing the recalculations.	ARR 2009 § 43	Austria has already made a QA/QC Check in NIR 2010 in order to give explanations on how the consistency of the time-series is ensured, but will further elaborate on this issue in next submission NIR 2011.
Waterborne navigation: Although there is some international navigation on the Danube River, it has all been reported under domestic navigation and no values for international navigation have been reported.	ARR 2009 § 44	Meanwhile, the method has been changed and international navigation is reported separately under memo item I B (from submission 2010 onwards).
The ERT recommends that Austria consistently provides data for naphtha in CRF table 1.A(d) as well as the relevant underlying information in the NIR.	ARR 2009 § 45	Austria has provided data for naphtha in NIR 2010.
1A2d: The ERT recommends that the Party provides explanations and supportive data on the composition of the waste, together with evolution in time, in the NIR for its next annual inventory submission.	ARR 2009 § 47	In NIR 2010 a table has been included showing fluctuations of CO_2 IEF more transparently.
Biofuels – AD on and emissions from the use of biodiesel in road transportation have not yet been reported under biomass separately from AD on and emissions from the use of fossil fuels; moreover, in order to improve the transparency of the CRF tables, the ERT recommends that the fossil fuels should be reported under diesel oil and gasoline, and the biogenic share of the fuels under biomass.	ARR 2009 § 52	Information on the substitution of CO_2 emissions through the use of biofuels is included in NIR 2010 Table 59. Also the CRF table now shows the fossil and biogenic share separately.
The ERT recommends that Austria provides in its NIR a graphical representation of the AD per type of fuel together with the heating degree days.	ARR 2009 § 49	A table has been included in NIR 2010 showing AD by type of fuel together with the correlating heating degree days.
IP & Fugitive		
For 2007, the CO_2 IEF for clinker production (0.534 t/t clinker) is higher than the IPCC default value and lower than the IEF for previous years. The ERT encourages Austria to give explanations on this and the larger inter-annual variations in the CO_2 IEFs	ARR 2009 §58	Explanation on this given in NIR 2010.

Finding	Reference	Improvement made
The ERT found data on aluminium production available from international databases (UNICS, United States Geological Survey) that are not consistent with the AD reported by the Party for the years 1990–1992. During the review, Austria explained to the ERT that the figures for aluminium production in 1990 from UNICS were not credible, because they by far exceed the Party's aluminium production capacity. The ERT encourages Austria to check the data reported in its inventory against international statistics and to report thereon in its next annual inventory submission.	ARR 2009 §60	Explanation on this given in NIR 2010.
The ERT encourages Austria to report on the trend in melamine production, for example as an index of the base year, for the sake of transparency.	ARR 2009 §60	Trends of melamine production as suggested by the ERT introduced in NIR 2010.
Austria indicated that a new survey on F-gases in Austria was being carried out, covering consumption in and emissions from all subcategories. The ERT recommends that Austria reports in its next NIR on the results of the survey or provides a justification for the fact that, in contrast to most other countries and the IPCC default EFs, emissions do not occur from GIS manufacture in Austria.	ARR 2009 §61	The chapter on F-gases has been re-written according to the results set out in the F-gases study, and further calculation for NIR 2011 were carried out according to the same model as set out in the study.
Fugitive emissions: natural gas – CH_4: Austria has not yet fulfilled its plan to implement a higher-tier methodology to estimate emissions from this key category. The ERT recommends that Austria implement a higher-tier methodology or at least provide an update on this issue in its next annual inventory submission.	ARR 2009 § 55	Austria has already implemented higher-tier methodologies for this category. This will be elaborated on in NIR 2011.
Agriculture		
The ERT noted that the QC activities performed by the Party included only routine control procedures, and that no source category-specific QC procedures have been designated to the key categories in the agriculture sector.	ARR 2009 § 63	A description of category-specific QC procedures is included in the NIR 2010.
Austria has reported in the NIR that a tier 2 approach together with Swiss EFs was used to estimate emissions from poultry. Since the parameters used were specific to Switzerland, this means that Austria simply used Swiss EFs as default values and a tier 1 method.	ARR 2009 § 64	Austria has already rectified the reporting of the method in NIR 2010.
The ERT recommends that the Party consider the most representative species of deer and use its weight to estimate emissions, in the next annual submission.	ARR 2009 § 65	Austria has elaborated on the chosen method in NIR 2010 (page 253)
The ERT encourages Austria to update the data on its AWMS distribution in its next annual inventory submissions.	ARR 2009 § 67	The inventory has been updated taking into account animal characteristics and the manner in which manure is managed. More information is included in NIR 2010.

Finding	Reference	Improvement made
During the CR 2010 the ERT asks whether it is possible to use the relative areas of individual crops within the total cereals area to provide a breakdown of the area burnt on a crop by crop basis.	Centralised Review 2010	Austria considered the recommendation in submission 2011
LULUCF		
The estimates for changes in forest and other woody biomass stocks still contain a high degree of uncertainty. The Party will improve the estimations of uncertainties through the Monte Carlo simulations.	Centralised Review 2004 (para 57 ARR)	A new uncertainty calculation is planned and will be included in NIR 2011.
5A Austria has reported litter carbon stock changes under the soil organic matter (SOM) pool. The ERT noted that this approach is not in accordance with the IPCC good practice guidance for LULUCF, and recommends that Austria report net changes of litter carbon stock under the dead organic matter (DOM) pool. Art.3.3 KP The ERT recommends that Austria either reports net changes in litter carbon stock under the DOM pool, in accordance with the IPCC good practice guidance for LULUCF, or, if the Party cannot separate litter from soil, provide the necessary justification and to include litter strata in the constant depth of soil (0 to 50 cm).	Centralised Review 2009	The litter pool will be no more reported as IE under the soil C pool, but reported separately under the DOM pool (UN-FCCC CRF) and under the Litter Pool (KP CRF), respectively
5A (Forest Wild Fires): Emissions show a decrease of 75.0% between 1990 (0.58 Gg) and 2008 (0.15 Gg). Some inter-annual changes have been identified as outliers (ranging from -91.4% to 700.0%). The trend fluctuates. The N_2O IEFs for 1990–2008 (constant value of 2.91 Mg/ha) have been identified as outliers, They are the highest of reporting Parties (0.000013–2.91 Mg/ha) except in 1990 when is the second highest.	Centralised Review 2010	A mistake in the estimates was identified as reason for this finding. This will be corrected in NIR 2011 submission.
In table NIR.1 Austria reports CH_4 and N_2O emissions under ARD for all sources as NO, including CO_2 emissions from liming and biomass burning. This is reported consistently in the CRF tables 5(KP-II) 1 to 5.	Centralised Review 2010	N_2O emission due to D from forest land to cropland (KP) and due to LUC from forest land to cropland (UN-FCCC) will be reported in the next submissions (from NIR 2011 on). The NOs for emissions from liming and biomass burning will remain unchanged.
Waste		
Background data/related information: Austria reports a value for DOC degraded greater than 100% in CRF table 6.A throughout the time series. It is recommended that the party corrects this information in next submission.	ARR 2009 § 81	The DOC degraded was re-calculated for submission 2010.
Austria has stated that it plans to update the fraction of DOC dissimilated (DOCF) for sludge to 0.55 for its next inventory submission, and it is encouraged to do so.	ARR 2009 § 81	The DOC F has been updated and described in NIR 2010.

Finding	Reference	Improvement made
For Residual Waste the same DOC as 2004 was applied for 2005 and onward as no new information on the waste composition became available.	Centralised Review 2010	The DOC for Residual Waste will be updated in NIR submission 2011 based on new information on waste composition of an Austrian Province which can be regarded as representative for the whole country.
Transparency issues: The ERT asked for clarifications or further details above all on L0 (methane generation potential) and potential CH_4 from sludge/wastewater treatment.	Centralised Review 2010	It will be elaborated on these issues in NIR submission 2011.

3.2 Information on Completeness

Geographical coverage is complete. There is no part of the Austrian territory that has not been covered by the inventory.

Emissions from most sources specified in the CRF have been estimated. For information on sources not estimated („NE") and emissions included with sources other than those stipulated in the CRF („IE") please refer to Table 9 Completeness of the CRF.

3.3 National Inventory System Austria (NISA)

This section provides a short description of the most important aspects of NISA; a detailed description including all required information as set down in Decision 15/CMP.1, part II ("Reporting of supplementary information under Article 7, paragraph 2", D. National systems in accordance with Article 5, paragraph 1) can be found in the Austrian Initial Report[6], in Austria's NIR 2010[7] and in the NISA Implementation Report[8].

Legal Arrangements

Austria has a centralized inventory system, with all the work related to inventory preparation being carried out at a single national entity. The most important legal arrangement is the Austrian Environmental Control Act (Umweltkontrollgesetz[9]), which defines the main responsibility for inventory preparation and identifies the Umweltbundesamt as the single national entity with the overall responsibility for inventory preparation. Within the Umweltbundesamt the "Inspection Body for Emission Inventories" is responsible for the compilation of the greenhouse gas inventory.

[6] BMLFUW (2006): Austria's Initial Report under Article 7, paragraph 4, of the Kyoto Protocol, Federal Ministry of Agriculture and Forestry, Environment and Water Management, Vienna

[7] UMWELTBUNDESAMT (2010): Austria's National Inventory Report 2010, Submission under the United Nations Framework Convention on Climate Change and under the Kyoto Protocol, REP-0265; Umweltbundesamt, Vienna

[8] UMWELTBUNDESAMT (2005): NISA National Inventory System Austria, Implementation Report, REP-0004; Umweltbundesamt, Vienna. http://www.umweltbundesamt.at/umweltkontrolle/

[9] „Umweltkontrollgesetz"; Federal Law Gazette 152/1998

To ensure the availability of data necessary for the annual compilation of the GHG inventory further legal and institutional arrangements have been made, which are described in more detail in Austria's NIR and in full detail in the NISA Implementation Report.

QMS

A Quality Management System (QMS) has been designed and implemented to fulfil all requirements of *good practice*. Since 2005, the unit in the Umweltbundesamt responsible for inventory preparation is accredited according to the Standard ISO/ICE 17020 *General Criteria for the operation of various types of bodies performing inspections* as "Inspection Body for Emission Inventories". This standard takes into account standards regarding a QMS as set out in the EN/ISO 9000 series and goes beyond: it also provides a clear statement of requirements regarding competence and independence; impartiality, integrity and confidentiality.

On the 13th and 14th January 2011 a comprehensive external audit by the accreditation body took place at the Umweltbundesamt. This 'Re-Accreditation' is obligatory every 5 years and aims at examining the "Inspection Body for Emission Inventories" respectively its QM-System in detail. The result of this audit and measures to be implemented will be described in the National Inventory Report 2011.

Sector Experts

Within the inventory system specific responsibilities for the different emission source/sink categories ("sector experts") are defined. Sector experts collect activity data, emission factors and all relevant information needed for finally estimating emissions. The sector experts are also responsible for the choice of methods, data processing and archiving and for contracting studies, if needed. As part of the quality management system, the head of the "Inspection body for GHG inventory" approves the methodological choices. Finally, sector experts perform Quality Assurance and Quality Control (QA/QC) activities.

The main data sources used, as well as information on who did the actual calculations, are presented in the Chapter 3.4.

Data Management

The Austrian Inventory is based on the SNAP nomenclature and has to be transformed into the UNFCCC Common Reporting Format to comply with the reporting obligations under the UNFCCC. In addition to the actual emission data, the background tables of the CRF are filled in by the sector experts, and finally QA/QC procedures as defined in the inventory planning process are carried out before the data are submitted to the European Commission and to the UNFCCC.

As part of the QMS's documentation and archiving procedures a reliable data management system has been established to fulfil the data collecting and reporting requirements. This ensures the necessary documentation and archiving for future reconstruction of the inventory and consequently enables easy access to up-to-date and previously submitted data for the quantitative evaluation of recalculations.

Corrective and Preventive Actions

As part of the QMS an efficient process is established to grant transparency when collecting and analyzing findings by UNFCCC review experts or any other issues concerning the quality of activity data, emission factors, methods and other relevant technical elements of inventories. Any

findings and discrepancies are documented; responsibilities, resources and a time schedule are attributed to each of these in the improvement plan. Measures, which include possible recalculations, are taken by the sector experts.

Changes since the last submission

There were no changes in the NISA since the last submission.

3.4 Sources of data

The national energy balance is the most important data basis for the Austrian Air Emissions Inventory. The Austrian statistical office (Statistik Austria) is required by contract with the Federal Ministry of Agriculture, Forestry, Environment and Water Management and with the Federal Ministry of Economics and Labour to annually prepare the national energy balance. The compilation of several other relevant statistics is regulated by law; other data sources include reporting obligations under national and European regulations and reports of companies and associations.

The following table presents the main data sources used for activity data as well as information on who did the actual calculations (for unpublished studies a detailed description of the methodologies is given in the NIR):

Table 7: Main data sources for activity data and emission values.

Sector	Data Sources for Activity Data	Emission Calculation
Energy	Energy Balance from Statistik Austria; EU-ETS; Steam boiler database;	Umweltbundesamt, plant operators
Transport	Energy Balance from Statistik Austria	Umweltbundesamt (Aviation), Technical University Graz (Road and Off-road transport)
Industry	National production statistics, import/export statistics; EU-ETS; direct information from industry or associations of industry	Umweltbundesamt, plant operators F-gases based on a study by: Öko-Recherche GmbH, Frankfurt (2010)
Solvent	Short term statistics for trade and services Austrian foreign trade statistics Structural business statistics Surveys at companies and associations	Umweltbundesamt, based on studies by: Institut für industrielle Ökologie and Forschungsinstitut für Energie und Umweltplanung, Wirtschaft und Marktanalysen GmbH[10]
Agriculture	National Studies, national agricultural statistics obtained from Statistik Austria	Umweltbundesamt, based on studies by: University of Natural Resources and Applied Life Sciences, Research Center Seibersdorf
LULUCF	National forest inventory obtained from the Austrian Federal Office and Research Centre for Forests	Umweltbundesamt
Waste	Database on landfills (1998–2007), Electronic Data Management (from 2008 on)	Umweltbundesamt

[10] Research Institute for Energy and Environmental Planning, Economy and Market Analysis Ltd./Institute for Industrial Ecology

The main sources for emission factors are:

- national studies for country specific emission factors
- plant-specific data reported by plant operators
- IPCC GPG
- Revised IPCC 1996 Guidelines
- EMEP/CORINAIR Guidebook
- EMEP/EEA air pollutant emission inventory guidebook (formerly referred to as the EMEP CORINAIR emission inventory Guidebook).

A complete list of data sources for activity and emission data or emission factors used by sector for the submission 2011 can be found in the National Inventory Report 2011 to be published in spring 2011.

Table *Summary 3* of the CRF (Summary Report for Methods and Emission Factors Used) presents the methods applied and the origin of emission factors used in the present Austrian GHG inventory.[11]

3.5 Recalculations

This chapter describes the changes made to the inventory since the last submission to the UNFCCC (April 2010). Further background information and a complete description of the recalculation of the inventory for the period 1990–2008 will be given in Austria's National Inventory Report 2011, which will be published in spring 2011.

3.5.1 Energy (Sector 1)

Combustion Activities (1 A)

Stationary sources

Update of activity data

Updates of activity data and NCVs follow the updates of the IEA-compliant energy balance compiled by the federal statistics authority Statistik Austria.

Energy balance update and corrections

Revisions affect the years from 1999 onwards. In general gross inland consumption of fossil fuels has not been revised significantly except for natural gas. Revisions of the transformation sector affect consumption of manufacturing industry and 'other sectors'.

[11] The description of methodologies and data sources used for the Community's key sources can be found in a separate file (AT_AnnexI_ KS2011.xls), which is submitted together with this report. This file follows in structure and content the latest version provided by the Commission to the member states on November 15, 2010.

Natural gas: Gross inland consumption has been revised since 2006 to be consistent with the figures from the national natural gas market regulator (E-Control). This implies revised time series of *1.A.4.a commercial/institutional* with a maximum of +11.8 PJ in 2007. From 2000 on consumption of the transformation sector has been revised with a maximum of -2.8 PJ in 2006.

Residual fuel oil: From the year 2000 on (max 2.3 PJ in 2006) fuel oil has been shifted from the transformation sector to final consumption.

Gasoil: Revision of final consumer stock change from 2000 to 2002 (up to ±2.6 PJ) to better reflect yearly final consumption instead of fuel sales. This change affects categories *1.A.2 Manufacturing Industries* and *1.A.4 Other Sectors*. The 'net change' for the 3 revised years is 0 PJ. Revised imports and stock change in 2006 (4.3 PJ) but no change in gross inland consumption.

Other solid biomass (such as wood waste, wood chips, pellets): Revision of gross inland consumption from the year 2000 on (2008: +5.5 PJ). This change mainly affects category *1.A.2 Manufacturing Industries*.

Fuel wood: Revision of gross inland consumption from 2001 to 2008 (-2.3 PJ). This mainly affects category *1.A.4.b Residential*.

Biogas: Revision of gross inland consumption from 2005 to 2008 (-3.8 PJ). This mainly affects category *1.A.1.a Public electricity and heat*.

Municipal waste: Revision of gross inland consumption from 2005 to 2008 (+2.5 PJ).

Industrial waste: Revision of gross inland consumption from 2004 to 2008 (+2.3 PJ). Shifts from *1.A.4.a commercial/institutional* to *1.A.2.c chemicals*.

Hard coal: from 2007 on hard coal is considered as non energy use in the iron and steel sector (blast furnace). This does not affect total emissions from integrated steel plants as the verified emissions from ETS is used.

Changes in response to the UNFCCC reviews

Reference Approach: Use of country specific instead of default calorific values for all types of fuels except naphta and brown coal briquettes. The carbon content for natural gas has been changed from default to country specific.

Mobile sources

Improvements of methodologies and emission factors

1.A.3.b Road Transport

In 2009, the following methodical changes have been implemented in the transport emission calculation models GLOBEMI and GEORG which result in revised emission data for the whole time series:

- Revised road freight performance data has been implemented in the GLOBEMI calculation model for the years 2007, 2008 and 2009. These data has been generated from automatic vehicle counting checkpoints on highways. Thus, statements about real-world road freight performance in Austria over the past three years are possible instead of estimations based on out-dated traffic performance projections.

- The revised road freight performance data leads to a heavily decreased fuel consumption of inland road freight transport amounting to -5% (caused by the weak economic situation). As the revised national energy balance shows a nearly identical overall fuel consumption for 2008 compared with the value in the national emission inventory 2009, the decrease in inland fuel consumption has been counterbalanced by an increase in fuel export on road. As the economic downturn has the same slowing effect on road freight transport from abroad, the decrease in inland fuel consumption has especially been counterbalanced by an increase in fuel export from cars.
- Adaption of out-dated age pattern and failure rates of the Austrian vehicle fleet according to actual fleet structure data from national statistics. This leads to an adjustment of the Austrian inland fleet towards newer vehicles with a less specific overall fuel consumption.
- Adaptation of the specific CO_2 emission factors of passenger cars according to the national CO_2 monitoring data for the Austrian fleet.
- The "fuel export" fleet composition which is necessary to calculate the proportional driving and transport performance and the corresponding emissions has been updated towards the characteristics of the Austrian long-distance inland fleet.

1.A.3.c Railways

Revised data on rail transport from the Federal Ministry for Transport, Innovation and Technology has been implemented in the GEORG calculation model which leads to a reduction in diesel consumption (mainly used for rail shunting).

1.A.2.f Manufacturing Industries and Construction – Other – mobile sources

Activity data of mobile machinery (especially in industry) has been updated for the whole time series and adjusted downwards for the year 2008 according to the revised national energy balance.

Update of activity data

1.A.3.b Road Transport

A methodical update of the quantity structure of road transport resulted in a reduction of fuel consumption of inland road transport. This reduction can be explained by the ex post consideration of real-world road performance data for 2007, 2008 and 2009, which especially shows the downturn of road freight transport caused by the economic slowdown.

As the revised national energy balance shows a nearly identical overall fuel consumption for 2008 compared with the value in the national emission inventory 2009, the shifting of reduced inland fuel consumption to the amount of fuel export has no effect on overall GHG emissions. What can be seen clearly is the shift of reduced inland GHG emissions (320 kt) towards the share of fuel export.

1.A.3.c Railways

Activity data was revised according to an updated study by the Federal Ministry for Transport, Innovation and Technology about rail performance in Austria. The integration of revised data leads to reduced GHG emissions for the rail sector in 2008 (-11 kt).

1.A.2.f Manufacturing Industries and Construction – Other – mobile sources

The fuel consumption of mobile machinery (especially in industry) has been adjusted downwards for the year 2008 according to the revised national energy balance, which leads to reduced GHG emissions (-8 kt).

3.5.2 Fugitive Emissions (1 B)

Update of activity data

1.B.2.a.2 Production: The activity data for the year 2008 was updated.

Improvements of methodologies and emission factors

1.B.2.b.3 Transmission:

A minor transcription error in the calculation of the country-specific CH_4 emission factor was corrected.

1.B.2.b.4 Distribution:

Minor transcription errors in the calculation of the material-specific CH_4 emission factors were corrected. This correction also influences the estimate of NMVOC emissions as NMVOC emissions are assumed to be 1.2 % of the CH_4 emissions.

3.5.3 Industrial Processes (Sector 2)

Update of activity data

2.C.1 Pig Iron and Electric Furnace Activity

Activity data for 2008 was updated as revised data of the energy balance became available in 2010. This leads to a minor change in emissions.

2.C.2 Ferroalloys

Activity data for 2008 has been updated, as data on World Mineral Production 2008 (published by British Geological Survey) was published in the mean time.

3.5.4 Solvent and other Product Use (Sector 3)

Update of activity data

3.A, 3.B, 3.C and 3.D.5.

The short term statistics for trade and services and the Austrian foreign trade statistics were updated from 2007 onwards.

The activity data from 2002 onwards concerning non-solvent use and the solvent content of products has been updated by surveys at companies and associations.

Introduction of new commodities chart for biogenic based solvents like bio-ethanol in the short-term and foreign trade statistics.

3.5.5 Agriculture (Sector 4)

Improvements of methodologies and emission factors

4.F.1 Field Burning of Agricultural Residues – Cereals

Following a recommendation of the ERT during the Centralized Review 2010, emissions are now calculated on the basis of relevant crops (wheat, barley, rye, oats).

3.5.6 LULUCF (Sector 5)

Revision of the data series for LULUCF are due to the following changes

General

The Litter pool is generally reported under DOM pool and no more as IE together with the SOM pool.

5.A Forestland

New Austrian specific data for wood densities out of the related Austrian standard are used and the whole time series was revised using these new wood densities.

A mistake in the estimates for forest fires was corrected, and the time series of the emissions from forest fires was revised.

5.B Cropland

The method for estimating LUCs between annual and perennial cropland and between cropland and grassland was completely revised. The previous method led to a significant overestimate of the areas of LUCs between cropland and grassland due to a method-inherent several-times-accounting of LUC-lands within a transition period of 20 years (in the order of 1/3 to ¼ of the total cropland and grassland area, respectively). The new method leads to more accurate and realistic estimates of such areas of LUCs. As a consequence, the area of CL remaining CL also changes and all emissions/removals figures of the sector differ compared to those of previous submissions.

The management factors for cropland remaining cropland were (partly) revised on the basis of the results of Austrian long time experiments (in previous submissions IPCC GPG default values were used). The time series for cropland remaining cropland was revised on basis of these new management factors.

There was a slight methodological mistake when estimating the root biomass of annual crops which was corrected. This led to a new figure for the biomass in annual cropland that was used for the estimates of LUCs to and from annual cropland.

Changes in biomass C stock at LUC areas to perennial cropland were reported only for the year of LUC in these LUC subcategories (annual cropland to perennial cropland, grassland to perennial cropland) and then in the category “perennial cropland remaining perennial cropland”. This was a difference to the related LUC area and soil C stock changes which was reported in these LUC categories for a transition period of 20 years. For consistency and transparency reasons also the biomass C stock changes at these LUC areas to perennial cropland are reported now in these LUC categories for a transition period of 20 years.

N_2O emissions due to LUC from forest land to cropland was estimated for the first time.

5.C Grassland

The method for estimating LUCs between cropland and grassland was completely revised. The previous method led to a significant overestimate of the areas of LUCs between cropland and grassland due to a method-inherent several-times-accounting of LUC-lands within a transition period of 20 years (in the order of 1/3 to ¼ of the total cropland and grassland area, respectively). The new method leads to more accurate and realistic estimates of such areas of LUCs. As a consequence, the area of GL remaining GL also changes and all emissions/removals figures of the sector differ compared to those of previous submissions.

The emissions from organic soils were revised on basis of the use of the correct IPCC GPG default EF. In previous submissions, the EF for warm temperate regions was used while Austria belongs to the cold temperate region.

5.D Wetlands

Due to the revision of the LUC areas between CL and GL also the LUCs from these categories to wetland had to be revised to secure consistency in the land use statistic. As a consequence the emissions/removals of this category differ compared to those of previous submissions.

5.E Settlements

Due to the revision of the LUC areas between CL and GL also the LUCs from these categories to settlement had to be revised to secure consistency in the land use statistic. As a consequence the emissions/removals of this category differ compared to those of previous submissions.

5.F Other land

LUCs from grassland to other land were estimated for the first time.

LULUCF KP estimates

N_2O emissions due to deforestation from forest land to cropland were estimated for the first time.

3.5.7 Waste (Sector 6)

Improvements of methodologies and emission factors

6.A.1 Managed waste disposal on land

3 recalculations have been implemented in this years' submission:

1. So far (until submission 2010), more than 5 half lives[12] have been considered in the emissions calculation for some deposited waste fractions (residual waste: > 8; sludges: > 8; green waste: ~ 6; fats: ~ 15). To be in line with the IPCC GPG this was adjusted for in the submission 2011, whereupon now at least 41 years are considered (relevant for waste fractions showing half lives below 8 years) to be in accordance with the base year calculation[13]. This recalculation has led to slightly revised emission estimates for 1991 and onwards.

[12] Pursuant to the IPCC GPG (5.7) it is usually necessary to include data for 3 to 5 half lives in order to achieve an acceptably accurate result.

[13] In the calculation for 1990 waste deposited since 1950 has been considered generally, for every inventory year.

2. The value of CH_4 recovered was amended taking into account the (since 2002) falling methane concentration in landfill gas recovered. Compared to submission 2010 now less CH_4 is recovered and consequently more emitted into the environment.

3. The DOC of residual waste was adjusted slightly for the year 2008 as new information on waste composition became available.

6.B Waste Water Handling

The FAO has published new data on daily protein intake in Austria. This was taken into account in the inventory leading to revised N_2O emission values for several years between 1990 and 2004. Furthermore, an update of the connection rate became available for 2008, changing the N_2O and CH_4 emissions of 2008 and 2007 (due to interpolation).

3.6 Quality Assurance and Quality Control (QA/QC)

A quality management system (QMS) has been designed to achieve to the objectives of *good practice guidance*, namely to improve transparency, consistency, comparability, completeness and confidence in national inventories of emissions estimates. The QMS is based on the International Standard ISO/IEC 17020 *General Criteria for the operation of various types of bodies performing inspections*. The QMS ensures that all requirements of a type A inspection body as stipulated in ISO/IEC 17020 are met, which include strict independence, impartiality and integrity. Since December 2005 the Umweltbundesamt has been accredited as inspection body (Id.No.241) in accordance with the Austrian Accreditation Law.

The implementation of QA/QC procedures as required by the IPCC-GPG support the development of national greenhouse gas inventories that can be readily assessed in terms of quality and completeness. The QMS as implemented in the Austrian inventory includes all elements of the QA/QC system outlined in IPCC-GPG Chapter 8 ”Quality Assurance and Quality Control”, and goes beyond. It also comprises supporting and management processes in addition to the QA/QC procedures in inventory compilation and thus ensures agreed standards not only within (i) the inventory compilation process and (ii) supporting processes (e.g. archiving), but also for (iii) management processes (e.g. annual management reviews, internal audits, regular training of personnel, error prevention).

The Austrian Quality Management System is described in detail in Austria's NIR 2010[7)].

Changes to the QMS since the last submission

In 2010 the following QA/QC activities and improvements have been made:

- In response to an external audit by the accreditation body (2009), excel files used for emissions calculations have to be validated before use additionally to the validation of the results. This has fairly been implemented in 2010.
- In 2010 new experts joined the “Inspection Body for Emission Inventories”. They have been integrated successfully enabling a smoothly maintenance of inventory work.
- In case of a resubmission of the Austrian Inventory – as required 2010 in response to the UNFCCC Review 2010 (‘Saturday Paper’) – an additional QAQC check has been introduced resp. formalized in the QMS. It provides for an accurate checking of data and calculation, following the four-eye principle.

- In response to an external system audit of the QMS, the responsibilities of the CEO (Chief Executive Officer) and the Head of the Inspection Body has been reorganized.

On the 13th and 14th January 2011 a comprehensive external audit by the accreditation body took place at the Umweltbundesamt. This 'Re-Accreditation' is obligatory every 5 years and aims at examining the "Inspection Body for Emission Inventories" respectively its QM-System in detail. The result of this audit and measures to be implemented will be described in the National Inventory Report 2011.

3.7 Uncertainty Assessment

After a first uncertainty analysis in 2000[14] and sector-specific uncertainty updates by expert judgements in the following years, a second comprehensive uncertainty analysis was performed by WINIWARTER the greenhouse gases CO_2, CH_4, N_2O, HFC, PFC and SF_6 for 1990 and 2005. Information on the more general results of this uncertainty analysis can be found in Austria's NIR 2008[15]. Table 8 shows the key results of the latest uncertainty evaluation of the Austrian GHG Inventory implemented at last for the submission of the National Inventory Report 2009[16] using the method developed in WINIWARTER (2008)[17] based on the Tier 2 approach (Monte-Carlo Analysis).

Table 8: Key results of the Austrian GHG inventory uncertainty analysis 2009.

	Random uncertainty	**CO_2**	**CH_4**	**N_2O**	**PFC***	**HFC**	**SF_6***	**Total GHG emissions**
1990	Mean value [Tg]	62.09	9.16	6.22	1.05	0.02	0.53	79.07
	Standard deviation	0.41	0.72	2.64	0.26	0.01	0.04	2.78
	2σ	**1.3%**	**15.8%**	**84.9%**	**49.8%**	**53.8%**	**16.1%**	**7.0%**
2007	Mean value [Tg]	74.18	6.94	5.42	0.00	0.85	0.60	88.00
	Standard deviation	0.63	0.53	2.34	0.00	0.23	0.09	2.48
	2σ	**1.7%**	**15.2%**	**86.2%**	**54.3%**	**54.3%**	**29.4%**	**5.6%**

**Due to the definition of key category FC emissions from 2.F.7, PFC emissions are partly considered in SF_6 emissions.*

Uncertainty calculation and reporting according to IPCC GPG (2000) Table 6.1 for key categories is presented in Annex II.

[14] WINIWARTER, W. & RYPDAL, K. (2001): Assessing the Uncertainty Associated with National Greenhouse Gas Emission Inventories: A Case Study for Austria, Atmospheric Environment 35 (2001) 5425–5440.

[15] UMWELTBUNDESAMT (2008): Anderl, M.; Freudenschuß, A.; Kampel, E.; Köther, T.; Muik, B; Poupa S.; S.; Schodl, B.; Schwaiger, E., Weiss, P.; Wieser, M. & Zethner, G.: Austria's National Inventory Report 2008. Reports, Bd. REP-152. Umweltbundesamt, Wien.

[16] As the uncertainties of the national total emissions estimated by Tier 2 analysis did not vary significantly over the last years, Austria decided to perform the Monte Carlo analysis every two years instead of every year. The next Tier 2 analysis will be provided in National Inventory Report 2011.

[17] WINIWARTER, W. (2008): Quantifying Uncertainties of the Austrian Greenhouse Gas Inventory, ARC-sys-0154.

3.8 Comparison of the Sectoral Approach with the Reference Approach

In this chapter, CO_2 emissions from the sectoral and reference approach are compared and explanations for the differences are provided.

Table 9 shows CO_2 emissions calculated from the two approaches.

Table 9: CO_2 emissions by type of fuel.

Year	Reference Approach				Sectoral Approach *1 A Fuel Combustion*				
	Liquid [Gg CO_2]	Solid [Gg CO_2]	Gaseous [Gg CO_2]	**Total [Gg CO_2]**	Liquid [Gg CO_2]	Solid [Gg CO_2]	Gaseous [Gg CO_2]	Other [Gg CO_2]	**Total [Gg CO_2]**
1990	28 110	17 039	12 146	**57 295**	28 119	13 924	11 301	732	**54 076**
1991	30 584	17 789	12 841	**61 215**	30 595	14 518	11 940	805	**57 858**
1992	29 636	13 908	12 610	**56 153**	29 329	10 666	12 000	956	**52 951**
1993	30 475	12 542	13 298	**56 316**	30 738	9 495	12 453	675	**53 360**
1994	29 915	12 723	13 679	**56 317**	30 107	9 379	13 111	820	**53 417**
1995	30 454	14 414	14 935	**59 804**	30 316	10 741	14 339	839	**56 235**
1996	32 857	14 491	15 897	**63 244**	32 930	10 760	15 287	1 073	**60 051**
1997	32 396	15 304	15 321	**63 021**	32 131	11 318	14 720	1 017	**59 186**
1998	34 556	13 559	15 729	**63 844**	34 255	8 905	15 144	818	**59 123**
1999	32 539	13 513	16 004	**62 056**	32 406	9 192	15 412	828	**57 838**
2000	31 849	15 072	15 273	**62 194**	31 890	10 423	14 686	842	**57 841**
2001	34 066	15 513	16 186	**65 765**	34 139	11 180	15 632	958	**61 910**
2002	34 721	15 829	16 370	**66 920**	35 184	11 085	15 792	1 163	**63 225**
2003	37 212	16 864	17 699	**71 775**	38 068	12 566	17 070	1 389	**69 093**
2004	37 927	16 542	17 488	**71 957**	38 432	12 254	16 915	1 505	**69 107**
2005	38 600	16 664	19 162	**74 426**	38 795	11 904	18 506	1 374	**70 579**
2006	37 409	16 868	17 949	**72 226**	37 024	11 693	17 268	1 486	**67 471**
2007	36 545	15 973	16 927	**69 445**	35 700	10 902	16 319	1 428	**64 349**
2008	35 313	14 758	17 887	**67 959**	34 641	10 200	17 209	1 490	**63 540**
2009	33 786	11 388	17 515	**62 690**	32 919	7 955	16 814	1 524	**59 213**

Table 10 shows the difference (in percent) between reference and sectoral approach CO_2 emissions.

Table 10: Difference (in%) of CO_2 emissions by type of fuel.

Year	Liquid	Solid	Gaseous	Total
1990	-0.03%	22.37%	7.48%	5.95%
1991	-0.04%	22.53%	7.55%	5.80%
1992	1.05%	30.39%	5.08%	6.05%
1993	-0.85%	32.10%	6.79%	5.54%
1994	-0.64%	35.65%	4.33%	5.43%
1995	0.46%	34.20%	4.15%	6.35%
1996	-0.22%	34.68%	3.99%	5.32%
1997	0.82%	35.22%	4.08%	6.48%
1998	0.88%	52.27%	3.86%	7.98%
1999	0.41%	47.01%	3.84%	7.29%

Year	Liquid	Solid	Gaseous	Total
2000	-0.13%	44.60%	3.99%	7.53%
2001	-0.22%	38.76%	3.54%	6.23%
2002	-1.32%	42.80%	3.66%	5.84%
2003	-2.25%	34.20%	3.69%	3.88%
2004	-1.31%	34.99%	3.39%	4.12%
2005	-0.50%	39.99%	3.54%	5.45%
2006	1.04%	44.25%	3.94%	7.05%
2007	2.37%	46.52%	3.72%	7.92%
2008	1.94%	44.69%	3.94%	6.95%
2009	2.63%	43.15%	4.17%	5.87%

Positive numbers indicate that CO_2 emissions from the reference approach are higher than emissions from the sectoral approach.

3.8.1 Explanation of differences

Liquid Fuels: The energy balance is mass-balanced but not carbon balanced. The fuel category *Other Oil* is an aggregation of several fuel types and therefore it is difficult to quantify a reliable carbon emission factor for the reference approach. The reference approach takes a share of feedstock used for plastics and solvent production as non-carbon stored. In the sectoral approach emissions from waste incineration including plastics and waste oil are included in *Other Fuels*. Emissions from solvent use are included in category *3. Solvent and Other Products Use*. In the sectoral approach a share of municipal solid waste without energy recovery is considered in category *6.C.* for 1990 and 1991.

Diesel and Gasoline: In the Reference Approach CO_2 emissions from diesel and gasoline are fully accounted for as fossil emissions while in the sectoral approach the share of mixed biofuel is accounted for as biogenic.

Solid fuels: The reference approach includes process emissions from blast furnaces and steel production which are included in category *2.C. Metal Production* as well as process emissions from carbide production which are included in category *2.B.4. Carbide Production*. In the sectoral approach plant-specific CO_2 emission factors have been used for large coal boilers since 2005.

Gaseous fuels: Process emissions from ammonia production are included in category *2.B.1. Ammonia Production*.

Other fuels: The sectoral approach considers waste as an additional fuel type (e.g. municipal solid waste, hazardous waste and industrial fuel waste).

Carbon Stored: The reference approach uses IPCC default values for "fractions of carbon stored".

3.8.2 Quantification of differences

By quantifying the difference between the two approaches the remaining difference is between -0.5 to +2.8%. Currently it is not possible to quantify all fossil carbon flows such as solvents and plastic products which are imported or exported by products, bulk or waste.

Table 11 shows the differences that can be easily quantified. Positive numbers indicate CO_2 emissions not included in the sectoral approach. Negative numbers indicate CO_2 emissions which are not considered by the reference approach. The remaining differences are mainly due to the use of country-specific emission factors and NCVs within the sectoral approach and the use of "default fractions of carbon stored" within the reference approach.

Table 11: Quantification of differences.

Year	Natural Gas[1] [Gg CO_2]	2 B 1 Ammonia Production[3] [Gg CO_2]	Coke Oven Coke[4] [Gg CO_2]	Other Fuels [Gg CO_2]	Biofuels[5] [Gg CO_2]	Total [Gg CO_2]	Remaining difference[2]
1990	19	517	2 704	-732	0	2 817	0.7%
1991	17	546	2 722	-805	0	2 818	0.9%
1992	15	553	2 458	-956	0	2 111	2.0%
1993	14	539	2 526	-675	0	2 697	0.5%
1994	11	507	2 767	-820	0	2 515	0.7%
1995	13	537	3 136	-839	0	2 893	1.1%
1996	12	539	2 918	-1 073	0	2 454	1.2%
1997	10	532	3 316	-1 017	0	2 900	1.5%
1998	0	525	3 214	-818	0	2 980	2.8%
1999	2	530	3 102	-828	0	2 866	2.2%
2000	5	518	3 489	-842	0	3 234	1.8%
2001	3	472	3 449	-958	0	3 044	1.2%
2002	5	486	3 879	-1 163	0	3 293	0.6%
2003	5	526	3 721	-1 389	0	2 961	-0.4%
2004	4	468	3 650	-1 505	0	2 716	0.2%
2005	5	503	4 128	-1 374	125	3 482	0.5%
2006	5	542	4 206	-1 486	879	4 242	0.7%
2007	5	473	4 214	-1 428	1 010	4 360	1.1%
2008	5	533	4 184	-1 490	993	4 314	0.2%
2009	5	487	3 241	-1 524	1 472	3 766	-0.5%

(1) *Distribution losses which are not considered in the sectoral approach.*

(2) *Negative numbers indicate that CO_2 emissions from the reference approach are lower than emissions from the sectoral approach.*

(3) *Process emissions of natural gas used for ammonia production.*

(4) *Process emissions of coke oven coke used in blast furnaces. Emissions are allocated to 2.C.1. Iron and Steel Production.*

(5) *Share of biofuel in diesel and gasoline.*

4 ADDITIONAL REPORTING UNDER ARTICLE 3 OF DECISION 280/2004/EC

4.1 Article 3 (1) d

Austria decided not to make use of additional activities under Article 3(4) Kyoto Protocol, but reports the mandatory Article 3(3) activities. This includes emissions/removals from direct human-induced land-use change and forestry activities, limited to afforestation, reforestation and deforestation (since 1990).

Article 3.3 activities are a net sink in Austria: net CO_2 removals amounted to 1 385 Gg CO_2 equivalents in 2009 (Afforestation and Reforestation: -2 648 Gg CO_2 equivalents; Deforestation: 1 264 Gg CO_2 equivalents).

4.2 Article 3 (1) g

AAUs, RMUs, ERUs or CERs issued or transferred to the Austrian registry in the reporting period, the year 2009, can be found in the separate file AT_Report_Art31g_2011.xls which is submitted together with this report.

4.3 Article 3 (1) h

Austria has authorised Kommunalkredit Public Consulting GmbH (Türkenstraße 9, 1092 Vienna) to participate in the mechanisms according to Article 6, 12 and 17 of the Kyoto Protocol.

4.4 Article 3 (1) j

Indicators pursuant to Article 3 (1) j of the Monitoring Decision are reported in Annex III. Emission data are consistent with the CRF; denominators are taken from official Austrian statistics.

4.5 Article 3 (1) k

The national inventory system is unchanged compared to the description given in chapter 3.3 and in the Austrian Initial Report under the Kyoto Protocol[18].

[18] http://unfccc.int/files/national_reports/initial_reports_under_the_kyoto_protocol/application/pdf/at-initial-report-200611-corr.pdf

ANNEX I: EMISSION TRENDS

This Annex presents emission trends for CO_2, CH_4, N_2O and FCs.

This report uses the following UNFCCC notation keys for all tables:

NE (not estimated) .....for existing emissions by sources and removals by sinks of greenhouse gases which have not been estimated.

IE (included elsewhere).....for emissions by sources and removals by sinks of greenhouse gases estimated but included elsewhere in the inventory instead of the expected source/sink category.

NO (not occurring).....for emissions by sources and removals by sinks of greenhouse gases that do not occur for a particular gas or source/sink category.

NA (not applicable).....for activities in a given source/sink category that do not result in emissions or removals of a specific gas.

C (confidential) .....for emissions which could lead to the disclosure of confidential information if reported at the most disaggregated level. In this case a minimum of aggregation is required to protect business information.

Table A.I-1: Emission Trends CO_2.

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Gg											
Total Emissions/Removals with LULUCF	**48 288.45**	**47 463.27**	**48 474.29**	**49 859.61**	**55 494.97**	**59 947.82**	**59 907.77**	**62 003.12**	**59 376.53**	**56 720.11**	**56 294.20**	**50 052.64**
Total Emissions without LULUCF	**62 068.06**	**63 951.17**	**65 984.31**	**70 009.35**	**71 890.39**	**77 773.39**	**77 687.84**	**79 719.28**	**77 084.24**	**74 377.30**	**73 929.19**	**67 626.73**
1. Energy	**54 177.63**	**56 362.21**	**58 005.74**	**62 092.53**	**63 391.73**	**69 326.10**	**69 317.14**	**70 783.76**	**67 703.63**	**64 586.59**	**63 751.88**	**59 478.16**
A. Fuel Combustion (Sectoral Approach)	54 075.54	56 235.06	57 841.09	61 909.68	63 224.58	69 092.95	69 106.99	70 578.61	67 471.48	64 349.43	63 539.72	59 213.00
1. Energy Industries	13 792.26	12 918.63	12 238.76	13 813.62	13 646.94	16 088.40	16 113.71	16 095.66	15 161.06	13 855.87	13 648.52	12 648.58
2. Manufacturing Industries and Construction	12 682.08	13 482.68	13 716.58	13 718.09	14 039.86	14 669.39	14 828.75	16 210.49	15 981.24	15 798.51	15 814.79	14 270.04
3. Transport	13 754.80	15 657.54	18 795.61	20 043.24	21 967.35	23 810.53	24 330.23	24 633.67	23 357.94	23 530.20	22 263.72	21 390.66
4. Other Sectors	13 811.39	14 143.64	13 049.35	14 293.36	13 528.52	14 482.17	13 791.27	13 595.23	12 927.18	11 120.24	11 767.52	10 858.03
5. Other	35.01	32.56	40.80	41.36	41.91	42.47	43.03	43.56	44.06	44.61	45.17	45.70
B. Fugitive Emissions from Fuels	102.09	127.15	164.65	182.85	167.15	233.15	210.15	205.15	232.16	237.16	212.16	265.16
1. Solid Fuels	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2. Oil and Natural Gas	102.09	127.15	164.65	182.85	167.15	233.15	210.15	205.15	232.16	237.16	212.16	265.16
2. Industrial Processes	**7 584.25**	**7 388.04**	**7 773.68**	**7 700.46**	**8 268.26**	**8 213.54**	**8 169.33**	**8 710.01**	**9 117.55**	**9 549.94**	**9 954.43**	**7 983.25**
A. Mineral Products	3 274.18	2 862.55	2 965.71	2 983.49	3 093.10	3 081.21	3 178.18	3 132.87	3 306.72	3 517.56	3 530.92	3 008.47
B. Chemical Industry	585.10	583.65	587.27	539.50	551.22	592.50	528.09	563.47	599.25	530.62	599.35	545.64
C. Metal Production	3 724.96	3 941.84	4 220.70	4 177.48	4 623.93	4 539.83	4 463.06	5 013.66	5 211.58	5 501.76	5 824.16	4 429.14
D. Other Production	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
E. Production of Halocarbons and SF_6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
F. Consumption of Halocarbons and SF_6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
G. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Gg											
3. Solvent and Other Product Use	**279.30**	**189.95**	**192.62**	**204.10**	**218.14**	**221.49**	**189.10**	**213.25**	**250.80**	**228.51**	**210.62**	**153.05**
4. Agriculture	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
A. Enteric Fermentation												
B. Manure Management												
C. Rice Cultivation												
D. Agricultural Soils [(2)]												
E. Prescribed Burning of Savannas												
F. Field Burning of Agricultural Residues												
G. Other												
5. Land Use, Land-Use Change and Forestry	**-13 779.61**	**-16 487.90**	**-17 510.02**	**-20 149.74**	**-16 395.42**	**-17 825.57**	**-17 780.07**	**-17 716.16**	**-17 707.72**	**-17 657.19**	**-17 634.99**	**-17 574.09**
A. Forest Land	-15 803.48	-18 424.32	-19 116.47	-21 750.21	-17 989.79	-19 416.56	-19 389.50	-19 362.45	-19 335.39	-19 308.34	-19 281.28	-19 235.17
B. Cropland	223.34	286.02	311.14	315.51	319.76	327.02	346.26	339.45	346.88	375.64	394.66	442.93
C. Grassland	461.59	352.81	275.38	268.69	261.99	255.01	250.74	245.97	238.58	234.76	228.18	201.30
D. Wetlands	228.93	285.00	322.11	332.45	342.79	353.13	364.22	352.05	349.67	364.48	363.46	365.00
E. Settlements	320.03	286.15	133.24	135.19	137.13	139.08	143.43	216.00	211.68	207.37	203.06	201.81
F. Other Land	789.98	726.45	564.58	548.63	532.69	516.75	504.79	492.82	480.86	468.90	456.93	450.04
G. Other	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
6. Waste	**26.89**	**10.97**	**12.26**	**12.26**	**12.26**	**12.26**	**12.26**	**12.26**	**12.26**	**12.26**	**12.26**	**12.26**
A. Solid Waste Disposal on Land	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B. Waste-water Handling	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C. Waste Incineration	26.89	10.97	12.26	12.26	12.26	12.26	12.26	12.26	12.26	12.26	12.26	12.26
D. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Gg											
7. Other *(please specify)*	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Memo Items:												
International Bunkers	**904.54**	**1 347.25**	**1 715.80**	**1 671.50**	**1 561.07**	**1 470.24**	**1 742.20**	**2 024.37**	**2 091.30**	**2 211.93**	**2 213.42**	**1 924.16**
Aviation	885.97	1 327.42	1 695.58	1 651.28	1 540.85	1 452.97	1 724.93	1 959.83	2 048.88	2 175.79	2 181.97	1 893.40
Marine	18.57	19.83	20.22	20.22	20.22	17.27	17.27	64.54	42.42	36.13	31.45	30.75
Multilateral Operations	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
CO_2 Emissions from Biomass	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Table A.I-2: Emission Trends CH_4.

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Gg											
Total Emissions/ Removals with LULUCF	**395.46**	**362.67**	**314.88**	**308.24**	**303.61**	**303.63**	**296.99**	**290.16**	**284.07**	**279.08**	**272.37**	**269.65**
Total Emissions without LULUCF	**395.44**	**362.67**	**314.87**	**308.23**	**303.59**	**303.60**	**296.99**	**290.15**	**284.06**	**279.08**	**272.36**	**269.64**
1. Energy	31.89	31.12	25.19	25.23	24.04	23.91	24.11	25.09	23.89	23.70	23.88	24.42
A. Fuel Combustion (Sectoral Approach)	21.96	20.38	15.04	15.18	14.04	13.81	13.14	13.87	12.20	11.61	11.65	11.39
1. Energy Industries	0.16	0.16	0.16	0.19	0.20	0.24	0.27	0.25	0.29	0.30	0.31	0.33
2. Manufacturing Industries and Construction	0.34	0.39	0.44	0.46	0.46	0.52	0.56	0.61	0.62	0.61	0.65	0.63
3. Transport	3.06	3.07	1.91	1.79	1.75	1.66	1.49	1.33	1.15	1.01	0.85	0.76
4. Other Sectors	18.40	16.76	12.53	12.74	11.63	11.40	10.82	11.69	10.14	9.68	9.84	9.66
5. Other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B. Fugitive Emissions from Fuels	9.93	10.75	10.15	10.05	10.00	10.09	10.97	11.22	11.69	12.09	12.23	13.03
1. Solid Fuels	0.52	0.28	0.27	0.26	0.30	0.25	0.05	0.00	0.00	NO	NO	NO
2. Oil and Natural Gas	9.41	10.47	9.88	9.79	9.69	9.85	10.92	11.22	11.69	12.09	12.23	13.03
2. Industrial Processes	**0.71**	**0.69**	**0.70**	**0.67**	**0.71**	**0.70**	**0.70**	**0.75**	**0.92**	**0.91**	**0.89**	**0.85**
A. Mineral Products	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B. Chemical Industry	0.70	0.68	0.70	0.67	0.70	0.69	0.70	0.75	0.92	0.90	0.88	0.84
C. Metal Production	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D. Other Production	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
E. Production of Halocarbons and SF_6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
F. Consumption of Halocarbons and SF_6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
G. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Gg											
3. Solvent and Other Product Use	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
4. Agriculture	**199.65**	**192.00**	**180.36**	**177.96**	**174.06**	**172.23**	**171.83**	**169.72**	**169.02**	**169.69**	**168.97**	**171.21**
A. Enteric Fermentation	178.73	172.08	162.71	160.48	157.20	155.71	155.69	153.74	153.23	153.84	153.52	155.49
B. Manure Management	20.53	19.43	17.16	17.00	16.44	16.07	15.70	15.56	15.34	15.38	14.99	15.26
C. Rice Cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Agricultural Soils [(2)]	0.33	0.44	0.45	0.43	0.38	0.41	0.37	0.37	0.41	0.42	0.41	0.42
E. Prescribed Burning of Savannas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Field Burning of Agricultural Residues	0.06	0.05	0.05	0.05	0.05	0.05	0.07	0.05	0.04	0.04	0.04	0.04
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5. Land Use, Land-Use Change and Forestry	**0.03**	**0.00**	**0.01**	**0.00**	**0.03**	**0.03**	**0.00**	**0.00**	**0.01**	**0.01**	**0.01**	**0.01**
A. Forest Land	0.03	0.00	0.01	0.00	0.03	0.03	0.00	0.00	0.01	0.01	0.01	0.01
B. Cropland	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
C. Grassland	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Wetlands	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
E. Settlements	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
F. Other Land	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6. Waste	**163.20**	**138.86**	**108.62**	**104.37**	**104.78**	**106.76**	**100.35**	**94.60**	**90.22**	**84.78**	**78.63**	**73.17**
A. Solid Waste Disposal on Land	157.82	133.61	104.69	100.53	101.02	103.08	96.39	90.62	86.30	80.87	74.78	69.26
B. Waste-water Handling	4.85	4.21	2.68	2.43	2.18	1.95	1.79	1.64	1.48	1.39	1.30	1.30
C. Waste Incineration	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D. Other	0.52	1.04	1.24	1.41	1.58	1.74	2.16	2.33	2.44	2.52	2.55	2.61

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Gg											
7. Other *(please specify)*	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Memo Items:												
International Bunkers	**0.02**	**0.02**	**0.03**	**0.03**	**0.04**	**0.04**	**0.04**	**0.04**	**0.04**	**0.04**	**0.04**	**0.04**
Aviation	0.01	0.02	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Marine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Multilateral Operations	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
CO_2 Emissions from Biomass	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Table A.I-3: Emission Trends N_2O.

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Gg											
Total Emissions/ Removals with LULUCF	**20.14**	**21.45**	**20.42**	**20.05**	**20.05**	**19.80**	**17.55**	**17.65**	**17.78**	**17.89**	**18.52**	**17.63**
Total Emissions without LULUCF	**20.00**	**21.31**	**20.29**	**19.92**	**19.93**	**19.68**	**17.43**	**17.53**	**17.65**	**17.75**	**18.36**	**17.47**
1. Energy	**1.79**	**2.13**	**2.36**	**2.46**	**2.48**	**2.56**	**2.55**	**2.63**	**2.54**	**2.50**	**2.44**	**2.30**
A. Fuel Combustion (Sectoral Approach)	1.79	2.13	2.36	2.46	2.48	2.56	2.55	2.63	2.54	2.50	2.44	2.30
1. Energy Industries	0.15	0.16	0.16	0.19	0.19	0.22	0.24	0.27	0.28	0.30	0.32	0.31
2. Manufacturing Industries and Construction	0.26	0.31	0.43	0.43	0.40	0.41	0.40	0.47	0.49	0.51	0.52	0.48
3. Transport	0.63	0.88	0.99	1.01	1.10	1.13	1.11	1.07	1.00	0.95	0.85	0.78
4. Other Sectors	0.76	0.78	0.78	0.83	0.79	0.80	0.79	0.82	0.77	0.73	0.75	0.72
5. Other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B. Fugitive Emissions from Fuels	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE
1. Solid Fuels	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2. Oil and Natural Gas	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE
2. Industrial Processes	**2.94**	**2.77**	**3.07**	**2.54**	**2.60**	**2.85**	**0.91**	**0.88**	**0.90**	**0.87**	**1.05**	**0.53**
A. Mineral Products	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B. Chemical Industry	2.94	2.77	3.07	2.54	2.60	2.85	0.91	0.88	0.90	0.87	1.05	0.53
C. Metal Production	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE
D. Other Production	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
E. Production of Halocarbons and SF_6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
F. Consumption of Halocarbons and SF_6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
G. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3. Solvent and Other Product Use	**0.75**	**0.75**	**0.75**	**0.71**	**0.67**	**0.64**	**0.60**	**0.56**	**0.53**	**0.52**	**0.51**	**0.47**

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Gg											
4. Agriculture	**14.08**	**15.12**	**13.28**	**13.28**	**13.21**	**12.66**	**12.35**	**12.37**	**12.53**	**12.69**	**13.17**	**12.97**
A. Enteric Fermentation	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B. Manure Management	3.02	3.08	2.98	2.97	2.93	2.93	2.94	2.91	2.92	2.94	2.94	2.98
C. Rice Cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Agricultural Soils [(2)]	11.06	12.04	10.30	10.31	10.28	9.73	9.41	9.46	9.61	9.75	10.23	9.99
E. Prescribed Burning of Savannas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Field Burning of Agricultural Residues	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5. Land Use, Land-Use Change and Forestry	**0.14**	**0.13**	**0.13**	**0.12**	**0.12**	**0.12**	**0.12**	**0.12**	**0.13**	**0.14**	**0.16**	**0.16**
A. Forest Land	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B. Cropland	0.14	0.13	0.13	0.12	0.12	0.12	0.12	0.12	0.13	0.14	0.16	0.16
C. Grassland	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Wetlands	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
E. Settlements	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
F. Other Land	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6. Waste	**0.43**	**0.55**	**0.83**	**0.93**	**0.95**	**0.97**	**1.03**	**1.09**	**1.15**	**1.18**	**1.19**	**1.20**
A. Solid Waste Disposal on Land	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B. Waste-water Handling	0.35	0.40	0.66	0.74	0.74	0.73	0.73	0.77	0.81	0.83	0.84	0.84
C. Waste Incineration	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D. Other	0.08	0.14	0.17	0.19	0.22	0.24	0.30	0.32	0.34	0.35	0.35	0.36
7. Other *(please specify)*	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Gg											
Memo Items:	**0.04**	**0.05**	**0.06**	**0.06**	**0.06**	**0.05**	**0.06**	**0.09**	**0.08**	**0.09**	**0.08**	**0.07**
International Bunkers	**0.03**	**0.05**	**0.06**	**0.06**	**0.05**	**0.05**	**0.06**	**0.07**	**0.07**	**0.07**	**0.07**	**0.06**
Aviation	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.01
Marine	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Multilateral Operations	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
CO_2 Emissions from Biomass	**20.00**	**21.31**	**20.29**	**19.92**	**19.93**	**19.68**	**17.43**	**17.53**	**17.65**	**17.75**	**18.36**	**17.47**

Table A.I-4: Emission Trends HFCs, PFCs and SF_6.

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990 (Base year)	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Gg											
Emissions of HFCs – Gg CO_2 equivalent	**26.32**	**411.88**	**901.85**	**924.89**	**969.18**	**949.51**	**955.10**	**986.36**	**962.57**	**1 061.91**	**1 057.99**	**1 055.62**
HFC-23 (Gg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HFC-32 (Gg)	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
HFC-41 (Gg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HFC-43-10mee (Gg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HFC-125 (Gg)	0.00	0.01	0.04	0.05	0.05	0.05	0.05	0.06	0.07	0.08	0.08	0.08
HFC-134 (Gg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HFC-134a (Gg)	0.02	0.28	0.40	0.40	0.40	0.42	0.42	0.40	0.36	0.37	0.38	0.37
HFC-152a (Gg)	0.00	0.08	0.60	0.61	0.95	0.64	0.43	0.21	0.25	0.25	0.09	0.13
HFC-143 (Gg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HFC-143a (Gg)	0.00	0.00	0.04	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.07	0.07
HFC-227ea (Gg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HFC-236fa (Gg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HFC-245ca (Gg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unspecified mix of listed HFCs[5] – (Gg CO_2 equivalent)	1.93	8.53	3.85	4.14	4.05	3.88	4.06	3.98	5.03	7.07	7.39	1.71
Emissions of PFCs (Gg CO_2 equivalent)	**1 079.24**	**71.27**	**84.79**	**95.91**	**97.70**	**116.44**	**136.65**	**133.82**	**145.72**	**190.12**	**173.53**	**35.05**
CF_4 (Gg)	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C_2F_6 (Gg)	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C_3F_8 (Gg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C_4F_{10} (Gg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c-C_4F_8 (Gg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C_5F_{12} (Gg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C_6F_{14} (Gg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unspecified mix of listed PFCs[5] – (Gg CO_2 equivalent)	29.05	68.39	67.46	81.67	83.46	102.20	125.49	125.04	135.50	182.55	166.39	28.64
Emissions of SF_6 (Gg CO_2 equivalent)	**494.28**	**1 154.06**	**595.54**	**652.28**	**634.81**	**566.62**	**497.35**	**507.33**	**465.15**	**374.54**	**382.84**	**349.14**
SF_6 (Gg)	0.02	0 05	0 02	0 03	0 03	0 02	0 02	0 02	0 02	0 02	0 02	0.02

ANNEX II: TIER 1 UNCERTAINTY ASSESSMENT

This Annex presents activity data and emission factor uncertainty and/or uncertainty of the emission estimate (”combined uncertainty”) for key sources of the Austrian GHG inventory, based on the key source assessment of the 2009 submission. Sources of uncertainties are explained in the NIR 2009. The key source analysis of the 2010 submission will be presented in the NIR 2010[19].

Table A.II: Uncertainties for Key Sources of the Austrian GHG Inventory (KS Assessment 2009).

IPCC Source category	Gas	AD	EF	Combined	Combined as% of total national emissions in 2007	Introduced into the trend in total national emissions
		Uncertainty [%]				
1 A 1 a liquid: Public Electricity and Heat Production	CO_2	0.5	0.5	0.7	0.01	0.01
1 A 1 a other: Public Electricity and Heat Production	CO_2	10.0	20.0	22.4	0.17	0.18
1 A 1 a solid: Public Electricity and Heat Production	CO_2	0.5	0.5	0.7	0.04	0.05
1 A 1 b liquid: Petroleum refining	CO_2	0.5	0.3	0.6	0.02	0.03
1 A 2 mobile-liquid: Manufacturing Industries and Construction	CO_2	3.0	0.5	3.0	0.03	0.04
1 A 2 other: Manufacturing Industries and Construction	CO_2	10.0	20.0	22.4	0.25	0.24
1 A 2 solid: Manufacturing Industries and Construction	CO_2	1.0	0.5	1.1	0.07	0.10
1 A 2 stat-liquid: Manufacturing Industries and Construction	CO_2	3.0	0.5	3.0	0.08	0.12
1 A 3 a jet kerosene: Civil Aviation	CO_2	3.0	3.0	4.2	0.00	0.00
1 A 3 b diesel oil: Road Transportation	CO_2	3.0	3.0	4.2	0.85	1.05
1 A 3 b gasoline: Road Transportation	CO_2	3.0	3.0	4.2	0.30	0.35
1 A 4 biomass: Other Sectors	CH_4	10.0	50.0	51.0	0.15	0.08
1 A 4 mobile-diesel: Other Sectors	CO_2	3.0	0.5	3.0	0.03	0.04
1 A 4 other: Other Sectors	CO_2	10.0	20.0	22.4	0.04	0.07
1 A 4 solid: Other Sectors	CO_2	1.0	0.5	1.1	0.01	0.02
1 A 4 stat-liquid: Other Sectors	CO_2	3.0	0.5	3.0	0.17	0.27
1 A gaseous: Fuel Combustion (stationary)	CO_2	2.0	0.5	2.1	0.38	0.58
1 B 2 b: Natural gas	CH_4	4.2	14.1	14.7	0.10	0.07
2 A 1: Cement Production	CO_2	5.0	2.0	5.4	0.13	0.20
2 A 2: Lime Production	CO_2	20.0	5.0	20.6	0.14	0.22

[19] Austria’s National Inventory Report 2010, submission under the United Nations Framework Convention on Climate Change (the NIR is due for reporting under the Monitoring Mechanism (280/2004/EC) by March 15 and will be reported under the UNFCCC by April 15 – it will be published in April).

IPCC Source category	Gas	AD	EF	Combined	Combined as% of total national emissions in 2007	Introduced into the trend in total national emissions
		Uncertainty [%]				
2 A 3: Limestone and Dolomite Use	CO_2	19.6	2.0	19.7	0.07	0.11
2 A 7 b: Sinter Production	CO_2	2.0	5.0	5.4	0.02	0.02
2 B 1: Ammonia Production	CO_2	2.0	4.6	5.0	0.03	0.02
2 B 2: Nitric Acid Production	N_2O	0.0	5.0	5.0	0.02	0.05
2 C 1: Iron and Steel Production	CO_2	0.5	0.5	0.7	0.05	0.05
2 C 3: Aluminium production	CO_2	2.0	0.5	2.1	0.00	0.01
2 C 3: Aluminium production	PFC	0.0	50.0	50.0	0.00	0.12
2 C 4: SF6 Used in Al and Mg Foundries	SF_6	0.0	5.0	5.0	0.00	0.02
2 F 1/2/3/4/5: ODS Substitutes	HFC	20.0	50.0	53.9	0.18	0.14
2 F 7: Semiconductor Manufacture	FCs	5.0	10.0	11.2	0.04	0.03
2 F 9: Other Sources of SF6	SF_6	25.0	50.0	55.9	0.56	0.67
3: SOLVENT AND OTHER PRODUCT USE	CO_2	5.0	10.0	11.2	0.03	0.02
4 A 1: Cattle	CH_4	10.0	20.0	22.4	0.79	0.61
4 B 1: Cattle	N_2O	10.0	100.0	100.5	0.93	0.33
4 B 1: Cattle	CH_4	10.0	70.0	70.7	0.37	0.20
4 B 8: Swine	CH_4	10.0	70.0	70.7	0.34	0.11
4 D 1: Direct Soil Emissions	N_2O	5.0	150.0	150.1	2.87	0.75
4 D 2: Pasture, Range and Paddock Manure	N_2O	5.0	150.0	150.1	0.39	0.04
4 D 3: Indirect Emissions	N_2O	5.0	150.0	150.1	1.94	0.70
6 A: Solid Waste Disposal on Land	CH_4	12.0	25.0	27.7	0.57	0.76
6 B: Wastewater Handling	N_2O	20.0	50.0	53.9	0.18	0.15
Total					**3.97**	**2.13**

ANNEX III: INDICATORS

This Annex presents the indicators pursuant to Article 3 (1) j of the Monitoring Decision (280/2004/EC), a detailed description of the indicators can be found in Annex II of the "Implementing Provisions" (Commission Decision 2005/166/EC).

Information on all Priority Indicators (including Additional Priority Indicators) is provided; however, data for one Supplementary Indicator was not available (indicated by NA in the cells).[20]

Table A.III: Indicators pursuant to Article 3 (1) j of the Monitoring Decision for the years 1990, 1995, 2000–2008.

No	Indicator	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Priority												
1	Total CO_2 intensity of GDP [t CO_2/Mio Euro]	353.8	329.1	293.1	309.4	312.6	335.5	326.8	327.3	305.5	284.1	276.4	263.1
2	Energy related CO_2 intensity of GDP [t CO_2/Mio Euro]	308.3	289.4	257.0	273.6	274.9	298.0	290.7	289.7	267.4	245.8	237.6	230.3
3	Specific CO_2 emissions of passenger cars [g CO_2/ km]	212.5	206.1	192.8	189.6	186.6	183.8	181.2	177.3	171.5	168.4	164.8	160.8
4	Energy related CO_2 intensity of industry [t/Mio Euro]	290.1	282.0	250.4	249.7	256.8	264.1	260.6	275.1	257.4	238.1	231.7	239.4
5	Specific CO_2 emissions of households [t CO_2/dwelling]	3.38	3.17	2.76	2.75	2.61	2.58	2.47	2.56	2.33	2.04	2.07	2.05
6	CO_2 intensity of the commercial and institutional sector [t CO_2/Mio Euro]	25.93	28.91	22.45	31.10	27.53	34.36	30.71	25.62	25.28	19.23	21.62	16.36
7	Specific CO_2 emissions of public and autoproducer power plants [t CO_2/TJ]	166.8	150.9	128.7	133.7	132.0	131.9	130.7	122.9	121.7	117.8	106.7	97.3
	Additional Priority												
1	Freight transport on road [g CO_2/ ton-km]	141.1	120.8	94.7	90.8	88.5	87.9	89.3	87.6	87.0	85.1	84.3	82.8
2	Total CO_2 intensity – iron and steel industry [t CO_2/Mio Euro]	2,651	3,253	2,524	2,422	2,976	3,163	3,337	3,508	3,705	3,514	3,553	3,807
3	Energy related CO_2 intensity – chemical industry [t CO_2/Mio Euro]	575.2	596.7	569.3	665.0	618.3	649.9	578.5	520.2	413.2	328.1	321.3	298.5

[20] The units of the transport indicators (No. 3 Priority Indicator, No. 1 Additional Priority Indicator, and No.1-3 Supplementary Indicator) were changed to the common unit g CO_2/km (the suggested unit was g CO_2/100 km). Furthermore, the names of the transport indicators No.3 and 4 Supplementary Indicator have been adapted to be consistent.

No	Indicator	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
4	Energy related CO_2 intensity – glass, pottery and building materials industry [t CO_2/Mio Euro]	672.6	652.2	614.8	586.2	670.7	677.9	740.3	643.7	659.9	693.3	640.8	622.6
5	Specific CO_2 emissions of iron and steel industry [t CO_2/t production]	2.17	1.92	1.82	1.75	1.80	1.78	1.73	1.79	1.78	1.72	1.75	1.90
6	Specific energy related CO_2 emissions of cement industry [t CO_2/t production]	0.225	0.226	0.214	0.200	0.204	0.189	0.211	0.194	0.207	0.213	0.205	0.200
	Supplementary												
1	Specific diesel related CO_2 emissions of passenger cars [g CO_2/ km]	193.7	189.1	179.1	176.5	174.1	172.2	170.4	166.7	159.9	158.4	157.6	154.1
2	Specific petrol related CO_2 emissions of passenger cars [g CO_2/ km]	216.5	212.5	203.2	201.0	198.7	196.4	194.3	191.3	188.1	183.2	175.9	170.7
3	Passenger transport on road [g CO_2/passenger-km]	155.9	159.3	157.4	156.5	155.6	153.5	151.8	149.0	144.6	142.5	139.9	137.0
4	Passenger transport by air [kg CO_2/passenger]	234.0	226.1	125.8	104.2	109.6	107.0	106.2	110.8	110.7	106.4	96.3	99.9
5	Energy related CO_2 intensity – food, drink and tobacco industry [t CO_2/Mio Euro]	234.2	214.4	207.7	225.8	260.2	217.8	205.5	215.9	205.4	167.0	165.6	178.3
6	Energy related CO_2 intensity – paper and printing industry [t CO_2/Mio Euro]	864.7	836.4	676.3	622.5	657.9	736.4	668.9	668.5	587.1	533.1	519.0	541.5
7	Specific CO_2 emissions of households for space heating [t CO_2/m²]	35.92	32.25	26.97	26.65	24.70	23.81	22.25	22.97	20.68	17.95	18.24	18.03
8	Specific CO_2 emissions of commercial and institutional sector for space heating [kg CO_2/m²]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
9	Specific CO_2 emissions of public power plants [t CO_2/TJ]	166.4	143.5	133.3	133.5	127.8	129.6	123.1	112.2	110.2	103.2	93.9	84.2
10	Specific CO_2 emissions of autoproducer plants [t CO_2/TJ]	168.2	168.2	117.6	134.5	144.1	140.5	156.9	161.4	157.8	158.1	145.3	138.4
11	Carbon intensity of total power generation [t CO_2/TJ]	68.37	58.70	48.02	54.77	53.56	64.38	61.24	59.27	57.38	53.89	49.06	42.75

No	Indicator	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
12	Carbon intensity of transport [t CO_2/TJ]	65.86	63.99	63.42	64.14	65.39	66.69	66.76	64.91	62.39	61.59	60.20	59.88
13	Specific energy related CO_2 emissions of paper industry [t CO_2/t production]	0.755	0.643	0.536	0.522	0.501	0.522	0.462	0.464	0.424	0.421	0.427	0.476
14	Carbon intensity in Industry [kt CO_2 /PJ]	58.56	61.73	54.02	53.10	54.56	53.31	51.29	52.55	51.65	50.51	49.70	46.37
15	Carbon intensitiy Households [kt CO_2 /PJ]	40.86	37.51	34.89	33.70	33.09	32.63	32.19	31.40	30.36	28.39	28.42	28.31

In "Austria's Annual Greenhouse Gas Inventory 1990–2009" the Umweltbundesamt presents up-to-date figures of greenhouse gas emissions in Austria. In 2009, the second year of the first commitment period under the Kyoto-Protocol, greenhouse gas emissions amounted to 80.1 million t of CO_2 equivalents. This corresponds to a 2.5 % increase against base-year levels and a 7.8 % reduction below 2008 levels. The driving forces behind the emission trend 2008-2009 were the economic crisis – affecting industrial production (steel, cement), power generation and road performance (freight transport) – and the increased use of biofuels.

Content and format of this report are in accordance with obligations under the greenhouse gas monitoring mechanism 280/2004/EC for implementing the Kyoto Protocol. Updated emission data have to be reported to the European Commission by 15 January each year.

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