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**Methodological issues under the Kyoto Protocol**

**Report on the implementation of domestic action by Parties included in**

**Annex I to the Convention that are also Parties to the Kyoto Protocol**

**based on the information reported in their national communications**

## **Report on the implementation of domestic action by Parties included in Annex I to the Convention that are also Parties to the Kyoto Protocol based on the information reported in their national communications**

### **Note by the secretariat**

#### *Summary*

This report contains information relating to paragraph 4 of chapter VI.1 of the annex to decision 5/CP.6, based on information contained in national communications from Parties and other relevant sources, for consideration by the Subsidiary Body for Scientific and Technological Advice at its thirty-seventh session. It contains information on the implementation of domestic action in accordance with national circumstances and on the progress in reducing emissions in a manner conducive to narrowing per capita differences between developed and developing country Parties while working towards the achievement of the ultimate objective of the Convention.

## Contents

	<i>Paragraphs</i>	<i>Page</i>
I. Introduction.....	1–4	3
A. Mandate.....	1–2	3
B. Scope and approach.....	3–4	3
II. Domestic action implemented in accordance with national circumstances and their effects on greenhouse gas emissions.....	5–27	4
A. Overview of domestic action.....	5–9	4
B. Policies and measures reported by sector and related policy instruments .....	10–23	5
C. Reported effects of policies and measures on greenhouse gas emissions.....	24–27	10
III. Domestic actions undertaken to meet the targets under the Kyoto Protocol.....	28–32	11
IV. Greenhouse gas and per capita carbon dioxide emission trends .....	33–57	13
A. Approach .....	33–35	13
B. Total aggregate greenhouse gas emission trends.....	36–47	14
C. Trends in per capita carbon dioxide emissions across Annex I Parties and non-Annex I Parties .....	48–57	17
Annex		
Data used in the figures presented in this report.....		23

## I. Introduction

### A. Mandate

1. Decision 15/CMP.1, paragraph 4, requested the secretariat to prepare a report relating to paragraph 4 of chapter VI.1 of the annex to decision 5/CP.6, based on information contained in national communications from Parties and other relevant sources, for consideration by the Subsidiary Body for Scientific and Technological Advice. This report shall be prepared each time that the review process under Article 8 of the Kyoto Protocol relating to national communications and supplementary information from Parties included in Annex I to the Convention (Annex I Parties) is completed.

2. By decision 5/CP.6, the Conference of the Parties agreed that Annex I Parties to the Convention shall implement domestic action in accordance with national circumstances and with a view to reducing emissions in a manner conducive to narrowing per capita differences between developed and developing country Parties while working towards the achievement of the ultimate objective of the Convention.

### B. Scope and approach

3. This report was prepared in response to the above-mentioned mandate. Parties covered in this report include both Annex I Parties and Parties not included in Annex I to the Convention (non-Annex I Parties)<sup>1,2,3</sup> that are also Parties to the Kyoto Protocol. This report comprises an introduction (chapter I) and three substantive chapters that address the mandate. Chapter II below provides an overview of domestic action implemented by Annex I Parties in accordance with their national circumstances. Although the relevant paragraph of decision 5/CP.6 refers to domestic action only, it is placed in chapter VI of the annex to the decision, which is on mechanisms pursuant to Articles 6, 12 and 17 of the Kyoto Protocol. Accordingly, chapter III below provides an overview of domestic action in the broader context of action undertaken to meet the Kyoto targets, which includes the use of Kyoto Protocol mechanisms. Lastly, chapter IV below discusses Annex I Parties' trends in total aggregate greenhouse gas (GHG) emissions as well as the respective contribution to

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<sup>1</sup> Chapter VI.1, paragraph 4, of the annex to decision 5/CP.6 refers to per capita differences in emissions between developed and developing countries. As definitions or lists of such countries are not available in the Convention context, for the purposes of this report the lists of Annex I Parties and non-Annex I Parties to the Convention that are also Parties to the Kyoto Protocol were used.

<sup>2</sup> Owing to data limitation, the following non-Annex I Parties are not included in this report: Antigua and Barbuda, Bahamas, Barbados, Belize, Bhutan, Burkina Faso, Cape Verde, Central African Republic, Chad, Comoros, Cook Islands, Djibouti, Dominica, Equatorial Guinea, Fiji, Gambia, Grenada, Guinea, Guinea-Bissau, Guyana, Kiribati, Lao People's Democratic Republic, Lesotho, Liberia, Madagascar, Malawi, Maldives, Mali, Marshall Islands, Mauritania, Mauritius, Micronesia (Federated States of), Montenegro, Nauru, Niger, Niue, Palau, Papua New Guinea, Rwanda, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Samoa, San Marino, Sao Tome and Principe, Seychelles, Sierra Leone, Solomon Islands, Somalia, Suriname, Swaziland, Timor-Leste, Tonga, Tuvalu, Uganda and Vanuatu.

<sup>3</sup> For Kazakhstan, the Kyoto Protocol entered into force on 17 September 2009. In accordance with Article 1, paragraph 7, of the Kyoto Protocol, Kazakhstan is a Party included in Annex I for the purposes of the Kyoto Protocol (FCCC/KP/CMP/2009/21, para. 91). The submission of the third national communication of Kazakhstan, which will be also its first national communication under the Kyoto Protocol, is expected not earlier than by the end of 2012. This is why for Kazakhstan only GHG emission data are included in this report, not policies and measures.

the aggregated total of Parties with economies in transition (EIT Parties) and Parties that do not have economies in transition (non-EIT Parties). Chapter IV below also compares trends in per capita carbon dioxide (CO<sub>2</sub>) emissions between Annex I Parties and non-Annex I Parties. The annex contains background information based on the 2012 GHG inventories submitted by Annex I Parties and on International Energy Agency (IEA) statistical data.<sup>4</sup>

4. Information sources used include the 40 fifth national communications (NC5s) submitted by March 2011 and their respective in-depth review (IDR) reports. Data used for reporting Annex I Parties' most recent total aggregate GHG emission trends and CO<sub>2</sub> emission trends are from the 2012 national GHG inventory submission. When comparing Annex I and non-Annex I Parties' per capita CO<sub>2</sub> emissions, the IEA's web data services were used for both population and CO<sub>2</sub> emissions data.<sup>5</sup>

## **II. Domestic action implemented in accordance with national circumstances and their effects on greenhouse gas emissions**

### **A. Overview of domestic action**

5. In their NC5s and during the IDRs, Annex I Parties provided information on their national circumstances, which set the context for the levels and trends of their GHG emissions and removals, and which underpin their approach for national climate change strategies and policies and measures (PaMs). Most Annex I Parties now treat climate change mitigation as a core top-level issue in the national policy agenda and have developed greater policy-related capacity as well as legal and institutional frameworks to reduce emissions, with all Annex I Parties adopting and updating national climate change strategies, action plans and programmes with mitigation PaMs.

6. Annex I Parties reported that institutional frameworks were strengthened by enhancing coordination between government departments to facilitate coherent climate policy through the establishment of interministerial coordinating groups or commissions on climate change. Importantly, some Annex I Parties reported changing their administrative structure to better tackle emissions growth in the energy sector. For example, climate and energy departments were created to facilitate the harmonization of policymaking for energy and climate change mitigation in Denmark, France, Greece and United Kingdom of Great Britain and Northern Ireland.

7. Annex I Parties are also making broad use of multilevel governance – across multiple levels of government (e.g. local to regional) and non-governmental actors – for climate change issues. Regional and local governments are also increasingly involved in the implementation of climate change policies, particularly where devolution of power from central governments to the regions is taking place.

8. Following the economic crisis and shifts in global economic and energy flows, Annex I Parties are increasingly considering and implementing climate change PaMs that combine the goals of emission reductions and air and water quality improvement, energy security enhancement, job creation and economic competitiveness. To that end, several Annex I Parties with demanding medium- and long-term emission goals developed integrated energy and climate policy frameworks that are also used to build political momentum for climate change mitigation action in the near term and midterm. These policy

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<sup>4</sup> International Energy Agency web data services. Available at <<http://data.iaea.org/IEASTORE/DEFAULT.ASP>>.

<sup>5</sup> International Energy Agency web data services. *CO<sub>2</sub> Emissions from Fuel Combustion, 2011 Edition*. Available at <<http://data.iaea.org/IEASTORE/DEFAULT.ASP>>.

frameworks and goals help to frame, communicate and align the stringency of the many PaMs involved. Among the comprehensive policy frameworks and visions reported in the NC5s and updated during the IDRs are the European Union (EU) “20-20-20” climate and energy package and the medium- and long-term targets of Australia and Japan. The United Kingdom’s carbon budgets introduced the concept of targets with binding milestones. Several of these policy frameworks involve long-term strategies (e.g. to 2050), with corresponding research and development (R&D) in relation to new technologies and innovative solutions for decoupling GHG emissions and economic growth and establishing low-carbon societies.

9. Since the Kyoto Protocol entered into force, some Annex I Parties have assessed the effectiveness of existing climate policies and put in place new and or revised policy frameworks. The PaMs developed involve a wide range of actors and institutions, in many activities related to energy supply, energy end use and non-energy emissions. This has resulted in increased expenditure of resources and PaMs in some key areas being substantially strengthened, through more stringent requirements and wider coverage. While Annex I Parties continue to implement PaM portfolios that best fit their policymaking processes and national circumstances, an overall trend of a shift to a greater use of economic and market instruments that attach a price to carbon could be observed across all these Parties (see also para. 11 below).

## **B. Policies and measures reported by sector and related policy instruments**

10. In their NC5s and during the IDRs, Annex I Parties reported over 1,200 implemented, adopted and planned mitigation PaMs, with highly diverse scopes and expected emission reductions. The variety reflects the wide repertoire of human activities – the numerous investments, consumption and behaviour patterns of many individuals and organizations in varying circumstances – that must be affected to mitigate climate change. The numerous PaMs can be classified into the following categories:

- (a) Economic and fiscal, including emissions trading schemes (ETSs), other market instruments (other quotas and certificates), carbon and energy taxes, reforms and other fiscal and economic incentives (fees, subsidies and project funding);
- (b) Legal (acts, regulations, rules, standards and permitting requirements);
- (c) Voluntary and negotiated agreements, including voluntary sectoral commitments and voluntary enterprise partnerships;
- (d) Information, education and public awareness (labels, auditing, advice and demonstrations);
- (e) Research and development;
- (f) Other, including public facilities, procurement, vehicles, infrastructure, waste management and urban and regional development and land use.

11. The reported PaMs are either sector-specific or cover multiple emitting sectors and, according to the commonness of their use as reported in the NC5s and updated in the IDR reports, the following trends can be identified:

- (a) A pronounced move towards a greater use of broad carbon pricing frameworks, based on ETSs as a cornerstone upon which climate change mitigation strategies are based;
- (b) Tighter regulations, including those establishing targets for renewable energy and energy efficiency that supplant voluntary programmes in the key sectors of energy

supply, electricity generation, emission-intensive industry and transport, in particular road vehicle transportation.

**1. Cross-sectoral policies and measures**

12. The most inherently cross-sectoral PaMs are ETSs, carbon taxes, energy market reforms, and urban and regional development and land-use planning, but R&D also sometimes spans several sectors. However, rarely are any of these PaMs used on an economy-wide scale. Even carbon and energy taxes and ETSs, which are conceptually universal in scope, are often applied only to selected sectors in practice, although some carbon taxes and the New Zealand ETS are certainly widely applied.

13. ETSs are the newest policy instrument with the fastest growing role in the overall climate change policy portfolio. Since the Kyoto Protocol entered into force, there has been a significant effort in nearly all Annex I Parties to establish new or strengthen existing ETSs. As of July 2012, there are six active GHG ETSs, each with its specific set of rules and requirements: the EU ETS (2005); the Swiss ETS (2008); the Alberta, Canada, GHG emissions regulation (2007); the New Zealand ETS (2008); the Tokyo cap-and-trade programme in Japan (2010); and the Australian carbon pricing mechanism (2012). Two other systems are still under development: the mandatory Japanese national ETS and the Western Climate Initiative.<sup>6</sup> In addition, Norway’s ETS became part of the EU ETS in 2008, Iceland is part of the EU ETS as a member of the European Economic Area and Croatia is expected to join the EU ETS in 2013.

Box 1 Comparison of emissions trading scheme designs		
Australia	European Union	New Zealand
<p>Introduced in 2012, the Carbon Pricing Mechanism (CPM) is expected to include around 500 businesses that will meet the eligibility criterion of greenhouse gas (GHG) emissions of 25 kt carbon dioxide equivalent (CO<sub>2</sub> eq)/year, which account for approximately two thirds of Australia’s GHG emissions.</p> <p>The CPM covers CO<sub>2</sub>, methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O) and perfluorocarbons (PFCs) (aluminium smelters) from all sectors, except agriculture and forestry, light-duty on-road vehicles and on-site use of fuel by the agriculture, forestry and fishing industries. Opt ins to the CPM (from 1 July 2013) will be possible for large users of liquid fuels (e.g. airlines and railways),</p>	<p>Introduced in 2005, the European Union emissions trading scheme (EU ETS) is in its phase II (2008–2012) and applies to large-scale emitters (&gt;20 MW), covering about 11,000 installations that account for 40 per cent of EU emissions.</p> <p>The EU ETS covers CO<sub>2</sub> emissions from installations such as power stations, combustion plants, oil refineries and energy-intensive and mineral industries and N<sub>2</sub>O emissions from certain processes. In phase III (2013–2020), aviation, the petrochemical, ammonia and aluminium industries and additional gases will be included, covering in total 45</p>	<p>Introduced in 2008, the New Zealand ETS first covered forestry, followed by fossil fuel use in stationary energy sources, transport and the manufacturing industry sector (as of 1 July 2010), which are collectively responsible for roughly 50 per cent of New Zealand’s emissions. Emissions from waste and synthetic gases are scheduled to enter the scheme in 2013, while inclusion of agriculture will be decided in 2015.</p> <p>The New Zealand ETS covers all GHG emissions covered by the Kyoto Protocol (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, hydrofluorocarbons, PFCs and sulphur hexafluoride).</p> <p>The New Zealand ETS is based on trading of units that represent a tonne of CO<sub>2</sub> eq. Emitting firms</p>

<sup>6</sup> The New South Wales, Australia, GHG abatement scheme operated from 2003 to July 2012, when it was closed upon the commencement of the Australian carbon pricing mechanism. Other ETSs are in various stages of discussion and implementation in Turkey and in Ukraine, Russian Federation, Kazakhstan and Belarus.

<p>instead of being subject to the fuel tax system.</p> <p>The CPM will apply an initial fixed price for a three-year period, when emissions will not be limited, followed by a flexible pricing phase, beginning on 1 July 2015, which will start with an emissions cap set for a five-year period. By default, the cap option should ensure that the GHG reduction target of 5 per cent by 2020 compared with the 2000 level is delivered.</p> <p>Permits will be auctioned or allocated to businesses free of charge. Support is planned for energy-intensive industries exposed to carbon leakage and the energy sector.</p>	<p>per cent of EU emissions.</p> <p>Introduced as a flexible price cap-and-trade system from phase I (2006–2007), emission caps were set for emitters in national allocation plans in phase I and II. Phase III establishes an EU-wide cap for 2020 at 21 per cent below the 2005 level. The single EU cap contained in phase III sets a linear annual GHG reduction factor of 1.74 per cent.</p> <p>During phase I and II, member States have auctioned only very limited quantities of carbon allowances and the major share of carbon allowances was allocated for free. From the start of phase III, about half of the allowances are expected to be auctioned.</p>	<p>have to surrender these to the government annually, while those that remove rather than emit GHGs (e.g. those that plant and grow forests) can receive units.</p> <p>Free allocation is granted to firms whose activities are emission intensive and that are exposed to international trade and to the fishing and forestry sectors. There are some transitional measures beyond 2012, including the following: participants from the fuel combustion in energy industries, transport and the manufacturing industry will have to surrender only one emission unit for every two tonnes of emissions; and there is an option to buy emission units from the government for a fixed price of 25 New Zealand dollars.</p>
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14. ETSs are the most wide-ranging instrument for reducing CO<sub>2</sub> emissions from energy production and industrial energy use, and many are now also covering emissions of other GHGs and from other sectors. Box 1 provides an overview of the design of the national ETS systems for three Kyoto Protocol Parties, Australia, the EU and New Zealand.

**2. Policies and measures in the energy sector**

*Energy supply, including electricity and heat production*

15. With regards to electricity and heat generation, Annex I Parties are using considerably strengthened ETSs, which have a key role in this sector, indicator-specific targets, such as energy efficiency or electricity produced from renewable energy sources (implemented through economic and fiscal incentives and other market instruments), and regulations, in addition to the continued use of voluntary enterprise partnerships and long-term R&D. These PaMs are implemented to increase electricity and heat generation shares from energy sources that are less carbon-intensive than coal (i.e. renewable energy sources (RES), natural gas and nuclear energy). They also aim to increase the efficiency of generation, transmission and distribution through heat and power cogeneration, grid upgrades and distributed generation (i.e. small-scale generation). Another aim for several Annex I Parties is to stimulate the development, deployment and dissemination of new technologies, including carbon capture and storage (CCS) in the longer term.

16. To directly encourage the use of RES in electricity generation, many Annex I Parties, such as the EU, use framework targets administered through feed-in tariffs, tariff premiums, quota obligations (green certificates), investment grants or tax exemptions, or framework targets to be supported by subsidies, taxation measures and tariff regulation, such as in the Russian Federation. Other Annex I Parties use direct economic incentives and market instruments such as green certificates trading (Australia), tariff premiums (Canada), tax incentives and feed-in tariffs (Ukraine), and feed-in tariffs (Switzerland).

17. These actions increased the share of renewables and/or cleaner fossil fuels in the electricity supply mix of several Annex I Parties between 2000 and 2010 from 20–45 per

cent to 40–70 per cent (Belgium, Ireland, Portugal and Spain). For some Parties these actions led to a significant reduction in the GHG intensity of the energy supply (Hungary, Norway and Spain). For other Annex I Parties, high-carbon fossil fuels still account for a high proportion of the energy supply, mainly because of their continued reliance on domestic sources of coal and lignite (Australia, Bulgaria, Czech Republic, Estonia and Poland).

*Energy consumption*

18. Annex I Parties reported information in their NC5s, and updated it during the IDRs, on mitigation PaMs being implemented in all of the major energy end-use sectors. Most of the PaMs focus on improving energy efficiency (as opposed to fuel switching), and are generally sector-specific or even more narrowly targeted.

19. **Residential, commercial and public sectors.** Annex I Parties continue to use regulations, fiscal incentives, framework targets, information, voluntary enterprise partnerships, public facilities management and carbon taxes to mitigate emissions from these sectors. These PaMs aim to increase the energy efficiency of new and existing residential, commercial and public buildings, including their space heating, cooling and ventilation, water heating and lighting services (via designing, building, renovating and purchasing). These PaMs also aim to increase the energy efficiency of household appliances, home entertainment devices, office equipment and lamps (via manufacturing, retailing and purchasing). Also, the use of alternative energy supplies, including the purchase of ‘green’ electricity from renewable energy sources, is promoted by many PaMs.

20. **Industry sector.** Most of the PaMs reported in the NC5s and updated in the IDR reports focus on energy efficiency and emission reductions in energy-intensive industries, including CCS research. Only a few are aimed at less energy-intensive industries. Annex I Parties continued to use ETSS, regulations, voluntary sectoral commitments, voluntary enterprise partnerships, information and long-term R&D. The actions targeting improvements in energy efficiency led, together with structural shifts particularly in EIT Parties, to a considerable drop in energy and emission intensities in Annex I Parties in this sector.

21. **Transport sector.** As part of the NC5s and updated in the IDR reports, Annex I Parties provided information on PaMs for increasing the effectiveness and efficiency of transport, chiefly vehicle fuel economy and emission standards, as well as on PaMs for reducing the carbon intensity of the transport fuel mix. To increase efficiency, many Annex I Parties implemented or are planning to implement regulations to improve the energy efficiency and CO<sub>2</sub> emissions intensity of road vehicle fleets. Road vehicle fuel economy and CO<sub>2</sub> emission standards are implemented increasingly via mandatory regulations (gradually replacing voluntary approaches). Many of the standards have been newly established or substantially strengthened since the Kyoto Protocol entered into force; however, their stringency varies within a wide range (see box 2). The effectiveness of transport services is targeted by several measures addressing transport activity and structure through transport demand management and incentives for modal shifts towards less-polluting transport modes, such as public transport, cycling and walking, traffic-flow improvements and spatial planning. A number of PaMs aim at reducing the carbon intensity of the transport fuel mix through framework targets, regulations, other market instruments and long-term R&D. These PaMs also aim to increase the production, use and environmental sustainability of liquid biofuels and to promote the use of electricity, fuel cells and hydrogen in the long term.



## Box 2

**Road vehicle fuel economy and carbon dioxide emission standards**

**Australia:** the government is planning the introduction of a mandatory vehicle emissions standard for light-duty vehicles and has proposed average mandatory carbon dioxide (CO<sub>2</sub>) emission standards of 190 g/km by 2015 and 155 g/km by 2024. The actual emission levels set by the new standards will be determined in consultation with the vehicle industry and other key stakeholders.

**Canada:** passenger automobile and light truck greenhouse gas (GHG) emission regulations, aligned with similar regulations in the United States, were announced in 2010. These establish progressively more stringent GHG emission standards for new passenger automobiles and light trucks for the 2011–2016 model years.<sup>a</sup> In April 2012, the government also announced proposed regulations to reduce GHG emissions from new on-road heavy-duty vehicles, for the 2014 model year and beyond.

**European Union (EU):** a regulation is setting performance requirements for new light-duty passenger cars of 130 g CO<sub>2</sub>/km in 2012–2015 and 95 g CO<sub>2</sub>/km in 2020 as part of the EU's integrated approach to reducing CO<sub>2</sub> emissions from light-duty vehicles.

**Switzerland:** CO<sub>2</sub> emission regulations for new cars (average of 130 g CO<sub>2</sub>/km by 2015, mirroring the EU regulation) were introduced in July 2012, after the effects of a voluntary agreement with Swiss automobile importers were found to be insufficient.

**Japan:** had adopted the revised Top-Runner Standards programme (regulation), which emphasizes periodic recalibration for continued improvement of automobiles. Japan is currently (2012) planning to introduce new fuel-efficiency standards for passenger vehicles for 2020. The standards will improve fuel efficiency by 24.1 per cent compared with 2009.

<sup>a</sup> The Canadian government anticipates that the average GHG emission performance of the 2016 Canadian fleet of new cars and light trucks would be 153 g CO<sub>2</sub>/km (169 g CO<sub>2</sub>/km under the New European Driving Cycle). This would represent an approximately 20 per cent reduction compared with the new vehicle fleet that was sold in Canada in 2007.

### 3. Policies and measures in the non-energy sectors

#### *Industrial process and waste sectors*

22. The main focus of mitigation PaMs aimed at the non-energy sectors is on the waste and industrial processes sectors. For **industrial processes**, Annex I Parties continued to use regulations, reporting, voluntary enterprise partnerships, voluntary sectoral commitments and fiscal incentives (taxes). The most effective and most frequently used measures are those directed at fluorinated gases (F-gases), for example the EU F-gas regulation, while those aimed at CO<sub>2</sub> and nitrous oxide (N<sub>2</sub>O), for example abatement measures in the chemical industry, receive less attention. Concerning **waste**, Annex I Parties reported the continued use of framework targets, regulations, fiscal incentives, voluntary enterprise partnerships, and infrastructure and resource management. These PaMs target either the reduction of CH<sub>4</sub> emissions via waste minimization through reduced packaging, waste reuse through the implementation of waste separation and recycling, or landfill waste minimization through processing and incineration. Also, emissions from landfills are addressed by landfill gas capture or flaring. Generally, Annex I Parties are continuing to make wide use of the relatively low-cost options of mitigating non-CO<sub>2</sub> emissions in the industrial processes and waste sectors, and emission reductions in the waste sector are

particularly notable. However, there seems to be little remaining room for further emission reductions in these areas.

*Agriculture and land use, land-use change and forestry sectors*

23. Mitigation PaMs in the agriculture and land use, land-use change and forestry (LULUCF) sectors were applied to a somewhat lesser extent compared with the industrial processes and waste sectors. The measures tend to be part of larger policy strategies aimed at rural development, agricultural reform, environmental stewardship and biodiversity, and sustainable forest management, rather than being solely climate-focused. For **agriculture**, the PaMs include fiscal incentives (either direct or within the context of agricultural market reforms) and regulations to reduce N<sub>2</sub>O emissions through manure management and/or optimized nitrogen fertilizer use, and to reduce CH<sub>4</sub> emissions through changes in livestock management. For **LULUCF**, fiscal measures (subsidies) and regulations (environmental codes) for private lands, public infrastructure and resource management rules, and procedures for public lands and updating of the forest codes are used. These PaMs aim to promote sustainable forest management and afforestation and reforestation and other land management, and to prevent forest fires and increase green urban areas. Since the Kyoto Protocol entered into force, additional incentives for reducing emissions from deforestation and encouraging afforestation are provided by Annex I Parties, by either including forests in the ETS (New Zealand) or linking voluntary activities relating to emissions from LULUCF through domestic offsets to the ETS (Australia's Carbon Farming Initiative).

### **C. Reported effects of policies and measures on greenhouse gas emissions**

24. Although quantitative estimates of the expected mitigation effects of individual PaMs are not a mandatory reporting requirement for national communications, the estimated expected effects of many PaMs are reported in the NC5s and updated in the IDR reports. However, the estimates are not necessarily comparable across Annex I Parties because they rely on differing categorizations, methodological approaches, modelling procedures and baseline assumptions, and Parties associate relatively high uncertainties with their estimates. In addition, approaches differ in accounting for policy synergies and interactions, which in many cases make the quantification of cross-cutting PaMs like ETSs challenging, as these are usually accompanied by specific PaMs targeting, for example, RES and energy efficiency. Therefore, given the uncertainties and methodological issues related to the effects of PaMs reported by Annex I Parties and updated during the IDRs, these effects should be considered as an indication of the scale of emission savings Parties expected from their PaMs, usually calculated from a hypothetical 'business as usual' scenario in which PaMs are excluded, and not as precise absolute values of emission reductions delivered by specific PaMs or PaMs portfolios.

25. The total effects of PaMs, as reported in the NC5s and updated in the IDR reports, indicate that implemented and adopted PaMs were expected to lead to GHG emissions savings of around 735 Tg CO<sub>2</sub> equivalent (eq) in 2010, excluding LULUCF.<sup>7</sup> In most cases, Annex I Parties calculated these savings against a 'business as usual' scenario. Although there are methodological differences across assessments and estimated savings are not directly comparable with the GHG emissions reported in the inventories, this number indicates that without the implemented PaMs, total emissions in 2010, excluding LULUCF, (see para. 37 below) could have been 7 per cent higher. Furthermore, some Annex I Parties expected to implement additional measures, which were expected to lead to additional

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<sup>7</sup> The numbers differ from the effects reported in document FCCC/SBI/2011/INF.2 owing to updates provided by Parties during the reviews, which were considered in this report, whereas the information contained in document FCCC/SBI/2011/INF.2 is solely based on NC5 information.

emission savings of about 117 Tg CO<sub>2</sub> eq in 2010. In the absence of a full implementation of all implemented, adopted and anticipated additional PaMs (with total expected savings of 852 Tg CO<sub>2</sub> eq in 2010), total emissions in 2010, excluding LULUCF, could have been a total of 8 per cent higher (with additional measures contributing another percentage point). More than 90 per cent of these additional savings were expected to occur in the energy sector.

26. Most of the emission savings from implemented and adopted PaMs were expected to occur in the stationary energy sector (energy supply plus stationary energy consumption), which alone was expected to account for 74 per cent of the total savings in 2010. The total effect of PaMs in the industrial processes sector was estimated to represent 12 per cent of the total savings, and 7 per cent total savings for transport. The smallest effects are estimated for PaMs in the agriculture and waste sectors (both 3 per cent), which is consistent with the low share of these sectors in the total emissions of Annex I Parties. A few Annex I Parties also provided estimates of mitigation effects in the LULUCF sector, which in total amounted to 81 Tg CO<sub>2</sub> eq in 2010.

27. Based on the mitigation effects of PaMs reported by Parties, the following observations can be formulated:

(a) Policy efforts that in many cases began in the 1990s and early 2000s appear to have begun yielding the result of limiting growth in GHG emissions;

(b) Annex I Parties continued to target mostly emissions from the energy sector, which is the sector for which the largest emission savings were reported. In the non-energy sectors, emission savings from mitigation PaMs and PaMs that go beyond climate change have not been as extensively assessed as PaMs in the energy sector. In addition, Parties do not systematically monitor and report the emission reductions achieved by all PaMs ex post. As a result, reported expected savings are not always reflected in the observed emissions trends by sector as reported in the national inventories;

(c) Some Annex I Parties have progressed through one or more policy cycles and are now implementing second- and third-generation policy strategies and PaMs that are improved by lessons learned and likely to be more effective in reducing emissions than previous efforts.

### **III. Domestic actions undertaken to meet the targets under the Kyoto Protocol**

28. According to the information provided in the NC5s and as updated in the IDR reports, 21 Annex I Parties are planning to meet their targets under the Kyoto Protocol by domestic action alone (Australia, Bulgaria, Czech Republic, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Latvia, Lithuania, Monaco, New Zealand, Poland, Romania, Russian Federation, Slovakia, Sweden, Ukraine and United Kingdom), whereas 14 Annex I Parties report that they expect to meet their targets under the Kyoto Protocol only by a combination of domestic action and the use of Kyoto Protocol mechanisms

(Austria,<sup>8</sup> Belgium, Denmark, Ireland, Italy,<sup>9</sup> Japan, Liechtenstein, Luxembourg, Netherlands, Norway, Portugal, Slovenia, Spain and Switzerland).

29. The EU-15 (the 15 member States that formed the European Community at the time of ratification of the Kyoto Protocol (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and United Kingdom)) as a whole expects to meet its Kyoto target under the provisions of Article 4 by domestic efforts alone, based on updated projections provided during the IDRs. Within the EU-15, a number of member States report that they expect to outperform their targets set under Article 4 of the Kyoto Protocol using domestic efforts alone. However, as outlined above, some member States will require the use of the Kyoto Protocol mechanisms to reach their individual targets and are taking action to that end. Two Annex I Parties (Croatia<sup>10</sup> and Canada<sup>11</sup>) are currently not contemplating significant use of Kyoto Protocol mechanisms, although projections in the IDR reports indicate that they cannot meet their Kyoto targets with implemented domestic action alone.

30. According to the available information, EIT Annex I Parties, except Slovenia, report that they expect to meet their targets under the Kyoto Protocol with domestic action alone. However, most EIT Annex I Parties, of which many have surplus assigned amount units (AAUs), participate in the Kyoto Protocol mechanisms, either for capacity-building and facilitating technology transfer (joint implementation under Article 6) or for financing their climate-related PaMs, for example green investment schemes, using the revenues from the sale of AAUs (emissions trading under Article 17). Nine Parties included in Annex II to the Convention (Annex II Parties) (Australia, Finland, France, Germany, Greece, Iceland, New Zealand, Sweden and United Kingdom), and Monaco, are also planning to meet their targets without the use of Kyoto Protocol mechanisms. Nevertheless, most of these Parties participate in the mechanisms to some extent, either to support other Parties with capacity-building or because of private-sector involvement through ETSs (see also para. 32 below).

31. The remaining, mainly Annex II, Parties that are planning to use the mechanisms for complying with their Kyoto targets provided information on how their domestic action constitutes a significant element of the effort made to meet their targets and hence meet the supplementarity requirements. Many of these Parties defined criteria, either in quantitative or qualitative terms, on how their use of mechanisms is supplemental to domestic action. However, in the absence of an agreed common criteria, the definition of supplementarity<sup>12</sup> varies from Party to Party. In addition, differences exist between Annex I Parties in

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<sup>8</sup> In the IDR report, the expert review team (ERT) noted that a gap to the target still remains even after taking into account the planned use of Kyoto units. The ERT thus concluded that Austria may need to use additional Kyoto units in order to meet its target. However, at the time of the review no formal decision had been taken nor had an additional budget been reserved for that purpose.

<sup>9</sup> In the IDR report, the ERT noted that a gap to the target still remains even after taking into account the planned use of Kyoto units and that Italy expected to fill this gap by purchasing additional Kyoto units. However, at the time of the review this further purchase of Kyoto units had not been approved within Italy.

<sup>10</sup> The projections reported in the NC5 indicate that Croatia is in a position to meet its Kyoto target using domestic PaMs only; however, this assessment was based on a Kyoto target of 33.08 Tg CO<sub>2</sub> eq/year on average during the period 2008–2012. After the withdrawal of Croatia's appeal against the final decision of the enforcement branch of the Compliance Committee and acceptance of the initial review values at the end of 2011, its Kyoto target equals 29.76 Tg CO<sub>2</sub> eq/year on average during the period 2008–2012. According to the IDR report, Croatia may not be in a position to meet its Kyoto target, set in the report of the review of the initial report, using domestic action only.

<sup>11</sup> Canada submitted to the Depositary a notification of withdrawal from the Kyoto Protocol and the withdrawal will be effective as of 15 December 2012.

<sup>12</sup> The definitions of supplementarity vary from Party to Party, while remaining within the broad definition contained in decision 15/CMP.1, annex, paragraph 33.

quantifying the contribution of domestic action versus the use of mechanisms, which resulted mostly from the different baseline assumptions to estimate the total effect of domestic actions. Notwithstanding these differences and challenges, information provided in the NC5s and updated in the IDR reports broadly suggests that Annex I Parties that are using mechanisms to meet their Kyoto targets are striving to adhere to their defined supplementarity criteria.

32. In addition to Annex I Parties' participation in the Kyoto Protocol mechanisms, some Parties' policies allow for private-sector use of mechanisms to fulfil policy-related targets. The most prominent example of these policies is the EU ETS. The EU member States, for example, through the EU linking directive, allow companies covered by the EU ETS to meet their emission reduction targets by reducing emissions, acquiring emission allowances from the market and using the Kyoto Protocol mechanisms. Usually, these policies set a limit on the private-sector use of Kyoto units and, hence, such use may not be expected to lead to the use of mechanisms for Annex I Parties' compliance with the Kyoto targets that go beyond the requirement for supplementarity.

## **IV. Greenhouse gas and per capita carbon dioxide emission trends**

### **A. Approach**

33. Chapter IV examines the extent to which Annex I Parties that are also Parties to the Kyoto Protocol<sup>13</sup> and non-Annex I Parties managed to narrow their per capita GHG emissions differences while working towards the achievement of the ultimate objective of the Convention. In order to do a sound comparison, Annex I Parties' and non-Annex I Parties' per capita emission trends should be based on data sets that are consistent across Parties. This raises some challenges, since while Annex I Parties are required to submit their national GHG emissions inventory report annually to the secretariat, non-Annex I Parties are required to submit GHG emissions inventory information as part of their national communication, which until 2014 is not due on a frequent or regular basis. Consequently, time-series data for GHG emissions are not complete for most non-Annex I Parties.

34. To compare the trends in per capita emissions between Annex I Parties and non-Annex I Parties, other data sources were investigated and data from the IEA were selected. However, the IEA database did not include total GHG emissions full time-series for both Annex I Parties and non-Annex I Parties. This is why full data sets for CO<sub>2</sub> emissions from fuel combustion were selected (as they were complete for the most Parties) and used to calculate the per capita emissions trends used in the comparison between Annex I and non-Annex I Parties.

35. Chapter IV.B examines Annex I Parties' GHG emission trends as well as trends in CO<sub>2</sub> emissions from fuel combustion using UNFCCC data only. It also assesses the extent to which the trends in CO<sub>2</sub> emissions from fuel combustion capture the essential features of the total aggregate GHG emission trends of Annex I Parties. Chapter IV.C assesses the comparability of UNFCCC and IEA CO<sub>2</sub> emissions from fuel combustion data for Annex I Parties. It then compares the trends in per capita CO<sub>2</sub> emissions between Annex I and non-Annex I Parties and concludes that the initial gap has narrowed by about 36 per cent.

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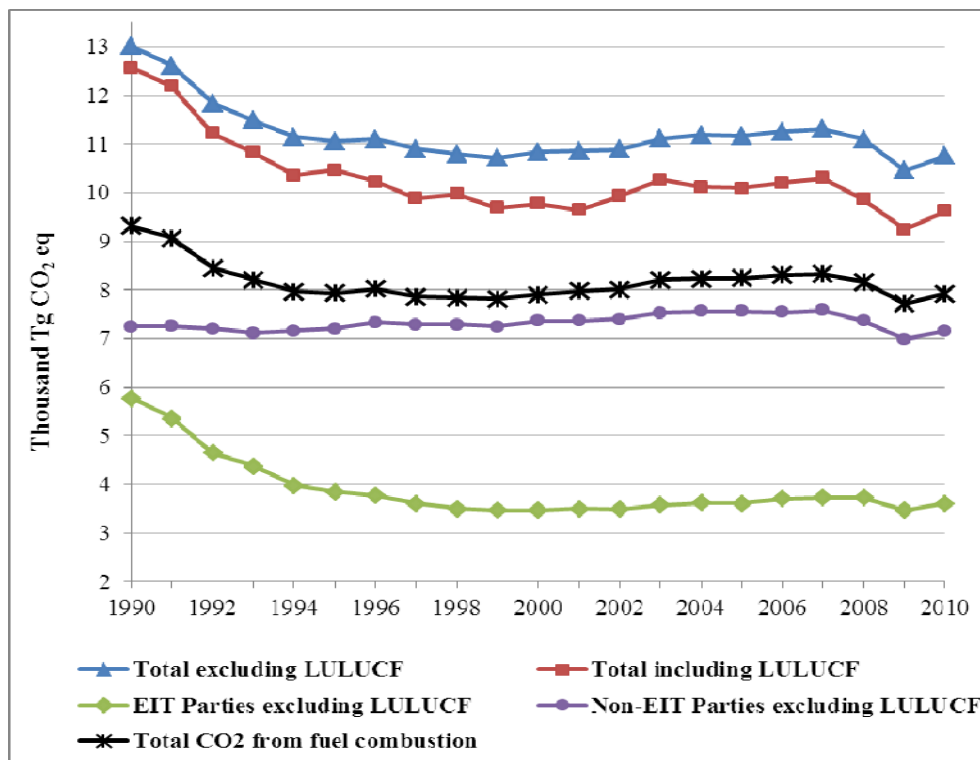
<sup>13</sup> Refers to Annex I Parties that are also Parties to the Kyoto Protocol and therefore includes Kazakhstan.

**B. Total aggregate greenhouse gas emission trends**

36. To set the context for the consideration of per capita emissions, chapter IV.B presents GHG emission trends of Annex I Parties that are also Parties to the Kyoto Protocol. The information included in this section is based on data reported by Annex I Parties in their 2012 national GHG inventory submissions to the secretariat, which contain GHG emissions data up to and including 2010. Figure 1 presents Annex I Parties’ total aggregate GHG emission trends excluding and including emissions and removals from LULUCF, as well as trends in GHG emissions excluding LULUCF from Annex I Parties that are EIT Parties and non-EIT Parties. It also shows total CO<sub>2</sub> emissions of Annex I Parties from fuel combustion.

37. Over the period 1990–2010, the total aggregate GHG emissions excluding LULUCF of Annex I Parties decreased by about 17.3 per cent, from 13.0 to 10.8 thousand Tg CO<sub>2</sub> eq. Total aggregate GHG emissions including LULUCF decreased by 23.4 per cent, from 12.6 to 9.6 thousand Tg CO<sub>2</sub> eq. During the same period, EIT Annex I Parties decreased their GHG emissions excluding LULUCF by 37.4 per cent, while those of non-EIT Annex I Parties decreased by 1.3 per cent. More information on individual non-EIT Annex I Parties is provided in figure 2.

Figure 1  
**Greenhouse gas emissions of Annex I Parties that are also Parties to the Kyoto Protocol**



Source: National greenhouse gas inventory submissions for 2012. Available at <[http://unfccc.int/ghg\\_data/ghg\\_data\\_unfccc/items/4146.php](http://unfccc.int/ghg_data/ghg_data_unfccc/items/4146.php)>.

Abbreviations: CO<sub>2</sub> = carbon dioxide, EIT Parties = Parties with economies in transition, LULUCF = land use, land-use change and forestry, non-EIT Parties = Parties that do not have economies in transition.

38. Four phases can be identified from figure 1 in the GHG emission trends: 1990–2000, 2000–2007, 2007–2009 and 2009–2010. Decreases in total aggregate GHG emissions essentially occurred during 1990–2000, with a 16.8 per cent decrease excluding LULUCF and a 22.2 per cent decrease including LULUCF. These decreases were mainly due to the significant drop in GHG emissions (excluding LULUCF) from EIT Annex I Parties, largely reflecting a drop in CO<sub>2</sub> emissions from fuel combustion, which can in turn be attributed to the decline in economic output in the early and mid-1990s, followed by the replacement of a number of carbon-intensive technologies by more energy-efficient technologies.

39. Between 2000 and 2007, total aggregate Annex I Party GHG emissions increased by 4.4 per cent and 5.3 per cent excluding and including LULUCF, respectively. Over the same period, EIT Annex I Parties and non-EIT Annex I Parties increased their GHG emissions (excluding LULUCF) by 7.5 per cent and 3.0 per cent, respectively. In their NC5s and updated in IDR reports, most Annex I Parties reported that, despite having started to implement mitigation PaMs, GHG emissions increased as a result of sustained economic growth based on the use of fossil fuels as the primary source in their energy mix.

40. The mid-2007 global financial crisis caused most Annex I Parties to enter an economic recession, which for many lasted until late 2009. With a significant slowdown in economic activities, for the most part still relying on fossil fuel use, Annex I Parties' GHG emissions excluding and including LULUCF dropped by 7.6 per cent and 10.3 per cent, respectively, over the period 2007–2009. EIT Annex I Parties and non-EIT Annex I Parties both saw their GHG emissions (excluding LULUCF) decrease as a result of the recession. While EIT Annex I Parties' GHG emissions (excluding LULUCF) peaked in 2008, those of non-EIT Annex I Parties peaked in 2007, before dropping as a result of the recession. From their peak value to the lowest point in 2009, GHG emissions (excluding LULUCF) of EIT Annex I Parties and non-EIT Annex I Parties decreased by 7.0 per cent and 7.9 per cent, respectively.

41. From 2009 to 2010, most Annex I Parties slowly regained economic momentum and total aggregate GHG emissions increased (a 2.9 per cent increase excluding LULUCF and a 4.2 per cent increase including LULUCF). EIT Annex I Parties experienced a 4.1 per cent increase in GHG emissions, a value larger than the 2.4 per cent growth in non-EIT Annex I Parties' emissions.

42. In 1990, CO<sub>2</sub> emissions from fuel combustion of Annex I Parties that are also Parties to the Kyoto Protocol amounted to around 71.6 per cent of total GHG emissions excluding LULUCF, a share that increased to 73.8 per cent in 2005 and varied little until 2010 (73.6 per cent). One important factor behind this increase in share, although CO<sub>2</sub> emissions decreased by about 14.9 per cent between 1990 and 2010, is the fact that GHG emission reductions that occurred in other sectors outpaced the reduction of CO<sub>2</sub> emissions from fuel combustion. More specifically, the largest emission reductions took place in agriculture (30.7 per cent), followed by industrial processes (25.1 per cent) and waste (6.6 per cent). As a result, emissions of CH<sub>4</sub> and NO<sub>2</sub> decreased accordingly (by 22.2 per cent and 34.6 per cent, respectively), leading overall to an increased share of CO<sub>2</sub> emissions in total GHG emissions.

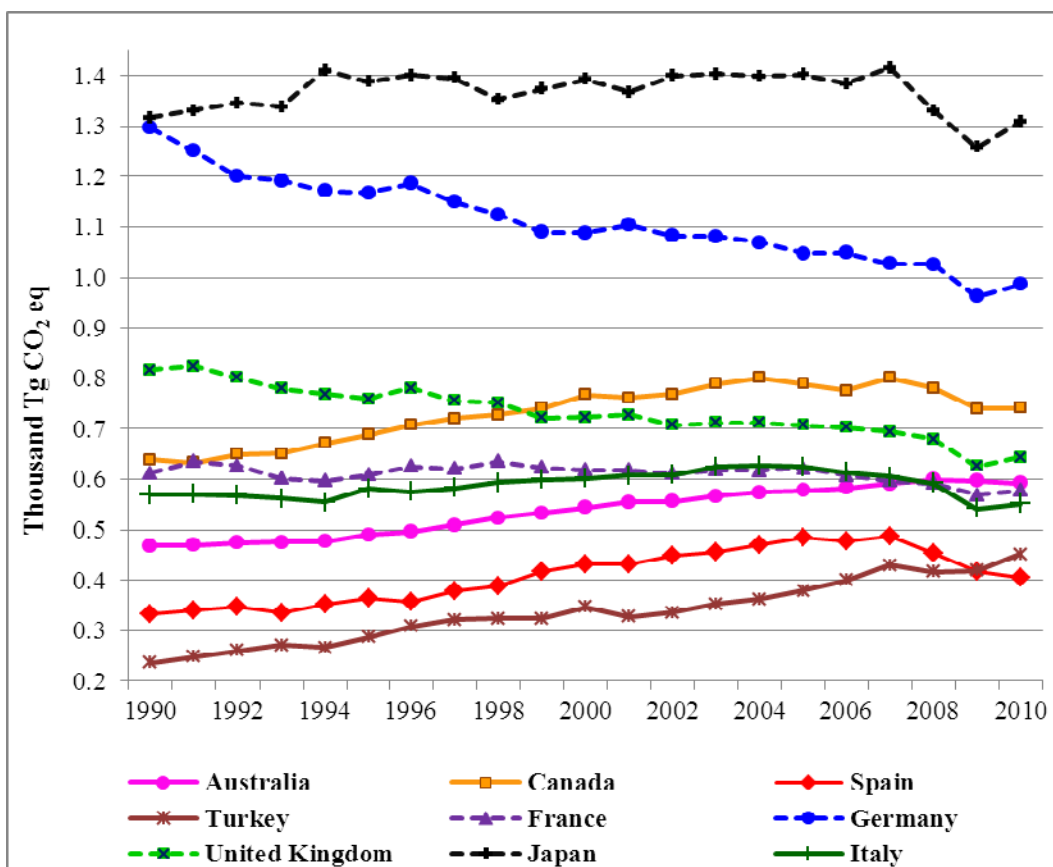
43. Finally, figure 1 shows that the changes in total CO<sub>2</sub> emissions of Annex I Parties from fuel combustion follow very closely the changes in total aggregate GHG emissions. This correlation, outlined in the analysis above, also indicates that CO<sub>2</sub> emissions from fuel combustion represent a reliable substitute for total aggregate GHG emissions excluding LULUCF during 1990–2010 wherever full data sets are not available.

44. Figure 2 shows the GHG emission trends excluding LULUCF of major non-EIT Annex I Parties and highlights that while some Parties increased substantially their GHG emissions (Australia, Canada, Spain and Turkey), others had their emissions decrease

(Germany and United Kingdom) or stabilize (France and Japan). This led overall to a slight decrease in GHG emissions between 1990 and 2010 by the non-EIT Annex I Parties as a group (1.3 per cent).

45. The GHG emissions data and trends reported by Parties in their annual inventory submissions to the secretariat do not necessarily distinguish the causes of observed changes in emission levels or quantify the effects attributable to factors such as the global economic recession, autonomous energy-efficiency improvements (not directly related to mitigation PaMs) and mitigation PaMs. To some extent, such factors have been explained in the NC5s and IDRs. Therefore, most of the emission reductions that occurred in EIT Annex I Parties have been attributed to the economic decline and restructuring in the early to mid-1990s and not to explicit mitigation PaMs, which is consistent with these Parties reporting fewer PaMs than non-EIT Annex I Parties. On the other hand, the considerable number of PaMs with their total effects reported in the NC5s and updated in the IDR reports give an indication of how PaMs were expected to influence the emissions levels in 2010 and beyond (see para. 25 above).

Figure 2  
**Greenhouse gas emissions excluding land use, land-use change and forestry of Annex I Parties that do not have economies in transition that are also Parties to the Kyoto Protocol and that have the largest contribution to total aggregate emissions**



Source: National greenhouse gas inventory submissions for 2012. Available at <[http://unfccc.int/ghg\\_data/ghg\\_data\\_unfccc/items/4146.php](http://unfccc.int/ghg_data/ghg_data_unfccc/items/4146.php)>.

Note: The EU-15 as a Party is not included since total aggregate GHG emissions of Annex I Parties are calculated based on the 15 individual member States contributions. Adding EU-15 GHG emissions to the total aggregate GHG emissions of Annex I Parties would lead to double counting of emissions.



46. The average GHG emissions level excluding LULUCF attained over 2008–2010 (10.8 thousand Tg CO<sub>2</sub> eq.) by Annex I Parties that are also Parties to the Kyoto Protocol is 17.3 per cent below the 1990 level. This suggests that these Parties are well on track to achieving a level that is consistent with the Kyoto Protocol goal of Article 3, paragraph 1, of an overall reduction in GHG emissions to a level that is at least 5 per cent below the 1990 GHG emissions level in the commitment period 2008–2012. Concurrently, under the Convention, Annex I Parties decreased their GHG emissions level excluding LULUCF by 8.4 per cent<sup>14</sup> during 1990–2010.

47. While Annex I Parties that are also Parties to the Kyoto Protocol have reported the implementation of a large number of mitigation PaMs, the trend in total aggregate GHG emissions over 1990–2010 remained nevertheless governed by the effects of global and national macroeconomic events on their domestic economic activities and output. Most Parties reported that this is mainly because economic activities continued to rely principally on fossil fuels, which in turn continued to account for the bulk of the energy supply mix of these Parties. In addition, although Annex I Parties reported implementing many PaMs for substituting fossil fuels with less carbon-intensive or renewable sources of energy, as well as PaMs for reducing energy use through increased energy efficiency, the rates of substitution and efficiency gains were not yet sufficient to decouple the economic growth rates from GHG emissions.

### C. Trends in per capita carbon dioxide emissions across Annex I Parties and non-Annex I Parties

48. As mentioned in chapter IV.A, UNFCCC time-series data for GHG emissions are incomplete for most non-Annex I Parties. Based on the availability, quality and comparability of data, and given that CO<sub>2</sub> emissions from fuel combustion account by far for the bulk of emissions of all Parties (around 73 per cent of total Annex I Parties' GHG emissions excluding LULUCF over the period 1990–2010) and also that their trend mirrors very closely the trend in total GHG emissions, the IEA CO<sub>2</sub> emissions from fuel combustion were selected as an alternative and are examined below.

49. To illustrate the comparability of UNFCCC and IEA data for Annex I Parties' CO<sub>2</sub> emissions from fuel combustion, figure 3 presents data trends from both sources over the period 1990–2009.<sup>15,16</sup> The trends from both sources are very similar and the difference in most years lies between 3 per cent and 4 per cent, with a maximum difference observed for 2008, where the UNFCCC emissions data are 4.5 per cent lower than the IEA data. This is in line with the IEA's assessment of the differences between both data sets and of the reasons that underpin this difference.<sup>17,18</sup> Based on this, it was assessed that IEA data were comparable with UNFCCC data for Annex I Parties and that under the circumstances it was reasonable to assume that the IEA data for non-Annex I Parties' trends in CO<sub>2</sub> emissions from fuel combustion would also be comparable with UNFCCC data if such complete times-series data existed.

<sup>14</sup> Decreases are for all Annex I Parties and not only those that are Parties to the Kyoto Protocol.

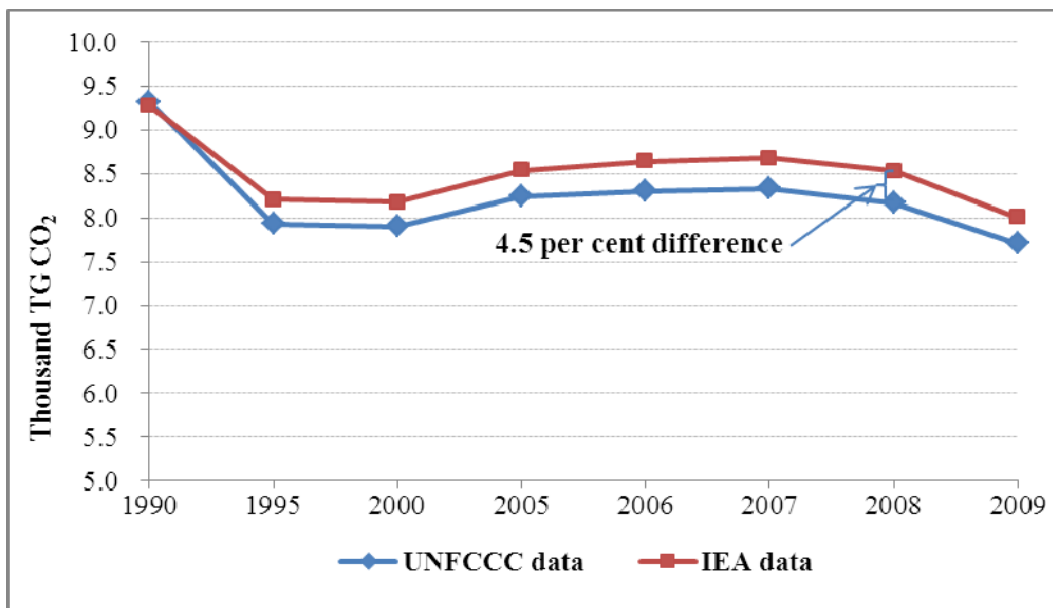
<sup>15</sup> IEA data for 2010 were not available at the time of publication.

<sup>16</sup> Both sources report data for Intergovernmental Panel on Climate Change (IPCC) category 1.A (fuel combustion) using the sectoral approach.

<sup>17</sup> As footnote 5 above.

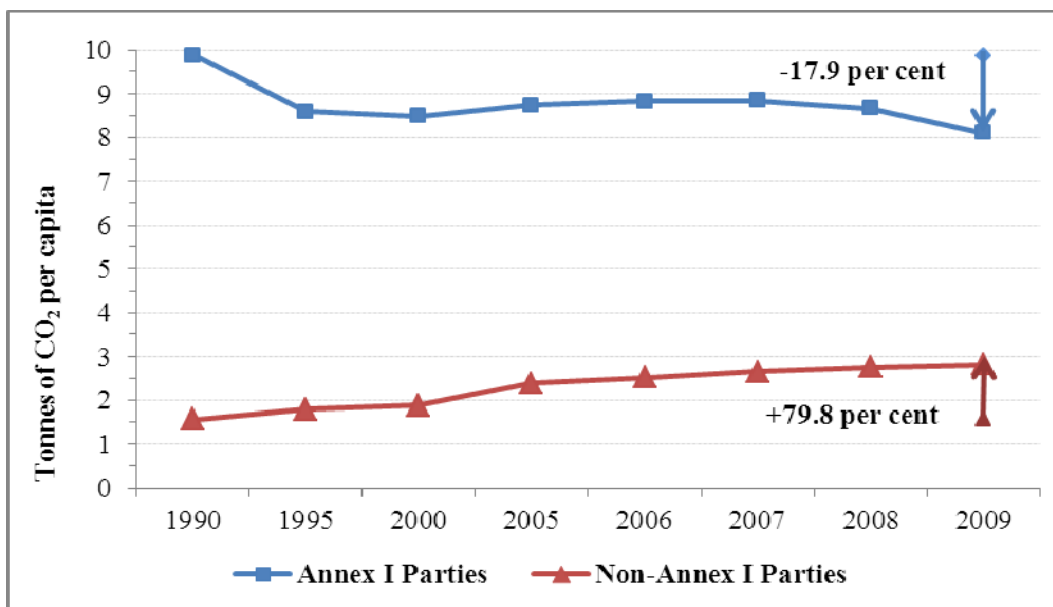
<sup>18</sup> The IEA emissions are calculated using the IPCC tier 1 for all Parties. The UNFCCC data are calculated by each Party using methods that in many cases correspond to higher tiers (IPCC tier 2 or tier 3) or country-specific methods that are more accurate than the IEA approach. In this context, using lower tiers is known to lead to estimates that are more conservative and result in higher values than more accurate methods.

Figure 3  
**Difference between UNFCCC and International Energy Agency data for Annex I Parties' carbon dioxide emissions from fuel combustion**



Source: National greenhouse gas inventory submissions for 2012, available at <[http://unfccc.int/ghg\\_data/ghg\\_data\\_unfccc/items/4146.php](http://unfccc.int/ghg_data/ghg_data_unfccc/items/4146.php)>, and International Energy Agency, *CO<sub>2</sub> Emissions from Fuel Combustion* (2011 edition), available at <<http://wds.iea.org/WDS/Common/Login/login.aspx>>. Abbreviation: IEA = International Energy Agency.

Figure 4  
**Annex I Parties' and non-Annex I Parties' per capita carbon dioxide emissions from fuel combustion**



Source: Prepared by the secretariat using data from the International Energy Agency, *CO<sub>2</sub> Emissions from Fuel Combustion* (2011 edition). Available at <<http://wds.iea.org/WDS/Common/Login/login.aspx>> .

50. IEA data were also used for the populations of Annex I Parties and non-Annex I Parties in order to calculate per capita CO<sub>2</sub> emissions. The resulting 1990–2009 trends in per capita CO<sub>2</sub> emissions from fuel combustion for Annex I Parties and non-Annex I Parties are illustrated in figure 4. Annex I Parties overall decreased their per capita emissions by 17.9 per cent, whereas non-Annex I Parties together increased their emissions per capita by 79.8 per cent, but starting from very low levels. In other words, the initial gap of 8.3 tonnes per capita that existed in 1990 between Annex I Parties and non-Annex I Parties narrowed to 5.3 tonnes per capita in 2009, a decrease of 36 per cent of the initial gap. This suggests that Parties managed to narrow the difference in emissions per capita between Annex I Parties and non-Annex I Parties while working towards the ultimate objective of the Convention. However, the difference in the per capita emissions remains significant, even taking into account the relatively small uncertainty usually attributed to the estimation of CO<sub>2</sub> emissions from fossil fuel combustion used for this comparison.

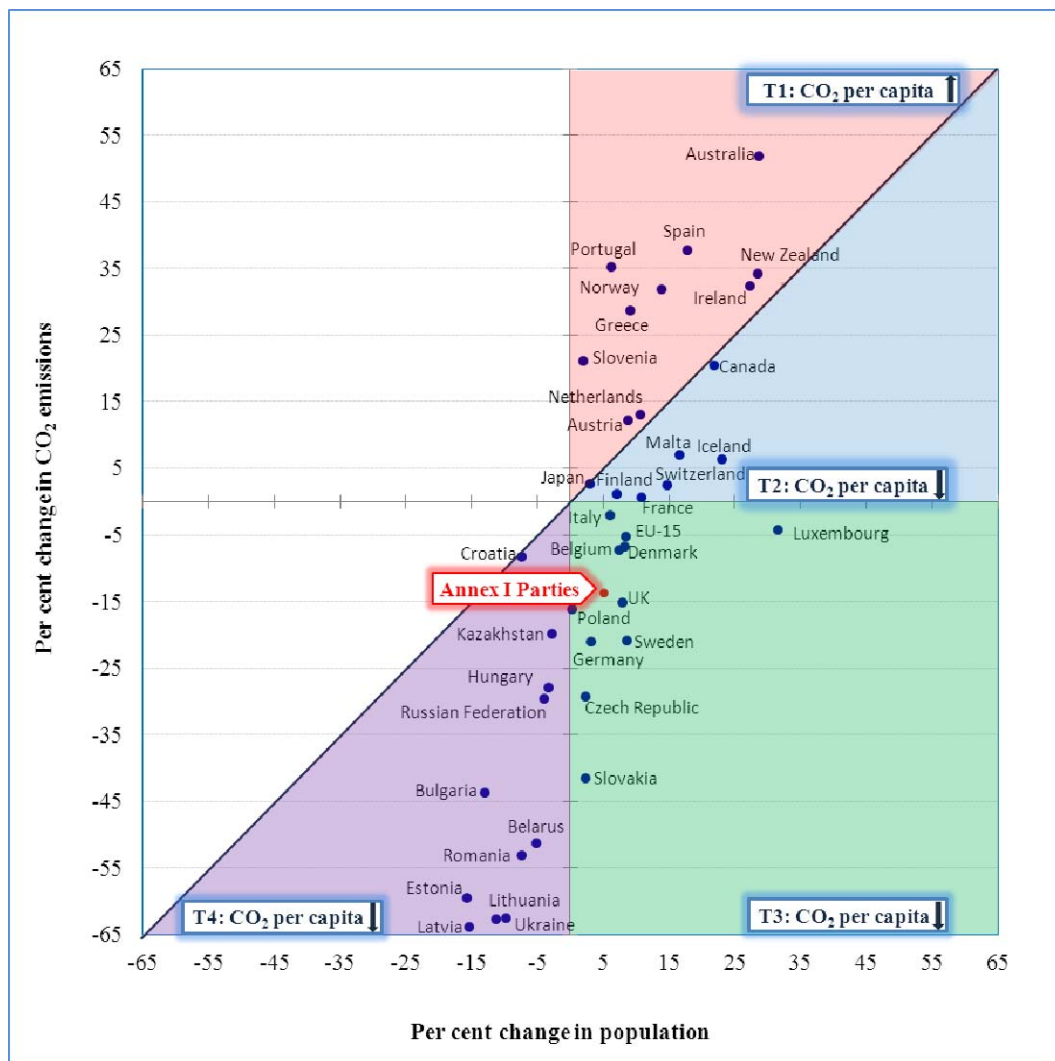
51. Figure 5 presents Annex I Parties' 1990–2009 per cent change in CO<sub>2</sub> emissions from fuel combustion against the per cent change in population. Overall, the total population of Annex I Parties increased by 5.2 per cent, while their total aggregate CO<sub>2</sub> emissions from fuel combustion decreased by 13.7 per cent (see figure 5, Annex I label). As a result, Annex I Parties' CO<sub>2</sub> per capita emissions decreased by 17.9 per cent between 1990 and 2009, as indicated in figure 4.<sup>19</sup>

52. There is a wide range of Party-specific trends behind the average trend for Annex I Parties as a group. Figure 5 illustrates these differences in individual Parties' trends and shows that for most Parties there is a positive correlation between the change in population and the change in CO<sub>2</sub> emissions, suggesting that population is a determinant factor in the increase or decrease of CO<sub>2</sub> emissions from fuel combustion. Although they are not explicitly considered in this report, other key factors that influence the change in CO<sub>2</sub> emissions include changes in gross domestic product (GDP), the effect of climate change and energy mitigation PaMs as well as significant peaks of hot or cold weather.

53. For the majority of Annex I Parties, per capita CO<sub>2</sub> emissions from fuel combustion decreased. For Parties in the T3 square in the figure, including Annex I Parties as a group, population increased, while CO<sub>2</sub> emissions decreased, resulting in a decrease in per capita CO<sub>2</sub> emissions (Belgium, Czech Republic, Denmark, EU-15, Germany, Italy, Luxemburg, Poland, Slovakia, Sweden and United Kingdom). At least in part, this negative correlation between the change in population and the change in CO<sub>2</sub> emissions points to other determinant factors and could include the effect of PaMs, especially for Parties that experienced a strong economic growth during 1990–2009. The T2 triangle comprises Parties for which CO<sub>2</sub> emissions increased, but since the population increased even more, the net result is a decrease in per capita CO<sub>2</sub> emissions (Canada, Finland, France, Iceland, Japan, Malta and Switzerland). The T4 triangle shows Parties for which both the population and CO<sub>2</sub> emissions decreased, but since CO<sub>2</sub> emissions decreased more than the population, this results in a net decrease in per capita CO<sub>2</sub> emissions (Belarus, Bulgaria, Croatia, Estonia, Hungary, Kazakhstan, Latvia, Lichtenstein (not shown), Lithuania, Romania, Russian Federation and Ukraine). This group of Parties is the one with the lowest GDP growth over the period 1990–2009.

<sup>19</sup> While figure 4 shows the change in per capita CO<sub>2</sub> emissions during 1990–2009, figure 5 shows the change in CO<sub>2</sub> emissions against the change in population. Note that the change in per capita CO<sub>2</sub> emissions (figure 4) is not mathematically equivalent to dividing the change in CO<sub>2</sub> emissions by the change in population, so the data in figure 4 are not the same as in, and cannot be calculated from the data as presented in, figure 5.

Figure 5  
**Per cent change in carbon dioxide emissions from fuel combustion and the populations of Annex I Parties 1990–2009**



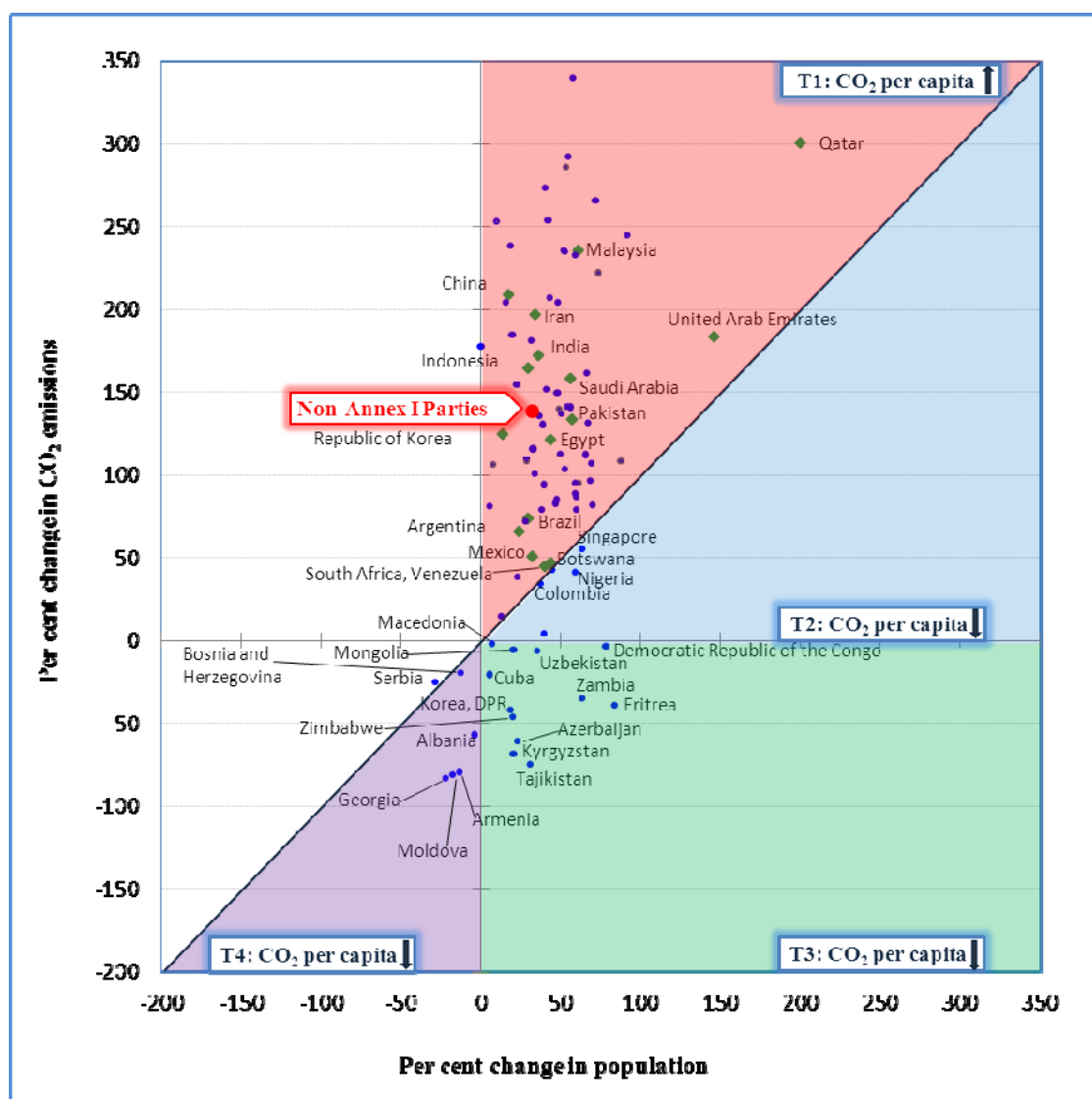
Source: Prepared by the secretariat using data from the International Energy Agency. *CO<sub>2</sub> Emissions from Fuel Combustion* (2011 edition). Available at <<http://wds.iaea.org/WDS/Common/Login/login.aspx>>. Abbreviation: UK = United Kingdom of Great Britain and Northern Ireland.

54. Finally, the T1 triangle in figure 5 shows the one group of Annex I Parties that increased their per capita CO<sub>2</sub> emissions (Australia, Austria, Greece, Ireland, Netherlands, New Zealand, Norway, Portugal, Slovenia, Spain and Turkey (not shown)). For this group of Parties, which experienced an economic growth relatively stronger than other Parties over the period 1990–2009, the per cent change in CO<sub>2</sub> emissions is larger than the per cent change in population.

55. For non-Annex I Parties, figure 6 shows that the total population during 1990–2009 grew by 32.8 per cent, while the total aggregate CO<sub>2</sub> emissions from fuel combustion increased by 138.9 per cent. Together, these non-Annex I Parties increased their per capita

CO<sub>2</sub> emissions from fuel combustion by 79.8 per cent (see figure 4).<sup>20</sup>

Figure 6  
**Per cent change in carbon dioxide emissions and the populations of non-Annex I Parties 1990–2009**



Source: Prepared by the secretariat using data from the International Energy Agency. Available at <<http://wds.iea.org/WDS/Common/Login/login.aspx>>.

Note: Iran = Iran (Islamic Republic of), Korea DPR = Democratic People’s Republic of Korea, Macedonia = the former Yugoslav Republic of Macedonia, Moldova = Republic of Moldova, Venezuela = Venezuela (Bolivarian Republic of).

<sup>20</sup> While figure 4 shows the change in per capita CO<sub>2</sub> emissions during 1990–2009, figure 6 shows the change in CO<sub>2</sub> emissions against the change in population. Note that the change in per capita CO<sub>2</sub> emissions (figure 4) is not mathematically equivalent to dividing the change in CO<sub>2</sub> emissions by the change in the population, so the data in figure 4 are not the same as in, and cannot be calculated from the data as presented in, figure 6.

56. There is also a wide spectrum of Party-specific circumstances that led to this average result for these non-Annex I Parties. As is the case for Annex I Parties, most non-Annex I Parties exhibit a positive correlation between population change and CO<sub>2</sub> emissions change and, notably, most of these countries saw their CO<sub>2</sub> emissions growth surpass their population growth. Although it does not include all of the non-Annex I Parties, this group comprises most of them and all the Parties with major economies (e.g. Brazil, China, India, Indonesia, Iran (Islamic Republic of), Republic of Korea, Malaysia, Mexico, Pakistan, Saudi Arabia, South Africa, Thailand and United Arab Emirates) and is therefore representative of the overall trend of emissions per capita for non-Annex I Parties. The T1 triangle in figure 6 shows the group of non-Annex I Parties that increased their per capita CO<sub>2</sub> emissions (Argentina, Brazil, China, Egypt, India, Indonesia, Iran (Islamic Republic of), Republic of Korea, Malaysia, Mexico, Pakistan, Saudi Arabia, South Africa, Thailand, United Arab Emirates and Viet Nam (not shown)). For this group of Parties, which experienced an average economic growth much higher than most other non-Annex I Parties over the period, the per cent change in CO<sub>2</sub> emissions is larger than the per cent change in the population.

57. For almost all of the other Parties, per capita CO<sub>2</sub> emissions from fuel combustion decreased. The T2 triangle comprises non-Annex I Parties for which CO<sub>2</sub> emissions increased, but since the population increased even more, the net result is a decrease in per capita CO<sub>2</sub> emissions (e.g. Botswana, Colombia, Nigeria and Singapore). For Parties in the T3 square, the population increased, while CO<sub>2</sub> emissions decreased, resulting in a decrease in per capita CO<sub>2</sub> emissions for 12 non-Annex I Parties included in this analysis (Azerbaijan, Cuba, Democratic People's Republic of Korea, Democratic Republic of the Congo, Eritrea, Kyrgyzstan, Mongolia, Tajikistan, the former Yugoslav Republic of Macedonia, Uzbekistan, Zambia and Zimbabwe). Finally, the T4 triangle shows Parties for which both the population and CO<sub>2</sub> emissions decreased, but since CO<sub>2</sub> emissions decreased more than the population, this results in a net decrease in per capita CO<sub>2</sub> emissions (Albania, Armenia, Bosnia and Herzegovina, Georgia and Republic of Moldova).

**Annex**

**Data used in the figures presented in this report**

Table 1

**Total aggregate anthropogenic greenhouse gas emissions excluding emissions/removals from land use, land-use change and forestry of Annex I Parties that are also Parties to the Kyoto Protocol (Tg CO<sub>2</sub> eq)**

	1990	1995	2000	2005	2007	2008	2009	2010
Australia	417.99	439.48	494.27	527.76	541.22	549.49	547.48	542.69
Austria	78.16	79.81	80.47	92.88	87.37	86.96	79.74	84.59
Belarus	139.18	82.85	79.17	84.18	87.32	90.61	87.89	89.44
Belgium	143.28	150.53	146.15	143.62	133.93	136.69	125.19	132.46
Bulgaria	114.30	81.54	62.89	66.36	70.91	68.60	58.90	61.43
Canada	589.29	638.59	717.60	739.79	751.10	730.60	690.02	691.71
Croatia	31.47	23.04	26.09	30.24	32.41	31.05	29.06	28.60
Czech Republic	195.82	150.34	145.78	146.33	148.85	143.66	134.72	139.16
Denmark	69.97	77.20	69.50	65.20	68.51	65.02	62.09	62.63
Estonia	40.86	20.19	17.22	18.57	21.13	19.71	16.39	20.52
EU-15	4 249.35	4 149.30	4 139.24	4 180.34	4 083.32	3 999.05	3 719.15	3 797.61
Finland	70.37	70.82	69.24	68.62	78.20	70.24	66.12	74.56
France	562.06	559.06	568.88	571.89	547.08	542.42	519.77	528.18
Germany	1 246.14	1 117.44	1 039.00	997.28	976.99	975.97	911.80	936.54
Greece	105.01	109.78	127.05	135.66	135.05	131.26	124.69	118.29
Hungary	97.31	78.82	77.27	79.49	75.65	73.29	66.86	67.68
Iceland	3.50	3.27	3.85	3.82	4.57	4.96	4.70	4.54
Ireland	55.16	58.77	68.10	69.32	68.30	67.57	61.74	61.31
Italy	519.25	531.91	551.57	574.75	555.76	541.59	491.53	501.32
Japan	1 266.72	1 337.54	1 341.92	1 351.50	1 365.26	1 281.26	1 207.38	1 257.98
Kazakhstan	360.11	225.37	189.34	234.30	265.87	241.88	261.25	262.72
Latvia	26.56	12.60	10.24	11.25	12.18	11.72	10.96	12.08
Liechtenstein	0.23	0.24	0.26	0.27	0.25	0.27	0.25	0.23
Lithuania	49.43	21.93	19.36	22.92	25.44	24.33	19.96	20.81
Luxembourg	12.83	10.10	9.60	12.95	12.21	12.05	11.52	12.08
Malta	2.04	2.44	2.60	3.03	3.13	3.09	3.02	3.04
Monaco	0.11	0.12	0.12	0.10	0.10	0.10	0.09	0.09
Netherlands	212.02	223.39	213.20	210.96	205.52	204.57	198.93	210.05
New Zealand	59.80	63.11	69.30	76.51	74.63	74.20	71.48	71.66
Norway	49.80	49.70	53.44	53.77	55.52	53.82	51.47	53.90
Poland	457.44	432.53	384.75	388.92	407.13	401.34	381.77	400.87
Portugal	60.08	70.50	82.29	86.54	79.02	77.83	74.37	70.60
Romania	253.33	181.25	140.52	148.89	150.25	146.67	123.38	121.36
Russian Federation	3 348.69	2 193.07	2 039.90	2 120.27	2 189.71	2 227.61	2 111.55	2 201.89
Slovakia	71.78	53.22	49.34	51.21	48.87	50.08	44.19	45.98
Slovenia	18.47	18.47	18.82	20.34	20.71	21.43	19.47	19.52
Spain	282.82	314.27	380.83	435.43	436.33	403.82	366.27	355.90
Sweden	72.76	74.43	68.96	67.38	65.60	63.60	59.67	66.23
Switzerland	53.06	51.27	51.88	54.40	52.04	53.80	52.46	54.25
Turkey	187.03	237.51	297.01	329.90	379.98	366.50	369.65	401.93
Ukraine	929.58	498.46	395.75	417.38	436.25	421.32	365.28	383.18
United Kingdom	767.26	709.65	673.53	657.66	643.99	629.83	576.13	594.02
<b>Total Annex I Kyoto Protocol</b>	<b>13 021.03</b>	<b>11 054.56</b>	<b>10 837.07</b>	<b>11 171.63</b>	<b>11 314.28</b>	<b>11 100.78</b>	<b>10 459.17</b>	<b>10 765.97</b>
<b>Total Annex I Convention</b>	<b>19 182.49</b>	<b>17 582.83</b>	<b>17 909.52</b>	<b>18 350.29</b>	<b>18 529.45</b>	<b>18 121.68</b>	<b>17 046.86</b>	<b>17 568.20</b>

Source: National greenhouse gas inventory submissions for 2012. Available at [http://unfccc.int/ghg\\_data/ghg\\_data\\_unfccc/items/4146.php](http://unfccc.int/ghg_data/ghg_data_unfccc/items/4146.php).



Table 2

**Total aggregate anthropogenic greenhouse gas emissions including emissions/removals from land use, land-use change and forestry of Annex I Parties that are also Parties to the Kyoto Protocol (Tg CO<sub>2</sub> eq)**

	1990	1995	2000	2005	2007	2008	2009	2010
Australia	511.03	455.70	554.17	534.01	635.08	512.04	593.30	580.65
Austria	68.14	68.21	65.43	85.48	86.85	87.34	76.10	80.98
Belarus	110.61	51.63	48.27	57.97	59.76	63.47	57.84	59.27
Belgium	142.04	149.53	145.20	142.67	133.04	135.76	124.18	131.42
Bulgaria	100.41	68.57	54.02	57.28	63.52	59.96	50.08	52.80
Canada	521.81	824.56	655.50	793.33	802.53	713.66	677.93	763.67
Croatia	25.88	16.38	24.22	22.58	24.68	23.08	21.30	20.31
Czech Republic	192.20	143.13	138.25	139.64	148.12	138.89	127.86	133.64
Denmark	74.40	80.61	75.40	69.84	66.15	67.81	61.22	60.46
Estonia	31.51	10.64	21.35	9.47	7.77	13.57	9.26	16.76
EU-15	4 082.88	3 963.89	3 941.29	4 007.91	3 911.82	3 813.13	3 521.12	3 619.63
Finland	54.65	56.29	49.16	40.01	54.24	43.66	30.03	52.47
France	542.67	533.67	544.37	531.69	503.50	498.99	483.62	495.95
Germany	1 218.44	1 090.23	1 012.47	1 013.08	993.03	992.25	929.02	953.83
Greece	102.46	106.52	124.22	132.77	132.85	128.53	121.88	115.65
Hungary	95.36	73.02	76.88	75.07	72.97	69.09	63.55	64.31
Iceland	4.69	4.41	4.85	4.70	5.40	5.75	5.46	5.28
Ireland	55.36	59.24	68.50	69.10	67.60	66.46	60.71	60.28
Italy	484.76	483.82	508.50	521.17	520.28	489.42	435.58	444.79
Japan	1 196.64	1 255.55	1 254.18	1 260.79	1 281.12	1 202.58	1 135.52	1 184.80
Kazakhstan	360.12	225.69	174.97	218.98	254.77	232.24	253.41	256.69
Latvia	10.54	-4.32	-4.25	-6.12	-9.71	-11.20	-9.63	-5.07
Liechtenstein	0.22	0.23	0.25	0.27	0.24	0.26	0.24	0.23
Lithuania	43.14	18.14	11.78	20.13	23.72	16.82	9.03	9.10
Luxembourg	13.18	9.87	9.21	12.57	11.94	11.78	11.22	11.78
Malta	1.98	2.38	2.55	2.97	3.07	3.03	2.96	2.97
Monaco	0.11	0.12	0.12	0.10	0.10	0.10	0.09	0.09
Netherlands	215.02	226.24	216.13	214.00	208.41	207.62	201.80	213.05
New Zealand	32.41	39.49	42.73	51.70	54.21	46.35	45.25	51.68
Norway	41.13	38.27	34.37	23.88	26.94	19.13	24.49	20.95
Poland	433.97	419.68	366.50	352.33	369.46	359.77	339.80	357.99
Portugal	53.19	61.87	70.25	83.19	68.57	66.31	62.53	60.72
Romania	226.05	154.13	111.37	120.89	125.05	122.37	95.12	95.55
Russian Federation	3 428.75	1 965.91	1 575.15	1 577.31	1 622.23	1 630.91	1 459.84	1 549.28
Slovakia	61.48	42.25	39.06	45.93	41.09	42.98	36.96	39.89
Slovenia	11.26	11.23	11.63	11.94	12.31	13.02	11.08	11.03
Spain	263.72	295.01	357.57	410.88	406.66	374.70	337.72	326.94
Sweden	31.50	38.96	30.05	36.49	28.67	26.82	23.92	32.18
Switzerland	49.21	46.64	52.14	52.54	51.27	53.03	51.36	53.37
Turkey	130.58	178.56	234.83	271.63	317.43	296.15	296.00	323.20
Ukraine	859.84	449.70	344.91	378.94	382.33	410.90	347.01	345.23
United Kingdom	771.15	712.11	673.91	654.71	640.51	625.95	571.92	590.18
<b>Total Annex I Kyoto Protocol</b>	<b>12 571.60</b>	<b>10 463.86</b>	<b>9 780.16</b>	<b>10 095.89</b>	<b>10 297.69</b>	<b>9 861.35</b>	<b>9 236.54</b>	<b>9 624.31</b>
<b>Total Annex I Convention</b>	<b>17 864.96</b>	<b>16 191.17</b>	<b>16 204.29</b>	<b>16 214.17</b>	<b>16 442.22</b>	<b>15 822.21</b>	<b>14 782.25</b>	<b>15 371.45</b>

Source: National greenhouse gas inventory submissions for 2012. Available at  
<[http://unfccc.int/ghg\\_data/ghg\\_data\\_unfccc/items/4146.php](http://unfccc.int/ghg_data/ghg_data_unfccc/items/4146.php)>.

Table 3

**Total aggregate anthropogenic carbon dioxide emissions from fuel combustion of Annex I Parties that are also Parties to the Kyoto Protocol (Tg CO<sub>2</sub>)**

	1990	1995	2000	2005	2006	2007	2008	2009
Australia	260.08	285.46	338.80	389.08	393.48	389.49	393.15	394.88
Austria	56.47	59.37	61.76	74.95	72.48	69.96	70.23	63.37
Belarus	124.57	61.42	58.66	62.07	66.18	64.00	64.20	60.79
Belgium	107.95	115.21	118.60	112.57	109.62	105.65	110.96	100.70
Bulgaria	74.94	53.27	42.03	45.97	47.30	50.47	49.05	42.21
Canada	432.35	465.23	532.78	558.82	543.57	568.04	551.09	520.75
Croatia	21.57	15.81	17.66	20.74	20.76	22.05	20.97	19.77
Czech Republic	155.14	123.68	121.88	119.59	120.67	122.02	116.82	109.84
Denmark	50.44	58.01	50.64	48.26	56.06	51.37	48.44	46.78
Estonia	36.12	16.10	14.62	16.87	15.52	19.26	17.71	14.66
EU-15	3 082.68	3 064.18	3 143.45	3 270.76	3 272.02	3 213.78	3 155.71	2 919.43
Finland	54.40	56.02	54.16	55.33	66.65	64.66	57.20	55.01
France	352.32	353.85	376.87	388.43	380.14	373.62	370.64	354.30
Germany	950.42	869.44	827.14	811.82	823.88	800.08	804.10	750.19
Greece	70.13	75.82	87.43	95.04	94.10	97.84	94.26	90.22
Hungary	66.74	57.31	54.19	56.36	55.87	54.12	53.01	48.16
Iceland	1.88	1.95	2.14	2.18	2.22	2.34	2.20	2.00
Ireland	29.81	32.29	40.86	43.57	45.05	43.95	43.85	39.46
Italy	397.36	409.41	426.04	460.81	463.84	447.27	435.07	389.28
Japan	1 064.37	1 147.91	1 184.03	1 220.68	1 205.04	1 242.32	1 152.59	1 092.86
Kazakhstan	236.41	167.02	112.50	156.64	172.87	187.33	207.89	189.54
Latvia	18.64	8.85	6.82	7.57	8.02	8.34	7.91	6.75
Liechtenstein <sup>a</sup>								
Lithuania	33.11	14.17	11.20	13.54	13.66	14.45	14.24	12.39
Luxembourg	10.44	8.15	8.03	11.33	11.15	10.60	10.52	9.99
Malta	2.29	2.35	2.11	2.70	2.57	2.72	2.56	2.45
Monaco <sup>b</sup>								
Netherlands	155.85	170.94	172.09	182.66	178.33	180.96	182.82	176.11
New Zealand	23.32	26.08	30.59	33.58	33.89	32.43	33.66	31.31
Norway	28.29	32.81	33.54	36.32	37.38	37.97	37.53	37.31
Poland	342.11	331.10	290.91	292.93	304.25	303.52	298.58	286.76
Portugal	39.28	48.27	59.44	62.80	56.37	55.94	53.26	53.14
Romania	167.08	117.07	86.28	91.93	95.86	93.28	92.12	78.36
Russian Federation	2 178.78	1 574.53	1 505.50	1 516.18	1 579.77	1 578.54	1 593.36	1 532.60
Slovakia	56.73	40.83	37.37	38.10	37.46	36.80	36.25	33.17
Slovenia	12.50	13.31	14.09	15.59	15.90	15.83	16.73	15.15
Spain	205.81	233.28	283.87	339.71	332.37	344.07	317.60	283.37
Sweden	52.75	57.52	52.76	50.34	48.03	46.35	44.63	41.71
Switzerland	41.38	41.62	42.53	44.64	44.28	42.33	43.87	42.42
Turkey	126.91	152.66	200.56	216.36	239.67	265.00	263.53	256.31
Ukraine	687.86	392.78	291.96	305.59	310.28	313.93	309.28	256.39
United Kingdom	549.25	516.60	523.76	533.14	533.95	521.46	512.13	465.80
<b>Total Annex I Kyoto Protocol</b>	<b>9 275.85</b>	<b>8 207.50</b>	<b>8 176.20</b>	<b>8 534.79</b>	<b>8 638.49</b>	<b>8 680.36</b>	<b>8 534.01</b>	<b>8 006.26</b>
<b>Total Annex I Convention</b>	<b>14 144.51</b>	<b>13 346.23</b>	<b>13 874.35</b>	<b>14 306.45</b>	<b>14 323.41</b>	<b>14 443.08</b>	<b>14 120.79</b>	<b>13 201.28</b>

Source: International Energy Agency. *CO<sub>2</sub> Emissions from Fuel Combustion* (2011 edition). Available at <<http://wds.iea.org/WDS/Common/Login/login.aspx>>.

<sup>a</sup> Included in Switzerland's emissions.

<sup>b</sup> Included in France's emissions.

Table 4

**Total aggregate anthropogenic carbon dioxide emissions from fuel combustion of non-Annex I Parties that are also Parties to the Kyoto Protocol (Tg CO<sub>2</sub>)**

	1990	1995	2000	2005	2006	2007	2008	2009
Albania	6.25	1.86	3.18	4.56	4.11	4.01	3.86	2.70
Algeria	51.67	55.65	62.42	78.55	81.67	85.69	88.09	92.52
Angola	4.01	3.96	5.08	7.05	8.90	10.38	12.23	12.92
Argentina	100.38	118.20	139.03	150.96	160.50	166.77	173.78	166.61
Armenia	20.46	3.42	3.40	4.12	4.14	4.79	5.26	4.26
Azerbaijan	64.20	31.60	29.13	32.54	33.03	27.03	29.41	25.22
Bahrain	11.70	11.63	14.13	18.15	20.14	21.19	22.35	22.82
Bangladesh	13.56	20.51	25.30	36.49	39.26	42.04	46.43	50.66
Benin	0.25	0.22	1.41	2.65	3.21	3.75	3.80	4.15
Bolivia (Plurinational State of)	5.15	6.93	7.33	9.62	10.43	11.42	12.29	12.87
Bosnia and Herzegovina	23.65	3.35	13.66	15.66	17.18	17.95	19.52	19.09
Botswana	2.93	3.33	4.19	4.43	4.38	4.44	4.52	4.18
Brazil	194.27	240.42	302.76	322.20	327.10	341.88	361.49	337.80
Brunei Darussalam	3.36	4.70	4.65	5.09	7.53	7.13	7.49	8.12
Cambodia	n.a.	1.40	2.42	3.73	4.06	4.43	4.61	4.26
Cameroon	2.67	2.50	2.79	2.93	3.11	4.11	4.26	4.79
Chile	31.08	38.99	52.53	58.49	60.29	66.55	67.75	64.93
China	2 211.26	2 986.09	3 037.31	5 062.37	5 602.95	6 028.37	6 506.78	6 831.60
Colombia	44.96	58.05	58.67	56.90	56.96	57.17	58.26	60.56
Congo	0.70	0.53	0.59	0.93	1.13	1.18	1.48	1.66
Costa Rica	2.61	4.40	4.49	5.40	5.90	6.58	6.58	6.27
Côte d'Ivoire	2.63	3.21	6.13	5.85	5.84	5.65	6.47	6.09
Cuba	33.70	22.62	26.50	24.60	25.04	25.88	25.25	26.84
Cyprus	3.84	5.23	6.27	6.99	7.06	7.35	7.57	7.46
Democratic People's Republic of Korea	114.01	74.86	68.82	74.26	75.43	62.37	69.37	66.20
Democratic Republic of the Congo	2.96	2.10	1.67	2.26	2.40	2.59	2.82	2.87
Dominican Republic	7.66	11.42	17.44	17.44	18.80	18.88	19.18	18.07
Ecuador	13.19	16.29	18.54	23.57	25.44	25.81	26.50	28.48
Egypt	79.21	83.99	110.24	151.94	160.14	168.70	174.03	175.41
El Salvador	2.23	4.63	5.21	6.39	6.63	6.92	6.21	6.79
Eritrea	n.a.	0.77	0.61	0.60	0.52	0.51	0.45	0.47
Ethiopia	2.21	2.35	3.18	4.82	5.27	5.99	6.83	7.42
Gabon	0.90	1.33	1.38	2.15	2.05	2.42	2.33	1.70
Georgia	33.31	8.08	4.62	4.34	4.79	5.50	4.79	5.68
Ghana	2.71	3.31	5.11	6.40	7.79	8.20	7.33	9.02
Gibraltar	0.18	0.32	0.39	0.44	0.45	0.47	0.49	0.50
Guatemala	3.30	6.01	8.79	11.44	11.59	12.51	11.29	14.51
Haiti	0.94	0.90	1.41	1.98	2.03	2.31	2.34	2.37
Honduras	2.13	3.53	4.44	6.94	6.12	7.84	7.59	7.14
Hong Kong, China	32.82	35.97	39.85	40.75	41.72	43.40	42.25	45.60
India	582.34	776.57	972.47	1 160.40	1 252.03	1 357.16	1 431.27	1 585.82
Indonesia	142.17	202.07	264.04	336.43	356.18	365.52	343.45	376.26
Iran (Islamic Republic of)	179.56	252.35	316.68	426.82	461.86	500.75	522.74	533.22
Iraq	52.85	71.77	81.81	83.35	85.06	90.03	92.94	98.77
Israel	33.14	45.83	54.76	60.19	61.84	66.94	66.37	64.63
Jamaica	7.19	8.36	9.73	10.45	11.86	13.24	11.85	8.27
Jordan	9.20	12.13	14.30	17.91	18.29	19.18	18.42	19.20
Kenya	5.51	5.59	6.77	7.25	8.24	8.34	8.60	10.02
Kuwait	28.72	36.11	49.12	70.13	69.62	70.13	73.87	80.72

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	1990	1995	2000	2005	2006	2007	2008	2009
Kyrgyzstan	22.45	4.43	4.45	5.04	4.83	6.13	5.93	7.06
Lebanon	5.46	12.85	14.12	14.48	13.65	12.01	15.83	19.33
Libya	27.35	35.12	39.69	42.48	42.54	43.13	47.00	50.05
Malaysia	48.92	78.49	111.06	152.78	158.17	171.25	181.69	164.16
Mexico	264.86	296.60	349.32	385.52	394.65	409.80	403.70	399.67
Mongolia	12.66	10.05	8.81	9.48	10.49	11.10	11.20	11.99
Morocco	19.64	25.32	28.29	38.57	38.98	40.48	42.09	41.30
Mozambique	1.08	1.14	1.32	1.52	1.63	2.10	2.01	2.24
Myanmar	3.98	6.73	8.13	13.35	12.17	12.50	11.94	10.14
Namibia	n.a.	1.81	1.87	2.90	3.19	3.33	4.18	3.69
Nepal	0.88	1.74	3.06	3.04	2.47	2.55	2.85	3.40
Netherlands Antilles	2.74	2.82	4.05	4.20	4.13	4.48	4.27	4.97
Nicaragua	1.83	2.50	3.52	4.01	4.00	4.36	4.15	4.22
Nigeria	29.16	31.12	39.40	50.38	46.68	44.06	49.55	41.19
Oman	9.93	14.40	19.76	27.82	30.40	32.46	36.31	38.95
Pakistan	58.60	79.52	97.30	117.21	126.64	138.60	132.98	136.94
Panama	2.36	3.96	4.53	5.45	6.28	6.18	6.22	7.25
Paraguay	1.91	3.45	3.25	3.44	3.57	3.70	3.68	4.06
Peru	19.21	23.73	26.49	28.87	28.40	30.92	35.62	38.55
Philippines	38.11	57.02	67.85	71.29	65.34	68.85	70.96	70.54
Qatar	14.11	18.78	24.01	37.58	43.21	49.30	53.81	56.53
Republic of Korea	229.30	358.65	437.66	467.90	476.46	490.35	501.68	515.46
Republic of Moldova	30.18	10.92	6.48	7.86	7.43	7.50	7.07	5.75
Saudi Arabia	158.87	207.39	252.41	332.73	351.81	361.53	386.58	410.47
Senegal	2.01	2.47	3.59	4.64	4.46	4.96	5.07	5.26
Serbia	61.44	44.01	42.54	49.07	51.55	49.82	49.86	46.26
Singapore	28.80	37.53	40.24	44.11	44.39	45.60	46.09	44.83
South Africa	254.67	276.94	298.18	330.31	331.31	356.50	388.42	369.37
Sri Lanka	3.74	5.52	10.62	13.42	11.86	13.00	12.22	12.66
Sudan	5.50	4.56	5.48	10.00	11.23	12.00	12.07	13.26
Syrian Arab Republic	28.16	32.82	39.87	55.20	58.67	66.47	67.64	59.80
Tajikistan	10.90	2.44	2.17	2.37	2.60	3.17	3.04	2.77
The former Yugoslav Republic of Macedonia	8.52	8.18	8.40	8.78	8.75	9.18	8.98	8.34
United Republic of Tanzania	1.71	2.52	2.57	5.15	5.64	5.45	5.79	6.26
Thailand	80.08	140.32	161.79	219.06	222.79	231.89	237.82	227.80
Togo	0.57	0.57	0.96	0.98	0.90	0.90	1.10	1.12
Trinidad and Tobago	11.37	12.27	21.08	33.90	38.56	40.58	39.20	40.17
Tunisia	12.08	14.20	18.02	19.54	19.92	20.64	20.87	20.78
Turkmenistan	46.64	34.43	36.19	46.03	46.81	54.22	55.78	48.77
United Arab Emirates	51.85	69.59	85.85	108.09	113.58	128.34	144.35	147.04
Uruguay	3.75	4.52	5.26	5.30	6.21	5.80	7.70	7.74
Uzbekistan	119.83	101.59	117.58	108.38	112.34	112.30	114.93	112.36
Venezuela (Bolivarian Republic of)	105.09	118.29	126.74	148.16	161.24	153.28	153.43	154.57
Viet Nam	17.20	27.79	44.01	80.78	85.14	93.07	102.05	114.07
Yemen	6.43	9.34	13.21	18.83	19.46	20.62	21.41	22.18
Zambia	2.60	2.05	1.70	2.07	1.98	1.41	1.59	1.69
Zimbabwe	16.00	14.85	12.71	10.36	9.88	9.32	8.78	8.66
<b>Total non-Annex I</b>	<b>6 056.26</b>	<b>7 550.78</b>	<b>8 530.34</b>	<b>11 601.34</b>	<b>12 436.46</b>	<b>13 216.64</b>	<b>13 962.33</b>	<b>14 471.19</b>

Source: International Energy Agency. *CO<sub>2</sub> Emissions from Fuel Combustion* (2011 edition). Available at <<http://wds.iea.org/WDS/Common/Login/login.aspx>>.

Abbreviation: n.a. = not available.

Table 5  
Population trends of Annex I Parties that are also Parties to the Kyoto Protocol (millions)

	1990	1995	2000	2005	2006	2007	2008	2009
Australia	17.17	18.19	19.27	20.54	20.87	21.24	21.64	22.10
Austria	7.68	7.95	8.01	8.23	8.27	8.30	8.34	8.36
Belarus	10.19	10.19	10.01	9.78	9.73	9.70	9.68	9.66
Belgium	9.97	10.14	10.25	10.47	10.54	10.62	10.71	10.79
Bulgaria	8.72	8.40	8.06	7.74	7.70	7.66	7.62	7.59
Canada	27.69	29.30	30.69	32.25	32.58	32.93	33.33	33.74
Croatia	4.78	4.67	4.43	4.44	4.44	4.44	4.43	4.43
Czech Republic	10.36	10.33	10.27	10.23	10.27	10.32	10.43	10.51
Denmark	5.14	5.23	5.34	5.42	5.44	5.46	5.49	5.52
Estonia	1.59	1.45	1.37	1.35	1.35	1.34	1.34	1.34
EU-15	366.02	372.73	377.97	388.67	390.75	393.13	395.38	397.00
Finland	4.99	5.11	5.18	5.25	5.27	5.29	5.31	5.34
France	58.17	59.42	60.73	62.96	63.39	63.78	64.14	64.49
Germany	79.36	81.66	82.19	82.46	82.37	82.26	82.12	81.88
Greece	10.34	10.63	10.92	11.10	11.15	11.19	11.24	11.28
Hungary	10.37	10.33	10.21	10.09	10.07	10.06	10.04	10.02
Iceland	0.26	0.27	0.28	0.30	0.30	0.31	0.32	0.32
Ireland	3.51	3.60	3.80	4.16	4.26	4.37	4.44	4.47
Italy	56.72	56.84	56.94	58.61	58.94	59.38	59.83	60.19
Japan	123.61	125.57	126.93	127.77	127.77	127.77	127.51	127.33
Kazakhstan	16.35	15.82	14.88	15.15	15.31	15.48	15.67	15.89
Latvia	2.67	2.52	2.37	2.30	2.29	2.28	2.27	2.26
Liechtenstein <sup>a</sup>								
Lithuania	3.70	3.63	3.50	3.41	3.39	3.38	3.36	3.34
Luxembourg	0.38	0.41	0.44	0.47	0.47	0.48	0.49	0.50
Malta	0.36	0.38	0.39	0.40	0.41	0.41	0.41	0.42
Monaco <sup>b</sup>								
Netherlands	14.95	15.46	15.92	16.32	16.34	16.38	16.44	16.53
New Zealand	3.37	3.69	3.87	4.15	4.20	4.24	4.28	4.33
Norway	4.24	4.36	4.49	4.62	4.66	4.71	4.77	4.83
Poland	38.03	38.28	38.26	38.16	38.13	38.12	38.12	38.15
Portugal	10.00	10.03	10.23	10.55	10.58	10.61	10.62	10.63
Romania	23.21	22.68	22.44	21.63	21.59	21.55	21.51	21.48
Russian Federation	147.67	148.46	146.89	143.47	142.75	142.22	142.01	141.90
Slovakia	5.30	5.36	5.40	5.39	5.39	5.40	5.41	5.42
Slovenia	2.00	1.99	1.99	2.00	2.01	2.02	2.02	2.04
Spain	39.01	39.39	40.26	43.40	44.07	44.87	45.59	45.93
Sweden	8.56	8.83	8.87	9.03	9.08	9.15	9.22	9.30
Switzerland	6.80	7.08	7.21	7.50	7.56	7.62	7.71	7.80
Turkey	55.12	59.76	64.26	68.58	69.42	70.26	71.08	71.90
Ukraine	51.89	51.51	49.18	47.11	46.79	46.51	46.26	46.01
United Kingdom	57.24	58.03	58.89	60.24	60.58	60.99	61.40	61.79
<b>Total Annex I Kyoto Protocol</b>	<b>939.88</b>	<b>955.50</b>	<b>963.25</b>	<b>975.68</b>	<b>978.38</b>	<b>981.76</b>	<b>985.26</b>	<b>988.47</b>
<b>Total Annex I Convention</b>	<b>1 190.06</b>	<b>1 222.09</b>	<b>1 245.67</b>	<b>1 271.91</b>	<b>1 277.43</b>	<b>1 283.79</b>	<b>1 290.09</b>	<b>1 295.95</b>

Source: International Energy Agency. *CO<sub>2</sub> Emissions from Fuel Combustion* (2011 edition). Available at <<http://wds.iea.org/WDS/Common/Login/login.aspx>>.

<sup>a</sup> Included in Switzerland's data.

<sup>b</sup> Included in France's data.

Table 6

**Population trends of non-Annex I Parties that are also Parties to the Kyoto Protocol (millions)**

	1990	1995	2000	2005	2006	2007	2008	2009
Albania	3.29	3.13	3.07	3.11	3.12	3.13	3.14	3.16
Algeria	25.28	28.27	30.51	32.86	33.35	33.86	34.37	34.90
Angola	10.66	12.54	14.28	16.62	17.09	17.56	18.02	18.50
Argentina	32.50	34.77	36.94	38.73	39.11	39.49	39.88	40.28
Armenia	3.55	3.22	3.08	3.07	3.07	3.07	3.08	3.08
Azerbaijan	7.16	7.69	8.05	8.39	8.49	8.58	8.68	8.78
Bahrain	0.49	0.58	0.65	0.73	0.74	0.76	0.78	0.79
Bangladesh	115.63	128.09	140.77	153.12	155.46	157.75	160.00	162.22
Benin	4.80	5.72	6.66	7.87	8.13	8.39	8.66	8.94
Bolivia (Plurinational State of)	6.67	7.48	8.32	9.18	9.35	9.52	9.69	9.86
Bosnia and Herzegovina	4.31	3.33	3.69	3.78	3.78	3.78	3.77	3.77
Botswana	1.35	1.55	1.72	1.84	1.87	1.89	1.92	1.95
Brazil	149.57	161.69	174.17	186.08	188.16	190.12	191.97	193.73
Brunei Darussalam	0.26	0.30	0.33	0.37	0.38	0.39	0.39	0.40
Cambodia	10.00	11.38	12.76	13.87	14.09	14.32	14.56	14.81
Cameroon	12.23	14.05	15.87	17.82	18.24	18.66	19.09	19.52
Chile	13.18	14.40	15.40	16.27	16.43	16.60	16.76	16.93
China	1 135.19	1 204.86	1 262.65	1 303.72	1 311.02	1 317.89	1 324.66	1 331.46
Colombia	33.20	36.46	39.77	43.05	43.70	44.36	45.01	45.66
Congo	2.45	2.78	3.04	3.42	3.49	3.55	3.62	3.68
Costa Rica	3.08	3.48	3.93	4.33	4.40	4.46	4.52	4.58
Côte d'Ivoire	12.61	14.98	17.28	19.25	19.67	20.12	20.59	21.08
Cuba	10.59	10.91	11.09	11.19	11.20	11.20	11.21	11.20
Cyprus	0.58	0.65	0.69	0.76	0.77	0.79	0.80	0.81
Democratic People's Republic of Korea	20.14	21.72	22.86	23.53	23.63	23.73	23.82	23.91
Democratic Republic of the Congo	37.02	44.92	50.83	59.08	60.80	62.52	64.26	66.02
Dominican Republic	7.37	8.12	8.83	9.53	9.67	9.81	9.95	10.09
Ecuador	10.28	11.41	12.31	13.06	13.20	13.34	13.48	13.63
Egypt	57.79	63.86	70.17	77.15	78.60	80.06	81.53	83.00
El Salvador	5.33	5.73	5.95	6.06	6.08	6.11	6.13	6.16
Eritrea	2.76	3.21	3.66	4.47	4.63	4.78	4.93	5.07
Ethiopia	51.45	56.98	65.52	74.66	76.63	78.65	80.71	82.83
Gabon	0.93	1.08	1.23	1.37	1.40	1.42	1.45	1.48
Georgia	5.46	5.07	4.75	4.47	4.41	4.36	4.31	4.26
Ghana	14.97	17.25	19.53	21.92	22.39	22.87	23.35	23.84
Gibraltar	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Guatemala	8.91	10.01	11.23	12.71	13.03	13.35	13.69	14.03
Haiti	7.11	7.86	8.65	9.41	9.56	9.72	9.88	10.03
Honduras	4.90	5.59	6.23	6.89	7.03	7.17	7.32	7.47
Hong Kong, China	5.71	6.16	6.67	6.81	6.86	6.93	6.98	7.00
India	849.52	932.18	1 015.92	1 094.58	1 109.81	1 124.79	1 139.97	1 155.35
Indonesia	177.39	191.50	205.28	219.21	221.95	224.67	227.35	229.97
Iran (Islamic Republic of)	54.40	58.95	63.94	69.09	70.10	71.02	71.96	72.90
Iraq	18.14	19.56	22.68	26.08	26.78	27.50	28.22	28.95
Israel	4.68	5.55	6.29	6.93	7.05	7.18	7.31	7.44
Jamaica	2.39	2.48	2.59	2.65	2.66	2.68	2.69	2.70
Jordan	3.17	4.20	4.80	5.41	5.54	5.68	5.81	5.95
Kenya	23.43	27.49	31.44	35.82	36.77	37.76	38.77	39.80
Kuwait	2.13	1.80	2.19	2.54	2.60	2.66	2.73	2.80

	1990	1995	2000	2005	2006	2007	2008	2009
Kyrgyzstan	4.42	4.59	4.92	5.14	5.19	5.24	5.28	5.32
Lebanon	2.97	3.49	3.77	4.08	4.13	4.16	4.19	4.22
Libya	4.37	4.83	5.35	5.92	6.05	6.17	6.29	6.42
Malaysia	18.10	20.59	23.27	25.63	26.10	26.56	27.01	27.47
Mexico	81.25	91.12	98.26	103.83	104.75	105.68	106.57	107.44
Republic of Korea	42.87	45.09	47.01	48.14	48.30	48.46	48.61	48.75
Republic of Moldova	4.36	4.34	4.10	3.76	3.71	3.67	3.63	3.60
Mongolia	2.22	2.27	2.39	2.55	2.58	2.61	2.64	2.67
Morocco	24.81	26.95	28.83	30.50	30.85	31.22	31.61	31.99
Mozambique	13.54	15.95	18.25	20.83	21.35	21.87	22.38	22.89
Myanmar	40.84	43.86	46.61	48.35	48.72	49.13	49.56	50.02
Namibia	1.42	1.62	1.82	2.01	2.05	2.09	2.13	2.17
Nepal	19.11	21.62	24.43	27.22	27.76	28.29	28.81	29.33
Netherlands Antilles	0.19	0.19	0.18	0.19	0.19	0.19	0.20	0.20
Nicaragua	4.14	4.66	5.10	5.46	5.53	5.60	5.67	5.74
Nigeria	97.34	110.45	124.84	140.88	144.27	147.72	151.21	154.73
Oman	1.84	2.17	2.40	2.62	2.67	2.73	2.79	2.85
Pakistan	107.98	122.38	138.08	155.77	159.15	162.59	166.11	169.71
Panama	2.41	2.67	2.95	3.23	3.29	3.34	3.40	3.45
Paraguay	4.25	4.80	5.35	5.90	6.02	6.13	6.24	6.35
Peru	21.78	23.94	26.00	27.84	28.18	28.51	28.84	29.17
Philippines	62.43	69.97	77.69	85.50	87.10	88.72	90.35	91.98
Qatar	0.47	0.53	0.62	0.89	1.00	1.14	1.28	1.41
Saudi Arabia	16.26	18.27	20.64	23.12	23.68	24.24	24.81	25.39
Senegal	7.54	8.66	9.90	11.28	11.58	11.89	12.21	12.53
Serbia	10.23	10.39	10.04	7.44	7.41	7.38	7.35	7.32
Singapore	3.05	3.53	4.03	4.27	4.40	4.59	4.84	4.99
South Africa	35.20	39.12	44.00	47.20	47.73	48.26	48.79	49.32
Sri Lanka	17.11	18.08	18.71	19.67	19.89	20.01	20.16	20.30
Sudan	27.09	30.84	34.90	38.70	39.55	40.43	41.35	42.27
Syrian Arab Republic	12.72	14.61	16.51	19.12	19.60	20.08	20.58	21.09
Tajikistan	5.30	5.78	6.17	6.54	6.63	6.73	6.84	6.95
The former Yugoslav Republic of Macedonia	1.91	1.96	2.01	2.04	2.04	2.04	2.04	2.04
Thailand	56.67	60.14	62.35	65.95	66.51	66.98	67.39	67.76
Togo	3.93	4.43	5.25	5.99	6.15	6.30	6.46	6.62
Trinidad and Tobago	1.22	1.27	1.30	1.32	1.32	1.33	1.33	1.34
Tunisia	8.15	8.96	9.56	10.03	10.13	10.23	10.33	10.43
Turkmenistan	3.67	4.19	4.50	4.84	4.91	4.98	5.04	5.11
United Arab Emirates	1.87	2.43	3.24	4.09	4.23	4.36	4.49	4.60
United Republic of Tanzania	25.46	29.97	34.13	39.01	40.12	41.28	42.48	43.74
Uruguay	3.11	3.22	3.30	3.31	3.31	3.32	3.33	3.35
Uzbekistan	20.51	22.79	24.65	26.17	26.49	26.87	27.31	27.77
Venezuela (Bolivarian Republic of)	19.75	22.04	24.31	26.58	27.03	27.48	27.94	28.38
Viet Nam	66.20	72.98	77.64	83.11	84.14	85.16	86.21	87.28
Yemen	12.31	15.52	18.18	21.02	21.64	22.27	22.92	23.58
Zambia	7.91	9.11	10.47	11.74	12.02	12.31	12.62	12.94
Zimbabwe	10.46	11.71	12.46	12.48	12.46	12.45	12.46	12.52
<b>Total non-Annex I</b>	<b>3 914.78</b>	<b>4 273.10</b>	<b>4 618.77</b>	<b>4 944.15</b>	<b>5 008.23</b>	<b>5 071.82</b>	<b>5 135.88</b>	<b>5 200.30</b>

Source: International Energy Agency. Beyond 2020 data portal, downloaded on 4 July 2012. Available at <<http://wds.iea.org/WDS/Common/Login/login.aspx>>.

Table 7

**Per capita total aggregate anthropogenic carbon dioxide emissions from fuel combustion of Annex I Parties that are also Parties to the Kyoto Protocol (t CO<sub>2</sub> per capita)**

	1990	1995	2000	2005	2006	2007	2008	2009
Australia	15.15	15.69	17.58	18.94	18.85	18.34	18.17	17.87
Austria	7.35	7.47	7.71	9.11	8.76	8.43	8.42	7.58
Belarus	12.22	6.03	5.86	6.35	6.80	6.60	6.63	6.29
Belgium	10.83	11.36	11.57	10.75	10.40	9.95	10.36	9.33
Bulgaria	8.59	6.34	5.21	5.94	6.14	6.59	6.44	5.56
Canada	15.61	15.88	17.36	17.33	16.68	17.25	16.53	15.43
Croatia	4.51	3.39	3.99	4.67	4.68	4.97	4.73	4.46
Czech Republic	14.97	11.97	11.87	11.69	11.75	11.82	11.20	10.45
Denmark	9.81	11.09	9.48	8.90	10.31	9.41	8.82	8.47
Estonia	22.72	11.10	10.67	12.50	11.50	14.37	13.22	10.94
EU-15	8.42	8.22	8.32	8.42	8.37	8.17	7.98	7.35
Finland	10.90	10.96	10.46	10.54	12.65	12.22	10.77	10.30
France	6.06	5.96	6.21	6.17	6.00	5.86	5.78	5.49
Germany	11.98	10.65	10.06	9.85	10.00	9.73	9.79	9.16
Greece	6.78	7.13	8.01	8.56	8.44	8.74	8.39	8.00
Hungary	6.44	5.55	5.31	5.59	5.55	5.38	5.28	4.81
Iceland	7.23	7.22	7.64	7.27	7.40	7.55	6.88	6.25
Ireland	8.49	8.97	10.75	10.47	10.58	10.06	9.88	8.83
Italy	7.01	7.20	7.48	7.86	7.87	7.53	7.27	6.47
Japan	8.61	9.14	9.33	9.55	9.43	9.72	9.04	8.58
Kazakhstan	14.46	10.56	7.56	10.34	11.29	12.10	13.27	11.93
Latvia	6.98	3.51	2.88	3.29	3.50	3.66	3.48	2.99
Liechtenstein <sup>a</sup>								
Lithuania	8.95	3.90	3.20	3.97	4.03	4.28	4.24	3.71
Luxembourg	27.47	19.88	18.25	24.11	23.72	22.08	21.47	19.98
Malta	6.36	6.18	5.41	6.75	6.27	6.63	6.24	5.83
Monaco <sup>b</sup>								
Netherlands	10.42	11.06	10.81	11.19	10.91	11.05	11.12	10.65
New Zealand	6.92	7.07	7.90	8.09	8.07	7.65	7.86	7.23
Norway	6.67	7.53	7.47	7.86	8.02	8.06	7.87	7.72
Poland	9.00	8.65	7.60	7.68	7.98	7.96	7.83	7.52
Portugal	3.93	4.81	5.81	5.95	5.33	5.27	5.02	5.00
Romania	7.20	5.16	3.84	4.25	4.44	4.33	4.28	3.65
Russian Federation	14.75	10.61	10.25	10.57	11.07	11.10	11.22	10.80
Slovakia	10.70	7.62	6.92	7.07	6.95	6.81	6.70	6.12
Slovenia	6.25	6.69	7.08	7.80	7.91	7.84	8.28	7.43
Spain	5.28	5.92	7.05	7.83	7.54	7.67	6.97	6.17
Sweden	6.16	6.51	5.95	5.57	5.29	5.07	4.84	4.48
Switzerland	6.09	5.88	5.90	5.95	5.86	5.56	5.69	5.44
Turkey	2.30	2.55	3.12	3.15	3.45	3.77	3.71	3.56
Ukraine	13.26	7.63	5.94	6.49	6.63	6.75	6.69	5.57
United Kingdom	9.60	8.90	8.89	8.85	8.81	8.55	8.34	7.54
<b>Annex I Parties to the Kyoto Protocol</b>	<b>9.87</b>	<b>8.59</b>	<b>8.49</b>	<b>8.75</b>	<b>8.83</b>	<b>8.84</b>	<b>8.66</b>	<b>8.10</b>
<b>Annex I Parties to the Convention</b>	<b>11.89</b>	<b>10.92</b>	<b>11.14</b>	<b>11.25</b>	<b>11.21</b>	<b>11.25</b>	<b>10.95</b>	<b>10.19</b>

Source: International Energy Agency. *CO<sub>2</sub> Emissions from Fuel Combustion* (2011 edition). Available at <<http://wds.iea.org/WDS/Common/Login/login.aspx>>.

<sup>a</sup> Included in Switzerland's data.

<sup>b</sup> Included in France's data.



Table 8  
**Per capita total aggregate anthropogenic carbon dioxide emissions from fuel combustion of non-Annex I Parties that are also Parties to the Kyoto Protocol (t CO<sub>2</sub> per capita)**

	1990	1995	2000	2005	2006	2007	2008	2009
Albania	1.90	0.59	1.04	1.47	1.32	1.28	1.23	0.85
Algeria	2.04	1.97	2.05	2.39	2.45	2.53	2.56	2.65
Angola	0.38	0.32	0.36	0.42	0.52	0.59	0.68	0.70
Argentina	3.09	3.40	3.76	3.90	4.10	4.22	4.36	4.14
Armenia	5.76	1.06	1.10	1.34	1.35	1.56	1.71	1.38
Azerbaijan	8.97	4.11	3.62	3.88	3.89	3.15	3.39	2.87
Bahrain	23.88	20.05	21.74	24.86	27.22	27.88	28.65	28.89
Bangladesh	0.12	0.16	0.18	0.24	0.25	0.27	0.29	0.31
Benin	0.05	0.04	0.21	0.34	0.39	0.45	0.44	0.46
Bolivia (Plurinational State of)	0.77	0.93	0.88	1.05	1.12	1.20	1.27	1.31
Bosnia and Herzegovina	5.49	1.01	3.70	4.14	4.54	4.75	5.18	5.06
Botswana	2.17	2.15	2.44	2.41	2.34	2.35	2.35	2.14
Brazil	1.30	1.49	1.74	1.73	1.74	1.80	1.88	1.74
Brunei Darussalam	12.92	15.67	14.09	13.76	19.82	18.28	19.21	20.30
Cambodia	0.12	0.12	0.19	0.27	0.29	0.31	0.32	0.29
Cameroon	0.22	0.18	0.18	0.16	0.17	0.22	0.22	0.25
Chile	2.36	2.71	3.41	3.59	3.67	4.01	4.04	3.84
China	1.95	2.48	2.41	3.88	4.27	4.57	4.91	5.13
Colombia	1.35	1.59	1.48	1.32	1.30	1.29	1.29	1.33
Congo	0.29	0.19	0.19	0.27	0.32	0.33	0.41	0.45
Democratic Republic of the Congo	0.08	0.05	0.03	0.04	0.04	0.04	0.04	0.04
Costa Rica	0.85	1.26	1.14	1.25	1.34	1.48	1.46	1.37
Côte d'Ivoire	0.21	0.21	0.35	0.30	0.30	0.28	0.31	0.29
Cuba	3.18	2.07	2.39	2.20	2.24	2.31	2.25	2.40
Cyprus	6.62	8.05	9.09	9.20	9.17	9.30	9.46	9.21
Democratic People's Republic of Korea	5.66	3.45	3.01	3.16	3.19	2.63	2.91	2.77
Dominican Republic	1.04	1.41	1.98	1.83	1.94	1.92	1.93	1.79
Ecuador	1.28	1.43	1.51	1.80	1.93	1.93	1.97	2.09
Egypt	1.37	1.32	1.57	1.97	2.04	2.11	2.13	2.11
El Salvador	0.42	0.81	0.88	1.05	1.09	1.13	1.01	1.10
Eritrea	0.24	0.24	0.17	0.13	0.11	0.11	0.09	0.09
Ethiopia	0.04	0.04	0.05	0.06	0.07	0.08	0.08	0.09
Gabon	0.97	1.23	1.12	1.57	1.46	1.70	1.61	1.15
Georgia	6.10	1.59	0.97	0.97	1.09	1.26	1.11	1.33
Ghana	0.18	0.19	0.26	0.29	0.35	0.36	0.31	0.38
Gibraltar	6.00	10.67	13.00	14.67	15.00	15.67	16.33	16.67
Guatemala	0.37	0.60	0.78	0.90	0.89	0.94	0.82	1.03
Haiti	0.13	0.11	0.16	0.21	0.21	0.24	0.24	0.24
Honduras	0.43	0.63	0.71	1.01	0.87	1.09	1.04	0.96
Hong Kong, China	5.75	5.84	5.97	5.98	6.08	6.26	6.05	6.51
India	0.69	0.83	0.96	1.06	1.13	1.21	1.26	1.37
Indonesia	0.80	1.06	1.29	1.53	1.60	1.63	1.51	1.64
Iran (Islamic Republic of)	3.30	4.28	4.95	6.18	6.59	7.05	7.26	7.31
Iraq	2.91	3.67	3.61	3.20	3.18	3.27	3.29	3.41
Israel	7.08	8.26	8.71	8.69	8.77	9.32	9.08	8.69
Jamaica	3.01	3.37	3.76	3.94	4.46	4.94	4.41	3.06
Jordan	2.90	2.89	2.98	3.31	3.30	3.38	3.17	3.23
Kenya	0.24	0.20	0.22	0.20	0.22	0.22	0.22	0.25

	1990	1995	2000	2005	2006	2007	2008	2009
Kuwait	13.48	20.06	22.43	27.61	26.78	26.36	27.06	28.83
Kyrgyzstan	5.08	0.97	0.90	0.98	0.93	1.17	1.12	1.33
Lebanon	1.84	3.68	3.75	3.55	3.31	2.89	3.78	4.58
Libya	6.26	7.27	7.42	7.18	7.03	6.99	7.47	7.80
Malaysia	2.70	3.81	4.77	5.96	6.06	6.45	6.73	5.98
Mexico	3.26	3.26	3.56	3.71	3.77	3.88	3.79	3.72
Mongolia	5.70	4.43	3.69	3.72	4.07	4.25	4.24	4.49
Morocco	0.79	0.94	0.98	1.26	1.26	1.30	1.33	1.29
Mozambique	0.08	0.07	0.07	0.07	0.08	0.10	0.09	0.10
Myanmar	0.10	0.15	0.17	0.28	0.25	0.25	0.24	0.20
Namibia	1.12	1.12	1.03	1.44	1.56	1.59	1.96	1.70
Nepal	0.05	0.08	0.13	0.11	0.09	0.09	0.10	0.12
Netherlands Antilles	14.42	14.84	22.50	22.11	21.74	23.58	21.35	24.85
Nicaragua	0.44	0.54	0.69	0.73	0.72	0.78	0.73	0.74
Nigeria	0.30	0.28	0.32	0.36	0.32	0.30	0.33	0.27
Oman	5.40	6.64	8.23	10.62	11.39	11.89	13.01	13.67
Pakistan	0.54	0.65	0.70	0.75	0.80	0.85	0.80	0.81
Panama	0.98	1.48	1.54	1.69	1.91	1.85	1.83	2.10
Paraguay	0.45	0.72	0.61	0.58	0.59	0.60	0.59	0.64
Peru	0.88	0.99	1.02	1.04	1.01	1.08	1.24	1.32
Philippines	0.61	0.81	0.87	0.83	0.75	0.78	0.79	0.77
Qatar	30.02	35.43	38.73	42.22	43.21	43.25	42.04	40.09
Republic of Korea	5.35	7.95	9.31	9.72	9.86	10.12	10.32	10.57
Republic of Moldova	6.92	2.52	1.58	2.09	2.00	2.04	1.95	1.60
Saudi Arabia	9.77	11.35	12.23	14.39	14.86	14.91	15.58	16.17
Senegal	0.27	0.29	0.36	0.41	0.39	0.42	0.42	0.42
Serbia	6.01	4.24	4.24	6.60	6.96	6.75	6.78	6.32
Singapore	9.44	10.63	9.99	10.33	10.09	9.93	9.52	8.98
South Africa	7.23	7.08	6.78	7.00	6.94	7.39	7.96	7.49
Sri Lanka	0.22	0.31	0.57	0.68	0.60	0.65	0.61	0.62
Sudan	0.20	0.15	0.16	0.26	0.28	0.30	0.29	0.31
Syrian Arab Republic	2.21	2.25	2.41	2.89	2.99	3.31	3.29	2.84
Tajikistan	2.06	0.42	0.35	0.36	0.39	0.47	0.44	0.40
Thailand	1.41	2.33	2.59	3.32	3.35	3.46	3.53	3.36
The former Yugoslav Republic of Macedonia	4.46	4.17	4.18	4.30	4.29	4.50	4.40	4.09
Togo	0.15	0.13	0.18	0.16	0.15	0.14	0.17	0.17
Trinidad and Tobago	9.32	9.66	16.22	25.68	29.21	30.51	29.47	29.98
Tunisia	1.48	1.58	1.88	1.95	1.97	2.02	2.02	1.99
Turkmenistan	12.71	8.22	8.04	9.51	9.53	10.89	11.07	9.54
United Arab Emirates	27.73	28.64	26.50	26.43	26.85	29.44	32.15	31.97
United Republic of Tanzania	0.07	0.08	0.08	0.13	0.14	0.13	0.14	0.14
Uruguay	1.21	1.40	1.59	1.60	1.88	1.75	2.31	2.31
Uzbekistan	5.84	4.46	4.77	4.14	4.24	4.18	4.21	4.05
Venezuela (Bolivarian Republic of)	5.32	5.37	5.21	5.57	5.97	5.58	5.49	5.45
Viet Nam	0.26	0.38	0.57	0.97	1.01	1.09	1.18	1.31
Yemen	0.52	0.60	0.73	0.90	0.90	0.93	0.93	0.94
Zambia	0.33	0.23	0.16	0.18	0.16	0.11	0.13	0.13
Zimbabwe	1.53	1.27	1.02	0.83	0.79	0.75	0.70	0.69
<b>Non-Annex I</b>	<b>1.55</b>	<b>1.77</b>	<b>1.85</b>	<b>2.35</b>	<b>2.48</b>	<b>2.61</b>	<b>2.72</b>	<b>2.78</b>

Source: International Energy Agency. *CO<sub>2</sub> Emissions from Fuel Combustion* (2011 edition). Available at <<http://wds.iea.org/WDS/Common/Login/login.aspx>>.