Future Climate Change Policy in the Accession and Candidate Countries: Looking beyond 2012

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Background Information

Ecologic - Institut für Internationale und Europäische Umweltpolitik

Pfalzburger Str. 43-44, D-10717 Berlin, Tel. +49 30 86 88 117, Fax +49 30 86 88 0100
E-Mail: wurm@ecologic.de, meyer-ohlendorf@ecologic.de

1 Introduction

Under the UN Framework Convention on Climate Change (UNFCCC), agreed in 1992, developed countries aim to return individually or jointly to their 1990 levels of greenhouse gas emissions by 2000, with the goal of stabilising greenhouse gas concentrations in the atmosphere to avoid dangerous human interference with the climate system.

In recognition that greater reductions were needed to successfully stabilise greenhouse gas concentrations, the international community agreed upon the Kyoto Protocol in 1997. The Kyoto Protocol aims for an overall reduction in greenhouse gas emissions from developed country Parties to 5.2% below 1990 levels by 2008-2012 – the Protocol's "first commitment period." Since this agreement was reached, scientific assessments have shown that far greater reductions are needed to avoid dangerous climate change, and that there is little time to achieve these reductions. Thus greater reductions will have to be achieved in subsequent commitment periods under the Kyoto Protocol.

Under Kyoto Protocol Article 3.9, Kyoto Parties are to "initiate the consideration" of commitments for subsequent periods at least seven years before the end of the first commitment period (2005). At the first Conference of the Parties to the UNFCCC serving as the Meeting of the Parties to the Kyoto Protocol (COP/MOP 1), in Montreal in December 2005, Kyoto Parties established an Ad Hoc Working Group (AWG) to consider further commitments for Annex I Parties. The AWG met for the first time in Bonn in May 2006. Drawing on a range of views expressed by Parties, the AWG Chair proposed a non-exhaustive and indicative list of topics that may be relevant to the further work of the AWG, including the scientific basis for determining the level of ambition of further commitments by Annex I Parties, emission trends, mitigation potential and the architecture of further commitments for Annex I Parties. The second session of the AWG will be held in Nairobi in November 2006 and will review information submitted by Parties on these and a range of other topics. The AWG will aim to complete its work in time to ensure that there is no gap between the first and second commitment periods, and will report back to each annual COP/MOP on its progress.

Also in Montreal, at the Eleventh Conference of the Parties to the UNFCCC, Convention Parties agreed to begin a dialogue on long-term cooperative action to address climate change by enhancing implementation of the Convention. The first of four workshops under this dialogue was held in Bonn in May 2006. A facilitators' report on the workshop will be circulated ahead of the Dialogue's second workshop in November 2006.

It is plain that not all countries have the same capacity to participate effectively in the discussions and negotiations that will determine the shape of the international climate regime after 2012, given the extreme complexity of international climate change policies, and the diversity of national circumstances. Many countries may lack the human resources and the technical and administrative capacity to follow and address every detail of this process, even though the ultimate nature of the post-2012 regime may have far reaching economic consequences for them. Despite great differences between the new Member States of the EU (NMS), Acceding Countries (AC) and Candidate Countries (CC), there is wide agreement

that these countries must strengthen their capacities to make their voices heard in the upcoming negotiations.

In this context, Ecologic - Institute for International and European Environmental Policy – is organising the workshop “Future Climate Change Policy in the Accession and Candidate Countries: Looking beyond 2012”. The workshop is commissioned by the European Commission and is the second of a series of events. It is organised in co-operation with:

- the Institute for Sustainable Development (ISD), Warsaw,
- the Institute for Environmental Studies (IVM) at the Free University of Amsterdam,
- the Foundation for International Environmental Law and Development (FIELD), London,
- the German Institute for Economic Research (DIW), Berlin as well as a network of experts.

The workshop aims to strengthen the capacity of EU Accession and Candidate Countries to prepare for and participate in the negotiations on future actions under the UNFCCC and Kyoto Protocol by

- fostering public debate on future climate change policy in these countries,
- structuring the complex discussions and providing background information,
- bringing together policy-makers and stakeholders, and
- strengthening and initiating networks between them.

After presenting some key issues and starting points for discussion, this paper highlights the challenges posed by climate change and the most significant aspects of current and future EU climate change policies. The paper then analyses the economic opportunities and challenges of future climate change policies for the Accession and Candidate Countries. Finally, the paper puts forward key elements for consideration in negotiations on the post-2012 climate regime.

2 Starting points for discussion

Participants are invited to consider the following elements as starting points for discussions. There are many aspects to the negotiation of the post-2012 climate regime, and both the science and the political context are likely to evolve over the next few years. Hence this list is non-exhaustive, and intended merely to assist in framing discussions:

- Research gathered by the Intergovernmental Panel on Climate Change (IPCC) indicates that the Earth's average surface temperature will warm by 1.4–5.8°C by the year 2100, with potentially very severe consequences for the environment, economies and societies alike. All simulations suggest that temperature rise in the late 20th century can only be explained by man-made increases in greenhouse gas concentration. To avoid or mitigate these consequences, average temperature should not increase by more than 2°C above pre-industrial temperature, a target more likely to be achieved if GHG concentrations do not exceed 440 ppm CO_2-equivalent.

- To stabilise greenhouse gas (GHG) concentrations at 440 ppm CO_2-equivalent, scientists agree that further cuts in GHG emissions are required. Despite various uncertainties, the European Council has stated that for the group of developed countries, reduction pathways in the order of 15-30% by 2020 should be considered. For the long term, the European Parliament has suggested a reduction target of 60-80 % by 2050.

- The Accession and Candidate Countries are currently on track to meet their reduction targets under the Kyoto-Protocol. However, the bulk of these emission reductions were achieved in the first half of the 1990s. Projections of future emissions indicate an upward trend in GHG emissions up to 2020 in each of the four Accession and Candidate Countries. The highest increase is predicted for Turkey with a six-fold increase in CO_2 emissions over the period 1990-2025. In light of the reductions required to stabilise global GHG concentrations in the atmosphere - in the range of 15-30% by 2020 and of 60-80% by 2050 respectively – the Accession and Candidate Countries will have to prepare for further GHG reductions. A EU burden sharing agreement after 2012 will be discussed in this context.

- Although the magnitude, timing and regional distribution of the impacts of global warming are still very uncertain, it is likely that global warming above 2°C will have increasingly dangerous effects, due to increases in tropical storms, floods and monsoon variability, increases in drought frequency and heat waves, shifts in vegetation zones and loss of biodiversity, causing irreversible damages. Because of their extensive and low-lying coastlines, sea-level rise could adversely affect Accession and Candidate Countries. While agriculture in Northern Europe, including the Accession and Candidate Countries, could potentially benefit from increasing CO_2 concentrations and rising temperatures, vulnerable ecosystems, such as sandy beaches and coastal wetlands might suffer

considerable loss of species and habitats.

- In light of recent sharp increases and fluctuations in energy prices, improved energy efficiency and increasing the share of renewable energies in the domestic energy mix can provide a boost to the competitiveness of the Accession and Candidate Countries. It is now well-established that measures that reduce GHG emissions do not necessarily entail an impediment to economic growth. Instead, these measures can lead to less fossil-fuel dependent economies, with greater energy security, decreased exposure to volatile energy prices, and multiple sustainable development and health co-benefits.
- Key priorities in the short term will be to expand and strengthen resources allocated to energy efficiency improvements in households and industries, and to remove institutional barriers to such improvements. The uptake of cleaner technologies, as well as the adoption of policies promoting their wider use, will play a key role in shifting to less GHG-intensive pathways.
- Accession and Candidate Countries have great capacity to reduce CO_2 emissions in a cost-effective manner. Energy efficiency in the Accession and Candidate Countries - despite recent progress - is still considerably lower than in the EU-15. Economic restructuring, then, provides a variety of investment cycle opportunities. In this context, the involvement of business actors will be essential.
- Beginning negotiations on post-2012 commitments will be difficult and complex. Emerging issues within these negotiations, such as technological change and the inclusion of additional sectors (international transport, deforestation), may present numerous challenges for the Accession and Candidate Countries, given the financial, technical, and human resources needed to participate fully and effectively in these discussions. Linking the outcomes of the AWG and the Dialogue on long-term cooperative action will be a challenging task.
- At the same time, the Accession and Candidate Countries stand to benefit greatly from investments in Joint Implementation projects under the Kyoto Protocol, which works to ensure that the post-2012 framework continues to provide market incentives for investments in GHG mitigation projects and clean energy projects in the Accession and Candidate Countries.
- The complexity of the post-2012 negotiations will require dedicated human and technical resources from NMS, AC and CC. The involvement of a range of stakeholders from government, key industrial sectors, and civil society will be essential over the next few years, in order to achieve the most effective and equitable outcomes at both international and national levels.

3 Climate Change: Challenges for the Accession and Candidate Countries and Beyond

3.1 Effects of Climate Change in the Accession and Candidate Countries and Beyond

3.1.1 Human-induced aspects of global climate change

Global average temperature has increased in the last hundred years by about 0.7°C, the European average temperature by 0.95°C.[1] Globally, the 10 warmest years on record all occurred after 1991. Though the extent of the anthropogenic greenhouse effect is uncertain, the Intergovernmental Panel on Climate Change (IPCC) has concluded that the Earth on average will warm by 1.4–5.8°C by the year 2100, with temperatures in Europe expected to rise by 2.0–6.3°C. The European Commission has acknowledged that climate change is already happening.[2] All simulations suggest that temperature rise in the late 20th century can only be explained by man-made increases in greenhouse gas concentration.[3] The concentration of CO_2 in the lower atmosphere has recently increased from its pre-industrial concentration of 280 ppm (parts per million) to more than 380 ppm, the highest level in the last 500,000 years.

Article 2 of UNFCCC provides that "the ultimate objective of this Convention […] is to achieve […] stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." The EU has chosen an official policy target of limiting global warming to 2ºC above pre-industrial temperatures. Any global warming above 2°C is likely to be increasingly dangerous, due to increases in tropical storms, floods and monsoon variability, increases in drought frequency and heat waves, shifts in vegetation zones, and loss of biodiversity, all causing irreversible damages.[4] If, hypothetically, all human-induced emissions were stopped immediately today, temperatures would still rise by about 0.7°C by the year 2100. If future GHG concentrations can be kept at about 440 ppm CO_2-equivalent (i.e. CO_2 only below 400 ppm), the probability of keeping temperature increases below 2°C by 2100 is more than 66%. If no climate policy measures are implemented, a further increase to 650–1215 ppm CO_2-equivalent is projected, diminishing the chance of meeting the 2°C target drastically.[5]

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1 Cf. European Environmental Agency, Impacts of Europe's changing climate. 2004, Copenhagen.

2 See “Winning the Battle Against Global Climate Change”, COM(2005) 35 final, 9.2.2005

3 Cf. Jones, P.D. and M.E. Mann, Climate Over Past Millennia. Reviews of Geophysics, 2004. 42(RG2002, doi: 10.1029/2003RG000143); Mann, M.E., et al., On Past Temperatures and Anomalous Late 20th Century Warmth. Eos, 2003. 84: p. 256-258.

4 EEA Draft Technical Report no. 7/2005: Vulnerability and Adaptation to Climate Change in Europe

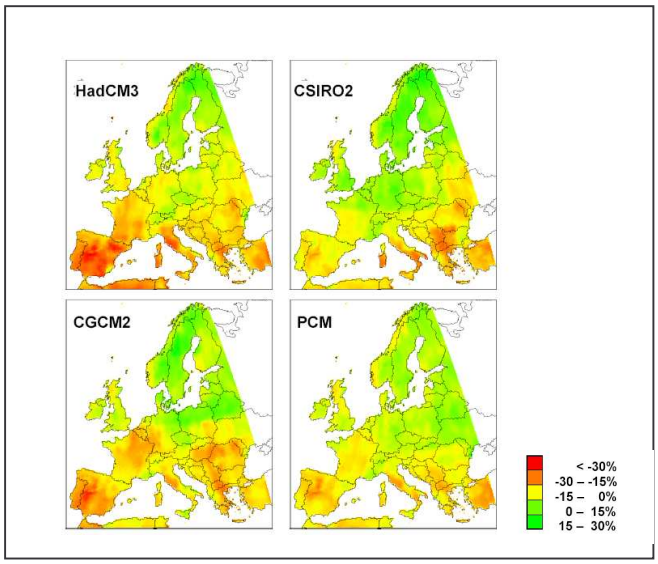
5 Hare, B. and M. Meinshausen, How much warming are we committed to and how much can be avoided? - PIK Report No. 93. 2004, Potsdam Institute for Climate Impact Research: Potsdam.

3.1.2 Temperature, precipitation and extreme events in Southeast Europe

Annual precipitation trends in Europe for the period 1900–2000 show a contrasting picture between northern Europe (10–40% wetter) and southern Europe (up to 20% drier). Changes have been greatest during the winter in most parts of Europe. These changes are projected to continue in the future. Cold winters are projected to disappear almost entirely by 2080 and hot summers are projected to become much more frequent.[6]

The trend for Southeast Europe and Western Turkey is rather clear: by 2080 large parts of this region will become warmer (2-4°C higher average temperatures) and drier (15-30% less rain) than in the late 20th century.[7] River flows will increase in autumn and winter, and decrease in summer. Evaporation losses will increase and groundwater levels will decrease.[8] Coastal areas, like Croatia, with high temporary water demand in the summer tourist season, could face more frequent water shortages.

Figure 1: Changes in precipitation by 2080, different climate models (Schroeter et al. 2005)



In addition, extreme weather events, such as droughts, heat waves and floods have increased in the past, while cold extremes (frost days) have decreased. The European summer of 2003 was extremely hot and dry.[9] In Europe, 64% of all catastrophic events since 1980 have been directly attributable to climate extremes; 79% of economic losses caused by catastrophic events result from these climate-related events. In the past decade, 1,940 people have died during floods and 417,000 have been made homeless. In 2002, 15 major floods occurred in Austria, the Czech Republic, Germany, Hungary and the Russian Federation. These floods affected one million people and killed approximately 250 persons. In 2005, after heavy rainfalls in May, June, and July, disastrous floods occurred in Northeast Bulgaria. The floods of the Danube tributary rivers caused enormous damages to infrastructure, agriculture, industry, and houses. Five people lost their lives. The material damages caused by heavy rainfalls and the resulting floods, in total, amounted to more than 500 million EUR. These floods were considered as extreme events, including high rainfall intensity for a comparatively long period of time over a large area, high surface runoff and increased flood discharges, and overtopping of dams, dikes and bridges, causing dikes and bridges to fail.

6 Cf. European Environmental Agency, Impacts of Europe's changing climate. 2004, Copenhagen.

7 Schroeter, D., et al., Ecosystem service supply and vulnerability to global change in Europe. Science 2005. 310, pp. 1333-1337. Supporting online material, Figure S2.

8 Republic of Bulgaria, Third National Communication on Climate Change.

9 Schar, C. and G. Jendritzky, Climate change: Hot news from summer 2003. Nature, 2004. 432(7017): p. 559-560.

Evidence of local flood levels indicate that the return period of such events were on the order of one every 100 years.[10] In 2006, snowmelt and high rainfall in Romania led to a dramatic increase in water levels of the Danube River to record-breaking values. More than 4,700 people had to be evacuated from the flooded regions. After a dam could no longer withstand the water pressure, 600 buildings were flooded from which 115 collapsed. At times, 40,000 hectares of land were covered by water.[11] With rising temperatures in the future, the frequency and severity of floods, droughts, and fires are expected to increase.

3.1.3 Impacts on agriculture and forestry in Southeast Europe

The average annual growing season in Europe lengthened by about 10 days between 1962 and 1995, and is projected to increase further in the future. The positive albeit slight effects of temperature increases on vegetation growth are likely to be outweighed by an increased risk of water shortage. While agriculture in Northern Europe is expected to potentially benefit from increasing CO_2 concentrations and rising temperatures, most parts of Central and Southeast Europe agriculture will be threatened by increased stresses on water supply.

During the heat wave in 2003, cereal production in the EU-15 member states dropped by about 10%, and in the Eastern European Accession Countries it decreased on average by 20%. In Bulgaria, Croatia, Hungary, Slovakia and Slovenia, cereal production even dropped by more than 25%. Dwindling harvests in these countries could become more common due to increasingly frequent extreme weather events, as well as a rise in pests and diseases, possibly entailing a wider use of pesticides.[12] Model illustrations for wheat and maize, the two most important crops, have shown different results. While temperature increases and lower precipitation will cause shorter periods of crop growth and maturation, higher CO_2 concentrations will have positive effects, especially for C3 crops like wheat.[13] On average, winter wheat may benefit from climate change, but irrigated maize is likely to have decreased yields.[14] In Romania and Bulgaria, large areas are forested, hosting a large number of species and ecosystems. After the year 2040, a serious decrease in forest productivity is predicted due to increasing temperatures and decreasing precipitation.[15]

3.1.4 Impacts on biodiversity in Southeast Europe

A large number of species may become extinct under future climate change. Due to non-climate-related factors, such as the fragmentation of habitats, extinction rates are likely to increase. These factors will limit the migration and adaptation capabilities of species to respond to climate change. Northward movement of plant species (induced by a warmer

10 See http://helmholtz-eos.dlr.de/platform/bulgarien_en.htm

11 See http://www.zki.dlr.de

12 Ibid.

13 Republic of Bulgaria, Third National Communication on Climate Change.

14 Cuculeanu et al., Climate change impact on agricultural crops and adaptation options in Romania, Climate Research 1999, 12, pp.153-160.

15 National Strategy on Climate Change of Romania – 2005-2007

climate) has probably increased species diversity in north-western Europe, but climate change has caused a decline in biodiversity in Southern and South-eastern parts of Europe.[16]

3.2 Adaptation needs for Climate Change in Accession and Candidate Countries

As stated by the EEA, South-eastern Europe, the Mediterranean, and central European regions are the most vulnerable to climate change. Here, considerable adverse impacts are projected to occur on natural and human systems already under pressure from changes in land use, for example. Northern and some western regions of Europe, on the other hand, may experience beneficial impacts, particularly within agriculture, for some period of time."[17]

Necessary adaptation needs in Southeast European countries include:

- Development of new agricultural crop varieties, which are tolerant to higher temperatures, higher CO_2 levels, and droughts (adaptation options include changes in maturing periods, sowing dates, plant density, fertilizer use);
- Slow-down of land degradation, especially wind erosion, through afforestation and improved agricultural practices;
- Change in selection of species for afforestation;
- Improvement of drought monitoring systems;
- Improvement of water management, especially related to irrigation;
- Preventive measures against river floods due to increased precipitation in winter (especially dikes and managed lowland areas to be flooded in emergency cases);
- Preserving sufficient area for nature conservation, in order to provide favourable conditions and flexibility for maintaining biodiversity.
- Strengthening the cooperation and capacity of relevant agencies and research institutions regarding the assessment of local impacts and vulnerability to climate change;
- Improving the assessment and prioritisation of adaptation policies and measures, especially those of agriculture, water management, forestry, and human settlements.

16 Cf. Footnote 6.

17 Cf. Footnote 6.

4 Climate Change policy in the EU and the Accession and Candidate Countries

4.1 Status of commitments in the EU, the Accession and Candidate Countries

Under the Kyoto Protocol, the EU committed itself to reducing greenhouse gas (GHG) emissions by an overall target of 8% below 1990 levels by 2008-2012, the first commitment period. This target only covers the 15 Member States that comprised the EU at the time the Protocol was agreed. The EU made use of Article 4 of the Kyoto Protocol, which allows groups of countries to accept a common emission target and to redistribute that target internally ('bubbling'). Table 1 below summarises the different GHG emissions reduction targets of the old EU Member States and their implementation status.[18] Table 2 provides similar information for the AC, CC as well as NMS.

Table 1. Emission Reduction Commitments of EU-15 under the Kyoto Protocol

	EU-15	*Austria*	*Belgium*	*Denmark*	*Finland*	*France*	*Germany*	*Greece*
Target	-8%	-13%	-7,5%	-21%	0%	0%	-21%	+25%
2003	-1,7%	+16,6%	+0,6%	+6,3%	+21,5%	-1,9%	-18,5%	+23,2%

	Ireland	*Italy*	*Luxem-bourg*	*Nether-lands*	*Portugal*	*Spain*	*Sweden*	*UK*
Target	+13%	-6,5%	-28%	-6%	+27%	+15%	+4%	-12,5%
2003	+25,2%	+11,6%	-11,5%	+0,8%	+36,7%	+40,6%	-2,4%	-13,3%

Table 2. Emission Reduction Commitments of NMS, AC and CC under the Kyoto Protocol

Country	**base year emissions (million tons)**	**KP target (%)**	**KP target (million tons)**	**2003 emissions (million tons)**	**change base year – 2003 (%)**
Bulgaria	141.8	- 8%	130.5	62.2	- 56.0%
Croatia	31.6	- 5%	30.0	28.0	- 11.4%
Cyprus	6.0	None	None	9.2	52.8%
Czech Rep.	192.1	- 8%	176.7	145.4	- 24.3%
Estonia	43.5	- 8%	40.0	21.4	- 50.8%
Hungary	122.2	- 6%	114.9	83.2	- 31.9%
Latvia	25.4	- 8%	23.4	10.5	- 58.5%

[18] Data source: Annual European Community greenhouse gas inventory 1990-2003 and inventory report 2005, available at: http://reports.eea.eu.int/technical_report_2005_4/en/EC_GHG_Inventory_report_2005.pdf. The base year for the 'old' Member States is 1990, except for the base year 1995 chosen by some States for fluorinated gases.

Lithuania	50.9	- 8%	46.8	17.2	- 66.2%
Malta	2.2	None	None	2.9	29.1%
Poland	565.3	- 6%	531.4	384.0	- 32.1%
Romania	261.0	- 8%	240.1	139.0	- 46.8
Slovakia	72.0	- 8%	66.2	51.7	- 28.2%
Slovenia	20.2	- 8%	18.6	19.8	- 1.9%
Turkey		None	None		

4.2 EU climate policy: history, instruments and the way forward

4.2.1 Historical and current policies and measures

The European Commission first took initiatives to tackle climate change in 1991, when it issued a strategy to limit CO_2 emissions in different sectors. Since then, a wide set of policies and measures have been adopted, aimed at reducing greenhouse gas emissions. These include, for example:

- the **Greenhouse Gas Emission Allowance Trading Scheme** (EU ETS), which limits the total carbon dioxide emissions from almost 12.000 installations across the 25 EU Member States [19],
- the **Linking Directive**[20]**,** which connects the EU ETS with the Kyoto Protocol's project-based Joint Implementation (JI) and Clean Development Mechanism (CDM),
- the **"Renewables Directive"**[21]**,** which sets the indicative target to reach a 22% share of electricity from renewable sources by 2010 (with specific indicative targets for each Member State),
- the **Directive on the promotion of cogeneration**[22], which requires Member States to use their potential for high efficiency cogeneration,
- a green paper on **energy efficiency**[23], according to which the EU should save 20% of its energy consumption by 2020,
- a draft **end-use efficiency directive**[24]**,** which proposes mandatory targets for annual energy savings for the period of 2006-2012,

19 Directive on Establishing a Scheme for Greenhouse Gas Emissions Allowance Trading within the Community and Amending Council Directive 96/61/EC; OJ L275.

20 Directive amending Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community, in respect of the Kyoto Protocol's project mechanisms 2004/101/EC; OJ L338/18.

21 Directive 2001/77/EC on the promotion of electricity produced from renewable energy sources in the internal electricity market; OJ L 283/33.

22 Directive 2004/8/EC of the European Parliament and of the Council of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC; JO L 052, 21/02/2004.

23 Directive 2004/8/EC of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC

24 Proposal for a Directive of the European Parliament and of the Council on energy end-use efficiency and energy services, COM(2003) 739.

- the **Framework directive on the eco-design of energy-using products**,[25] which sets conditions and criteria for requirements related to environmentally relevant product characteristics, such as energy consumption,
- a proposal for a **regulation to reduce emissions of fluorinated gases**[26] (F-gases).

4.2.2 Perspectives of EU climate change policies

In March 2005, the European Council stated that reduction pathways for the group of developed countries on the order of 15-30% by 2020, from the baseline set out in the Kyoto Protocol (typically 1990 emission levels), should be considered. EU leaders pointed out that this reduction range "will have to be viewed in the light of future work on how the objective can be achieved, including the cost-benefit aspect". The Council welcomed the **Commission Communication** "Winning the Battle Against Global Climate Change" of 9 February 2005[27], which outlines the following core elements of the EU's future climate change policy and negotiation strategy:

- To **broaden participation**, the Commission recommends the adoption of a negotiation strategy persuading the major world emitters to comply with a binding system. In order to accelerate progress at the global level, the installation of a small discussion group including EU, US, Canada, Russia, Japan, China and India as the largest emitters is an option.
- **More policy areas should be included**, i.e. international action must be enlarged to cover all greenhouse gases and sectors, with a particular focus on emissions from aviation and maritime transport, as well as consideration of how to combat deforestation, an important source of emissions.
- Climate-friendly, **low-emission technologies must be promoted** and related research needs to be enhanced.
- **Flexible, market- and project-based mechanisms**, such as the ETS and JI/CDM should be maintained in the post-2012 system. Targets and timetables are efficient instruments, but the international negotiations should also link climate change issues with technology innovation, energy efficiency promotion, the development of low-carbon sources of energy and development policy.
- Finally, **adaptation policies** must be included, and financial support should be provided for the adaptation efforts of the poorest and worst-affected countries.

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25 Directive 2005/32/EC on the eco-design of Energy-using Products

26 Proposal for a Regulation of the European Parliament and of the Council on certain fluorinated greenhouse gases; 7.3.2005, COM (2003) 492, 2003/0189/COD.

27 "Winning the Battle Against Global Climate Change", COM(2005) 35 final, 9.2.2005.

The **European Parliament** welcomed the conclusions by the European Council, in particular the 15–30 % target. The Parliament insisted that emission targets for the long-term are needed and suggested a reduction target of 60-80 % by 2050.[28]

The **Environment Council on 9 March 2006** noted that achieving the 2°C objective will require global greenhouse gas emissions to peak within two decades, followed by substantial reductions on the order of at least 15% and perhaps by as much as 50% by 2050, compared to 1990 levels. The Council also emphasised the need to ensure that there is no gap between the first and second commitment periods, and that further action must form part of a global effort by all parties (in accordance with the principle of common but differentiated responsibilities and respective capabilities).

The EU reiterated this position in its **submission to the UNFCCC secretariat** on further action on 22 March 2006 (submission concerning Article 3.9 of the Kyoto Protocol).[29] In this submission, the EU expresses its concern that delaying such reductions would necessitate more drastic cuts in the future, increase the cost and extent of adaptation measures, and lead to serious damage from climate change impacts. Concerning the process included in Article 3.9 of the Kyoto Protocol, the EU suggests, on the basis of thorough scientific and socio-economic analysis, addressing specific issues, such as:

- Whether the discussion should concentrate solely on the next commitment period, or take a longer term view? What should be the length of future commitment periods?
- What will be the provisions for the use of flexible mechanisms? What is the scope of the carbon market?
- How will sinks be treated under future commitment period(s)?
- Should there be any changes to sectors and sources of emissions covered? (e.g. international bunker fuels, giving priority to those that contribute the most to increasing rates of GHG emissions)

For the first session of the open-ended ad hoc working group, the EU suggested concentrating on two tasks:

- providing an open exchange of views on the expectations of the Parties for the work of the group and
- agreeing on elements for a programme of work, *inter alia*, the issues to be considered by the group.

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[28] European Parliament Resolution on the Communication from the Commission "Winning the Battle Against Global Climate Change" (2005/2049 (INI)) of 17 November 2005

[29] Submission by Austria on behalf of the European Community and its Member States, supported by Bulgaria, Romania, Croatia, the former Yugoslav Republic of Macedonia, Albania and Serbia and Montenegro, 22 March 2006.

5 Analysis of the economic opportunities and challenges for the Accession and Candidate Countries

5.1 Global benefits and costs of climate change policies

Unrestricted climate change may result in a broad array of mostly negative impacts on the environment, human well-being, and the economy. However, the magnitude, timing and regional distribution of impacts is still very uncertain. This makes a precise cost-benefit analysis difficult. Nevertheless, most studies agree that the marginal damages resulting from greenhouse gas emissions will increase over time. Damage estimates suggest that current mitigation measures with social costs below € 20 per ton of CO_2 eq. (or even higher) may be justified from a global economic efficiency point of view. Over time, more expensive mitigation measures could be justified.[30]

Climate change itself may impede growth and development. This aspect is most pressing for poor countries but also for those countries that are particularly vulnerable for geographic reasons, for example because of low-lying coastal areas. For countries that actively develop adaptation and mitigation policies, the flexibility in restructuring the economy is crucial. Especially in the reforming AC and CC, the opportunity to consider climate change policies in a phase of major economic restructuring is a big advantage. To minimize mitigation and adaptation costs, swift adjustment of policies is paramount, including instruments for energy production and consumption, increased energy efficiency, and coordinated action among countries. These changes could entail increased (energy) efficiency of industries, reduced dependency on foreign sources of energy, reduced vulnerability to volatility of energy prices, reduced air pollution, job creation, and additional investment opportunities. For the example of the impact of energy prices on economies, recent studies have shown that taking less than 4% of oil off the global market due to small incidents of political unrest and terrorism would cause prices to rise dramatically. It also showed that once an oil supply disruption occurs there are few short-term options for protecting the U.S. and global economy.[31]

5.2 Situation in the Accession and Candidate Countries: GHG emissions, sources, and trends

5.2.1 Key Economic Trends

The four Accession and Candidate countries differ considerably in economic terms. While

[30] See, for example, P. Watkiss (2005), The Social Cost of Carbon (SCC) Review – Methodological Approaches for Using SCC Estimates in Policy Assessment, AEA Technology Environment, UK. From an extensive review of literature, Watkiss suggests a central SCC value of € 22 per ton of CO_2 for emissions in the year 2000, with a range between € 14 and € 51 per ton of CO_2. The central SCC value and the upper and lower values of the range increase by approximately 2.9 % per year. Hence, the central SCC value of emissions in the year 2010 would be around € 25 per ton of CO_2, increasing to € 82 per ton of CO_2 in the year 2050.

[31] Oil Shockwave. Oil Crisis Executive Simulation: Securing America's Future Energy (SAFE) and the National Commission on Energy Policy (NCEP), March 2006 http://www.energycommission.org/ewebeditpro/items/O82F6801.pdf

Bulgaria and Romania share a similar history of transition and economic problems after the end of the Cold War, Croatia has additionally suffered from the civil war of the early 1990s and the break-up of Yugoslavia. In contrast, Turkey must be approached in a way that reflects its completely different historical, cultural and economic background. It is the largest economy of the four AC and CC with a population of 70.7 million. Turkey started its negotiations on EU membership in October 2005.

Bulgaria

Bulgaria is one of the poorest countries in Central and Eastern Europe with a per capita income in 2003 of around 30 percent of the average EU-25 level. Bulgaria's (population: 7.8 million) key sectors include agriculture, tourism, light industry, and metallurgy. The country has undertaken massive macroeconomic and structural reforms which led to a growth rate close to 5 percent in the 2000-2004 period. The private sector accounts for approximately 75% of the economy and is the major driver of economic growth. Economic growth has decreased unemployment (around 12.7 percent by 2004), and has increased per capita income and living standards. Membership to the EU is envisaged for January 2007, which stimulates further reform. Problems, however, are prevalent in the agricultural and environmental policy areas, justice and home affairs, company law, and the services sectors, mainly with respect to implementation. The fight against corruption and crime remain on the agenda. The EU will reassess the country in October 2006.[32]

Croatia

Croatia has a population of 4.4 million people. It became independent in 1991 and started accession negotiations with the EU in October 2005 (with the ambition to enter in 2009). The list of reforms in this process contains the strengthening of market institutions, and judicial reforms to improve the business climate, public administration, and social sector efficiency. Structural reforms have been carried out already, e.g. 60 per cent of the economy is private sector driven and a pension reform was undertaken in 2001. Market liberalisation has been implemented in the telecommunication, energy, and transport sectors. A recession in 1999/2000 was followed by an annual growth period of 4 percent on average. [33]

Romania

With a population of 21.7 million, Romania is the second largest country in Central and Eastern Europe (larger than 19 current EU members). Restructuring of the economy and administration is undertaken with a view to join the EU in 2007. Among the major challenges is that per capita income is very low (an estimated 2,940 US$/capita in 2006), and 25.5 % of the population live below the poverty line, 2/3 of which live in rural areas. Romania's economy is not quite a competitive market economy yet. The economy after 1990 was on the brink of collapse; due to being left with excessive and heavy industry, large infrastructure

[32] www.worldbank.bg, The Economist, 16th May 2006 "Joining the union"

[33] www.worldbank.hr

projects and major reforms were delayed. Only from 2000 onwards fiscal, monetary and structural reforms were installed. Competitiveness was boosted by direct investment, currency depreciation, and productivity gains. Challenges in successfully addressing corruption have led to inefficient public administration, which the government continues to actively tackle. Another EU assessment is due in October 2006.

Turkey

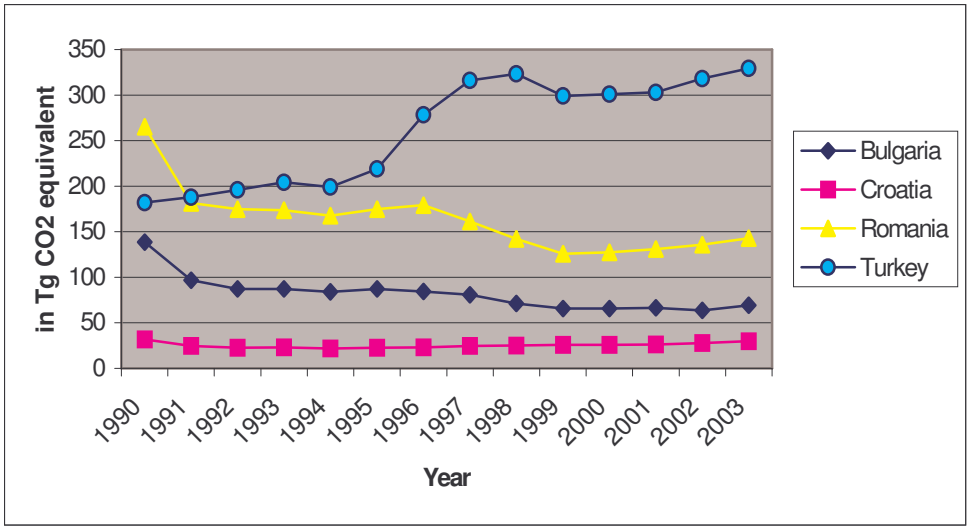
Turkey has experienced strong recovery from a 2001 severe economic recession, caused by a devastating financial and currency crisis (see Figure 1 for the development of GHG emissions in this period). During 2004, Turkey's real gross domestic product (GDP) grew by 8.9 percent, with an inflation rate of 8.6 percent. For 2005, real GDP growth was at 5.6 percent, while unemployment was around 12 percent. Despite the positive signs, Turkey continues to face numerous economic challenges (including a large "underground" economy; sharp income inequalities; a large state sector; complicated legal and administrative procedures; a relatively inhospitable foreign investment climate; and a stalled privatisation program). The GHG emissions mirror the economic performance.[34] After an initial slump in 1991, an increase in GHG emissions took place in 1994 and peaked in 1997, fell again and had an all time high in 2001. After another slump in 2002, Turkey's emissions are rising again.

5.2.2 Trends in Greenhouse Gas Emissions

In Bulgaria and Romania the deep social, economic and – last but not least - environmental changes after the collapse of the communist block led to a distinct drop in GHG emissions. Significantly, most of these emission reductions came about in the first half of the 1990s, and contrary to other NMS emissions did not rise again after a period of stabilisation in the late 1990s (see Figure 1). The current trend shows a slight upward slope, also for Croatia. The GHG emissions in Turkey mirror the economic development. The trend goes clearly upwards, especially since the mid-1990s, with a pause during the economic crisis of 2000/2001.

[34] See also Lise (2006), Decomposition of CO_2 emissions over 1980-2003 in Turkey, Energy Policy 34, 1841-1852, which argues that emissions growth in Turkey over the period 1980-2003 was for almost 80% the result of the growing economy, for 13% the result of a structural change towards more energy-intensive sectors, for 13% the result of an increase in the carbon intensity of energy, while a decreasing energy intensity offset these increases by 7%.

Figure 1. Emissions of GHGs in the Accession and Candidate Countries (Gg CO_2-equivalent)



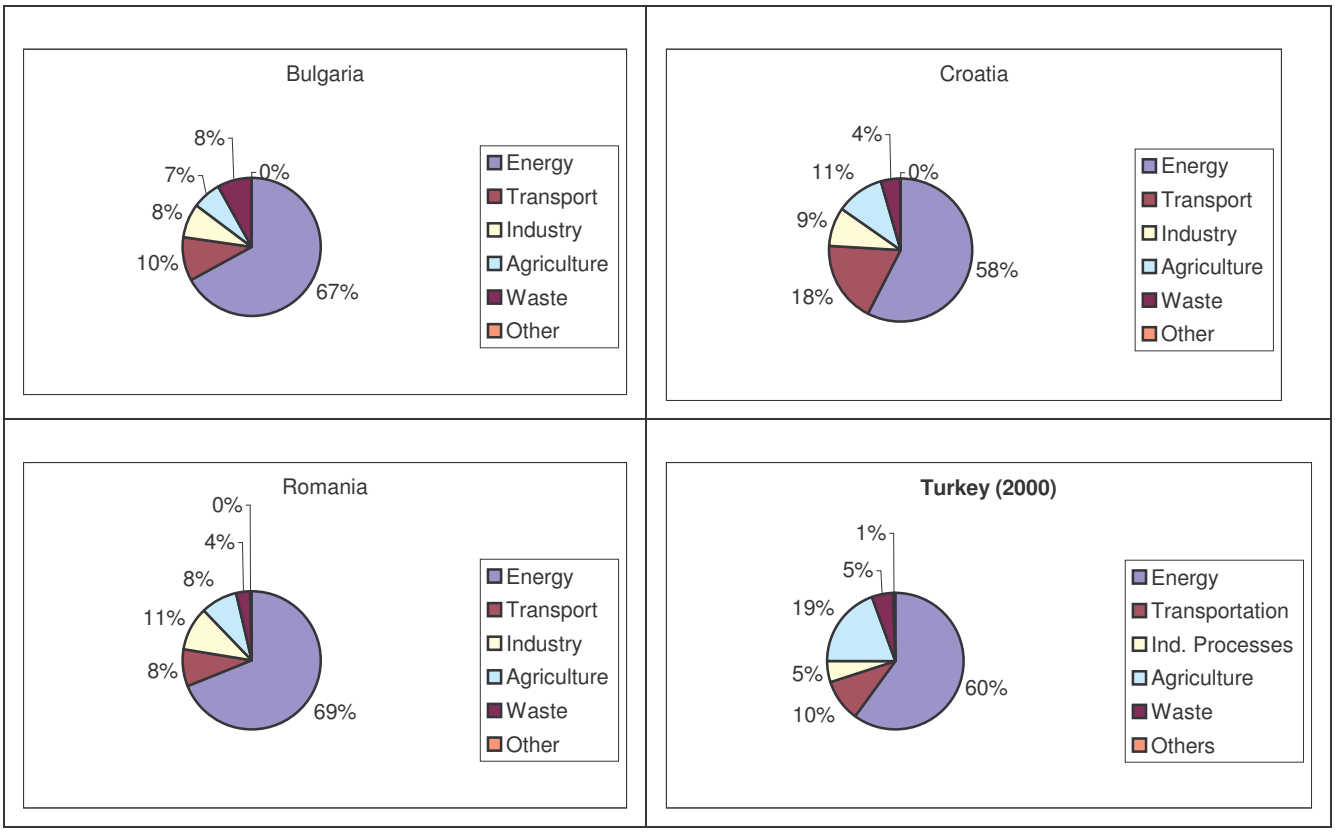
Source: UNFCCC, Greenhouse Gases Database

Projections of GHG emissions show increases of emissions in Bulgaria and Croatia in the period 1995-2020 of 50 to 100%, while the expectation of growth for Romania over the same period is somewhat less with about 30%. Recent projections for Turkey from the UNDP and World Bank suggest a six-fold increase in CO2 emissions over the period 1990-2025.[35]

Figure 2 shows the sector shares in GHG emissions in the AC and CC in 2003. In Bulgaria, and Romania, the energy sector accounts for nearly 70% of GHG emissions; in Croatia, energy production contributes up to 58% to GHG emissions, while in Turkey nearly 60%. In Bulgaria, the other sectors that contribute to GHG emissions are transport (10%), industry (8%), agriculture (7%), and waste (8%) (see Figure 2). This ranking compares to Croatia with transport (18%) followed by agriculture (11%), industry (9%) and waste (4%). In Romania, industry contributes the second-most (11%), followed by agriculture (8%) and waste (8%). Finally, in Turkey, the second-most contributing sectors are agriculture (19%) and transport (10%).

35 Lise, op cit.

Figure 2. Sector shares in GHG emissions in Bulgaria, Croatia, Romania (2003) and Turkey (2000)



Source: UNFCCC, Greenhouse Gases Database; First Report by Turkey to the UNFCCC data base, April 2006

5.3 Climate Relevant Aspects of the AC and CC Economies

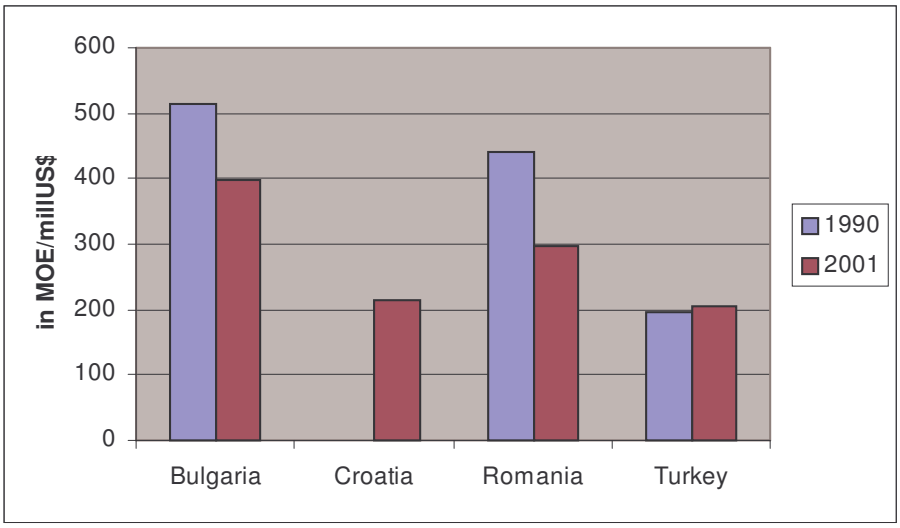
The main climate relevant aspect of the AC and CC economies is the energy consumption and production of these countries. This has been highlighted already by the sector shares in Figure 2. On a world scale, the countries of the Balkans region are neither major energy producers nor consumers, although the region does hold some important fossil fuel deposits. In recent years, the political and economic instability in the Balkans has discouraged substantial foreign investment in the countries' energy sectors. However, the region is becoming more important as a transit region for Russian and Caspian Sea oil exports to Western consumers. Turkey, on the other hand, is a relatively large consumer of energy. The transport sector in all four national economies is a dynamic growth sector and as such, is discussed separately.

5.3.1 Climate Relevant Aspects in the Energy Sector

All AC and CC rely to a large extent on fossil fuel as their main energy source. Romania and Bulgaria are all net oil importers, depending primarily on Russia for most of their supply. Moreover, in April 2003, representatives from all of the Balkan Countries signed an agreement supporting a proposed natural gas pipeline from Greece, through the Balkans and into Austria.

The energy intensity of the economy decreased considerably in Bulgaria and Romania (by approximately 20% from 1990 to 2001). In Turkey, energy intensity rose slightly in this period (see Figure 3). For Croatia, no data for 1990 were available.

Figure 3: Energy intensity per GDP in international dollars



Source: WRI – World Resources Institute 2006

Bulgaria

Bulgaria's geographic location on the Black Sea allows it to serve as a transit route for Caspian Sea oil exports heading to European refineries, as well as a transit point for Russian gas exports to Turkey. Oil is imported through Bulgaria's main port at Burgas. Bulgarian oil and gas exploration occurs predominately in the northern part of the country and the Black Sea. In January 2005, the Bulgarian government offered the offshore Shabla block a three-year exploration license for the northern Black Sea shelf . Potential reserves are expected at 200 million barrels. Actual Bulgarian refining capacity is estimated at 115,000 bbl/d. Bulgaria's largest refinery, Neftochim, has a capacity of 140,000 bbl/d.

Many energy-intensive industries did not have enough funds for energy efficiency improvements, leading many to shut down in the period 1998-2001 due to insufficient competitiveness. On the other hand, new owners of privatised companies tended to implement low cost energy efficient measures. The shutdowns and efficiency measures resulted in a reduction in GHG emissions by the end of the 1990s.

In the near future, the GHG emissions in the power sector are likely to rise. Increased lignite combustion and the closure of two further nuclear units at Kozloduy to fulfill EU obligations will result in higher CO2 emissions. The controversial re-uptake of the construction of the nuclear power plant at Belene, which was halted in 1992, is pursued by the Bulgarian government. However, the commissioning and its date are uncertain.[36]

[36] See Third National Communication to the UNFCCC, Bulgaria, Sofia 2002

Croatia

Privatisation efforts are underway in Croatia's oil production. Most Balkan natural gas imports come from Russia. Croatia is an oil importer (as all countries in the Balkan region), but has established reserves of 69 million barrels. Although a number of companies are active in the region and exploration is picking up, oil production in the Balkan states remains low, with Croatia producing 28,000 bbl/d. The Balkan region's dependency on oil imports is around 80%. Croatia holds a further 1.0 Tcf and produced 70 Bcf of natural gas.

In the Croatian power supply system, hydro power plays an important role and generates about 50% of total power supply. The remainder is produced by thermal power plants and one nuclear power plant at Krško, Slovenia, which delivers 50% of its production to the Croatian grid. It is projected to operate until 2023, subject to a possible extension in subsequent years. Although further constructions of hydro power plants are planned, new thermal power plants are needed to meet the rising demand for energy and to replace old plants. The new facilities are going to be coal- and gas-fired plants.[37]

Romania

Romania is central and eastern Europe's largest producer of natural gas, extracting 505 Bcf in 2001. But Romania's production has fallen significantly--by almost 60% in 20 years. Consumption also fell during this period, but at 696 Bcf in 2001, Romania's domestic demand is still the highest in the region. The country imports natural gas from Russia, delivered via the south-bound Progress pipeline. However, with reserves of 3.6 trillion cubic feet (Tcf) and a sizeable domestic market, Romanian natural gas assets have proven to be attractive acquisitions for foreign investors.[38]

Romania imports oil via the Black Sea through two major ports, Constanta and Tulcea, giving the country the capability to be a major energy transport point. Because of its perceived strategic importance, the Romanian government has no plans to privatise Conpet, the state-owned oil transport company, which operates the national pipeline system.

Romania’s one-reactor nuclear plant, Cernavoda, accounts for about 7% of the total average annual electricity generation. The government regards nuclear energy to be the main source to meet future increases in energy demand, and is working on the development of a second and third reactor at the facility, which are planned to commence operation in 2006-2007 and in 2010-2015 respectively.[39] In October 2003, the Romanian government announced plans to overhaul the country's electricity sector following a series of blackouts in 2002. The government's plan aims to spend $10.4 billion on developing new nuclear and hydroelectric generating facilities, as well as upgrading the country's transmission infrastructure.

37 EKONERG (2003). Republic of Croatia – Projections of Greenhouse Gas Emissions, Zagreb.

38 In December 2003, the Romanian government announced a tender offering 51% of two regional gas distributors, Distrigaz Nord and Distrigaz Sud. Bidders were Russia's Gazprom, Italy's Enel, Germany's Ruhrgas, and Gaz de France. Germany's Wintershall and Ruhrgas already own assets in Romania. See <www.eia.doe.gov/emeu/cabs/seeurope.html>, <www.worldbank.org.tr>, <www.worldbank.org.bg>, < www.worldbank.org.hr>

39 See Romania's Third National Communication under the UNFCCC.

Hydroelectric power also plays a significant role in Romania, accounting for almost 30% of generation in 2001. With established oil reserves of 956 million barrels--roughly comparable to net oil exporter, Denmark—Romania is also the largest oil producer in Central and Eastern Europe. However, Romania's oil production has fallen sharply over the past few decades, from 252,000 barrels per day (bbl/d) in 1980 to 125,000 bbl/d in 2002, a decline of roughly 50%.

Moreover, Romania dominates Southeastern Europe's downstream petroleum industry, with ten of the region's eleven refineries. This refining capacity far exceeds domestic demand for refined petroleum products, allowing the country to export a wide range of oil products and petrochemicals. However, nearly all of Romania's refineries are running well under capacity because of a lack of crude oil supplies, and the majority remain state owned. Years of low investment have left the country's refining industry in poor health, requiring massive amounts of capital to modernise and improve efficiency.[40]

Turkey

Prior to Turkey's severe economic difficulties in 2001, the country's energy consumption and net imports had been growing rapidly. Assuming that the Turkish economy and energy demand return to a rapid growth path, Turkey will require billions of dollars worth of investments in the energy sector in coming years. In 2001, Turkey ratified the Energy Charter Treaty, the main international legal framework for energy investment. In December 2003, parliament passed legislation liberalising the country's energy sector. In February 2004, the government raised taxes on unleaded gasoline, diesel, and natural gas as part of a move towards boosting budget revenues in line with IMF recommendations.

In April 2005, the International Energy Agency (IEA) elaborated that Turkey needs to "restructure the state-owned enterprises...create independent electricity and gas operators and to remove cross-subsidies from electricity and gas prices." The IEA report follows an October 2004 European Commission assessment of Turkey, in which the Commission called on Turkey to continue liberalising the country's energy sector in line with the single European energy market, and recognised Turkey's role as an important oil and gas transit center. As part of Turkey's efforts to join the EU, the country has incorporated numerous EU energy laws and standards into its national energy legislation.

In general, Turkish oil consumption has increased in recent years, although the country's recent economic recession, coupled with price deregulation measures (which have raised the price of many oil products), since June 1999 appear to have interrupted this trend for the time being. In the long-run, Turkish oil demand and imports are expected to resume steady growth (during 2004, Turkish oil demand increased to around 685,000 bbl/d). Oil provides

[40] Romania's state oil company, Petrom, is 93% state owned although Bucharest sold 51% to OMV (Austria "Österreichische Mineralölverwaltung Aktiengesellschaft") in 2004. With approximately 60,000 employees, Petrom is a major player in Romania's economy. See <www.eia.org>

over 40 percent of Turkey's total energy requirements, but its share is declining with the rising share of natural gas.

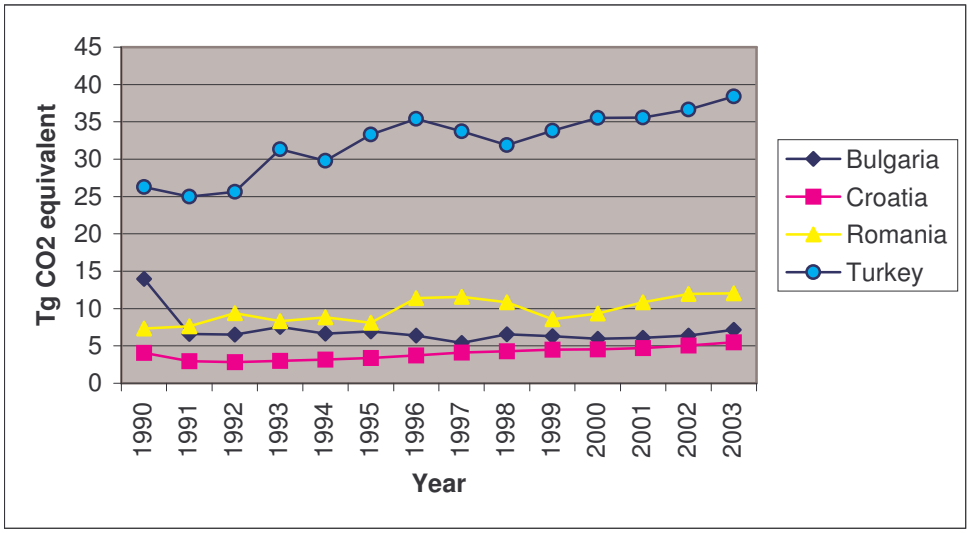
Around 90 percent of Turkey's oil supplies are imported, mainly from the Middle East (Saudi Arabia, Iran, Iraq, Syria) and Russia. Oil flows from Iraq, though, have only been sporadic since late March 2003, following the outbreak of the Iraq war. Turkish oil fields are generally small, and scattered throughout the country. Oil fields in the country's southeast (specifically the Hakkari Basin, Turkey's main oil producing area) are old and expensive to exploit. In addition to the Hakkari Basin, Turkey contains oil prospects in its European provinces, in the Black Sea shelf region, and in other oil basins in southern and southeastern Turkey. Potential oil reserves in the Aegean Sea have not been explored due to conflicting Greek claims over the area.

5.3.2 Climate Relevant Trends in the Transport Sector

The transport sector has seen the largest increase in energy usage worldwide, mainly with respect to fossil fuels. This also holds for the AC and CC, especially as transport activities increase with GDP growth. In Bulgaria, Croatia and Romania, the transport sector has experienced major restructuring during the last decade, departing from a system characterised by limited private mobility, extensive use of subsidised public transportation, obsolete infrastructures, and inefficient use of freight capacity. Private car ownership hasincreased in all NMS while public transport has declined. While freight traffic by rail was dominating until 1999, a switch towards truck traffic characterises the current split between the modes. Thus, these two trends determine energy demand for transportation. Road transportation is facilitated by EU financing of major European corridors. For freight transport, the integration of trade relations of the AC and CC is most paramount.

Any attempt to reduce GHG emissions of the transport sector needs to rely on a reduction of fossil resources, e.g. by increased energy efficiency, a shift in transport modes towards public transport, and new technologies relying on renewable fuels. Last but not least, the dynamics in this sector, which is crucial for the integration and growth in the NMS and ACs, need strong policy guidance towards a sustainable mobility concept. The shift of sectoral activities towards services could yield, to a certain extent, of decoupling freight transport activities and GDP growth.

Figure 4. Transport-related GHG emissions in AC and CC (1990-2003)



Source: UNFCCC, Greenhouse Gases Database

5.3.3 Benefits and costs of climate change policies for the AC and CC

Climate change is expected to increase the risks and frequency of droughts and floods in Bulgaria and Romania. The 2000 drought in Romania was the strongest of the last century in terms of intensity and duration, and had devastating effects on crop yields. Further severe floods affected Romania in 2001, 2005, and 2006. The death toll alone from these disasters provides the main argument for long-term action (e.g. in 2005, the summer floods in both countries led to 50 deaths). An approximation of the flood damages in Romania for 2005 is 25 million $US.[41] Thus, the costs of adaptation are of major concern to these countries. Still, current climate change impacts cannot be tackled by mitigation alone. From mitigation efforts, a major long-term efforts will lower risks of extreme weather events.

Apart from this direct benefit, mitigation measures could bring additional benefits to Accession and Candidate Countries with increased energy-efficiency of industries, reduced dependency on foreign energy sources, reduced air pollution, job creation, and additional investment opportunities. Many studies have identified a vast potential for relatively cheap energy efficiency measures in NMS, AC and CC. The International Energy Agency estimates the economic potential of these energy savings to exceed 20% of total current final energy consumption in Central and Eastern European countries, including the Balkan States.[42] However, precise numbers for the costs and benefits of the AC and CC related to climate policy measures are currently not available.

41 See e.g. <http://edition.cnn.com/2006/WORLD/europe/04/26/romania.floods.ap/>

42 International Energy Agency (December 2004). Energy Efficiency in Economies in Transition (EITs): A Policy Priority. at: http://www.iea.org/textbase/papers/2004/effeit.pdf

5.4 Impacts of Further Action on Industrial Competitiveness

The European Union has recognised in its renewed Lisbon strategy in 2005 that increasing energy efficiency is but one way to revitalise the European economy and make it more competitive. The great potential for energy efficiency improvements in Accession and Candidate Countries promises large benefits in terms of increased competitiveness of businesses and industrial sectors, and enhanced standards of living for citizens. Recently, the sharp increase in energy prices has forcefully underlined the need for both increased energy efficiency and a shift away from (imported) fossil fuels. The International Energy Agency warns, however, that the resources allocated to energy efficiency in Central and Eastern Europe remain largely insufficient to meet this challenge.[43] European climate change policies thus could give another incentive and provide resources for further energy efficiency improvements and investments in the development of renewable energy sources. For the candidate countries, these incentives will be subject to overall accession negotiations.

Bulgaria, with the highest energy intensity per GDP of the four countries, has a high potential for profitable energy efficiency measures. However, inadequate bank liquidity and risk-adverse bank behaviour due to the unfamiliarity with energy efficiency projects resulted in the virtual lack of financing possibilities. The most promising energy saving projects, with a payback time of less than 3 years, have been included in the Government's National Energy Saving Action Plan 2001-2003, but only very few of them have actually been implemented. The World Bank has realised the potential for energy savings in Bulgaria and provides assistance under its 2005 Energy Efficiency Project, which focuses on the development and implementation of profitable energy efficiency projects, without relying on public subsidy.[44]

Romania has been able to attract increasing foreign direct investment in recent years. One of the top sectors with FDI participation in Romania is metallurgy, which was traditionally one of the largest industries in terms of production and number of employees. The most important contributor to privatisation in Romania has been the steel manufacturer Sidex. The buyer of Sidex (LNM Ispat, today Mittal Steel) received generous incentives from the state and highly invested in technology and restructuring the company, while managing to keep downsizing relatively moderate. The company is profitably operating now, the technology has been improved, environmental standards strengthened, and nearly 80% of employees retained.[45] Nevertheless, as options for privatisation decrease, and the current account deficit widens from increasing domestic demand, new possibilities of FDI inflows are needed. The low wages and a well-trained workforce (especially technicians and engineers) are potential incentives for investments, which may also be able to shift Romania's sectoral structure to more high technology and service sectors, which will also be relevant for greenhouse gas

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43 op cit.

44 World Bank Project ID: P084831

45 See Birsan, Maria, Camelia Moraru, Romana Cramarenco and Stela Andrei (2005), Contribution of FDI to the privatisation in the manufacturing sector in Romania. Success and failure stories, Studia Negotia, 2005, No2/2005, 4.

emissions. The opportunities in the IT sector have already been recognised by international companies, which have undertaken several investments in Romania.[46]

The perspectives for increasing energy use and CO2 emissions in Turkey depend mainly on the outlook for economic growth. Besides the possibility to substitute high-carbon-emitting fuels through low- or non-carbon-emitting fuels, a more efficient energy usage is the most attractive option for Turkey. The potential for efficiency measures in the generation, distribution, and consumption of energy is quite large. Until recently, the Turkish government held a monopoly in the energy sector and the pricing policy has encouraged inefficient use of energy. Market reforms, including price reforms, andenergy-saving incentives have been introduced. Nevertheless, stronger energy efficiency policies are needed; the definition of an emissions target in accordance with the Kyoto Protocol could help to reach this goal.

In the long term, Europe's competitive advantage will increase if foreign competitors are forced to implement necessary mitigation measures, and if early movers in Europe could supply advanced technologies and techniques to these competitors. Belonging to the group of early mover countries could be in the interest of the AC and CC.

5.5 Kyoto mechanisms

At present, there are so-called "Kyoto mechanisms" available for the financing of mitigation measures in Acceding and Candidate Countries. These include: (1) Joint Implementation, under which Annex I Parties may earn credits by undertaking emission reduction projects in another Annex I Party; and (2) International emissions trading, whereby Parties in Annex B to the Protocol may participate in emissions trading with other Annex B Parties to fulfil their mitigation commitments.[47]

While countries' experiences with Joint Implementation projects to date have been mixed, the availability of this mechanism certainly has stimulated various projects that will reduce emissions and improve local conditions. After accession to the EU, Joint Implementation can be integrated in the European Emissions Trading Scheme.[48]

Detailed analysis of the European Emissions Trading Scheme (modelled upon international emissions trading under the Protocol, but operated at the level of installations) has revealed that the scheme does not threaten the competitiveness of most industrial sectors in Europe, including most energy-intensive sectors. Indeed, several sectors, such as power generation, have the potential to profit from the scheme.[49] As many energy-intensive firms in the accession countries still have the opportunity to reduce greenhouse gas emissions at

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46 See <www.aries.ro>

47 At the moment, International Emissions Trading is an option for Bulgaria and Romania, and for Croatia after it has ratified the Kyoto Protocol.

48 See Directive 2004/101/EC of 27 October 2004.

49 See, for example, Carbon Trust (2004). The European Emissions Trading Scheme: Implications for industrial competitiveness. The Carbon Trust, London, and Reinaud, J. (2005). Industrial competitiveness under the European Union Emissions Trading Scheme. IEA Information Paper, International Energy Agency, Paris.

relatively low marginal costs, these firms might well become sellers of “greenhouse gas allowances” in the Emissions Trading Scheme, thereby generating additional financial resources.

Bulgaria and Romania are already preparing to enter the European Emissions Trading Scheme in its second commitment period, starting in 2008. One of the requirements of the Scheme and challenges for these countries is to design National Allocation Plans that allocate CO2 emissions rights among companies and installations.[50] Preparation of final documents requires further negotiations between ministries and industry on the allocation of emission allowances. Turkey and Croatia are not participating in the ETS and will not do so before their accession.

5.6 Options for the Way Forward for the Accession and Candidate Countries

Greenhouse gas emissions in Bulgaria and Romania have fallen in the early 1990s, but have been increasing in recent years. In Croatia, recent emissions data show also an upward trend. However, emissions are expected to rise considerably up to 2020. The fastest growing sources of CO_2 emissions are the energy and transport sectors. Thus, it is paramount for climate change policies to encourage emission reductions mainly from these sectors by increasing energy efficiency and investing in infrastructure that has a high share of sustainable components (e.g. not only rail and shipping, but also biofuels).

In Turkey, the development of GHG emissions was not interrupted by a fundamental political and economic disruption, and thus has benefited from a clear path of economic growth. The options here are to tackle wasteful energy consumption and encourage more efficient production to avoid a decease in both GDP growth and emissions. Also of importance is a strong need to attract foreign investment with more efficient technologies. Certainly, the ambitions to enter the EU will yield the incentive to frame the investment environment, not only in Turkey, but in all AC and CCs.

Bulgaria and Romania have a clear preference for nuclear energy production. Although this could be welcomed from a climate policy point of view, this strategy must be evaluated in the EU context and on the background of unresolved nuclear waste disposal. Promoting the production and use of renewable energy will offer some advantages - e.g. lessen the States’ dependency of external sources of energy, which is very strong, or could match the energy strategies of major EU member countries like Germany – that should be communicated very clearly in the discussion on Post-2012 climate strategies.

In general for all AC and CC, the economic restructuring provides various opportunities for investment cycles to help establish a more sustainable energy mix and economic structure. This is an asset for policy makers in these countries, and who should demand support of the EU and other international actors.

[50] For a discussion of and proposals for a national allocation plan in Bulgaria, see I. Baranova et al. (2003). Emissions Trading in Bulgaria. EPCEM project report, Institute for Environmental Studies, Free University, Amsterdam.

6 International negotiations on post-2012 commitments

6.1 Status of the international debate following COP 11

The Eleventh Conference of the Parties (COP 11) to the UN Framework Convention on Climate Change took place in Montreal in December 2005. That same session also served as the first Meeting of the Parties to the Kyoto Protocol (COP/MOP 1). There were three key outcomes from the Montreal session:

1. **Adoption of a series of decisions that bring the Kyoto Protocol's 'flexible mechanisms' into full operation, and endorse procedures and mechanisms relating to compliance with the Kyoto Protocol.** A series of decisions that create the rule book for international emissions trading, the Clean Development Mechanism and Joint Implementation have been negotiated in the years since the Kyoto Protocol was first agreed. These decisions were formally adopted in Montreal at COP/MOP 1.[51]

2. **Establishment of an Ad Hoc Working Group to discuss commitments of Kyoto Protocol Parties beyond 2012.** [52] The Kyoto Protocol defines a five-year period from 2008-2012 as its "first commitment period". Under Article 3.9 of the Protocol, Parties are required to "initiate the consideration" of commitments for subsequent periods at least seven years before the end of the first commitment period (i.e. in 2005). In Montreal, Parties to the Kyoto Protocol established an Ad Hoc Working Group (AWG) to consider future commitments of Annex I Kyoto Parties for the period beyond 2012. In May 2006, the AWG, which is open to all Kyoto Parties, met for the first time in conjunction with the 24th session of the Subsidiary Bodies to the UNFCCC.[53] The Group agreed that it would be useful to hold an in-session workshop at its second meeting, which will take place in Nairobi in November 2006, in conjunction with the 25th session of the Subsidiary Bodies. That event will include a presentation by the IPCC, and presentations by Parties on the scientific basis for determining further commitments, scenarios for stabilising concentrations of GHGs and the implications of these scenarios, to assist the AWG in determining amendments to Annex B to the Kyoto Protocol. The AWG invited Parties to submit information by September 1, 2006 on specific topics they would wish to present at the in-session workshop in Nairobi. The AWG will report back to each annual COP/MOP, and aim to complete its work in time to ensure that there is no gap between the first and second commitment periods.

3. **Establishment of a Dialogue on long-term cooperative action to address climate change by enhancing implementation of the Convention**.[54] In Montreal, Convention Parties agreed to begin a Dialogue, to be held in up to four workshops, to

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51 See FCCC/KP/CMP/2005/8/Add.1–3)

52 Decision 1/CMP.1 (FCCC/KP/CMP/2005/8/Add.1)

53 At SB 24, the Chair of the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol presented a report on the planning of the future work of group (FCCC/KP/AWG/2006/L.2/Rev.1).

54 Decision 1/CP.11 (FCCC/CP/2005/5/Add.1)

discuss ways to enhance implementation of the Convention. The Dialogue will create a forum for Parties to exchange experiences and analyse strategic approaches for long-term cooperative action that include: (1) advancing development goals in a sustainable way; (2) addressing action on adaptation; (3) realising the full potential of technology; and (4) realising the full potential of market-based opportunities. The Dialogue will be informed by the best available scientific information and assessment on climate change from the IPCC, as well as other relevant scientific, social, and economic information. It will serve as a forum to identify actions to promote research, development and deployment of cleaner technologies and infrastructure. It will also identify ways to support voluntary actions by developing countries, and ways to promote access by developing countries to climate-friendly technologies and technologies for adaptation. The Dialogue's first workshop was held from 15-16 May 2006 in Bonn, Germany. Parties used the opportunity to express their views on ways to accelerate the reduction of emissions, including through the use of economic incentives and greater involvement of the private sector in climate protection.[55] The Dialogue will report back to COP 12 and COP 13.

Review of the Kyoto Protocol. Separate and apart from these processes, Article 9 of the Protocol provides that the COP/MOP shall periodically review the Protocol "in light of the best available scientific information and assessments on climate change and its impacts, as well as relevant technical, social and economic information." Article 9 review is to be coordinated with reviews under the Convention, including those on the adequacy of commitments for all developed country Parties under Articles 4.2(a) and (b) of the Convention. Article 9 provides that the first review of the Protocol is to take place at COP/MOP 2, which will be held in Nairobi in November 2006. The Article 9 review is linked politically and substantively to discussions under Kyoto Protocol Article 3.9 on future commitments, and discussions within the Convention's Dialogue on long-term cooperative action.

6.2 Most significant challenges faced by the UNFCCC and Kyoto Protocol

A number of key issues will need to be addressed in future international negotiations under the UNFCCC and the Kyoto Protocol:

- **How to stabilize atmospheric GHGs at an appropriate level?** Targets and actions under the climate regime must be designed to allow for early and significant emission reductions, to increase the likelihood of stabilizing GHG concentrations at a level that will avoid dangerous climate change.[56] Different 'reduction pathways', representing different scenarios for aggregated emission reduction effort, will offer different timeframes for GHG stabilisation, and consequently will have different impacts on the climate system.

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55 ENDS Europe DAILY 2101, 19/05/06

56 See above, den Elzen, M.G.J., and Meinshausen, M., Meeting the EU 2°climate target: global and regional emission implications (2005).

- **How to secure *deeper* emission reductions by *more* countries?** In order to stabilise GHG levels as soon as possible, deeper emission reductions by more countries are needed. This requires the creation of greater incentives for all countries to participate in emission reduction efforts. What incentives can be put in place to encourage greater emission reductions by Kyoto Parties that have existing emission reduction or limitation commitments, for the next commitment period? What measures can encourage meaningful emission reduction efforts by countries that have not yet ratified the Kyoto Protocol? What incentives can lead to increased efforts by developing countries?

- **How to address adaptation?** GHG emissions that have already occurred will affect the climate system far into the future. Most countries will have to adapt to some impacts of climate change, even if emissions are reduced rapidly in the future. Developing and developed countries alike, including those of old and new EU Member States, will have to develop a systematic approach to meet domestic adaptation challenges. At the same time, at the international level, the UNFCCC requires certain developed countries (including the EU) to assist particularly vulnerable developing countries in meeting the costs of adaptation. Further arrangements for adaptation will need to be elaborated to address the needs of vulnerable countries, and consideration will have to be given to how the burden of adaptation can be shared equitably – taking into account the differentiation in responsibilities and capabilities among countries.

6.3 What options are under discussion?

Researchers outside the formal negotiating process have suggested a variety of approaches to the challenge of securing deeper emission reductions by more countries in the Post-2012 period. Various **types of mitigation commitments** have been proposed that may build upon or complement existing Kyoto commitments. Many are designed to offer ways to engage developing countries in mitigation efforts. Examples include:[57]

- **absolute targets** – Kyoto-like numerical targets that reflect emission limitations or emission reductions compared to emissions in a country's base-year (for example, a limitation of X% over 1990 levels, or a reduction of X% below 1990 levels). Absolute targets build directly on the Kyoto framework and lead to measurable overall reductions.

- **carbon intensity targets** – an agreed limitation or reduction of emissions per unit of output, relative to GDP or another indicator, with these targets applied to sectors or to economies as a whole.

[57] See generally, Pallemaerts, M., Parker, C.N., Shukla, P.R., and van Schaik, L.G., The Greenland Dialogue on Climate Change: A Policy Discussion Paper (July 2005); Commission Staff Working Paper, Winning the Battle Against Climate Change, Background Paper (February 2, 2005) at 44-45; Baumert, K., Pershing, J., Climate Data: Insights and Observations, World Resources Institute (December 2004); Bodansky, D., International Climate Efforts Beyond 2012: A Survey of Approaches, Pew Center on Climate Change (December 2004).

- **sectoral targets** – measures to be undertaken in specific sectors in an economy (e.g., energy, cement, steel, transport), with the type of target differing with the characteristics of the sector.
- **renewable energy targets** – a targeted level of generation or use of renewable energy, or a targeted increase in the generation or use of renewable energy (for example, the EC Renewables Directive aims to achieve a 22% share of electricity from renewable energies by 2010).
- **energy efficiency targets** – a target for energy-saving, requiring improved energy efficiency (for example, in industry, housing construction, or the design of energy-using products).

In addition to these types of mitigation commitments, there are a number of **approaches to agreeing upon Post-2012 commitments** that could be used:

- **top-down approaches** – overarching targets could be agreed (e.g., an overall percentage reduction for the global community to achieve) and then responsibility could be distributed among countries through multilateral negotiations;
- **a menu approach** – countries in differentiated groups (e.g., at different stages of development or with different capabilities) could be permitted to choose from among a prescribed menu of possible commitments;
- **bottom-up approaches** – countries could decide what types of commitments they are prepared to take (e.g., sector targets, a specified level of investment in technology, a specified level of installed capacity, implementation of specific policies and measures) and then pledge to achieve those commitments.

The Post-2012 climate regime could also allow for a **'multi-staged' approach** to mitigation commitments. This could allow for differentiation among groups of developing countries, based on a set of **objective criteria** (e.g., historic GHG emissions, capacity to reduce emissions, GDP per capita, emissions per capita, emissions per unit of GDP, human development index, emission growth rates, or some combination of these indicators). Each group of countries could undertake different levels or kinds of participation in GHG reduction efforts at different points in time. Countries could then **graduate between stages of mitigation effort** and take on greater commitments when they reach or cross one or more thresholds. **Criteria for graduation** would be developed to allow countries to move automatically or voluntarily through levels of participation. **Incentives** for participation would be offered at different levels, to encourage countries to move through stages and increase their reduction efforts.

6.4 Technology development and transfer to support emission reductions

Technologies that may play a significant role in Post-2012 negotiations include energy efficient technologies, renewables, hydrogen, fuel cells, and carbon capture and storage.

- **Energy efficiency and energy conservation** – it is estimated that 50% of future global emissions could be eliminated through energy efficiency and energy conservation measures.[58] These include improved **building design**, improved **design of home appliances** and **industrial equipment**, more energy-efficient **transport**, and alternative technologies that either increase the efficiency of the energy conversion process or that utilise waste heat. Many of these technologies are commercially available, though some supply only small markets or suffer from market barriers, such as a lack of awareness or information. In addition to reducing emissions, energy-efficient technologies reduce fuel costs, increase energy security, and reduce exposure to fossil fuel price fluctuations..[59]

- **Renewables** – world energy demand could potentially be satisfied entirely by renewable energy sources, including **wind, hydro, solar, biomass, tidal, wave and geothermal energy**. Most of these technologies are technically viable and well-proven. Wind, hydro and some forms of biomass have already reached competitiveness with conventional energy sources, and commercial and market barriers present the main obstacles to their broader uptake. The rapid deployment of renewable energy technologies has in the past led to substantial decreases in their unit costs. For example, in the fifteen years from 1980-1995, the unit cost of energy from photovoltaics dropped by 65%; the unit cost of electricity from wind dropped by 82%, and the cost of electricity from biomass dropped by 85%.[60] While other categories of renewables still have a high cost relative to conventional energy sources, a drop in their cost can also be expected through research and development and operating experience. The removal of subsidies for competing non-renewable energy sources would also be likely to enhance the uptake of energy from renewable sources.[61]

- **Hydrogen and fuel cells** – hydrogen technologies are not well-advanced, and will not be commercially viable for some time. Nevertheless, many see hydrogen and fuel cells as an important future energy carrier. The life-cycle GHG emissions of these technologies must be considered though, because hydrogen molecules must themselves be produced from fossil fuels, from biomass, or from electricity (which may itself be produced from fossil fuels, etc.) and water.[62]

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58 See Commission Staff Working Paper, Winning the Battle Against Climate Change, Background Paper (February 2, 2005) at 41.

59 Lithuania, Latvia and Estonia presently have a high energy intensity relative to the rest of the EU, which provides an opportunity for both cost and energy savings See Green Paper on Energy Efficiency or Doing More With Less (COM(2005) 265 final, 22 June 2005), Annex I, Figures 2 and 3, http://www.europa.eu.int/comm/energy/efficiency/ doc/2005_06_green_paper_book_en.pdf

60 Commission Staff Working Paper, Winning the Battle Against Climate Change, Background Paper (February 2, 2005) at 37.

61 The target for achieving electricity production from renewable energy sources (RES) for the enlarged EU is 21% by 2010 under the RES-E directive (Directive 2001/77/EC). Lithuania has an RES target of 7% by 2010; Latvia, 49.3%; Estonia, 5.1%. The share of RES in 2001 was for Lithuania, 4.6%, Latvia, 48% and Estonia 0.2%. The Share of Renewable Energy in the EU, Country Profiles, Overview of Renewable Energy Sources in the Enlarged EU (COM (2004)366 Final, 26.5.2004).

62 Commission Staff Working Paper, Winning the Battle Against Climate Change, Background Paper (February 2, 2005) at 41-42.

- **Carbon capture and storage** – this technology holds appeal for coal-dependent economies that seek to use coal in a cleaner way, by capturing the CO_2 that results from industrial processes, compressing it, transporting it to suitable destinations, and injecting it into underground cavities for long term storage to avoid emissions to the atmosphere. There is significant world wide underground storage capacity (most located off-shore), and this technology is already in use for certain processes, such as enhanced oil recovery.[63] However, carbon capture and storage can be very expensive, depending on the distance CO_2 must be transported and the location of the storage site. It has also yet to be demonstrated that CO_2 can be safely stored underground, contained and monitored for long periods of time without leakage to the atmosphere or damage to the surrounding environment.[64] As carbon capture and storage does not reduce the production of CO_2, but merely reduces CO_2 emissions to the atmosphere, it might serve as a potential bridging technology for coal-dependent economies until cleaner energy sources can be mobilised. A number of decisions taken in Montreal highlighted both developed and developing countries' interest in this technology. Two in-session workshops held during the meetings of the Subsidiary Bodies in Bonn in May 2006 considered this technology further.

Technology development and deployment are already supported by the UNFCCC framework. Under Article 4.1(c) of the Convention, Parties have agreed to cooperate in the development, application and diffusion of technologies, practices and process that control, reduce or prevent GHG emissions in the energy, transport, industry, agriculture, forestry and waste management sectors. The Kyoto Protocol's flexible mechanisms also facilitate technology development and deployment, by encouraging investment in cleaner technologies in developing countries (under CDM), and in developed countries with lower abatement costs (under JI).

For this reason, explicit agreements between countries on technology may form a suitable supplement to the existing climate regime architecture (though not an effective replacement). Such agreements might address: international research collaboration; guaranteed markets; research and development expenditures; technology targets; progressive international standards; or improvement of conditions for trade in environmentally-friendly goods.[65]

6.5 International transport: aviation and shipping

Emissions from international aviation and marine transport are becoming increasingly significant.

63 Ibid. at 42.

64 Ibid.

65 Ibid. at 39.

- **International aviation emissions** from developed countries increased by 51% from 1990 to 2003.[66] The EU's emissions from international flights grew at an even higher rate, increasing by 73% from 1990 to 2003 – a rate of 4.3% per year.[67] If present growth continues, emissions from international flights from EU airports will have grown by 150% over 1990 levels by 2012 – offsetting more than a quarter of the reductions required by the EU's target under the Kyoto Protocol.[68]

- **International maritime transport emissions** from developed countries as a whole decreased by 5% from 1990 to 2003 (mainly because of a 57% decrease in U.S. emissions since 1998),[69] while emissions from the EU-15 increased from 1990 to 2002 by about 35%.[70] These emissions are expected to increase still further as international trade expands, driving the demand for more, larger, and faster ships that consume more fuel.

The international aviation and maritime transport sectors are not regulated under the targets agreed in Kyoto. GHG emissions from domestic aviation and maritime transport activities are included in Parties' national GHG inventories for purposes of Kyoto commitments. In contrast, emissions that are associated with international transport are reported, but excluded from national emissions totals and hence from Kyoto targets.

Article 2.2 of the Kyoto Protocol provides that "*Annex I Parties are to pursue limitation or reduction of emissions of greenhouse gases from aviation and marine bunker fuels, working through the International Civil Aviation Organization [ICAO] and the International Maritime Organization [IMO] respectively*." Most of the work done through the ICAO and IMO to date has involved methodologies for determining and allocating emissions, and consideration of technical, operational and market-based approaches to reduce emissions and increase GHG efficiency for aviation and maritime transport.

Future options for addressing emissions from international aviation and maritime transport are both operational and technological. These include:

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66 FCCC/SBI/2005/17, National greenhouse gas inventory data for the period 1990-2003 and status of reporting at 8; FCCC/SBSTA/2005/INF.2, Information on greenhouse gas emissions from international aviation and maritime transport at 5.

67 EU Press Release 29.07.2005, Climate change: public consultation underlines support for tackling aviation's contribution (hereinafter 'EU Press Release 29.07.2005')

68 Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions, Reducing the Climate Change Impact of Aviation, COM(2005) 459 Final, 27.9.2005 (hereinafter 'COM(2005) 459 Final, 27.9.2005') at 2. Figures on international aviation differ substantially across the EU. For example, in 2003, 96% of arrivals into Cyprus were by air; 72.4% for Malta; 71.4% for the UK; and 70% for Greece. See PricewaterhouseCoopers, 'Aviation Emissions and Policy Considerations', Final Report, 23 September 2005, at 113 (Tourism and arrivals by air). For other countries, international aviation is far less a factor. In Slovenia, for example, only 0.4% of arrivals were by air. In Latvia, in 2003 7.4% of arrivals were by air; Lithuania, 5.3%; Estonia, 5.5%. Id.

69 FCCC/SBI/2005/17, National greenhouse gas inventory data for the period 1990-2003 and status of reporting at 8.

70 FCCC/SBSTA/2005/INF.2, Information on greenhouse gas emissions from international aviation and marine transport at 7.

- **For international aviation**: new aircraft; improved passenger management; improved load factors; improved air traffic management; fuel taxation; and emissions trading.[71] The EU will likely propose that aviation emissions be included in the EU Emissions Trading System for the post-2012 period, including all emissions from flights departing from the EU.[72]

- **For international maritime transport:** reducing speed; using higher quality fuels; improved voyage planning procedures that take weather factors into account; advances in hull shape, propulsion systems and injection systems, and use of alternative energy sources.

6.6 Initial positions of Parties and stakeholders in the Post-2012 debate

Many factors will influence the positions that countries take in Post-2012 negotiations. These include national responsibility for past GHG emissions, present emission levels, projected emission trends, national opportunities for GHG reductions and the cost of these reductions, existing challenges in meeting Kyoto targets, and possible incentives offered inside and outside the process for active participation in a post-2012 regime. Initial positions of major actors are highlighted below:[73]

- **EU-25** – committed to Kyoto's fixed target approach, and seeks ways to deepen and broaden commitments among a larger number of players (for more details refer to 4.2.).

- **United States** – rejects Kyoto's fixed target approach, and is interested in a long-term technological 'solution' to GHG emissions, and further research and development, rather than binding emissions targets.

- **Australia** – supports 'technological' solutions, researching carbon capture and geological storage, hydrogen and fuel cells.

- **Japan** – prefers voluntary agreements, pledges and technological approaches; seeks long-term goals and a future framework that includes all major emitters.

- **China** – emphasises that developed countries must take the lead in addressing climate change, but has a strong incentive to improve its own energy efficiency due to its energy endowment constraints; interested in enhancement of CDM and new paradigm for financial resources and technology transfer.

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71 EU Press Release 29.07.2005; COM(2005) 459 Final, 27.9.2005.

72 EU Press Release 29.07.2005.

73 See generally Joint Declaration of the Heads of State and/or Government of Brazil, China, India, Mexico and South Africa participating in the G8 Gleneagles Summit; Commission Staff Working Paper, Winning the Battle Against Climate Change, Background Paper (February 2, 2005). See also Views regarding Article 3, paragraph 9, of the Kyoto Protocol, Submissions from Parties (FCCC/KP/SWG/Misc.1) and Dialogue Working Papers (2006), submitted in connection with the Dialogue on long-term cooperative action to address climate change by enhancing implementation of the Convention (available at www.unfccc.int).

- **India** – developed countries must take the lead in addressing climate change, through deeper targets and increased use of the CDM, to facilitate technology transfer.
- **Emerging developing country economies (e.g., Brazil, South Africa, Korea, Mexico)** - interested in measures that provide strong 'positive incentives' for actions taken by developing countries to reduce or limit emissions (for example afforestation, reforestation, or measures in specific sectors (e.g., steel, cement, transport)).
- **Least Developed Countries** – interested in adaptation measures to increase their resilience to the impacts of climate change (including droughts, floods and other extreme weather events), and in access to affordable clean energy supplies for sustainable development.
- **AOSIS** (40+ small island states) – supports Kyoto's fixed target approach; seeks broader and deeper emission reductions commitments by major emitters; seeks immediate attention to the adaptation needs of particularly vulnerable countries including small island states.
- **OPEC/Saudi Arabia** – interested in compensation for any reduction in fossil fuel consumption or prices resulting from global efforts to reduce GHG emissions.
- **Environmental NGOs** – seek immediate GHG reductions based on the Kyoto approach, with the increased involvement of non-Kyoto Parties and developing countries.
- **Financial sector and business community** – concerned about the direct impact of climate change on assets, investments and global economic performance; also aware of business opportunities created by the climate change regime, including emissions trading, investment in renewable energies and climate-friendly technologies, and new insurance and financial products that may help manage environmental risks.

6.7 Issues to be resolved in the international process

A number of **issues** will have to be considered in negotiating the Post-2012 climate regime:

- **At what concentration level should GHGs be stabilised in the atmosphere?** Different stabilisation concentrations (e.g., 400 ppm, 450 ppm, 550 ppm) will have different impacts on the climate system and on vulnerable populations and ecosystems. The opportunity to stabilise concentrations at certain levels will be lost if sufficient emission reductions cannot be secured in the second commitment period.
- **What degree of effort is needed over what time frame to achieve stabilisation?** The Kyoto Protocol aimed for developed countries to reduce their emissions as a group to 5.2% below 1990 levels by 2008-2012. Much larger reductions are needed to stabilise GHG emissions. Neither the Convention nor the Protocol sets out a long-term reduction target, or a timeframe for meeting that target through a sequence of shorter-term milestones.

- **How should the principle of 'common but differentiated responsibilities and respective capabilities' be applied to developed and developing countries?** All countries will have to consider how to distribute or share the mitigation burden. Kyoto targets apply to developed countries only. Should developing countries be asked to take on commitments, in view of the rapidly increasing emissions from this group? If so, when, and what kind of commitments? Should different groups of developing countries be asked to take on different kinds of commitments? What kinds of economic incentives and opportunities might be needed to engage developing countries and non-Kyoto Parties in a global agreement?

- **How long should the Kyoto Protocol's second commitment period be?** Should a second commitment period be 5 years, like the first commitment period, or longer, to provide regulatory certainty to industry and guide long-term investment decisions?

- **What types of commitments could be taken in a second commitment period?** If commitments other than fixed Kyoto-like targets are to be permitted or encouraged for some countries (e.g., carbon intensity targets, sectoral targets, energy efficiency targets, renewable energy targets, policies and measures), how can countries' different efforts from these different kinds of commitments be compared?

- **How should technology development and transfer be achieved?** Can sufficient technology transfer occur through the flexible mechanisms or other market-based mechanisms? Or, should a supplemental technology agreement be negotiated that builds upon the Convention and the Kyoto Protocol?

- **How can equitable burden sharing for adaptation be achieved?** The Convention requires developed countries to assist particularly vulnerable countries in meeting the costs of adaptation, but provides no detail on how this is to be done. How can a secure and predictable revenue stream for adaptation be generated that draws upon the resources of all Annex I parties equitably? How can the adaptation needs of vulnerable countries be satisfactorily addressed?

- **Should anything be done to address the impacts of mitigation efforts on developing countries whose economies are heavily dependent on fossil-fuel production or consumption?** The Convention and the Kyoto Protocol require Parties to consider the impacts of measures taken to mitigate greenhouse gas emissions on developing country economies that are highly dependent on fossil fuel production or consumption. Is any action needed to address adverse impacts in a time of increasing demand and increasing oil prices?

- **What should be the role of the flexible mechanisms in a second commitment period?** The Kyoto Protocol does not resolve the scope of activities that can be included in the CDM in the second commitment period. Can the flexible mechanisms be used to create additional opportunities for cost-effective emission reductions and support sustainable development, without jeopardizing the environmental integrity of the Kyoto Protocol?