# Future Climate Change Policy in Cyprus, Hungary, Malta and Slovenia

## Workshop in Ljubljana,
## 11 October 2006

# Background Information

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# 1 Introduction

In Montreal, at the Eleventh Conference of the Parties to the **UN Framework Convention on Climate Change** (UNFCCC),, Parties agreed to begin a **dialogue on long-term cooperative action** to address climate change by enhancing implementation of the Convention. It is clear 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 up-coming negotiations.

In this context, Ecologic - Institute for International and European Environmental Policy – is organising **the workshop** “Future Climate Change Policy in Cyprus, Hungary, Malta and Slovenia”. The workshop is commissioned by the European Commission and 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.

After an initial conference in Warsaw in January 2006 and workshops in Riga and Sofia, this workshop in Ljubljana is the fourth of a **series of events** aimed at fostering public debate on future climate change policy in the new Member States, Acceding and Candidate Countries. This series consists of country-specific workshops and strategy workshops. While the country-specific workshops focus on the needs of specific countries, the strategy workshops discuss ongoing international negotiations for a second commitment period from the perspective of the new Member States, Acceding and Candidate Countries. The workshop of 11 October is the third country specific workshop, which meets back to back with the first strategy workshop. It addresses climate change policies in Cyprus, Hungary, Malta and Slovenia.

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 Cyprus, Hungary, Malta and Slovenia. 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** (see also in particular chapter 6 of this document), 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 20$^{th}$ 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 450 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.

- **Hungary** is currently on track to meet its reduction targets under the Kyoto-Protocol. **Slovenia** is the only NMS which is currently above the agreed reduction target under the Kyoto Protocol. **Malta and Cyprus** have ratified the Protocol but are not subject of specific reduction targets. However, their GHG emissions have increased significantly between 1990 and 2003 (+ 29.1% and 52.8%, respectively). In addition, projections of future emissions indicate an upward trend in GHG emissions in most NMS after 2003, with significant higher levels in 2010 in Hungary. These projections exclude Malta and Cyprus, for which no data were available. 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 – Cyprus, Malta and Slovenia and even Hungary will have to prepare for further GHG reductions.

- Although the precise magnitude, timing and regional distribution of the impacts of global warming are still uncertain, **global warming above 2°C will have increasingly dangerous effects**, due to increases in such as severe storms with hail, floods, increases in drought frequency and heat waves, shifts in vegetation zones and loss of biodiversity, causing irreversible damages. While agriculture in Northern Europe could potentially benefit from increasing $CO_2$ concentrations and rising temperatures, expectations for Central and Eastern Europe and Mediterranean show that agriculture will be more exposed to extreme weather events and damages. Further on, notable negative

effects on the economy (e.g. in tourism or energy sector) are expected, as well as considerable loss of species and habitats in vulnerable ecosystems, such as coastlines and wetlands.

- 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 Cyprus, Hungary, Malta and Slovenia. 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 use 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.
- Cyprus, Hungary, Malta and Slovenia have great capacity to reduce $CO_2$ emissions in a cost-effective manner. **Energy efficiency** in these 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.
- **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 Cyprus, Hungary, Malta and Slovenia, 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.
- 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.
- **Cyprus, Hungary, Slovenia and Malta** - to some extent - have made considerable economic progress over the past decade, putting them not only on the lists of developed countries, but also on the list of countries with high per capita GHG with a responsibility for abating climate change in a second commitment period.

# 3 Impacts of Climate Change on Cyprus, Hungary, Malta, Slovenia: the Challenge of Adaptation

## 3.1 Effects of Climate Change in Cyprus, Hungary, Malta, Slovenia 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 increased from its pre-industrial concentration of 280 ppm (parts per million) to more than 380 ppm recently, 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, 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]

### 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

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

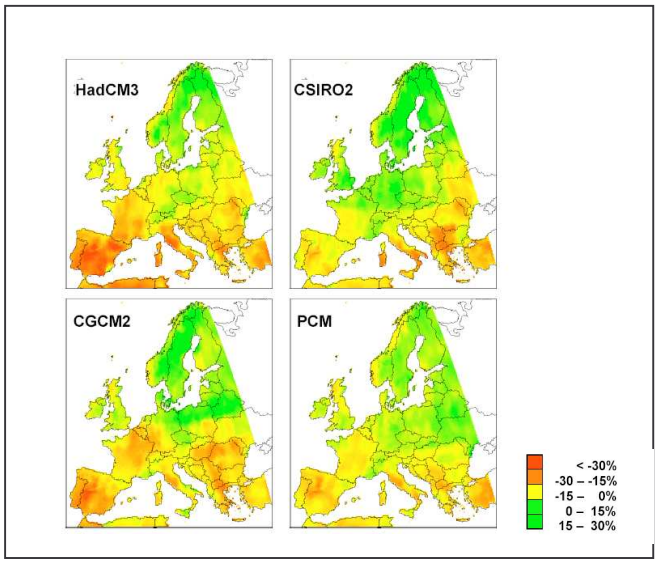
3 Cf. Jones, P.D. and M.E. Mann, Climate Over Past Millennia. Reviews of Geophysics, 2004. 42(RG2002, doi: 10.1029/2003RG000143); Mann, M.E., et al., On Past Temperatures and Anomalous Late 20th Century Warmth. Eos, 2003. 84: p. 256-258.

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.

have been greatest in 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 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 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. With rising temperatures in the future, the frequency and severity of floods, droughts and fires are expected to increase.

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 April 2006 not only Romania and Bulgaria, but also **large areas of Hungary** were affected by heavy floods. The level of the River Danube rose to 861cm, higher than any previously recorded water levels (848 cm in 2002). The two isles of the River Danube were closed. Hungary's second largest river, the Tisza, reached a record level of 9.8 meters, threatening some 160,000 people and over 50,000 homes. Around 138,000 hectares of crop fields were flooded for weeks.[10]

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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.

10 Stability Pact for Southeastern Europe (2006): Report on April 2006 floods in South Eastern Europe. www.stabilitypact.org

**Slovenia** is already experiencing an increase in extreme weather events and is likely to witness further increases in the coming decades. 2003 was marked with long lasting drought and extreme temperatures, while 2005 and 2006 brought numerous storms with hail and strong winds. Analysis show that water shortages increase by 6 % / 10 years on average. Precipitation quantities are expected to change from – 20 to + 20 %, depending on the region. Hot and dry summers, green winters, storms with hail, floods, droughts (and danger of fires), water stress and extreme temperatures are expected to occur more often in the future due to climate change.[11]

**In Cyprus**, reduced precipitation and increased temperatures already had an adverse impact on the availability of the natural water resources, which were reduced by 40% from the estimates made in 1970 for the preparation of the Cyprus Water Master Plan. Especially droughts and related water scarcity are more frequent than before. Due to climate change, the Government was forced to introduce seawater desalination already in 1997 (not in 2005-2010 as planned), accelerate the construction of the domestic effluents reuse projects and intensify the implementation of water demand measures.[12]

**Malta** has been experiencing serious problems with increasingly poor quality of water derived from boreholes. This will require further investment in desalination plants or the importation of water. Malta is reported to have, at present, emergency water stocks for just 2 days. As elsewhere in the Mediterranean, both Malta and Cyprus can expect to be increasingly vulnerable to flash floods arising from more frequent extreme rainfall events, from more intense Mediterranean storms, and from beach erosion due to increased wave heights and rising sea levels.[13]

### 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 slight positive effects of temperature increase on vegetation growth are likely to be more than 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 water stress.

During the heat wave in 2003 **cereal production** in the EU-15 member states dropped by about 10%, while in the Eastern European Accession Countries it decreased on average by about 20%. In Bulgaria, Croatia, Hungary, Slovakia and Slovenia, cereal production even dropped by more than 25%. Bad harvests in these countries could become more common due to more frequent extreme weather events as well as a rise in pests and diseases, possibly entailing a wider use of pesticides.[14] Model results for wheat and maize, the two most important crops, have shown different results. While temperature increases and lower

11 Slovenia's 4th National Communication to UNFCCC

12 Tsiourtis, N.X. (2002): Cyprus - Water Resources Planning and Climate Change Adaptation.

13 Halifax Travel Insurance (2006): Holiday 2030 report.

14 Ibid.

precipitation will cause shorter periods of crop growth and maturation, higher $CO_2$ concentrations will have positive effects, especially for C3 crops like wheat.[15] On average, winter wheat may benefit from climate change, but irrigated maize is likely to show negative responses.[16]

### 3.1.4 Impacts on biodiversity

A large number of species might 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 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.[17] Under a future scenario of strong agricultural intensification and high greenhouse gas emissions, ecosystem quality in Hungary and Slovenia may be reduced by up to 40 percent on croplands and 10-20 percent on pasture land.[18]

## 3.2 Adaptation needs for Climate Change in Cyprus, Hungary, Malta, Slovenia

As stated by the European Environment Agency (EEA), **South-eastern Europe, the Mediterranean and central European regions are the most vulnerable parts of Europe to climate change**. Here, considerable adverse impacts are projected to occur on natural and human systems that are 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.[19]

**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;

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

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

17 Cf. Footnote 6.

18 Ecosystem quality can be expressed as the mean abundance of species originally present in natural ecosystems relative to their abundance in undisturbed situations. The maximum value is 100% and indicates an undisturbed natural situation, while 0% represents a completely transformed/destroyed ecosystem without any wild species left (Reidsma et al. (2006): Impacts of land-use change on biodiversity: An assessment of agricultural biodiversity in the European Union, Agriculture, Ecosystems and Environment, 114, pp. 86-102).

19 Cf. Footnote 6.

- Improvement of drought monitoring systems;
- Improvement of water management, including desalination, 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);
- Keeping a sufficient area share under nature conservation, in order to provide favourable conditions and flexibility for maintaining biodiversity.
- Strengthening the cooperation and capacity in relevant agencies and research institutions regarding assessment of local impacts and vulnerability of climate change;
- Improving the assessment and prioritisation of adaptation policies and measures, especially in agriculture, water management, forestry, and human settlements.

# 4 Climate Change Policies in the EU and Cyprus, Hungary, Malta, Slovenia

## 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.[20] 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* |
|---|---|---|---|---|---|---|---|---|

[20] 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.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **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% |
| 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 Commitments of Cyprus, Hungary, Malta, Slovenia under the UNFCCC and Kyoto Protocol

Cyprus, Hungary, Malta and Slovenia acceded to the EU in 2004 and therefore participate in the current international negotiations as part of the EU. Consequently, they are not part of the EU burden sharing agreement which was adopted in 2002. However, **Hungary and Slovenia** have emission reduction targets under the Kyoto Protocol, i.e. – 6 % in the case of Hungary and – 8 % in the case of Slovenia. **Malta and Cyprus** are Non Annex I countries under the UNFCCC and therefore have no specific reduction targets for 2008-2012 inscribed in Annex B of the Kyoto Protocol.

## 4.3 EU climate policy: history, instruments and the way forward

### 4.3.1 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 [21],
- the **Linking Directive**[22]**,** which connects the EU ETS with the Kyoto Protocol's project-based Joint Implementation (JI) and Clean Development Mechanism (CDM),
- the **"Renewables Directive"**[23]**,** 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**[24], which requires Member States to use their potential for high efficiency cogeneration,
- a draft **end-use efficiency Directive**[25]**,** which proposes mandatory targets for annual energy savings for the period of 2006-2012,
- the **Framework Directive on the eco-design of energy-using products**,[26] which sets conditions and criteria for requirements related to environmentally relevant product characteristics, such as energy consumption.

### 4.3.2 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 European Council also stated that

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

22 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.

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

24 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.

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

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

"consideration should be given to ways of effectively involving major energy-consuming countries, including those among the emerging and developing countries. 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.

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).

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

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

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.

As a contribution to the **second session of the AWG** in November 2006, the EU stressed the 2°C objective and reduction targets as put forward by the Environment Council on 9 March 2006.[30] The EU also stated in this contribution that „commitments by Annex I Parties are an important part of the global efforts needed to reach the ultimate objective of the Convention, keeping in mind that the developed countries that presently have commitments inscribed in Annex B and have ratified the Protocol will not be able to combat climate change effectively on their own".

# 5 Analysis of the economic opportunities and challenges for Cyprus, Hungary, Malta, Slovenia

## 5.2 The Situation in Cyprus, Hungary, Malta and Slovenia: GHG emissions, sources and trends

### 5.2.1 Key economic trends

**Hungary and Slovenia** were part of the Eastern Bloc until 1990 and have been through a major economic transition in the past decade. The transformation of their centrally planned economies into market economies included industrial restructuring on a high level. **Cyprus and Malta**, on the other hand, have been part of the West and are - as two small island states dependent on imported resources, especially energy sources.

**Hungary** was hit by an economic crisis that began in the second half of the 1980s and lasted until 1993. Since 1997, the Hungarian economy has been characterised by consistently high growth rates. However, it was not until the year 2000 that real GDP reached pre-transition levels again. Despite today's robust economic growth, with projected increases of real GDP of above 4% for the next few years, there are rising concerns about the nation's persistent budget deficit. In 2006, the budget deficit is expected to amount to 8.3% of GDP and the public sector deficit to reach 6.7% of GDP.[31] Hungary has a population of 10 million people and had a per capita income of US$16,300 in 2005. In that year, it attracted the most foreign

[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.

[30] Information on topics the European Union wishes to present at the In-Session Workshop to be held during the Second Session of the Ad hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol, http://unfccc.int/resource/docs/2006/awg2/eng/misc02.pdf, 11 September 2006.

[31] European Commission (2006). "Economic Forecasts Spring 2006".

direct investment of all Central and Eastern European transition economies, in total terms as well as in per capita terms.

After **Slovenia**'s declaration of independence in 1991 and the subsequent ten-day war against Yugoslavia, the economy has been characterised by continuous growth since 1992 without major macroeconomic imbalances. The country has been a member of the European Union since 2004 and is well positioned to introduce the Euro in January 2007. Today, Slovenia is a high-income country with a per capita income of US$21,600 in 2005 and is often regarded as the most developed among the NMS. Projections for economic development forecast a growth of real GDP of around 4% during the next years.[32] The economy is highly integrated into international economic flows: in 2002 the Slovenian export and import of services and products was equivalent to 57.9% and 56.5% of GDP, respectively. With a population of 2 million people, Slovenia is one of the smallest Member States.

The population of **Cyprus** amounts to about 780,000 inhabitants; per-capita income is US$ 21,500. The most important part of the Southern Cypriot economy is the service sector (including tourism), which contributes 76.2% to GDP, followed by (light) manufacturing industries.[33] After a slow-down in 2002-2003, growth of real GDP took up speed again in 2004, with growth rates close to 4% per year. This trend is expected to continue in 2006 and 2007.[34]

The development of the **Maltese** economy is based primarily on the promotion of tourism, which accounts for roughly 30% of GDP, and on exports of manufactured goods since the domestic market is very small. Malta has a population of only 400,000 but due to its small size the density of population is more than 1,200 people per sq. km. The main export goods are semi-conductors, which account for about 75% of total exports. After strong growth rates of GDP at the end of the 1990s, the Maltese economy experienced a contraction in 2001. The bursting of the high tech bubble dampened investments and exports and furthermore, after September 11$^{th}$, the tourist industry suffered from declining tourist arrivals[35]. Since 2004, the economy is back on a moderate growth path and the public deficit, which reached about 10% of GDP in 2003, was successfully cut back to 3.3% in 2005. Per-capita income in 2005 was $19,900; projections forecast a GDP growth of around 2% in 2006 and 2007.[36]

[32] IMAD (2006). "Spring Forecasts of Economic Trends 2006", Institute of Macroeconomic Analysis and Development of Slovenia.

[33] U.S. Bureau of European and Eurasian Affairs (2006). "Background Note: Cyprus".

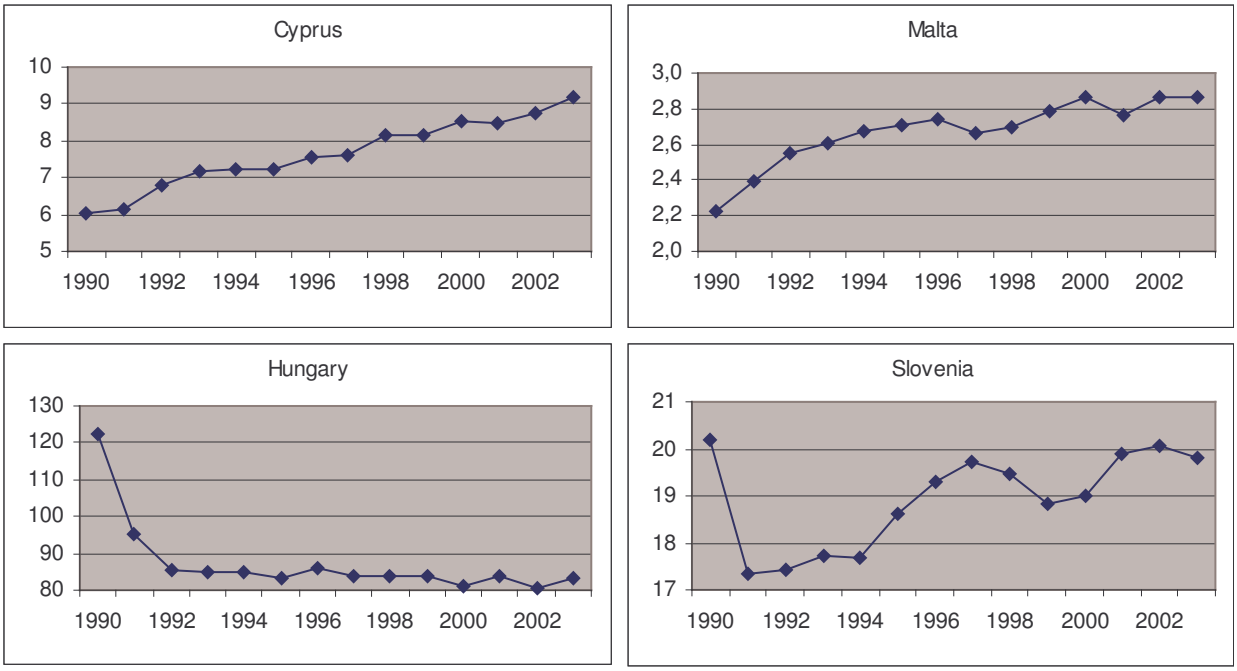
[34] European Commission (2006). "Economic Forecasts Spring 2006".

[35] U.S. Bureau of European and Eurasian Affairs (2005). "Background Note: Malta".

[36] European Commission (2006). "Economic Forecasts Spring 2006".

### 5.2.2 Trends in Greenhouse Gas Emissions

4.3.2.1.1 Figure1: GHG emissions in Cyprus, Hungary, Malta and Slovenia (in Tg $CO_2$ equivalent)




Sources: UNFCCC Key GHG Data (2005); Eurostat Air Emissions Dataset (March 2006)

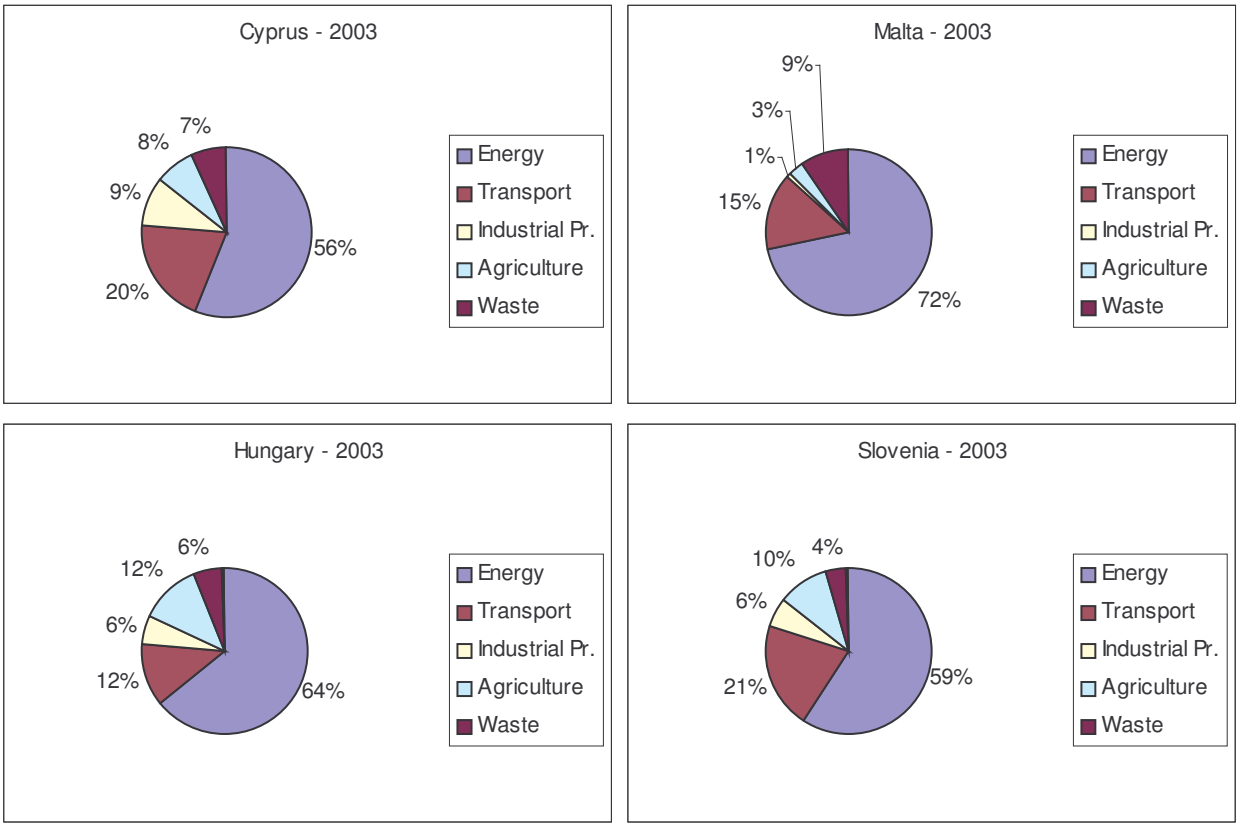
With the economic transformation, GHG emissions in **Hungary** and **Slovenia** have decreased by 30% and 15% respectively. While Hungary's emissions remained low, emissions in Slovenia have increased again and are today only 2% under the pre-transition level. Emissions are expected to rise in Slovenia to 21.58 Tg $CO_2$ eq. in 2010, which is 4.7% more than in the base year (to be check – different numbers in 2005 EEA report). The fulfilment of the Kyoto reduction targets will not pose problems for Hungary, but it will require additional measures in Slovenia.[37] Increases in GHG emissions in Slovenia are due to the rising energy-intensive industries, an increase of electricity production by thermal power plants and growing transport. 2005 EEA report projects that GHG emissions in Slovenia will be 8.3 % above the Kyoto target in 2010 with additional domestic measures and 12.9 % with existing domestic measures.[38]

Emissions in **Cyprus** and **Malta** developed mainly in line with real GDP and have increased considerably since 1990. In Cyprus, the beginning of desalination in 1997 has led to an increasing energy demand and, thus, more greenhouse gas emissions.

[37] Slovenia, 3rd National Communication to the UNFCCC (2004).

[38] Greenhouse gas emission trends and projections in Europe 2005, EEA report 8/2005

**Figure 2: Sector shares in GHG emissions in Cyprus, Hungary, Malta and Slovenia**




Sources: UNFCCC Key GHG Data (2005); Eurostat Air Emissions Dataset (March 2006)

## 5.3 Climate Relevant Aspects of the Economies of Cyprus, Hungary, Malta and Slovenia

### 5.3.1 Climate Relevant Aspects in the Energy Sector

Cyprus, Hungary, Malta and Slovenia have a **higher energy intensity than the EU-15 average**. Hungary has an energy intensity nearly three times the EU level, even though energy intensity has decreased by one third since the beginning of transition. The other three countries have also reduced their energy intensities, but on a smaller scale.

Although **Hungary** is a producer of coal, crude oil and natural gas, domestic sources cover only about one third of total primary energy consumption. The majority of crude oil and natural gas is imported from Russia.[39] Hungary uses nuclear power from one power plant (in Paks), which today accounts for more than one third of domestic electricity production. The projected lifetime of the reactors has recently been extended to 2032-2037.[40] Options to increase capacity for renewable energy are limited as geographical conditions for using wind

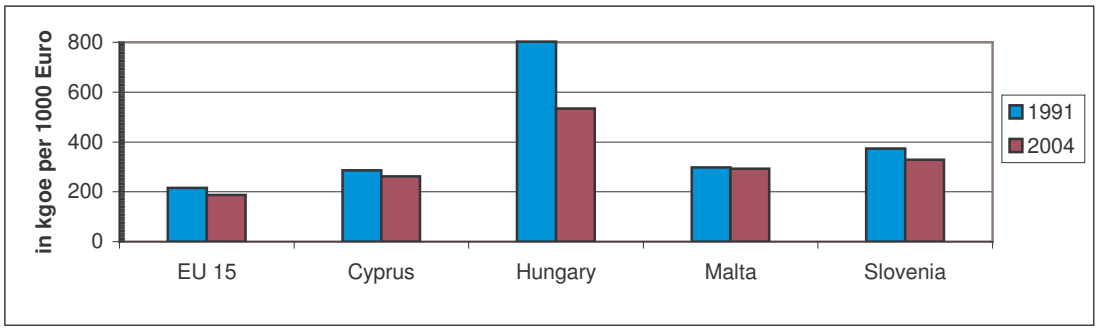
39 Hungary, 3rd National Communication to the UNFCCC (2002).

40 World Nuclear Association (2006). “Nuclear Power in Hungary”.

and hydro power are only moderate. Geothermal energy might experience an upturn in the future as Hungary is rich in underground hot water stocks. However, the exploitation of this source on a larger scale depends on the availability of a technology to pump the water back into the sedimentary layers.[41]

The only fossil fuels available in **Slovenia** are lignite and brown coal. 100% of oil and gas are imported. Furthermore, the mining of brown coal is likely to stop in 2007 and lignite is used in only one thermal power plant. In 2002, 37.9% of the electricity was produced by the nuclear power plant in Krsko, which is jointly-operated by Slovenia and Croatia. The electricity production of thermal power plants contributed 36.6% and that of hydro power plants 20.9% to total electricity production. The promotion of renewable energies, including the construction of five large hydro power plants, are expected to support efforts in reducing GHG emissions. The ongoing opening of the natural gas market is intended to lead to lower prices and hence the substitution of coal by natural gas in some of the thermal power plants.[42]

4.3.2.1.2 Figure 3: Energy Intensity per GDP in 1995-Euro




Source: Eurostat Energy Intensity of the Economy Dataset (Aug. 2006)

The energy production of both **Cyprus and Malta** relies almost exclusively on imported crude oil and petroleum products. Switching from oil to natural gas in some thermal power plants and the construction of facilities utilising renewable energies like wind and solar power are future options for emission reductions. In Malta, though energy-intensive industry is almost negligible, a considerable amount of electricity is consumed by the desalination plants for the production of potable water. Therefore, better management of water resources like the introduction of dual water supplies for domestic use can contribute to efforts in mitigating greenhouse gases.[43]

### 5.3.2 Climate Relevant Aspects in the Industrial Sector (non-energy)

Since 1990 GHG emissions in the **industrial sector in Hungary and Slovenia** have decreased by about 40% and 20%, respectively, following the downward trend in the EU-25 and even outperforming it. The larger share of this drop in emissions is due to economic breakdown and restructuring. In 2003 the share of the industrial sector in GHG emissions in

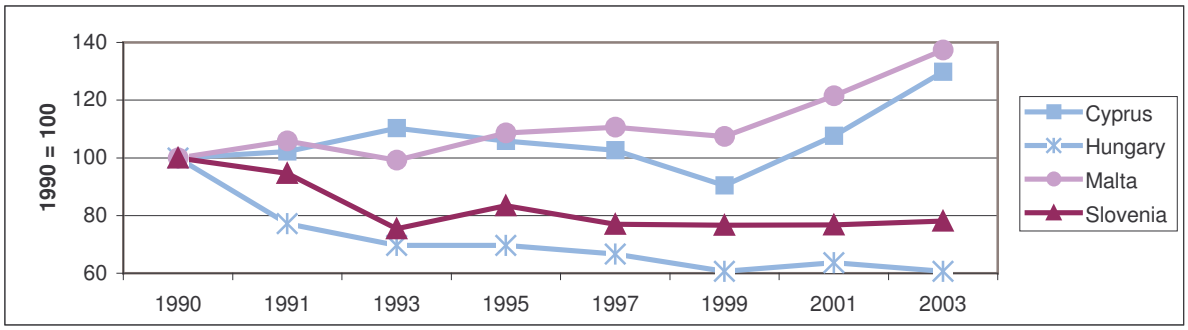
41 Hungary, 3rd National Communication to the UNFCCC (2002).

42 Slovenia, 3rd National Communication to the UNFCCC (2004).

43 Malta, 1st National Communication to the UNFCCC (2004).

Hungary was 19%, about the same as the EU average, and 17% in Slovenia.[44] In contrast, GHG emissions in the industrial sector have increased for Cyprus and Malta, particularly after 1999.

**Figure 4: Change of GHG emissions in the Industrial Sector**




Source: Eurostat Air Emissions Dataset (March 2006)

Despite its economic growth since 1993, emissions from the industrial sector in **Hungary** have continued falling, stabilising at 40% below pre-transitional level. Besides lower energy intensity, this is due to a change in the industrial structure. The output share of energy-intensive industries (mining, chemical industry, building material industry and metallurgy) has declined from 34 to 27% between 1995 and 2005. However, the largest fraction of GHG emissions still comes from the mineral sector.[45]

In **Slovenia**, the industrial sector has increased from 26% in 1995 to 29% in 2004 of GHG emissions. Energy demand has increased by 27%, and consumption of electricity increased by 25%.[46] Manufacturing has a share of 26% of GHG emissions in Slovenia (second highest in EU-25), almost half of which comes from energy-intensive industries (metal, non-metal, paper and chemical). The share of energy consumed by the energy-intensive industries is 71% of total energy consumption of the manufacturing sector.

In **Cyprus** GHG emissions from the industrial sector have risen by 30% between 1995 and 2003. The sector's share in total emissions decreased in this period from 23% to 19%.[47] Cyprus has a relatively high share of energy-intensive industries, including metallurgy and metal processing with an 8% share of GDP, and chemical industry and petrol processing with a 13% share of GDP.

GHG emissions from the industrial sector in **Malta** have risen by 37% but the sector's share of 3% in total GHG emissions is due to the small industry sector, accounting for only 23% of GDP and also to the structure of the industrial sector. Having few resources, the Maltese industry is concentrated in manufacturing, particularly semi-conductors and medical

44 Eurostat Air Emissions Dataset (March 2006)

45 Hungary, 3rd National Communication to the UNFCCC (2002).

46 Slovenia, 4th National Communication to the UNFCCC (2006).

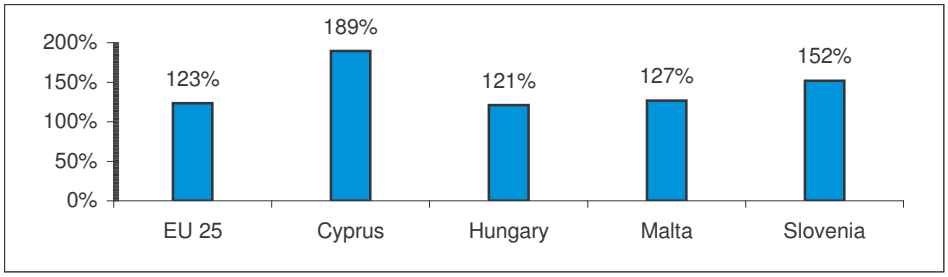
47 In the same time the share of GDP of the industrial sector has decreased from 20 to 18% (IMF (2005). "Country Report Cyprus", International Monetary Funds, Country Report No. 05/106, 2005).

equipment.[48] Some limestone production and the application of bitumen add to GHG emissions.[49]

## 5.4 Climate-Relevant Aspects in the Transport Sector

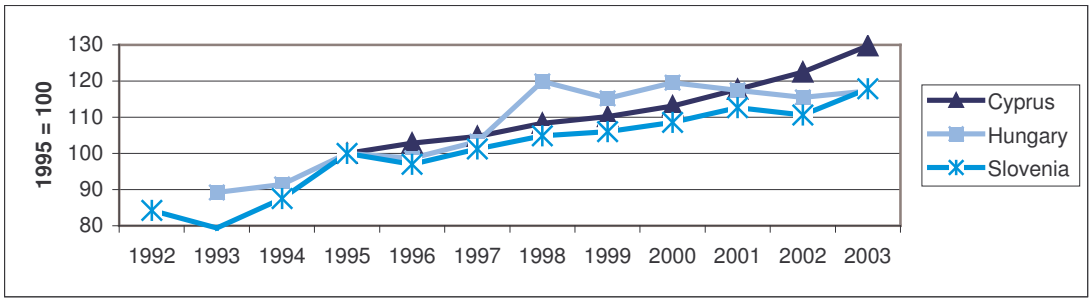
The transport sector currently is the sector with the **largest increase in energy consumption** worldwide, mainly with respect to fossil fuels. This also holds for Cyprus, Hungary, Malta and Slovenia. Transport activities generally increase along with GDP growth and the share of road freight traffic rises, whereas freight traffic by rail remains constant. In addition public transport has decreased while private transport and the number of vehicles per person has increased. In Slovenia and Hungary, road transportation is facilitated by EU financing of major European corridors. Any attempt to reduce the GHG emissions of the transport sector needs to rely on a reduction of the consumption of fossil fuels, e.g. by increased energy efficiency, a shift in the transport modes towards public transport and non-road freight transport, as well as use of new technologies relying on renewable fuels.

**Figure 5: Change of GHG emissions in the Transport Sector (1990 – 2003)**




Source: Eurostat Air Emissions Dataset (March 2006)

**Figure 6: Growth of Freight Transport in Cyprus, Hungary and Slovenia**




Source: Eurostat Volume of Transport Relative to GDP (April 2005); Eurostat GDP and Main Components - Constant Prices (Aug. 2006); own calculations

In **Hungary**, emissions from the transport sector have risen by 21% since 1990, and the sector's share in GHG emissions has reached 12%. This is in large part due to an expansion of road freight transport by 150% between 1995 and 2005 whereas freight transport by other

[48] U.S. Bureau of European and Eurasian Affairs (2005). "Background Note: Malta".

[49] Malta, 1st National Communication to the UNFCCC (2004).

modes of transportation has remained nearly constant.[50] Furthermore, the number of vehicles per capita has been increasing constantly while passenger transport by railway has declined below EU-15 average.[51]

The share of GHG emissions from the transport sector more than doubled between 1986 and 2003 in **Slovenia**.[52] The number of vehicles per capita has been increasing steadily since 1990. Road freight transport has increased by 29% between 1990 and 2003. Slovenia has intensive transit traffic, which produces nearly one third of GHG emissions from heavy transport vehicles. Due to the upcoming completion of Slovenian cross-country motorway, the subsidence of the Balkan conflict and the further expansion of the EU to the east, road transport in Slovenia will continue increasing.

GHG emissions from the transport sector nearly doubled in **Cyprus** between 1990 and 2003. The share of the transport sector in total GHG emissions has risen to 20% in 2003, based on the strong growth of road freight transport by 30% since 1995.[53] Because of the small size of the country, no other modes of transport exist.

GHG emissions in the transport sector in **Malta** increased by 27% between 1990 and 2003; the sector's share in total GHG emissions has remained constant at 15%. Malta also experienced a rapid growth in the number of private cars, with an average annual rate of about 7% and a similar increase in road traffic.[54] At the same time, use of public transport steadily decreased.[55]

### 5.5 Benefits and costs of climate change policies for Cyprus, Hungary, Malta and Slovenia

In **Hungary and Slovenia**, increased frequency and severity of droughts is expected to be the major adverse impact of climate change. This will affect agriculture and the food security of the countries.[56] In Slovenia, an expected shortness of water will also imperil electricity production by hydro power plants and warm winters may negatively affect tourism. Furthermore, the small but important coastal area would be threatened by a sea level rise.

Being small island states with a long coastline, high population density and dependence on tourism, **Cyprus and Malta** are highly vulnerable to climate change. Impacts induced by climate change are likely to be severe in water resources. Increased evapotranspiration, due to an increase in the air temperature level, and a deterioration of the groundwater quality due to a rise in the sea water level, will lead to water shortages and greater dependence on

50 Hungarian Central Statistical Office (2006). "Hungary in Figures 2005".

51 Hungary, 4th National Communication to the UNFCCC (2005).

52 UNFCCC Key GHG Data (2005).

53 Eurostat Volume of Transport Relative to GDP (April 2005); Eurostat GDP and Main Components - Constant Prices (Aug. 2006); Eurostat Road Share of Inland Freight Transport (July 2006); own calculations

54 Malta, 1st National Communication to the UNFCCC (2004).

55 Malta Environment and Planning Authority (2001). "Transport Topic Paper".

56 UNFCCC (2005). "Country Profile Hungary" and UNFCCC (2005). "Country Profile Slovenia".

expensive water production by desalination. Low-lying coastal areas are susceptible to further risks from sea level rise. Aside from the negative impacts on tourism activities, these locations support rare habitats containing highly specialised organisms.[57] Moreover, critical infrastructure tends to be located in or near coastal areas. Damages to coastal roads, bridges and seawalls could be disruptive to economic and social activities, and vital desalinisation facilities on the coast would be at risk.[58]

In addition to their mitigating effects, GHG reduction measures are expected to entail several **benefits in terms of decreased energy intensity, reduced dependency on foreign energy sources, job creation, increased research and development and reduced air pollution**. Energy intensity of the economy is between 40% and 180% above the EU-15 average in the four countries. This implies a huge potential to increase energy efficiency at low costs and to improve industrial competitiveness.[59] Since all four countries are net energy importers of at least 50% of total primary energy supply (for Cyprus and Malta it is 100%), they are very vulnerable to supply shocks and price increases. Reduced energy intensity and use of domestic renewable energy sources can lower vulnerability.[60] The Joint Implementation and Clean Development Mechanisms of the Kyoto Protocol can be expected to generate knowledge spillovers, from which the economies will benefit.

Besides the long-term climate change mitigation, the reduction of GHG emissions has direct environmental and economic effects. Reducing air pollution will create welfare benefits through a higher quality of live and also through a reduction of the costs of health services.[61] Furthermore, improving the environment can benefit tourism, an important sector in all four countries.

### 5.6 Impacts of Further Action on Industrial Competitiveness

Energy intensity in **Hungary** is nearly triple the EU-15 average. Measures to reduce energy intensity have been implemented. Financial incentives for research and development in energy efficiency and renewables[62] are likely to further increase attractiveness of the Hungarian economy for investors.

Energy intensity of the economy in **Slovenia** has been decreasing since 1991 but it is still 76% higher than the EU-15 average. Financial incentives for investments in energy efficiency and the use of renewable energy sources have been introduced in 2003. Excise duties on fossil fuel and electricity that will be introduced in 2007 may threaten the international competitiveness of energy-intensive industries. They have attracted a large share of FDI in 2004[63]. Furthermore, carbon-rich solid fuels will be replaced by renewable energy sources

57 Malta, 1st National Communication to the UNFCCC (2004).

58 IPCC (1998). "IPCC Special Report on the Regional Impacts of Climate Change – An Assessment of Vulnerability".

59 IEA (2004). "Energy Efficiency in Economies in Transition", International Energy Agency.

60 IEA (2004). "Energy Efficiency in Economies in Transition", International Energy Agency.

61 Hunt, A.; Mason, P.; Markandya, A. (1999). "Measuring the Indirect Costs and Benefits of Greenhouse Gas Mitigation Options: Methodology and a Case Study from Hungary".

62 Hungary, 4th National Communication to the UNFCCC (2005)

63 Bank of Slovenia (2005). "Direct Investment 2004".

and natural gas. Only 43% of the potential hydro energy in Slovenia is currently used, hence there is a high future potential of cheap clean energy. An opening of the markets for natural gas and an improvement of infrastructure will make gas more competitive.[64]

A grant scheme that offers financial incentives for energy efficiency and renewable energies was drafted in **Cyprus** in 2003.[65] Since energy intensity is 40% higher than EU-15 average, reduction measures will be possible at low costs. Another option to reduce GHG emissions is to replace oil as primary energy resource with natural gas. This measures would imply abatement costs of approximately US$8 per ton $CO_2$.[66] Given that the costs will be included in energy prices, Cyprian energy-intensive industries may suffer, but energy conservation measures could thwart this effect.

GHG reduction measures in **Malta** concentrate on more efficient electricity production. Since Malta imports 100% of its energy, improving energy efficiency is of high importance to protect the economy against rising prices of fossil fuels. Energy intensity of the Maltese economy is 40% above EU-15 average. In order to improve energy efficiency of the industry, financial and market incentives are planned.[67]

### 5.7 Kyoto mechanisms

At present, there are three so-called "Kyoto mechanisms" available for the financing of mitigation measures in **Slovenia and Hungary**. These include: (1) Joint Implementation, under which Annex I Parties may earn credits by undertaking emission reduction projects in another Annex I Party; (2) the Clean Development Mechanism, under which an Annex I Party may earn credits by undertaking emission reduction projects in non-Annex I Parties; and (3) 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.

While countries' experiences with **Joint Implementation** projects to date have been mixed, the availability of this mechanism has stimulated various projects that will reduce emissions and improve local conditions.

Detailed analyses 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.[68] As many energy-intensive firms in Slovenia and

64 Slovenia, 4th National Communication to the UNFCCC (2006).

65 Ministry of Commerce, Industry and Tourism of Cyprus (2003). "Grant Scheme for Energy Conservation and the Promotion of Renewable Energy Resources (RES) Utilization (Draft Translation)".

66 Mirasgedis, S.; Sarafidis, Y.; Georgopoulou, E. ; Lalas, D. P. ; Papastavros, C. (2004). "Mitigation Policies for Energy Related Greenhouse Gas Emissions in Cyprus: the Potential Role of Natural Gas Imports", Energy Policy 32 (2004) 1001-1011.

67 Malta, 1st National Communication to the UNFCCC (2004).

68 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.

Hungary still have the opportunity to reduce greenhouse gas emissions at relatively low marginal costs, these firms might well become sellers of greenhouse gas allowances in the Emissions Trading Scheme, generating additional financial resources.

Being non-Annex I Parties, **Cyprus and Malta** do not have quantified GHG reduction obligations. However, they have the opportunity to cooperate with an Annex I Party to implement CDM projects on their territories. Benefits for Cyprus and Malta from these CDMs will be higher energy efficiency and technology spillovers that will improve industrial competitiveness as well as reduce air pollution on their territories.

### 5.8 Options for the Way Forward for Cyprus, Hungary, Malta and Slovenia

While emissions have remained on a low level in **Hungary**, they have increased again in **Slovenia** to nearly the pre-transitional level. In both countries emissions are expected to rise further, if no measures are taken. Since energy intensity is high, the countries have the potential to enhance energy efficiency at low costs. This would not only reduce GHG emissions, but also reduce energy costs for the economy, resulting in higher competitiveness. Other ways to reduce GHG emissions are to reorganise the transport sector, shift freight transport from the road to railways, improve public transport, and to increase the use of renewable energy sources. The latter is especially true for Slovenia, which has a big potential of unused economically-feasible hydro power. Slovenia and Hungary can benefit from the Kyoto protocol mechanisms in two ways. First, they can engage in joint implementation measures with other Annex I Parties. This will be likely to increase energy efficiency and generate technology spillover effects. Second, as energy intensity is still much higher than in the EU-15 countries, abatement costs for GHG emissions will be low. Firms that invest in energy efficiency measures can sell emission permits and hence generate additional income under the EUETS.

In **Cyprus and Malta**, GHG emissions have been increasing steadily since 1990. Most of their emissions stem from the energy sector. As both countries are completely dependent on external energy sources, enhancing energy efficiency is attractive, even though no reduction obligations must be obeyed. Moreover, the use of renewable resources can be increased, particularly the potential for solar thermal power is high. Much energy is used for desalination processes and the transport sector. Substituting road freight transport is difficult due to the small size of the countries, but improved public transport will reduce GHG emissions and save energy resources. In addition, Cyprus and Malta can profit from the Clean Development Mechanism of the Kyoto Protocol. These measures will reduce GHG emissions, improve energy efficiency and generate technological spillovers to the benefit of the countries' economies. In addition to these direct benefits, Cyprus and Malta will profit immensely from an abatement of climate change. Since both countries are highly vulnerable to climate change, global abatement measures will clearly be cheaper than the national adaptation measures they would be forced to undertake.

# 6. International Negotiations on post-2012 commitments

## 6.1 Status of the international debate before COP 12

The last Conference of the Parties to the UN Framework Convention on Climate Change (COP 11) took place in Montreal in December 2005. That same session was particularly significant as it also served as the first Meeting of the Parties to the Kyoto Protocol (COP/MOP 1).

There were four key outcomes from COP 11 and COP/MOP 1 that will affect future negotiations under both the Convention and the Protocol:

- Adoption of a series of decisions that bring the Kyoto Protocol's *'flexible mechanisms'* into full operation.
- Endorsement of *procedures and mechanisms relating to compliance* with the Kyoto Protocol.
- Establishment of an *Ad Hoc Working Group* to discuss commitments of Kyoto Protocol Parties beyond 2012. [69]
- Establishment of a *Dialogue on Long term cooperative action to address climate change by enhancing implementation of the Convention*.

In addition, Article 9 of the Kyoto Protocol calls for a first review of the Protocol at the second Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol. This will take place in November 2006 in Nairobi, in conjunction with COP 12.

### 6.1.2 Kyoto Protocol Flexible Mechanisms

The flexible mechanisms allow developed country Parties to lower the cost of meeting their Kyoto Protocol targets, by undertaking emission reduction projects in other Annex I Parties (Joint Implementation) or in developing countries (Clean Development Mechanism), and applying the credits from these projects toward their own targets.

COP/MOP 1 agreed on a decision that recognised the importance of the flexible mechanisms for the second commitment period. This offers opportunities for both developed and developing countries in the second commitment period, depending on how rules for the CDM and JI are negotiated for the post-2012 period.

### 6.1.4 Ad Hoc Working Group (AWG) on Article 3.9 of the Kyoto Protocol

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

[69] Decision 1/CMP.1 (FCCC/KP/CMP/2005/8/Add.1)

the period beyond 2012. 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.

The AWG is open to all Kyoto Parties. It met for the first time in conjunction with the 24th session of the Subsidiary Bodies to the UNFCCC in May 2006.[70] The AWG is chaired by Malta; Brazil serves as vice-chair. Over the course of the May SB session, the AWG discussed the planning of its work. 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 AWG will 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 in the atmosphere and the implications of these scenarios, to assist the AWG in determining amendments to Annex B to the Kyoto Protocol. Parties have been invited to submit information to the UNFCCC Secretariat on topics they wish to present at this event. As of 11 September 2006, the secretariat has received submissions from the EU, Japan, Malaysia, Mexico and Norway. In addition, New Zealand informed the secretariat that it wishes to make a presentation at the workshop on the issue of mitigation potential in the agricultural sector.[71]

### 6.1.5 Article 9 Review of the Kyoto Protocol.

Article 9 of the Kyoto Protocol provides for a first review of the Protocol at COP/MOP 2, in Nairobi in November 2006. Article 9 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.” The 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.

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. COP/MOP 1 invited Parties to submit their views on how this Article 9 review should be conducted by September 1, 2006.

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[70] 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).

[71] The text of submission can be viewed at

http://unfccc.int/resource/docs/2006/awg2/eng/misc02.pdf

## 6.2 Most significant challenges faced by the UNFCCC and the 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.[72] 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.
- **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 mitigation options are under discussion?

A variety of mitigation approaches have been suggested by researchers outside the formal negotiating process, to meet the challenge of securing deeper emission reductions by more countries in the Post-2012 period. Many have been proposed to build upon or complement

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

existing Kyoto commitments and are designed to offer ways to engage developing countries in mitigation efforts. Examples include:[73]

- **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.

- **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; China has a target of 10% of total power capacity from renewables, excluding large hydro, by 2010)[74].

- **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).

- **sustainable development policies and measures (SD-PAMs) -** measures that make the development path of a country more sustainable, with the co-benefit of lowering GHG emissions.

There are also a number of **approaches to agreeing upon Post-2012 commitments** that could be used:

- **a top-down approach** – an overarching target 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;

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73 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).

74 **Expert Group on Renewable Energy Convened by the United Nations Department of Economic and Social Affairs,** Increasing Global Renewable Energy Market Share: Recent Trends and Perspectives (December 12, 2005) at 36 **(noting that b**y mid-2005, at least 43 countries had set a national target for renewable energy supply, including all 25 EU countries).

- **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 (e.g., targets or voluntary measures);
- **a bottom-up approach** – 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.[75] 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.
- **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, although there remain commercial and market barriers to their broader

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

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%.[76] 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.[77]

- **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. However, because hydrogen molecules must themselves be produced from fossil fuels, biomass or electricity (which may itself be produced from fossil fuels, etc.) and water, it is important to consider life-cycle GHG emissions from hydrogen.[78]

- **Carbon capture and storage** – this technology holds appeal for coal-dependent economies, such as the United States, Australia and China, who seek to use coal in a way that generates fewer emissions. It involves the capture of $CO_2$ that results from industrial processes, its compression into a liquid state, its transportation by ship, truck or pipeline, and then its injection 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.[79] 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.[80] 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.

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

77 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). See 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).

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

79 Ibid. at 42.

80 Ibid.

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 processes 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.[81]

### 6.5 International transport: aviation and shipping

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

- **International aviation emissions** from developed countries increased by 51% from 1990 to 2003.[82] 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.[83] 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.[84]
- **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),[85] while emissions from the EU-15 increased from 1990 to 2002

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81 Ibid. at 39.

82 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.

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

84 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, PwC Economics, '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 Hungary, 4% of arrivals were by air. Id.

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

by about 35%.[86] 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. Only 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:

- **For international aviation**: new aircraft; improved passenger management; improved load factors; improved air traffic management; fuel taxation; and emissions trading.[87] The EU will likely propose that aviation emissions be included in the EU Emissions Trading System for the post-2012 period.[88]
- **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.

### 4.4 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:[89]

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

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

88 EU Press Release 29.07.2005. See 4 July 2006, European Parliament resolution on reducing the climate change impact of aviation (2005/2249(INI))

89 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

- **EU-25** – committed to Kyoto's fixed target approach, and seeks ways to deepen and broaden commitments among a larger number of players. The 2005 Spring European Council expressed support for an emissions reduction target of 15-30% for developed countries by 2020.[90] In March 2006, the EU called for a global reduction of emissions of 15-50% below 1990 levels by 2050 (for more details refer to 4.3).

- **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.[91] Has opposed calls for global approaches to address future commitments; recently stressed the need for economic development to enable all countries to be able to tackle climate change.

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

- **Japan** – supports the Kyoto Protocol and is committed to reaching its target, but prefers voluntary agreements, pledges and technological approaches; thinks a sector-by-sector approach may be beneficial; seeks long-term goals and a future framework that includes all major emitters.

- **Russia** – has expressed the view that new commitments may only be agreed after the first commitment period ends, and an assessment can be made of the results; wishes to see a mechanism to allow non-Annex I Parties to take voluntary commitments.

- **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. Takes the official position of no new commitments for developing countries, but has given signals that it may be willing to engage in future action with support from developed countries.

- **India** – developed countries must take the lead in addressing climate change; future Annex I targets should be ambitious, driving increased use of the CDM, which will in turn facilitate technology transfer and address developing country emissions. Emphasizes that development and poverty alleviation are its main aims.

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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).

90 Council of the European Union, Brussels, 23 March 2005 (04.05), (OR.fr), 7619/1/05) REV 1 CONCL 1 at 16 (reduction pathways for developed countries on the order of 15-30% by 2020 compared to the Kyoto baseline, and beyond, should be considered.

91 See Wall Street Journal, July 21, 2006, 'Burning Debate As Emission Restrictions Loom, Texas Utility Bets Big on Coal Planned TXU Plants Raise Global-Warming Concerns; Rivals Try New Technology, Mr. Wilder Cites Demand' (noting that the U.S. produces nearly one-quarter of the world's man-made carbon dioxide; power plants produce 39% of U.S. carbon-dioxide emissions, and four-fifths of that amount comes from coal-fired power plants).

- **Brazil** – calls for more ambitious targets from Annex I counties in the second commitment period; all efforts from developing countries should be voluntary and cannot be linked to goals, targets or timeframes; objects to the inclusion of avoided deforestation in the CDM, but supports other positive incentives to address emissions from deforestation.
- **South Africa** - interested in measures that provide strong 'positive incentives' for actions taken by developing countries to reduce or limit emissions (e.g., afforestation, reforestation, or measures in specific sectors (e.g., steel, cement, transport)); highlights sustainable development policies and measures as promising, which allow countries to design measures that fulfil development priorities but also contribute to mitigation.
- **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) – support 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; has stressed the need for significant contributions by all countries.
- **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. The Climate Action Network (CAN) expressed the view at the Ad Hoc Working Group on Article 3.9 in May 2006 that developed countries need to reduce their emissions by 15-20% below 1990 levels by 2015, and 30-35% by 2020.[92]
- **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. Interested in long term frameworks with global participation to mitigate competitiveness concerns.

### 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:

[92] Climate Action Network is a world-wide network of over 340 non-governmental organizations working to promote governmental and individual action to limit human-induced climate change to ecologically-sustainable levels. See www.climatenetwork.org, First Intervention on Ad Hoc Working Group on Article 3.9 of Kyoto Protocol, 17 May, 2006.

- **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 might such incentives and opportunities be designed and provided?

- **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 can overall progress be measured?

- **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?