Background study for the preparation of the long-term greenhouse gas mitigation strategy of Hungary

Project commissioned by the Hungarian Ministry of Environment and Water Protection

The project

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This research project has been commissioned by the Hungarian Ministry of Environment and Water Protection with the aim of preparing a background study for the long-term climate change strategy of Hungary.

Aim and objectives

The project examines the scientific and political science framework for global climate change, places Hungary in the context of this global framework and its European dimension and provides a guidepost for the key sectors of the Hungarian economy where there are good indications that emission reduction potential can be harnessed highlighting priority mitigation measures at sectoral level and pointing at further specific research needed for national level policy-making to unlock the emission reduction potential of Hungary.

The project team

- Summarises material on evidence and impacts of global climate change, emission trajectories and implications for CO_2 concentration and temperature increase;

- Presents and analyse the features of a selection of post-Kyoto climate mitigation regimes and reviews studies about the implications of different political regimes on the likely emission reduction commitments for Europe (in particular Eastern Europe) and about the likely costs of mitigation;

- Analyses the emerging European position on post-Kyoto and the national long-term climate change strategies in some European countries;

- Examines emission reductions for Hungary based on the Contraction and Convergence model in the context of recent baseline projections for energy and transport development in Hungary;

- Studies sectoral emission reduction opportunities in Hungary and pointing at priority mitigation measures to be taken up on a sector-by-sector basis.

Project duration: July 2004 - December 2005

Activities and deliverables

The work has been carried out in three main phases over the period July 2004 - December 2005:

Phase 1: Assembling and summarizing the evidence from natural sciences is collected on the impacts of global climate change, emission trajectories and implications for CO_2 concentration and temperature increase. The following questions have been answered:

- What is the evidence for global climate change happening and what are the likely impacts?
- How much and how quickly is the mankind adding up emissions in the atmosphere, what are the scenarios for future emission trajectories and what are the likely implications from these on CO_2 concentrations and global temperature change?
- What are the options to frame the future post-2012 climate mitigation regimes in order to avoid dangerous climate change?
- What are the emission reductions to be demanded from Eastern Europe in general and from Hungary in particular under different adjustments of commonly discussed regimes?

Phase 2: An analytical review is made of the emerging European position on post-Kyoto and the national long-term climate change strategies in some European countries. Costs of mitigation are studied based on existing estimates. The following questions have been answered:

- How much is mitigation likely to cost in Europe in terms of GDP decrease?
- What is the emerging common European position on post-Kyoto targets and action?
- What is the strategic vision for long-term climate mitigation action in selected European countries and what specific activities are envisaged within national long-term strategies for climate mitigation?

Phase 3: Analysis of the consequences of the global climate change regimes for Hungary. This includes a discussion of the emission reductions that Hungary will face under two stabilization scenarios in the Contraction and Convergence regime based on a model run of the Contraction and Convergence model. Subsequently key emission mitigation opportunities in Hungary are highlighted to provide a guidepost and point at key areas where there are good indications that emission reduction potential can be harnessed. The following questions are answered:

- What are the emission reductions that Hungary will face under two stabilization scenarios in Contraction and Convergence regime?
- In which sectors of the Hungarian economy are emission reductions to be achieved and what are the priority mitigation measures at sectoral level?

Project deliverables

A report has been prepared for the Hungarian Ministry of Environment and Water Protection, which has been circulated for review and comment and will be used as a background study for the preparation of the long-term climate change strategy of Hungary.

Brief summary of findings

There is a strong and increasing scientific evidence that climate change is happening; the 6 Business-As-Usual scenarios form the Special Report of Emission Scenarios (SRES) if combined show that, among other:

- In 2100 atmospheric concentration of CO_2 will increase from 540 to 970 ppm,
- The temperature will increase by 1.4 to 5.8 degrees Celsius, which is unprecedented increase in the last 10,000 years,
- The sea level will raise by 0.09 to 0.88 meters compared to 1990.

Europe is facing serious impacts and since the beginning of the 20th century Europe has warmed more than the global average. From 1990 to 2100, the global average temperature is projected to increase by 2.0–6.3 °C for Europe. In the last 25 years almost two thirds of all catastrophic events are directly attributable to weather and climate extremes: floods, storms and droughts/ heat waves and almost 80 % of economic losses caused by catastrophic events in Europe result from weather and climate related events. Climate change is likely to increase the frequency of extreme flood events in Europe, in particular the frequency of flash floods, which have the highest risk of fatality.

How to respond? Stabilization of CO2 emissions at near-current levels would not lead to the stabilisation of CO2 atmospheric concentrations*: s*tabilising CO2 concentration requires reduction of net global CO2 emissions to a fraction of their current levels. For stabilising CO2-eq concentration at 550 ppm global GHG emissions would have to peak around 2015 and then start to decrease, while for stabilizing at 650 ppm peak would be 2030[1]. It must be emphasized that tTiming of emission reduction is crucial: delaying emission reduction action in the coming years would require much more demanding action on the mid- and long-term for the same temperature target with annual emission reduction rates for meeting a given temperature target increasing by 1 % for every 5 years delay.
While there is a broad understanding and agreement on the necessity to act, the exact design of a future regime offers numerous challenges. We have provided an overview and analysis of the major regimes on the negotiators' table for future climate change action. We have also analyzed the requirements from the enlarged Europe in terms of emission reductions associated with the most commonly discussed regimes – Multi-Stage, Contraction and Convergence, and Global Triptych under different setting of their key parameters. The emerging conclusion is that significant emission reductions will be required from the enlarged Europe ranging between 40 and more than 80 % in 2050 as compared to 1990[2].

At the meeting of EU environment ministers in March 2005, a resolution has been adopted on global climate strategy after 2012 that calls for

[1] This stabilization levels are broadly accepted as likely to be sufficient to avoid dangerous climate change
[2] Criqui et al 2003, 550 ppm emission profile.

> “Reduction pathways […] in the order of 15-30 % by 2020 and 60-80 % by 2050 should be considered”.

The resolution has been agreed by all 25 Member States. The European Commission has also backed it despite having recently argued against just such a move on the grounds that it would repel key negotiating partners such as the US. Furthermore at its spring meeting of the Council of the European Union (22-23 March 2005) the EU determination was emphasized to reinvigorate the international negotiations. A major climate change related point on the presidency conclusions is that

> “Without prejudging new approaches for differentiation between parties in a future fair and flexible framework, the EU looks forward to exploring with other parties strategies for achieving necessary emission reductions and believes that, in this context, reduction pathways for the group of developed countries in the order of 15-30 % by 2020 compared to the baseline envisaged in the Kyoto protocol, and beyond […] should be considered”.

How much will action cost? Cost of mitigation depends on a complex plethora of factors, discussed in the report. Estimates show that reducing the emissions in EU-25 by 1.5 % per year after 2012 will reduce GDP by 2025 by about 0.5 % below the level it will reach in the absence of a pro-active climate change policy.

Most EU Member States want to open international negotiations on the future of the Kyoto protocol by suggesting in advance quantitative targets for greenhouse gas emission targets after 2012. Several European countries – namely Germany, the UK, France, the Netherlands, Switzerland and the Czech Republic – have already announced ambitious long-term national targets to reduce their emissions. The review of long-term climate strategies in these countries shows the size of domestic commitments in Europe, gives insights about how targets have been defined and above all points at what actions and objectives are envisaged in order to attain targets. Typically the main measures that have internationally been emphasized as instrumental in attaining emission reduction targets are related to improved energy efficiency in end-use sectors (especially buildings). End-use energy efficiency has been highlighted as a cost-effective way to reduce emissions; in addition measures to improve the efficiency in the end use of energy provide ‘win-win’ solutions and offer opportunities for environmental policy integration. However, more is needed as end-use energy efficiency is in itself unlikely to bring the needed emission reductions. Another mitigation option underlined internationally is facilitating the deployment of RES. Energy efficiency and conservation together with RES are the safest, fastest, and most environmentally and socially acceptable ways to achieve GHG emission reductions in the energy sector.

As part of a united Europe Hungary should be ready for emission reduction efforts on the long-term that are far more ambitious than ever before. This also represents a window of opportunity: apart from environmental benefits emission reduction carry along very important policy integration advantages such as improved security of supply and improved competitiveness with a more efficient economy. The final part of the study points at carbon mitigation measures that are seen as both appropriate and advantegous for Hungary for environmental and economic reasons placing the discussion on carbon mitigation measures in the context of emission reductions that are to be expected from Hungary should Contraction and Convergence be accepted as the basis of a future climate change framework and in the context of baseline projections up to 2030 on energy and transport in Hungary.

Despite significant improvements in the last decade, the Hungarian economy is still more carbon and energy intensive than the average in the old Member states of the European Union. This reveals potential to reduce the energy consumption across all the sectors of the economy. This is important not only for environmental reasons such as carbon emission mitigation and reduction of local pollution, but also for other widely accepted goals such as increased business competitiveness in an increasingly competitive world, reduced import dependency and increased security of supply.

Through the results of a run of the Contraction and Convergence model of the Global Commons Institute this part of the study has shown that under a Per Capita regime – considered one of the strictest regimes for developed countries in terms of burden sharing of emission reduction - Hungary would need to achieve emission reductions in per capita industrial CO_2 emissions in the range of 15 to 50 percent below 2004 levels by 2050 and by 70-80 % below 2004 levels by 2100[3].

In contrast it has been shown that the most likely development of the Hungarian energy system in the future in the context of current knowledge, policy objectives and means (baseline scenario) is likely to lead to an annual increase of CO_2 emissions 1.5 % by 2010 and by 1 %/ in the two decades to follow, which in general will bring emissions in 2030 at 111 % above 1990 levels. Very significant growth is expected in CO_2 emissions from electricity and steam generation and transport and, to a slightly smaller extent, residential and tertiary sectors.

Therefore current policy objectives and means, while delivering results, seem to be insufficient to prevent carbon emissions growth. In the final section we have explored fuel combustion-related CO_2 mitigation roots in different sectors. Table 1 provides a summary of our findings of what appear to be the most important mitigation routes in each sector (left column); in the right column of the table we have suggested some indicative targets that can be used as a guidepost for the effect of the proposed mitigation routes.

[3] The ranges are due to the impact form the choice of stabilization scenario.

Table 1. Mitigation options in Hungary

Mitigation roots by sector	**Some indicative targets**
Energy supply	
• modernization/improved efficiency of **coal-based electricity generation**; • fuel switch to **biomass and natural gas**; • increased penetration of **CHPs** on natural gas; • increased utilization of **renewables** for both electricity and heat generation, biomass- and geothermal-based district heating;	**20 %** improvement in generation efficiency **Reducing carbon intensity of coal-based electricity generation:** by 10 % less CO_2/kWh Increasing **CHP capacity by 70 %** 58 PJ/year of biomass Utilization of 58 PJ/year of biomass and of 50 PJ/year geothermal
Energy demand	
Industry • Reducing unit consumption of energy intensive branches (steel, cement and paper industries) in line with selected European benchmarks; • Measures in non-process use and auxiliary services (space heating, kitchens etc.) and eradicating standby ('idle') consumption	**10%** reduction of industrial energy consumption; **20 % reduction of energy intensity** of manufacturing
Residential and tertiary • Reducing **space heating needs**, thermal insulation of buildings; • **Appliances**: promoting more efficient appliances and wiser usage modes • Eradicating **standby** consumption	**20-30 %** energy savings in **non-residential buildings;** **similar** probably for residential buildings; bring average **standby** power consumption per household **below 5W**
Transport	
• Promote **public transport** in order to at least preserve its share in passenger trips; • Encourage **park-and-ride**; • Promote **sustainable freight transport modes** and make their use attractive; • Improve the **cycling infrastructure** and promote carpooling in commuting; • Reduce **'idle consumption'** of vehicles;	Certain share of public transport trips in overall passenger trips; Certain share of train freight transport in overall freight trips; Kilometres of cycling lanes, number of park-and-ride facilities and degree of utilization Number of public transport and/or private vehicles equipped with idle consumption fuel saving appliances

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