



GREENHOUSE GAS MITIGATION: AUSTRIA'S LONG AND EXPENSIVE JOURNEY TO BUENOS AIRES

Summary

In this paper the following topics are worked out, with special emphasis on Austria: past trends in Greenhouse Gas Emissions, current legal situation, the cost of emission reduction, effective set of measures, the role of flexible instruments, „Joint Implementation, Clean Development Mechanism, Emission Trading“ and the journey ahead.

SMANJENJE EMISIJE STAKLENIČKIH PLINOVA: DUGO I SKUPO AUSTRIJSKO PUTOVANJE U BUENOS AIRES

Sažetak

Ovaj rad prikazuje sljedeće teme, s posebnim osvrtom na Austriju: prijašnje trendove u smanjenju emisija stakleničkih plinova, postojeći pravni okvir, troškove smanjenja emisije, učinkovite mjere, ulogu fleksibilnih instrumenata, „zajedničku primjenu, mehanizme čistog razvoja, trgovanje emisijom“ i ono što predstoji.

THE PROCESS OF GLOBAL GREENHOUSE GAS MITIGATION

At the Toronto Conference on ‘The Changing Atmosphere’ in 1988, environment and development movements, scientists and politicians called for a 20% cut of 1988 levels in anthropogenic CO₂ emissions by 2005 and an accelerated programme to reduce emissions. This so-called ‘Toronto Target’ formed the basis of the greenhouse gas mitigation policy of the Austrian Government since 1990 /5/ and until the conference of Kyoto. In 1992, the United Nations Framework Convention on Climate Change (UNFCCC) was signed by 154 states at the Earth Summit in Rio de Janeiro /7/. Austria ratified the convention in 1994. In 1995, at the UNFCCC First Conference of the Parties (COP1) in Berlin, it was recognised that the current efforts to reduce emissions were inadequate. An ‘Ad-hoc Group’ was established to elaborate quantified limitation and reduction objectives within specified time-frames. At COP2 in Geneva (1996), the United States accepted the need for legally binding emission reduction limitations.

The objectives elaborated by the ‘Ad-hoc Group’ were adopted at COP3 (Kyoto) in 1997. The Kyoto protocol to the UNFCCC /6/ lays down legally binding national targets on GHG emission limitation for 38 industrialised countries (the so-called Annex-I-Countries). It defines 6 classes of substances as greenhouse gases, namely Carbon dioxide (CO₂), Methane (CH₄), Nitrous oxide (N₂O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs),

and Sulphur hexafluoride (SF₆). The national emissions of CO₂, CH₄, and N₂O in 1990 and HFCs, PFCs and SF₆ in 1995 have been taken as reference values for the national limits. The targets have to be achieved in the pentade of 2008-2012. The provisions of the Kyoto Protocol give a wide room to so-called 'Flexible Instruments', namely international emission trading (ET) between Annex-I-Countries, 'Joint Implementation' (JI) and 'Clean Development Mechanism' (CDM). However, they were quite loosely defined and many details necessary for their operation remained open to be refined in negotiations at future COPs.

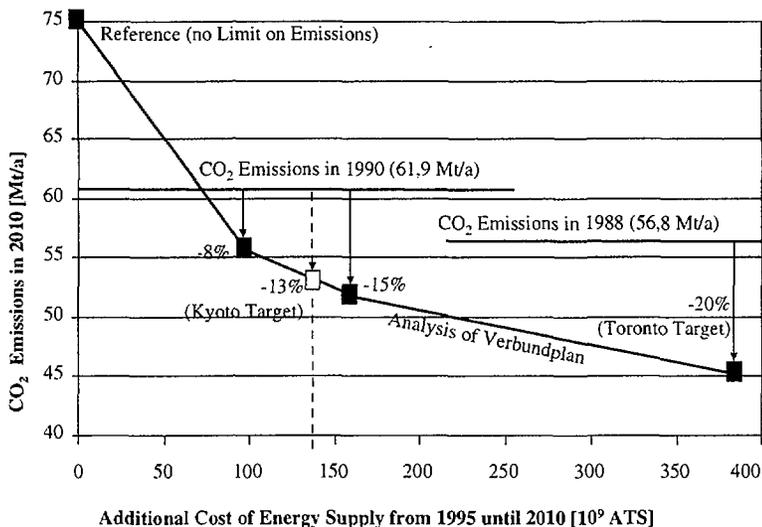
At the Kyoto Conference, the European Union had agreed to an 8% reduction target. In June 1998 this obligation allocated to the EU member states. As a result of the EU burden sharing, Austria has to reduce its GHG emissions by 13%, according to the provisions of the Kyoto Protocol. Some Eastern-Central European countries which intend to join the EU, also belong to the group of Annex-I-Countries: Croatia, e.g. has to achieve a 5% mitigation target.

COP4 in Buenos Aires (November 1998), will be governed by the discussion around the development of principles, modalities, rules and guidelines for the application of flexible instruments, land-use change and forestry. Delegates will also discuss voluntary commitments by non-Annex I countries.

THE CONSEQUENCES OF THE KYOTO COMMITMENT FOR AUSTRIA

In a model-based analysis of the Austrian energy system /4/, Verbundplan GmbH developed a cost-curve of CO₂ mitigation (Figure 1). The curve is based on cost calculations for four scenarios (1. Toronto-target: 20% reduction from 1988 until 2005, 2. 15% reduction from 1990 until 2010, 3. 8% reduction from 1990 until 2010, 4. reference: no limit on CO₂ emissions). The costs comprise investments and other expenditures necessary for the operation of the Austrian energy system from 1995 until 2010. They are given as additional costs of achieving a certain mitigation target compared to the development if no emission limit be fixed.

Figure 1: Additional Cost of Energy Supply vs. CO₂ Emissions



As the computations have been done prior to the burden sharing inside the European Union, there were no calculations of a -13% scenario. However, the curve above can be applied to estimate the cost of achieving the Austrian Kyoto target by some 140 Giga-ATS.

The analysis showed that improved heat insulation of buildings and substitution of coal and oil by natural gas and biomass are the most cost effective technical measures for CO₂ emission mitigation in Austria.

AUSTRIA'S GHG MITIGATION POLICY

Austria intends to achieve its CO₂ reduction target through energy conservation and a shift from fossil fuels to renewable forms of energy (hydropower, biomass and solar energy). A set of almost 100 detailed measures that covers the whole field of energy policy has been developed in order to achieve the mitigation target. A monitoring mechanism to assess the implementation process is in place.

So far, numerous experts, institutions and pressure groups contributed considerations on the best way to achieve the -13% target. All technical and political mitigation options and their consequences have been analyzed extensively. In the wake of COP3 and COP4, the time has come to formulate a mitigation strategy which guarantees to achieve the Kyoto target, is accepted by all parts of the Austrian society, and does not endanger the Austrian economy.

As first step in developing a strategy, the Austrian government asked all experts to harmonise their different

- analysing methods,
- evaluations of costs, potentials and consequences of measures
- assessments of future developments.

This process of developing a consensus started in November 1998 and shall be finished by April 1999.

Even though Austria's Kyoto target remains much behind the former Toronto target, achieving this target is very ambitious. Table 1 gives a comparison of specific CO₂ emissions and limitation commitments of some European countries.

- The commitment of Great Britain is about the same as the Austrian, but the specific emissions in the United Kingdom are some 50% higher than in Austria. Probably, the British mitigation potentials are much more cost effective.

- In Norway, the CO₂ emissions per capita are slightly lower than in Austria. Anyhow, Norway may increase its emissions while Austria has to decrease them.

The low specific emissions of CO₂ are due to the high shares of hydro power and biomass in primary energy supply and high efficient technology. A further increase of the efficiency and the share of renewables is technically possible, but only at high costs. Therefore, there is only little potential for 'cheap' greenhouse gas mitigation and the cost of reducing 1 ton of CO₂ emissions in Austria is much higher than in most other European countries. Therefore, we seek for a more cost effective solution.

Table 1: Specific CO₂ Emissions in 1990 and Kyoto-Commitments

Country	CO ₂ Emissions in 1990 related to ...		Kyoto-Commitment
	... Population [t CO ₂ /capita]	... GDP [kg CO ₂ /USD1990]	
Luxembourg	28.43	1.05	-28
Germany	12.38	0.60	-21
Denmark	10.36	0.41	-21
Austria	7.70	0.37	-13
United Kingdom	10.15	0.60	-12.5
Switzerland	6.52	0.20	-8
Slovenia	6.33	0.73	-8
Croatia	~3.5	n.a.	-5
Norway	7.42	0.27	+1

Sources: UN /6/, EU, IEA /1/

FLEXIBLE INSTRUMENTS: A POTENTIAL SOLUTION FOR AUSTRIA?

While the Austrian government opposed JI in its 1994 national climate report, this attitude has changed in the course of the Kyoto negotiations. Austria now considers that flexible instruments are useful, if some preconditions should be fulfilled (e.g. prevention of the 'Hot-Air' effect and removal of impediments for the development of new technologies).

Comparing the efficiency of transforming primary energy to final energy in some Central European countries (see Table 2), we realise that there is a high potential for flexible instruments in our region: While the efficiency of the Austrian system exceeds 80%, the corresponding systems in the transition countries work with efficiencies of only 60 or 70%. Even though the 1990/91 numbers may lack of statistical quality and the 1996 numbers are biased by non-used capacity it is evident that the efficiency of the energy systems in Eastern- Central Europe is much below that of Austria. Taking the example of Slovenia, which is the most energy efficient transition country, the financial advantage of flexible instruments can be shown:

In 1996, the Slovenian total primary energy supply amounted to some 253 PJ /3/. It was transformed to 163 PJ of final energy. If the Slovenian system would be as efficient as the Austrian, more than 56 PJ of primary energy could have been saved in this year. Taking the actual price of crude oil this would have reduced the costs of energy imports by some 80 Mega-Euro. - It is obvious that investing in energy efficiency is much more cost-effective in Slovenia than in Austria. The same seems to hold for Croatia. Verbundplan evaluated the cost of achieving the Austrian Kyoto-target to some 10 GigaEuro. We estimate that the cost of achieving the Austrian Kyoto target can be reduced at least by 1 GigaEuro without jeopardising the achievement of Slovenia's and Croatia's reduction targets.

Table 2: Efficiency of Energy Supply Systems in 1990 and 1996

Country	Total Final Energy Consumption / Total Primary Energy Supply 1990	Total Final Energy Consumption / Total Primary Energy Supply 1996
Austria	0.80	0.83
Slovenia*	0.58	0.64
Slovakia	0.72	0.63
Hungary	0.67	0.56
Poland	0.50	0.55
Czech Rep.*	0.59	0.44
*: 1991		
Sources: IEA /2,3/		

THE TRANSPOL PROJECT

In order to assess the benefits of a transnationally concerted greenhouse gas mitigation strategy, including international trade with emission permits ('Emission Trading') and 'Joint Implementation' in the process of achieving the Kyoto targets, Verbundplan GmbH together with "Elektroinštitut Milan Vidmar" of Slovenia, and "Energetski Institut 'Hrvoje Požar'" of Croatia, proposed a model-based case study in the frame of the SYNERGY programme of the European Union. The benefits shall be shown by the example of three Central European neighbouring countries with completely different preconditions:

- As the efficiency of the Austrian energy system is very high and the share of renewables in total primary energy supply is considerable, the ambitious Kyoto target of 13% can only be achieved at high marginal cost.

- Slovenia is the most wealthy post-communist state and the most favourite candidate for EU accession. However, the efficiency of the energy system and the level of specific greenhouse gas emissions are still much below the standard of most EU member countries. In the course of preparation for the EU, these differences will be reduced, which will offer a high potential for implementing high-efficiency- and low-emission energy transformation technology. Slovenia has to achieve a 6% GHG mitigation target.

- Croatia is a "post-war country". As the national priority is set on the revitalisation of the economy, greenhouse gas mitigation is only of secondary importance. Anyway, as part of the energy system has to be rebuilt and as economic growth is high, there is a large potential for implementing high-efficiency energy transformation technology. Croatia has to reduce its GHG emissions by 5%.

A process analytical model of the energy systems of the 3 countries and their interrelations (imports and exports of energy, transnational emission trading, and select joint implementation measures) shall be in the centre of the project. The proposers intend to use the MESSAGE modelling software for this purpose. As the emission of greenhouse gases in the TRANSPOL-countries is restricted almost only to CO₂, N₂O and CH₄, the three other groups of greenhouse gases listed in the Kyoto Protocol shall not be included in this study.

As the economic situation and the technological conditions are different in the three countries, a trans-nationally concerted strategy including flexible instruments seems to be more cost-effective than three non-coordinated national strategies. Therefore, the main aim of the TRANSPOL project is to develop a 3-country greenhouse gas mitigation strategy for achieving the Kyoto target which is

- cost-effective from the trans-national energy system's point of view (i.e. which causes the least overall mitigation cost in the three countries) and
- not inferior to the cost-effective national strategy of any of the 3 countries.

In the course of the action, the three-national trade of emission permits and select joint implementation options will be assessed by their cost-effectiveness.

The project shall identify cost effective technical and economical measures both on the national and the trans-national level. This includes energy efficiency improvements at all links of the energy chain, emission trading, and joint implementation measures.

- The project shall develop guidelines, how the mitigation obligations could be allocated to the 3 countries and to the sectors of the economy in a globally cost-optimal way.

- The design of technology promotion programmes and GHG mitigation measures shall be analysed in the light of their cost-effectiveness and their benefits for the national economies.

- As the international trade with emission permits will be included into the model, the marginal price at which it is advantageous for a particular state to buy or sell certificates abroad can be estimated.

- Furthermore the project shall show that the mitigation of greenhouse gas emissions can be improved by taking joint efforts and by harmonising the mitigation policies of the three countries, including taxation, technology promotion programmes, enactment of directives, regulations, restrictions and limitations, joint implementation, and national and international emission trading.

- Not least, the action will strengthen the regional energy co-operation of the 3 neighbouring countries in assessing additional potentials of energy and equipment imports and exports.

The governments of the three countries will get a factual basis at hand which will show them where to allocate resources to reduce the emission of greenhouse gases on a trans-national basis. This will allow them to give or to get support for improvements to/from other affected countries.

REFERENCES

1. International Energy Agency: CO₂ Emissions from Fuel Combustion - 1997 Edition. IEA. Paris. 1997
2. International Energy Agency: Energy Balances of OECD Countries 1994-1995. . IEA. Paris. 1997
3. International Energy Agency: Energy Statistics and Balances of Non-OECD Countries 1994-1995. IEA. Paris. 1997
4. Kühner, R. et al.: Das "Toronto-Technologie-Programm". Gutachten im Auftrag des Verbandes der Elektrizitätswerke Österreichs, der Vereinigung der Österreichischen Industrie und der Wirtschaftskammer Österreich. Schriftenreihe der Energieforschungsgemeinschaft des Verbandes der E-Werke Österreichs. Wien. 1998.
5. Österreichische Bundesregierung: Bericht der Bundesregierung an den Nationalrat gemäß Entschließung des Nationalrates vom 1. 9. 1994: „Österreichischer Klimaschutzbericht“. Wien. Dezember 1995.
6. United Nations: Kyoto Protocol to the United Nations Framework Convention On Climate Change. Conference of the Parties. Third session. Kyoto. 1-10 December 1997.
7. United Nations: United Nations Framework Convention On Climate Change. Rio de Janeiro. 1992