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ABSTRACTS for
PARALLEL SESSION 2-3-1 on POLICY AND MITIGATION
and
PARALLEL SESSION 2-3-2 on UNFCCC/POST-KYOTO REGIMES

CHAIRPERSONS: ***Ferenc Toth and Johannes Bollen***

Climate Change Policies Revisited: Do We Need a More "Balanced" Regime

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Even after its coming into force, the shortcomings of the Kyoto protocol and of international climate change policy in general are obvious. There is insufficient implementation, the (linked) challenges of re-integrating the USA and involving industrializing countries like China in a meaningful manner have not yet been grasped, and concepts for long-term policies for substantially reducing world-wide GHG emissions still have to be established.

Therefore, a discussion about a modified global climate regime with a more "balanced" mitigation strategy and a stronger consideration of adaptation measures is gaining momentum. Core topics of such a regime will be addressed in this contribution.

Keywords: Kyoto, climate policy, mitigation, adaptation, energy

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Post-Kyoto Climate Negotiations: A Dynamic Game Approach Focusing on Developing and Oil Exporting Countries

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Provision of transnational public goods must be voluntary since States can be pressured but not forced to contribute to the supply of a transnational public good (e.g. Barrett, 2003). In other words, international environmental agreements must be *self-enforcing*. Founded on the insights from the game theory, economists have proposed to restructure incentives through *issues linkages* consisting in exchanging concessions across different policy dimensions. Multilateral cooperation across different issues gives the possibility to form agreements and to enforce them. Several authors have proposed to link international environmental agreements to international trade (e.g. Barrett, 1997, 1999), technology R\&D and technology diffusion (e.g. Carraro & Siniscalco, 1996, Katsoulacos 1996, Tol et al. 2000) or sustainable development and greening development assistance (e.g. Beg et al. 2002, Toman 2002). It has also been proposed to negotiate a policy architecture that would allow meaningful participation of developing countries (DCs) in the international effort to curb GHG emissions (Viguier 2004).

In this paper we explore further this idea of creating incentive for participation in the international climate regime via international emission trading. We propose a dynamic game model for the international negotiations that will take place to share the burden of stabilizing global GHG concentration in the atmosphere in the long run. The model assumes a non-cooperative behavior of the parties except from the fact that they will be collectively committed to reach a target on total cumulative emissions by the year 2050. The concept of normalized equilibrium is used to characterize a family of dynamic equilibrium solutions in an *m*-player game where the agents are (groups of) countries and the payoffs are the welfare gains obtained from a Computable General Equilibrium (CGE) model.

Evaluation of Various International Schemes for Climate Change Mitigation after Kyoto Protocol

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For constructing the concrete scheme for climate change mitigation after Kyoto protocol, it is important to estimate the regional costs, to assess technological options for various targets and to evaluate them from the equity viewpoint. Several schemes for burden sharing of CO_2 reduction, e.g. the scheme achieving the convergence of the regional CO_2 emissions per capita, were evaluated by using a new developed world energy systems model having 77 regions. The obtained regional costs, CO_2 reductions, etc. were integrated into some conceptual indices such as burden equity by using a covariance structure analysis. Each scheme was evaluated through those indices.

Keywords: Energy systems model, Climate policy, Kyoto protocol, Post-Kyoto regimes, Burden sharing

Long-term Evaluation on CO_2 Mitigation and Primary Energy Conservation Effects of Co-Generation System in Japan with an Econometric Model

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This paper aims to estimate the installation potential of Co-Generation System, which is expected to contribute to future CO_2 mitigation and energy conservation, in Japan with an econometric model up to year 2020. This model explicitly evaluates the influence of these Co-Generation Systems on Japan's energy structure in a consistent way employing both an econometric model and an optimal power generation mix model. In Japan, the installed capacity of Co-Generation Systems accounted for only 6.5 MW in 2002. With considerable uncertainty remaining concerning various assumptions in this model, installation is preliminarily predicted around 10.3 MW in 2020, which eventually contributes to both energy conservation and CO_2 mitigation, and promotes shift for gas in Japan's primary energy mix based on this calculation.

Keywords: Co-Generation System, CO_2 emissions, Energy conservation, econometric approach, End-use model

Perspectives of Electric Power Generation in Europe – Dealing with Policy Impacts, Sustainability and Post-Kyoto Targets

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The electricity sector is a main component in the European energy system. The developments in this sector and the evolution of electricity generation technologies will play an important role in tackling the challenges of liberalization, climate protection and security of energy supply.

In this paper the development potential of various electricity generation technologies is presented followed by an analysis of the long-term perspectives of the electric power sector in Europe with a regionalized TIMES model. In different scenarios regarding policy instruments and Post-Kyoto GHG reduction pathways, the economic, supply-side related and environmental impacts of the generation technologies are assessed.

Keywords: electricity generation technologies, Europe, energy system analysis, GHG mitigation, policies, sustainability

TIMES Modeling of Energy, Emission and Climate Scenarios

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TIMES model is used to represent world energy and climate scenarios up to 2100. The transition from the MARKAL database to TIMES includes: keeping most of the structure of the 15-region MARKAL database; new assumptions about the long-term energy service demands, resources availability and specific energy policies/behaviours to be reflected in the base case; the implementation of a climate module and of non-energy and non-CO_2 abatement cost curves. Results are presented for the reference and some climate control cases.

Keywords: MARKAL/TIMES model, energy/emission scenarios, climate change

How much can "Soft Kyoto" Achieve? Assessing the Impact of Renewable Portfolio Standards (RPS) and Voluntary Carbon Emissions Reductions in the United States

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While the US opted not to participate in the Kyoto Protocol, it has pursued a program of renewable energy development combined with a scheme of voluntary emissions reductions by large energy users. The renewable program, driven by strong state and some federal incentives, has resulted in considerable renewable energy development: total non-hydro renewable capacity stands at 27,000 MW, with roughly 9,800 MW of biomass, 6,000 MW of wind power, and 5,900 MW of wood/wood waste already developed. Wind energy development has developed at a very strong pace, with average annual growth rate from 1999 to 2003 at 23%.

The "Renewable Portfolio Standard (RPS)" program is a market-based strategy that aims to incentive renewable technologies and increase renewable development throughout the country. State RPS standards require utilities to purchase a given percentage of their energy from renewable sources.

This paper analyzes the US model of combining voluntary reductions with incentives for renewable energy development. It evaluates the structures and goals for federal and state RPS programs and provides an assessment of gains realized, potential obstacles, and future trends.

Influence of Technological Learning of Advanced Energy Conversion Technologies on Future Energy Perspectives

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This study examines the role of innovative technologies on mid- and long- term perspectives of the global energy system. In doing so, we use a scenario approach with and without CO_2 constraints in order to assess the effectiveness of chosen technologies in the energy system. In this study, we focus on combined cycle technologies, fuel cell technologies, CO_2 sequestration technologies and hydrogen production technologies, and attempt to determine which of these technologies could contribute most to the mitigation of CO_2 emissions. In addition, we analyze the economic perspectives of these new and currently rather expensive technologies using technological learning.

Keywords: combined cycle technologies, fuel cell technologies, CO_2 sequestration technologies, hydrogen production technologies, technological learning