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GHG MITIGATION TARGETS BY 2020: WHAT INTERNATIONAL COORDINATION?

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Overview

In the past couple of years the climate change debate has been marked by increased scientific evidences reported in the fourth IPCC assessment report, the release of the EU climate package and its approval by the EU parliament in December 2008, and the recent political transition in US with greener positions expressed by the new administration. There are therefore great expectations for an international agreement at the up-coming Copenhagen Climate Change Conference which will also be the final step of the two-year negotiation process set by the Bali conference in 2007. For the long term, a noticeable convergence exists between EU expressed views and the Obama-Biden new energy for America plan around a 60 to 80 percent reduction of greenhouse gas emissions by 2050 compared to 1990 levels. But, the deal on medium term targets is far from being sealed.

On one hand, the European Union has pledged to reduce by 20% its GHG emissions by 2020 compared to 1990's level, and is prepared to commit additional efforts in case of international agreements. In this case emissions reduction will reach 30% by 2020. On the other, the currently expressed short term target for the US is a 20% reduction on 2005 levels by 2020. While this represents a significant step, it roughly leads to just a stabilization at 1990 levels by 2020. In the same time, US also stress the need for some mitigation efforts from fast growing transition countries such as China and, to a lesser extent, India.

All these positions leave of course room for negotiations and one rule of the Copenhagen game seems to be: "what involvement is acceptable from others to define our own commitment level?" EU is thus waiting for signs from other developed countries and in particular US which are itself waiting for positive signs from China. The aim of this paper is to discuss, through scenario analysis, the outcomes of different coordination schemes for intermediate mitigation targets. Therefore EU alone, involvement of US and other developed countries, participation or not of China and India commitments are investigated.

Methods

Analyses carried out in this paper are based on the ETSAP-TIAM model which offers a technology-rich representation in 15 regions of the world energy system. This model performs a minimization under constraints of the total discounted cost of the energy system over the long-term and in a partial equilibrium framework. We cover the period 2000-2050 and assess the evolutions of primary energy consumption and regional emission levels for different scenarios.

(1) World reference scenario without any explicit policy measures concerning CO2 mitigation (BASE);
(2) Europe scenario with a CO2 emission reduction commitment of :
    a. 20% to 2020 compared to 1990' level for European countries (CEU20);
    b. 30% to 2020 compared to 1990' level for European countries (CEU30);
(3) Developed countries scenario :
    a. with a CO2 emission reduction commitment of 20% to 2020 compared to 1990' level for European countries, USA, Japan, Canada, Australia (CDEVD20);
    b. with a CO2 emission reduction commitment of 30% to 2020 compared to 1990' level for European countries, USA, Japan, Canada, Australia (CDEVD30);
(4) Developed countries-China-India scenario:
    a. with a CO2 emission reduction commitment of 30% to 2020 compared to 1990' level for European countries, USA, Japan, Canada, Australia and a CO2 emission reduction commitment of 10% to 2020 compared to 1990' level for India and China (CDEVD10PLUS);
    b. with a CO2 emission reduction commitment of 30% to 2020 compared to 1990' level for European countries, USA, Japan, Canada, Australia and a CO2 emission reduction commitment of 20% to 2020 compared to 1990' level for India and China (CDEVD20PLUS).

The international community appears to converge on its long-term objectives, namely a GHG mitigation target of 60% to 80% by 2050 compared to 1990 levels. In this context, in our model, we consider that all countries have committed over the long term to reduce their GHG emissions by 60% in 2050 compared to 1990, whatever the outcome of international negotiations and mid-term commitments.

Results

The analysis of the scenario results focuses on the effects on CO2 emissions, total discounted cost, and carbon prices associated with the different GHG reduction targets for developed countries with or without a climate constraint for China and India. Results of the optimization are particularly the marginal costs of environmental measures (regulation, tax, cap-and-trade system), as carbon constraint of 30% emission reduction to 2020.

These scenarios allow us to compare effects of international coordination on three main environmental and economic indicators. The model shows CO2 emissions levels by regions and the impact of international climate change strategies on energy system as on investments in electricity generation capacity. Scenario analysis also provides a comparison of the total discounted cost of these CO2 mitigation policies according to international coordination on mid-term targets and so permits us to discuss impact of different commitment levels under post-Kyoto negotiations. Through these total discounted costs, the level of ambition of the CO2 reduction targets could be analyzed. Other focus consists on the long-term development of carbon price and permit trading issues.

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