Energy Modeling Forum (EMF) and results from AIM/Enduse[Global]

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1.EMF 27

The Energy Modeling Forum (EMF) is a structured forum for discussing important issues in energy and the environment by comparing the results of different models. The 27the session of EMF (EMF 27) focuses on “Technology Strategies for GHG Reductions and Energy Security.” The scenarios are specified by combinations of technology and policy cases.

- A technology case specifies the availability or the (future) status of key technologies.
- A climate policy case specifies the emissions reductions requirements and the configuration of the international climate policy regime. This dimension includes the baseline, or "no climate policy" case.

Table 1 Scenario design of EMF27

Technology Dimension									
	Default	**Single technologies changed**					**Conventional vs. renewable**		**Frozen technology**
Energy Intensity	Ref	Low	Ref	Ref	Ref	Ref	Ref	Low	Frozen
CCS	On	On	Off	On	On	On	On	Off	Off
Nuclear energy	On	On	On	Off	On	On	On	Off	Frozen
Wind & Solar	Adv	Adv	Adv	Adv	Cons	Adv	Cons	Adv	Frozen
Bioenergy potential	High	High	High	High	High	Low	Low	High	Frozen
Policy Dimension									
Baseline	R2G1	R2G2		R2G3	R2G4	R2G5	R2G6	R2G7	R2G8
450 CO2e	R2G9	R2G10	R2G11	R2G12	R2G13	R2G14	R2G15	R2G16	
550 CO2e	R2G17	R2G18	R2G19	R2G20	R2G21	R2G22	R2G23	R2G24	R2G25
G8	R2G26							R2G27	
Muddling through	R2G28							R2G29	

2. Scenario development by AIM/Enduse[Global]

AIM/CGE[Global] and AIM/Enduse[Global] are participating in EMF27. In this presentation, we focuses on 450 CO2e scenarios developed by AIM/Enduse[Global], a dynamic recursive optimization model with detailed technology selection framework.

The global GHG emission must be reduced by 50% relative to 1990 in 2050 in order to achieve 450 ppm CO2-eq concentration target. The model analysis using AIM/Enduse[Global] shows that GHG emission trajectory of 450 ppm scenario is technically feasible by 2050. However, it requires a drastic change in energy systems. In 450 ppm scenario, renewable energies, such as solar, wind, biomass and hydro, play crucial roles in the power generation, accounting for 75% of total electricity generation in 2050. Biomass power plants with CCS, which has net negative GHG emissions, are also widely diffused. As a result, the global average GHG emission intensity of electricity becomes negative in 2050, at -90 g/kWh from 403 g/kWh in the reference scenario. The top five key technologies in terms of reduction amount are CCS, solar power generation, wind power generation, biomass power generation and biofuel. These technologies, in total, account for 62% of global GHG emissions reduction in 2050. The analysis of technology limitation cases shows that 450 ppm scenario is technically feasible in all cases. However, investment cost becomes significantly high in no CCS scenario.

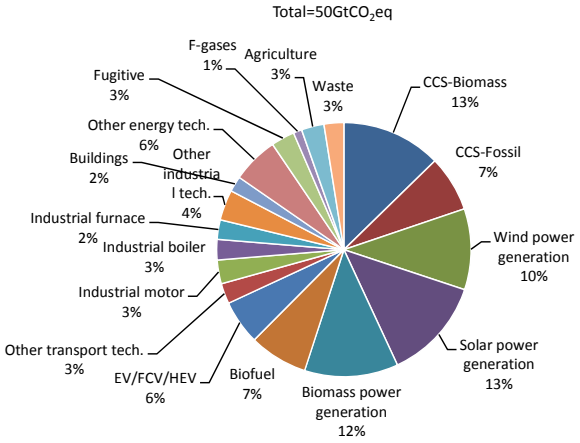

Figure 1 GHG emission reduction by technology in 2050 in 450 CO2e scenario with default technology setting