Energy investments under climate policy: A comparison of global models

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For further info: McCollum, Nagai et al. (2013), Climate Change Economics

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LIMITS in a nutshell

Low climate IMPact scenarios and the Implications of required Tight emission control Strategies

(www.feem-project.net/limits/)

• Integrated assessment model (IAM) inter-comparison exercise (7 IAMs)
• Funded by the European Commission FP7 (2011-2014)
• Main objective is to provide an assessment of the emissions reductions strategies necessary for achieving the 2 °C target
• Focus is not only global but also at the level of major regional economies
• Teams involved: FEEM (coordinator), PIK, IIASA, ECN, Univ. Utrecht, ERI-NDRC, LSE, JRC-IES, CEU, IIM, PNNL, NIES

• Focus of work (selected examples):
  • Defining the feasibility space of low-carbon scenarios and the associated emission reduction pathways according to different assumptions about policy regimes, delayed action, and burden-sharing architectures.
  • Assessing the investment requirements to implement these transformation pathways and the necessary financing mechanisms.
  • Evaluating the linkages of climate policies with other pressing social and environmental issues such as energy security, air pollution and economic development (to be continued in 2nd phase of project).
  • Special issue (10+ papers) in Climate Change Economics; pub. date in late-2013

The research leading to these results has received funding from the European Community’s Seventh Framework Programme FP7/2007-2013 under grant agreement n° 282846 (LIMITS)
CO2 Emissions until 2050 in the LIMITS Scenarios

* CO2 emissions from fossil fuel combustion and industrial processes; excludes emissions from land use
Sectoral Energy Investments (current)

Total: ~$1000 billion/yr (2% of global GDP)
- Fossil: ~$500 billion/yr
- Renewables: ~$250 billion/yr
- Other (Nuclear, T&D): ~$300 billion/yr

Demand-side investments???
Sectoral Energy Investments (current & future)

Energy Efficiency
Others
Liquids - Biofuels
Liquids - Fossil Fuels
Electricity - T&D and Storage
Electricity - Nuclear
Electricity - Renewables
Electricity - Fossil Fuels
Extraction - Others
Extraction - Fossil Fuels

(current climate policies, >3 ºC)
RefPol

(stringent climate policies, <2 ºC)
RefPol-450

Regional Energy Investments (current & future)

~900 GtCO2 (700-1100) ⇔ ~$45 trillion ($30-75)
Clean-energy Investment “Gap”

Annual Investment in Renewable Energy, Nuclear Energy, and Efficiency from 2010-2050 [billion USD/yr]

- RefPol-450 (stringent climate policies, <2 ºC)
- RefPol (current climate policies, >3 ºC)

Final thoughts

- **Policies**: critical to incentivize clean-energy investments

- **Developing countries**: financial flows from carbon credits under burden-sharing regimes on par with incremental investment needs

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Questions?
Comments?

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Back-up slides
RefPol-450

Annual Investments (Supply + Efficiency)
(normalized scale 2010 = 100%)

IMAGE
MESSAGE
REMIN D
TIAM-EC N
WITCH