International Institute for Applied Systems Analysis
IIASA www.iiasa.ac.at

science for global insight

Energy investments under climate policy: A comparison of global models

7th Annual Meeting of the IAMC

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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 **IM**pact scenarios and the **I**mplications of required **T**ight emission control **S**trategies

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

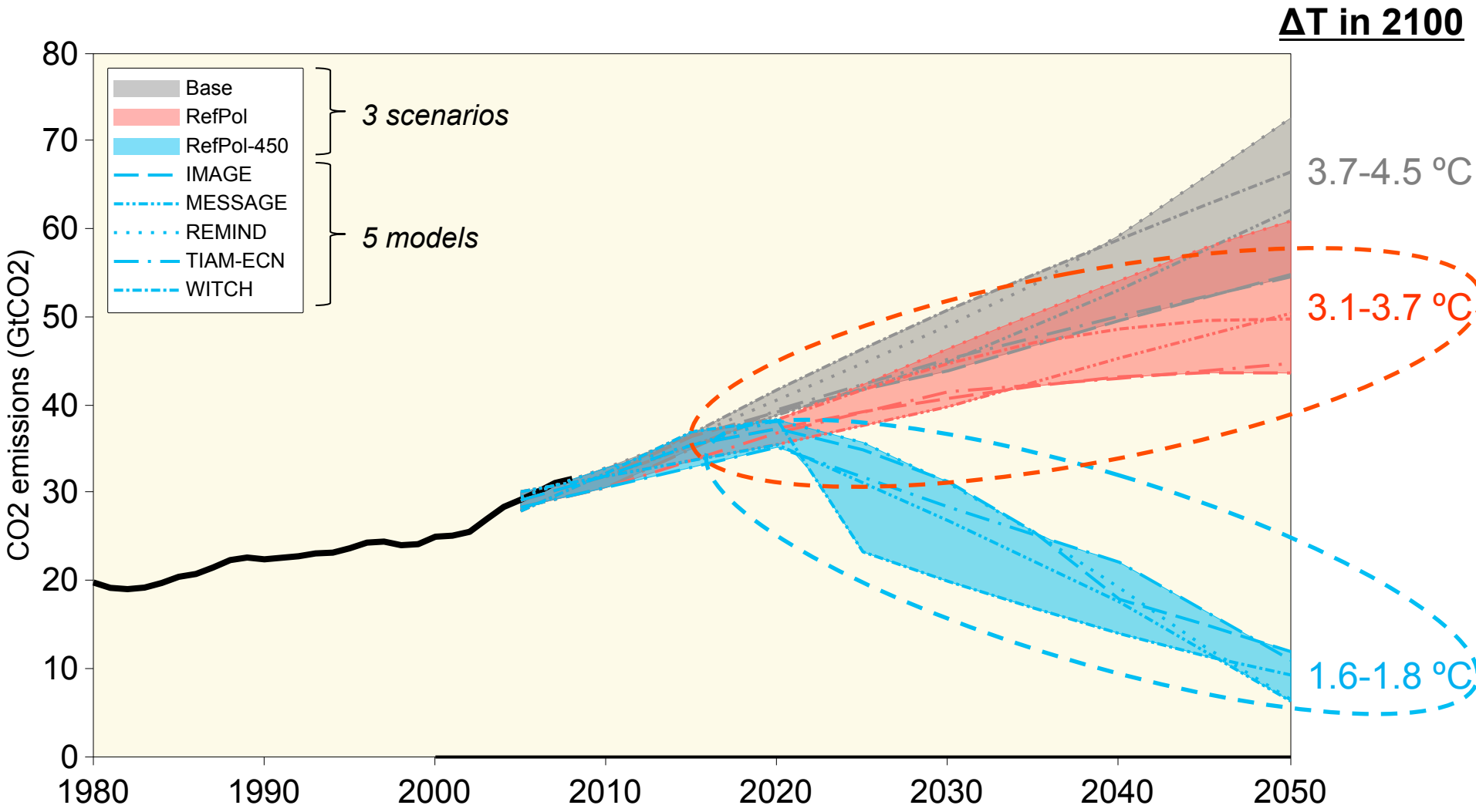
- Integrated assessment model (IAM) inter-comparison exercise (7 IAMs)
- Funded by the **European Commission** FP7 (2011-2014)
- Main objective is to provide an assessment of the emissions reductions strategies necessary for achieving the **2 °C target**
- Focus is not only **global** but also at the 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)

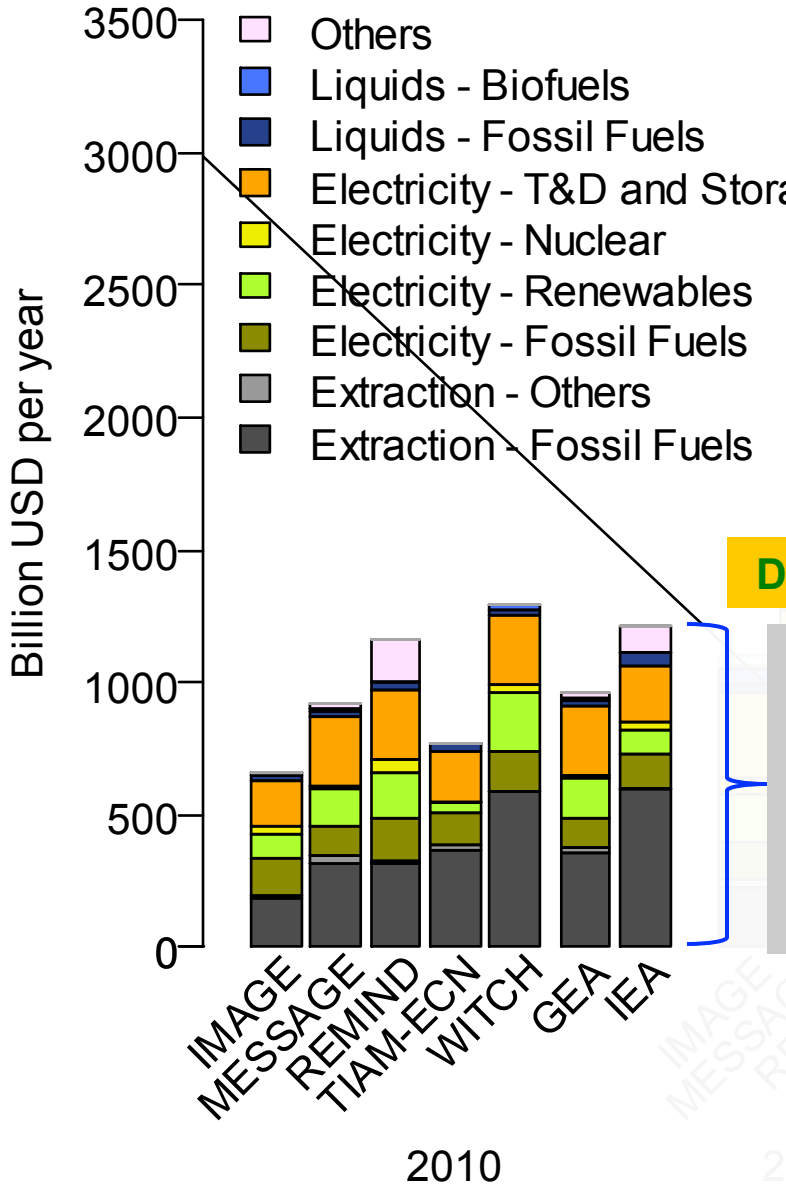
LIMITS

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)

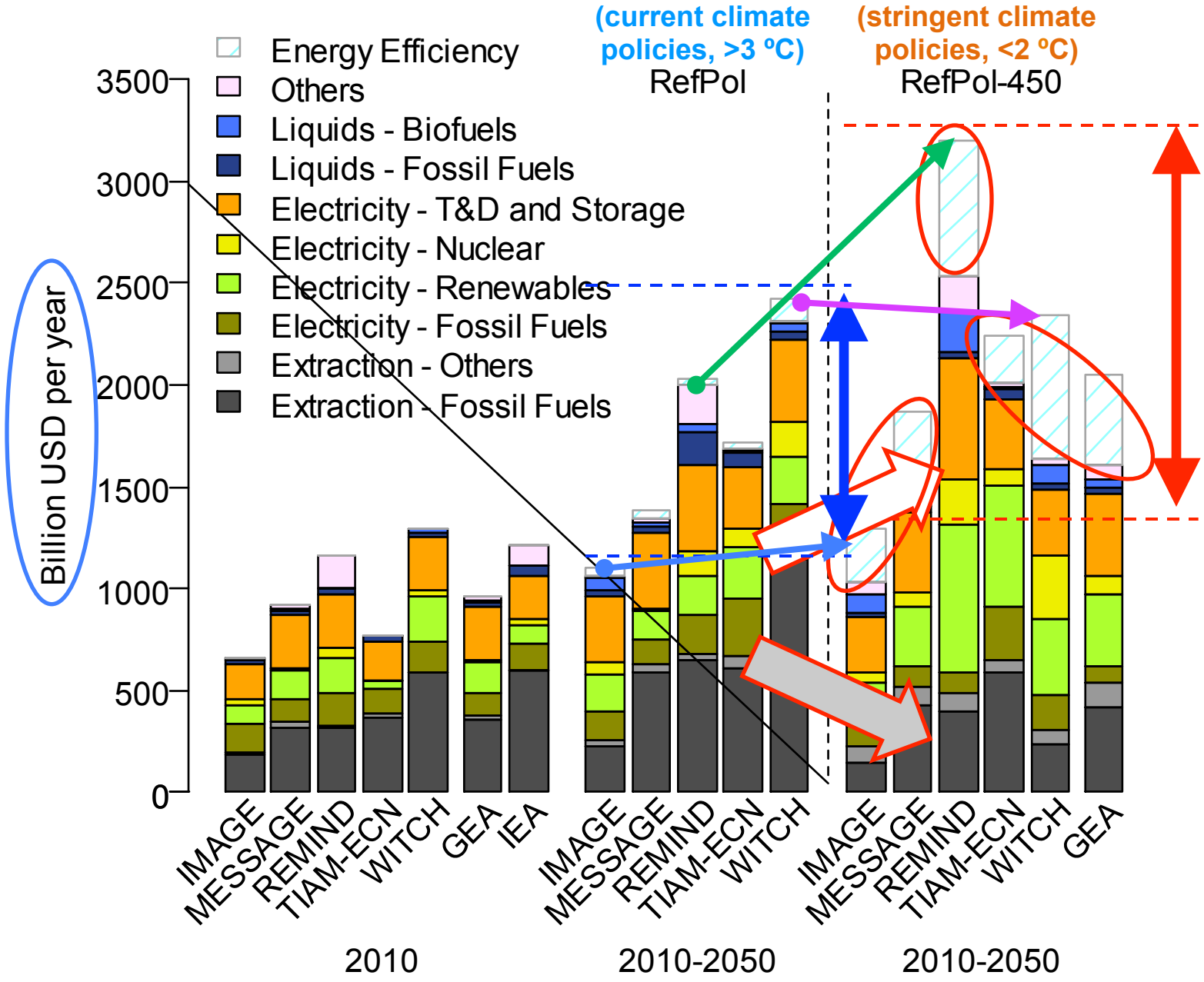


Demand-side investments???

Total: ~$1000 billion/yr (2% of global GDP)

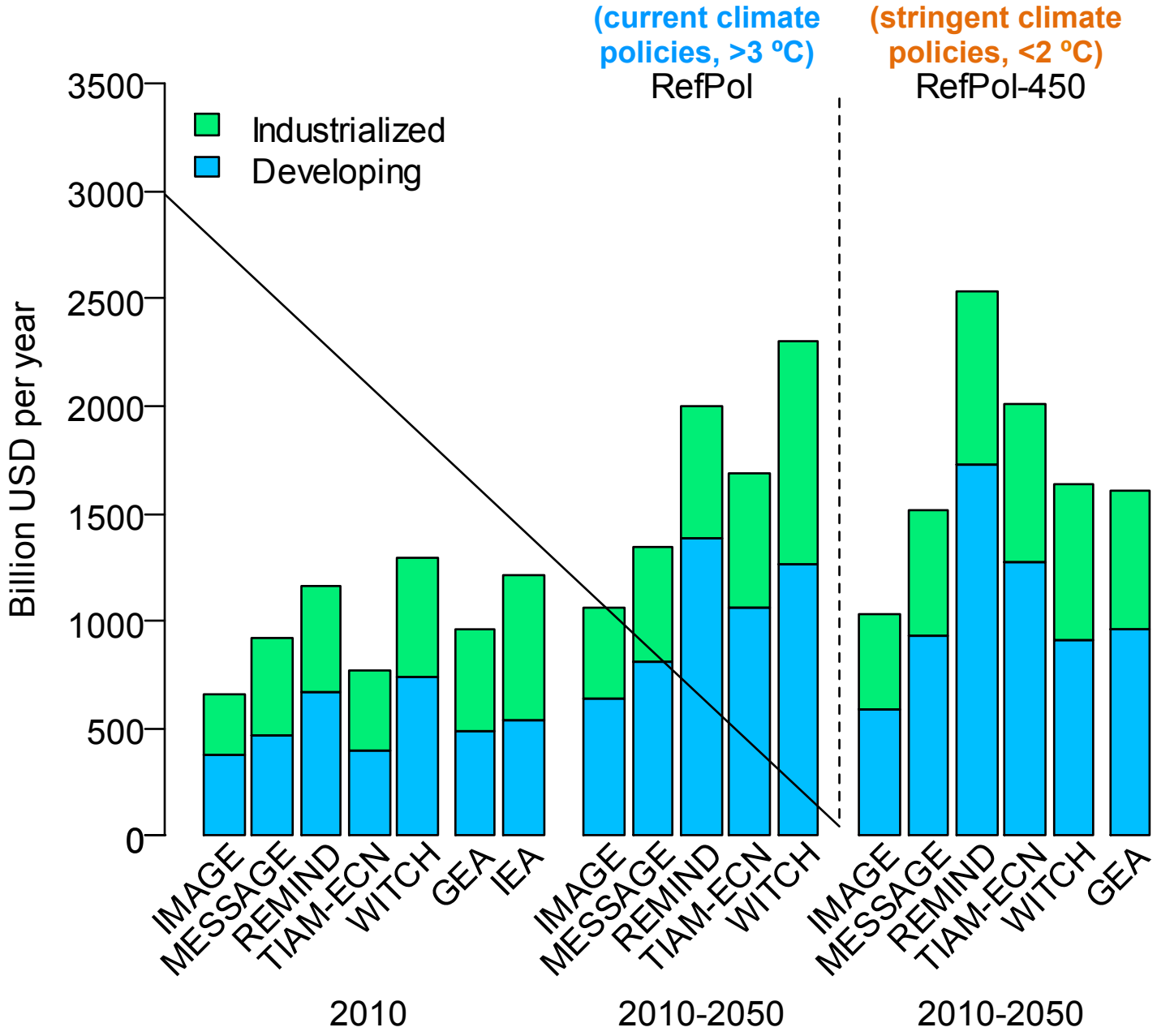
- Fossil: ~$500 billion/yr
- Renewables: ~$250 billion/yr
- Other (Nuclear, T&D): ~$300 billion/yr

Sectoral Energy Investments (current & future)



Source: McCollum, Nagai et al. (2013) "Energy investments under climate policy: a comparison of global models", *Climate Change Economics*.

Regional Energy Investments (current & future)



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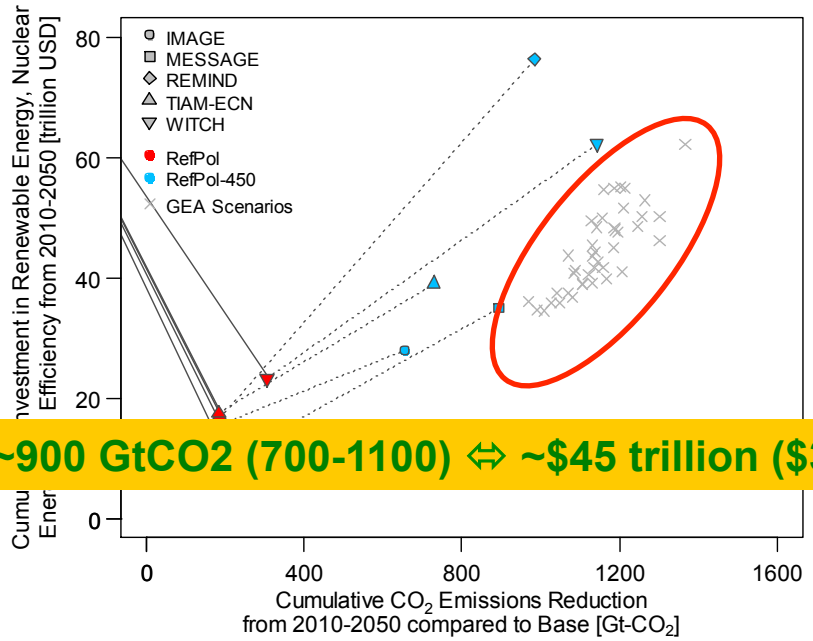
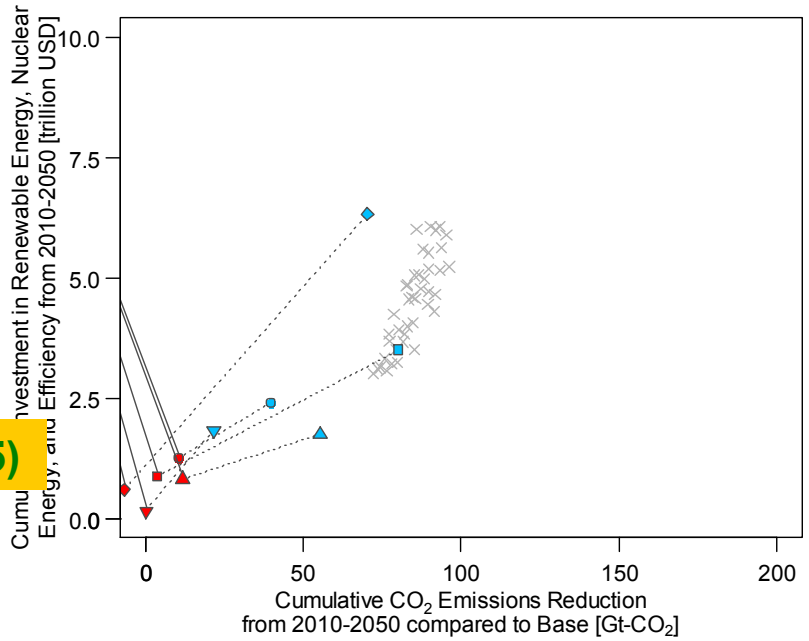
World

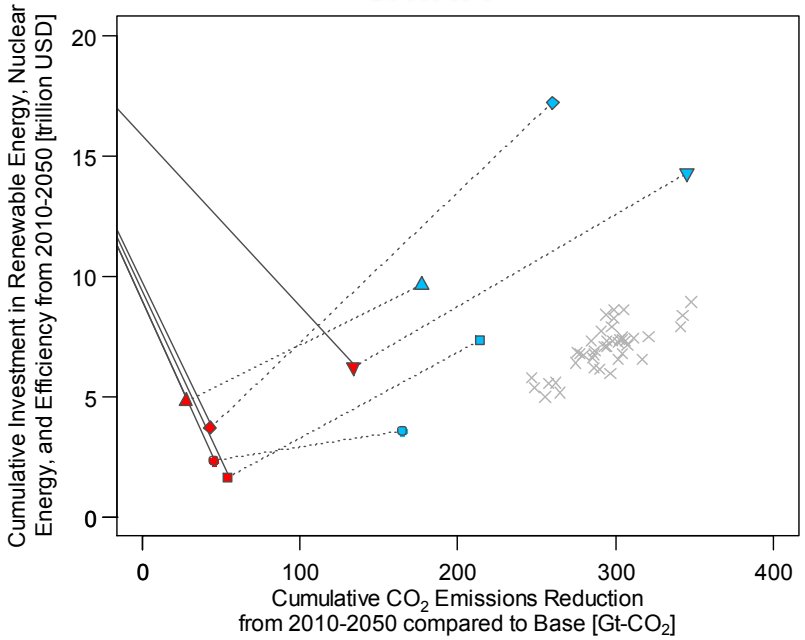


~900 GtCO2 (700-1100) ⇔ ~$45 trillion ($30-75)

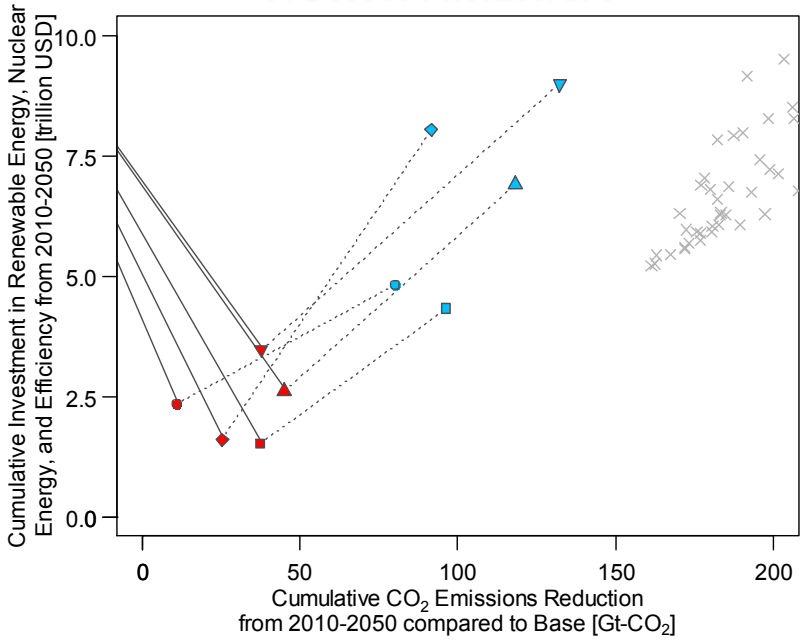
SUB-SAHARAN AFRICA



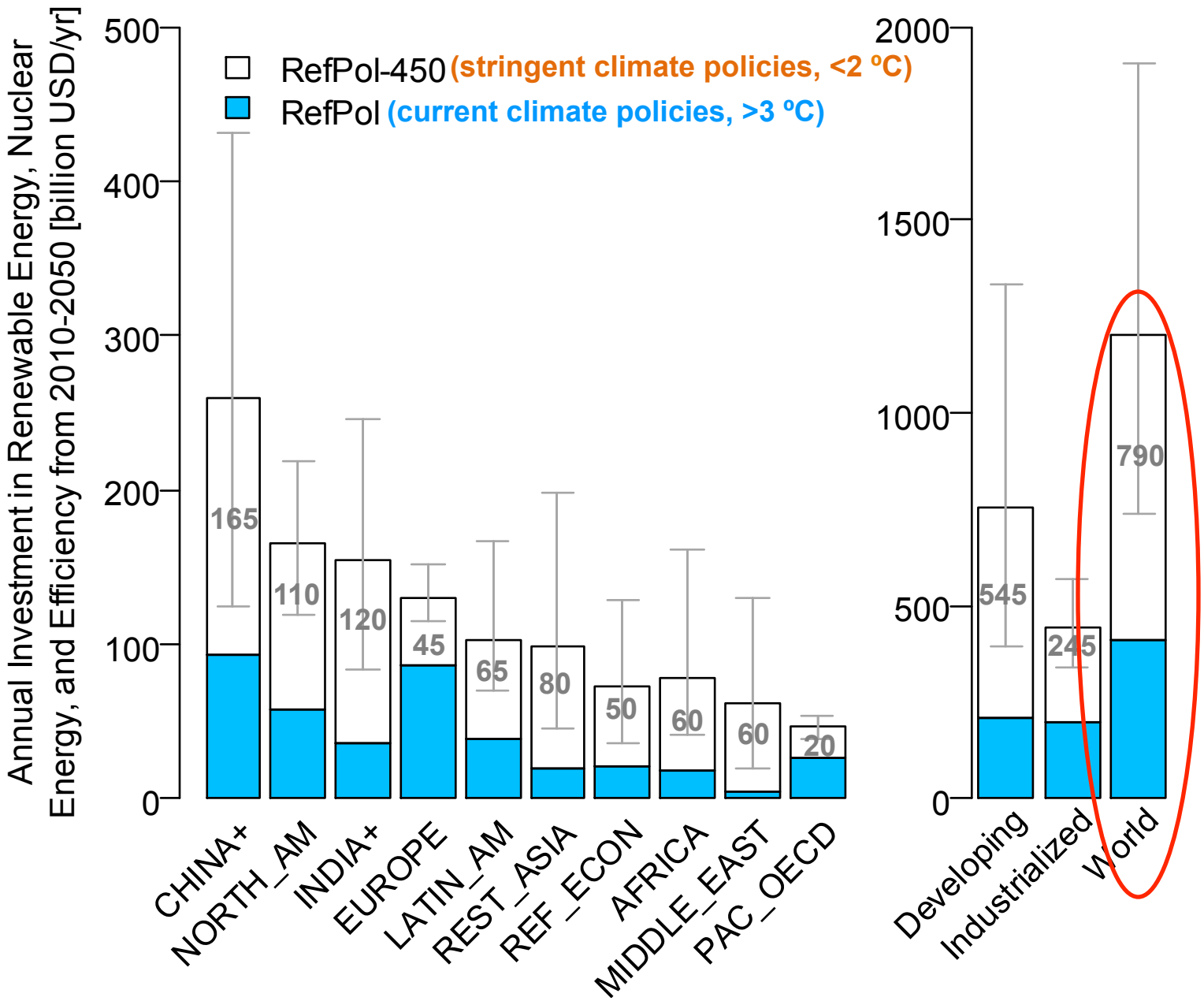
CHINA+



NORTH AMERICA



Clean-energy Investment "Gap"



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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

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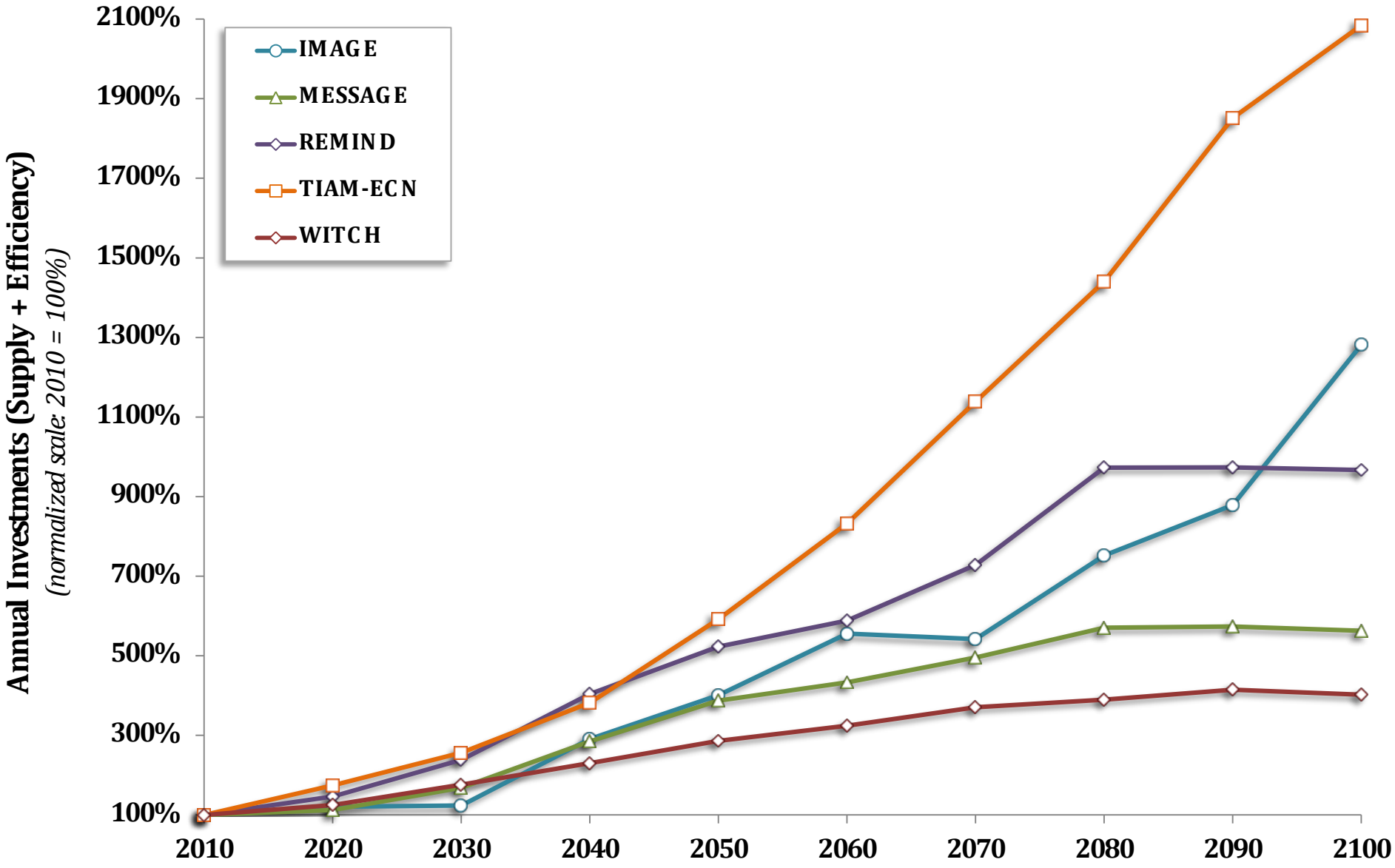
Annual Investments (Supply + Efficiency)
(normalized scale: 2010 = 100%)
2100%
1900%
1700%
1500%
1300%
1100%
900%
700%
500%
300%
100%
2010
2020
2030
2040
2050
2060
2070
2080
2090
2100
IMAGE
MESSAGE
REMIND
TIAM-ECN
WITCH

Electric Sector Investments