PBL Netherlands Environmental Assessment Agency

2°C Pathways

Regional low-emission pathways from global models

23 May 2016 | Heleen van Soest

MILES project

- Modelling and Informing Low Emission Strategies
- 19 international research teams
- Objectives:
  - *To explore different country-level strategies consistent with the 2°C target;*
  - *To increase understanding of differences between strategies in different parts of the world;*
  - *To enhance in all participating countries the capacity to perform analysis of mitigation strategies.*
- Funded by the European Union – DG CLIMA
  - No. 21.0104/2014/684427/SER/CLIMA.A.4

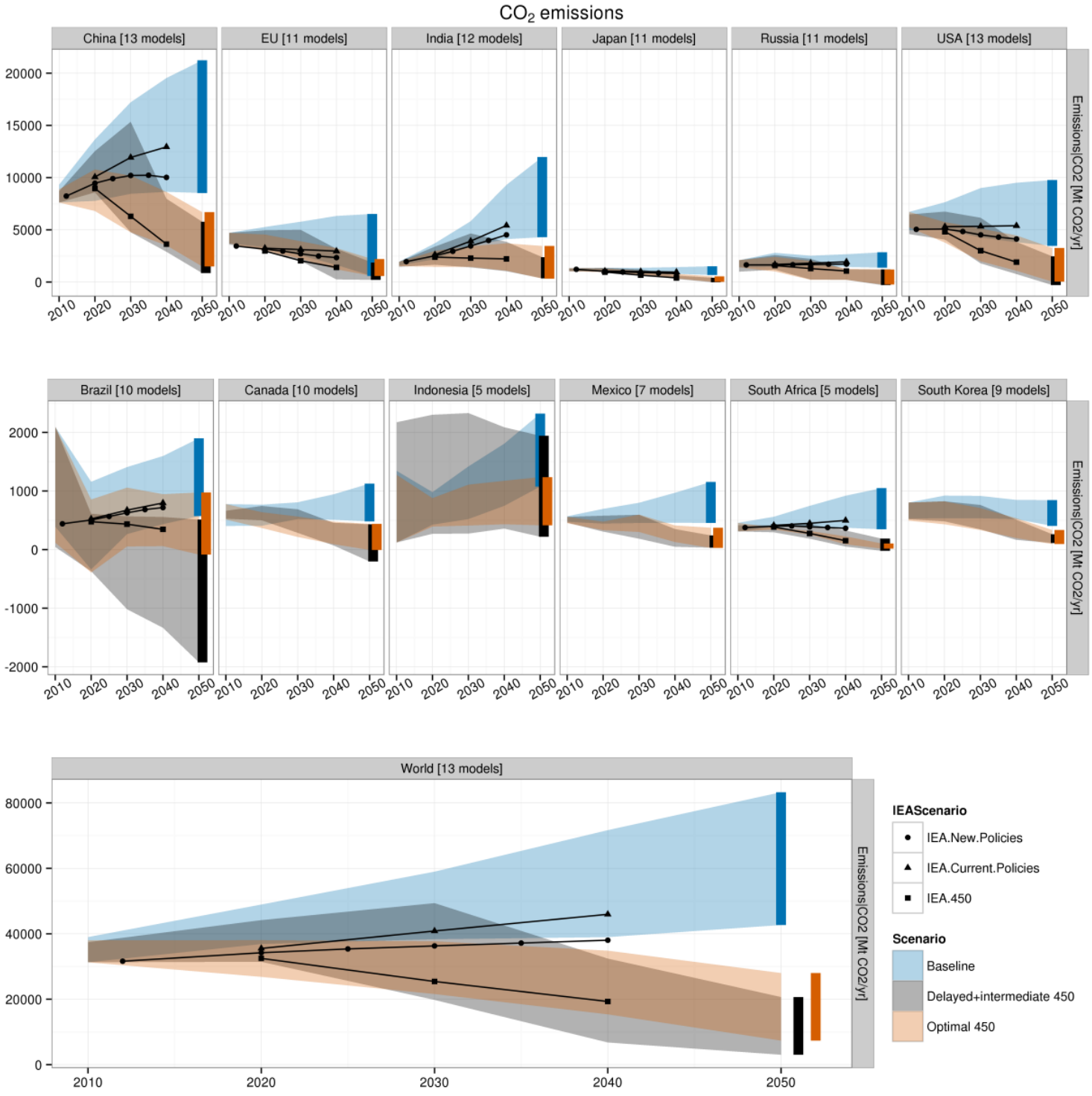
- *Van Soest, H., Aleluia Reis, L., Van Vuuren, D., et al. (2015) Regional Low-Emission Pathways from Global Models, Nota di Lavoro 110.2015, Milan, Italy: Fondazione Eni Enrico Mattei* http://www.feem.it/userfiles/attach/20151223165347 4NDL2015-110.pdf

Regional emission pathways from global models

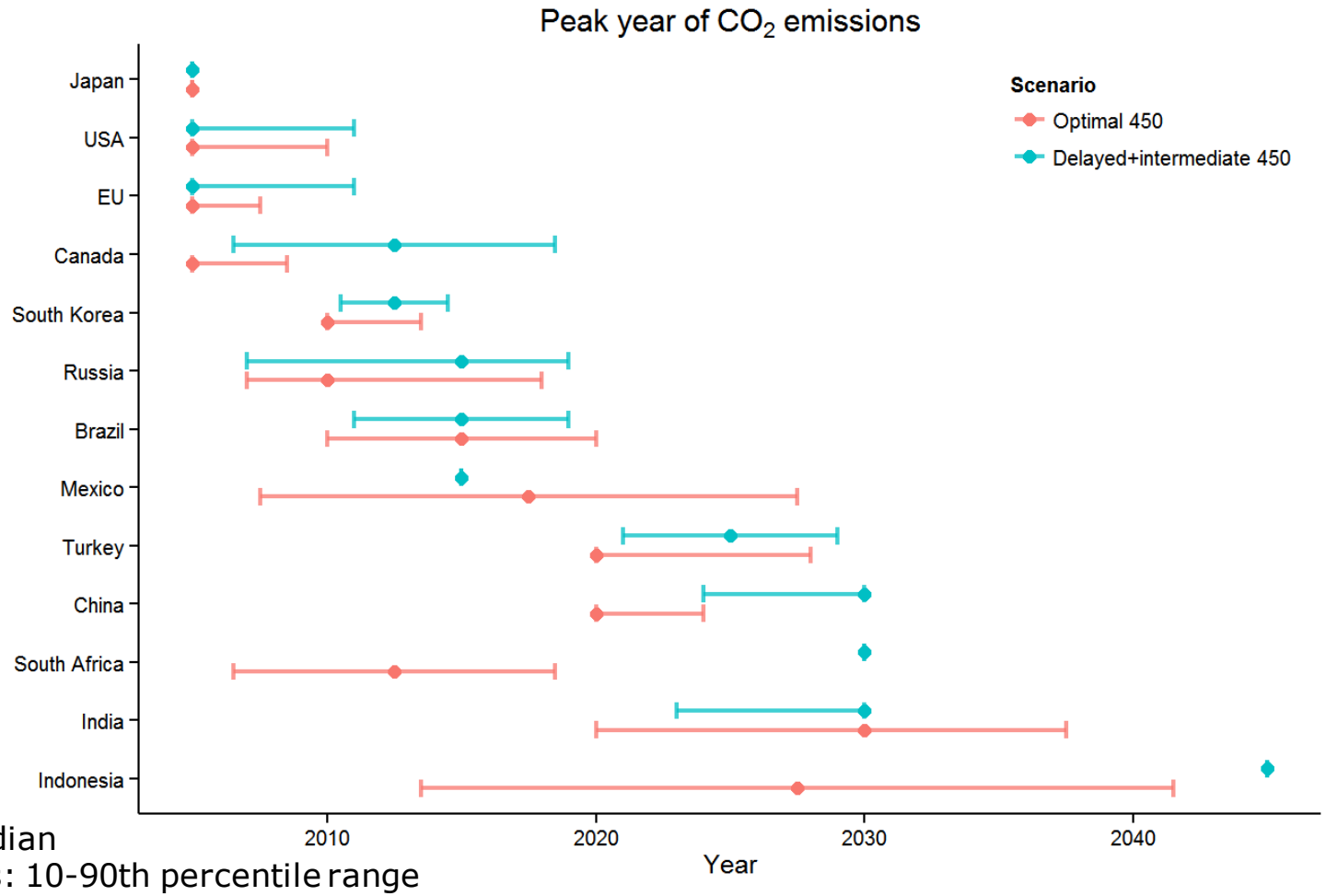
- Building on studies
  - LIMITS
  - AMPERE
  - EMF27
- Models
  - DNE21+ (RITE)
  - GCAM (PNNL)
  - GEM-E3 (EC)
  - IMAGE (PBL)
  - MESSAGE (IIASA)
  - POLES (EC)
  - REMIND (PIK)
  - WITCH (FEEM)
- Scenarios
  - Baseline
  - Delayed 450 ppm CO_2eq
  - Optimal 450 ppm CO_2eq

Emissions

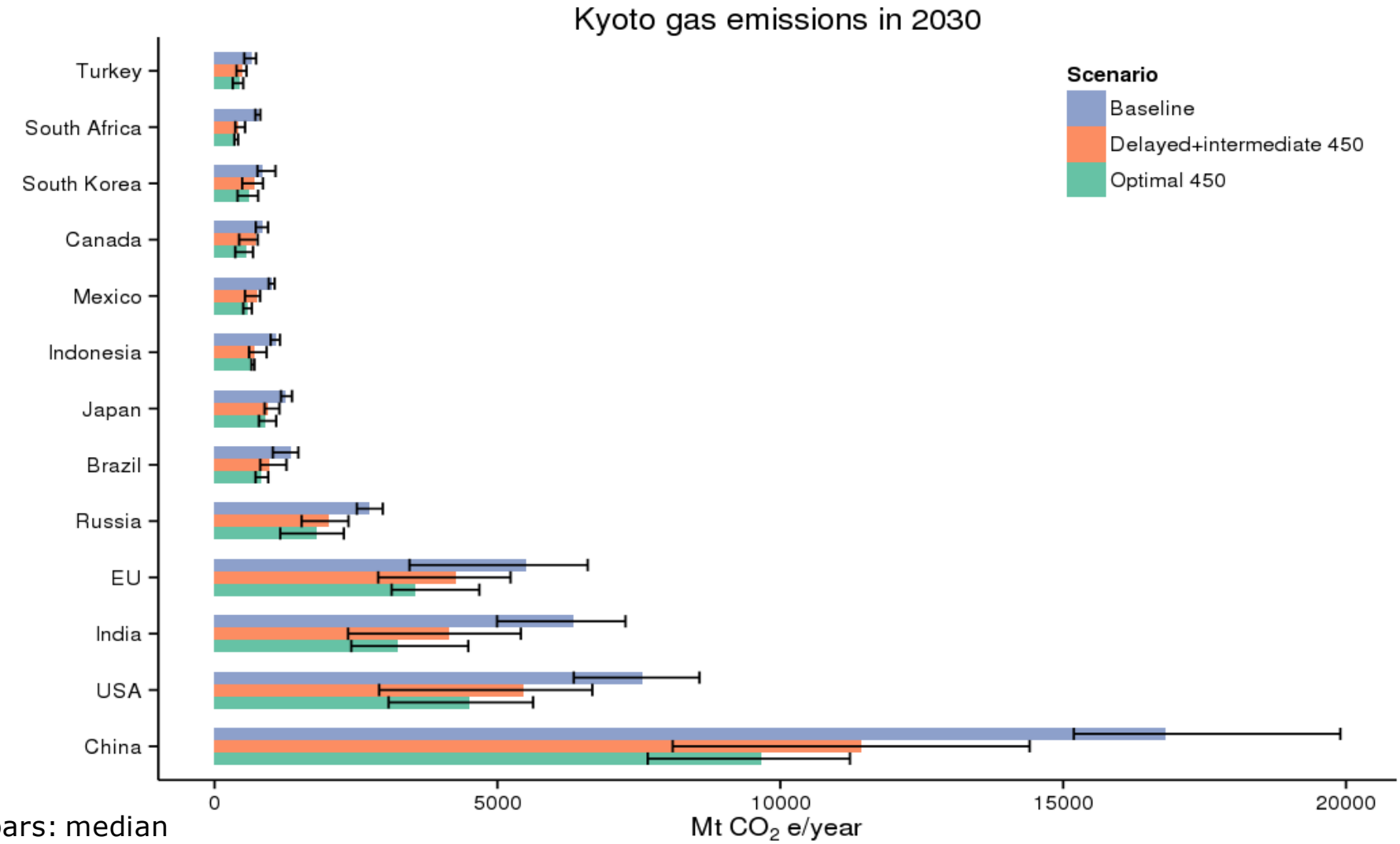
- Incl. LULUCF
- Range: minimum-maximum



Peak year CO_2 emissions

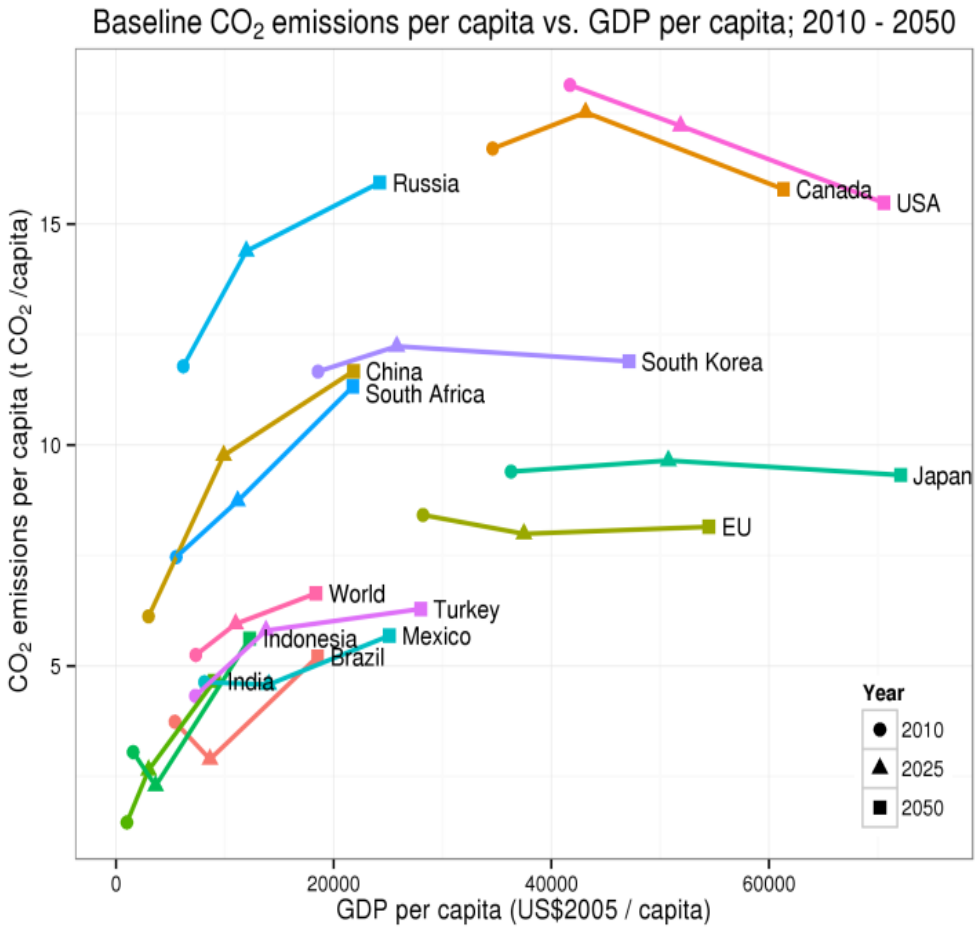


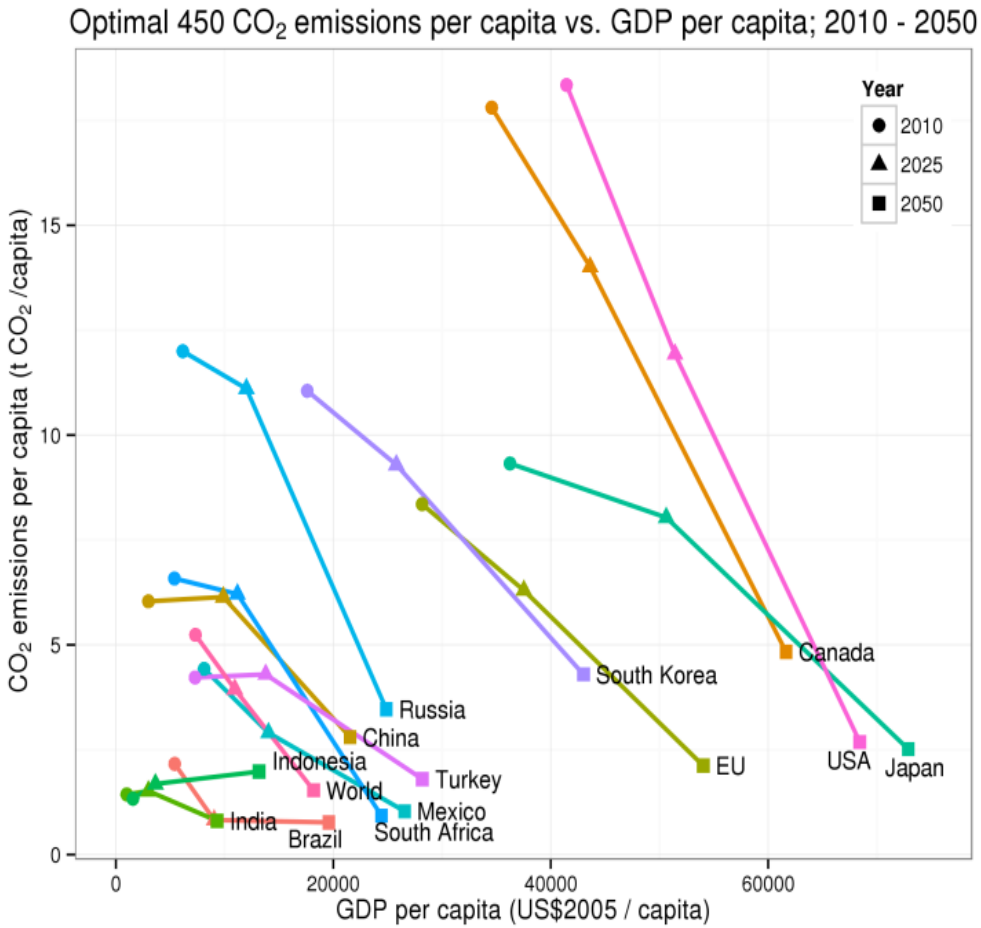
Dots: median
Error bars: 10-90th percentile range



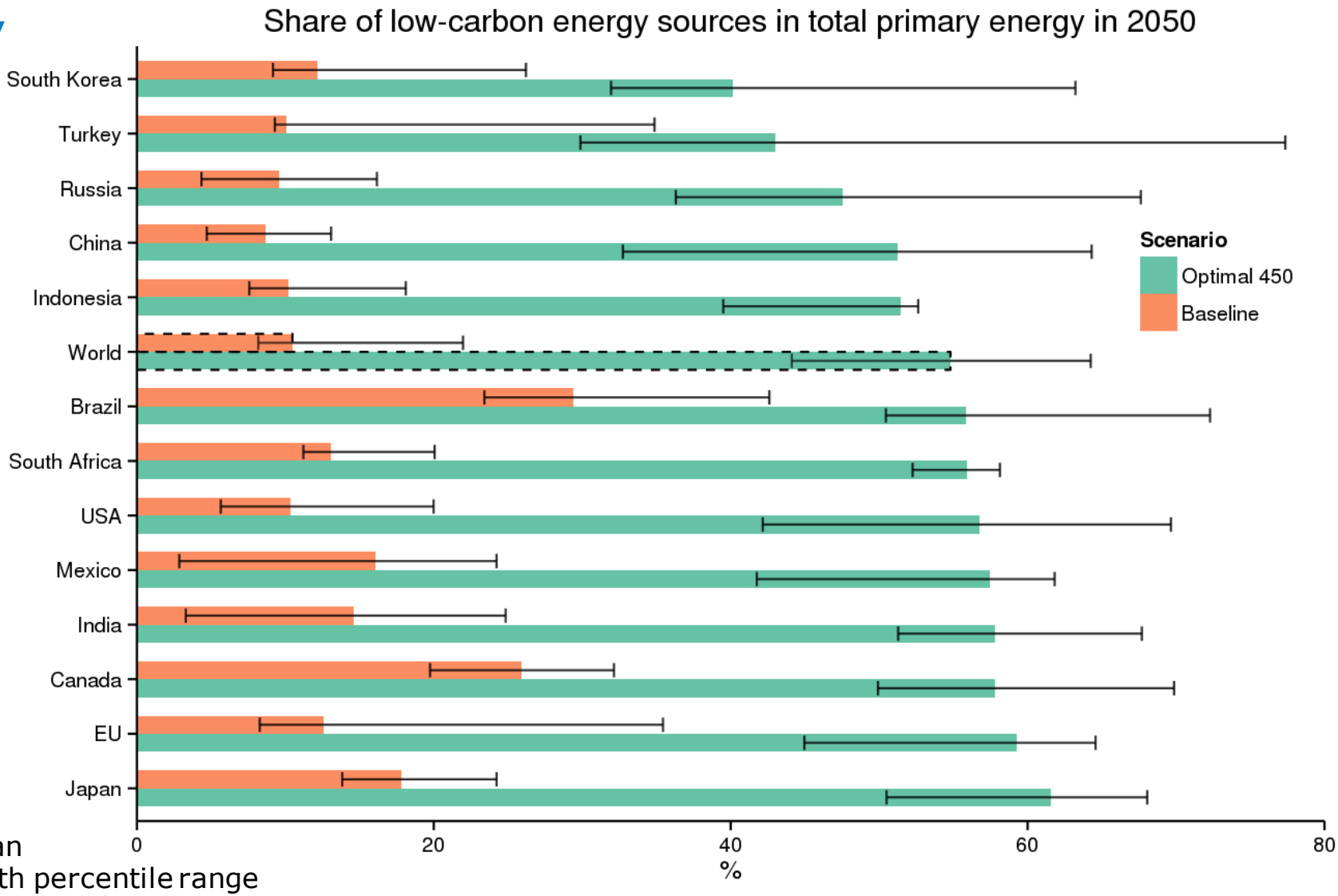
Filled bars: median
Error bars: 10-90th percentile range

Per capita emissions vs. GDP per capita





Energy



Filled bars: median
Error bars: 10-90th percentile range

Conclusions

- The 2°C pathways require major emission reductions in all countries
- Under the optimal 450 ppm CO_2eq scenarios:
  - Most countries' CO_2 emissions projected to peak before 2025
  - Declining and converging per capita emissions
- All countries show increasing shares of low-carbon primary energy
  - For developed countries, substantial increase on 2010 levels
  - Brazil, India and Indonesia already close to the mitigation range (over 25% of total primary energy supply)

Thank you

- MILES project: http://www.iddri.org/Projets/MILES-(Modelling-and-Informing-Low-Emission-Strategies)
- Working paper: http://www.feem.it/getpage.aspx?id=8188&sez=Publications&padre=73
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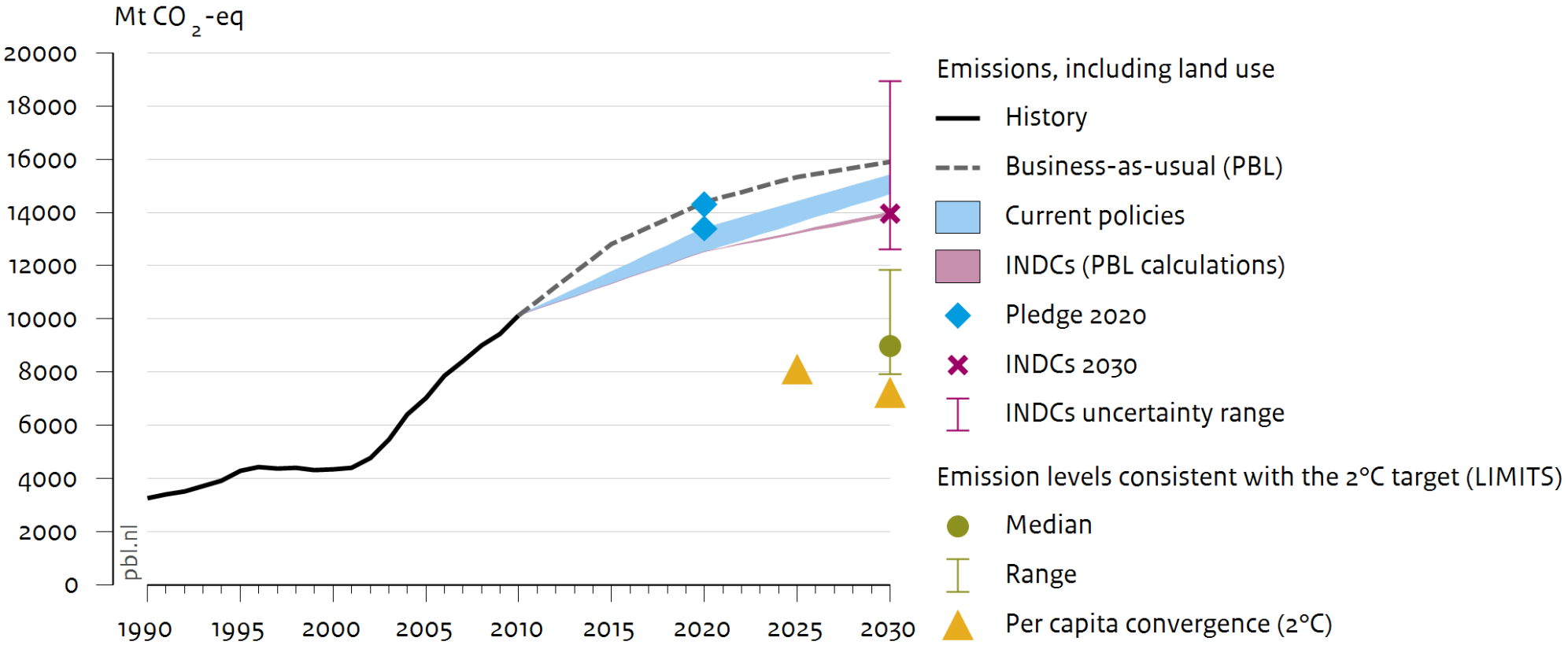
For comparison: INDC China

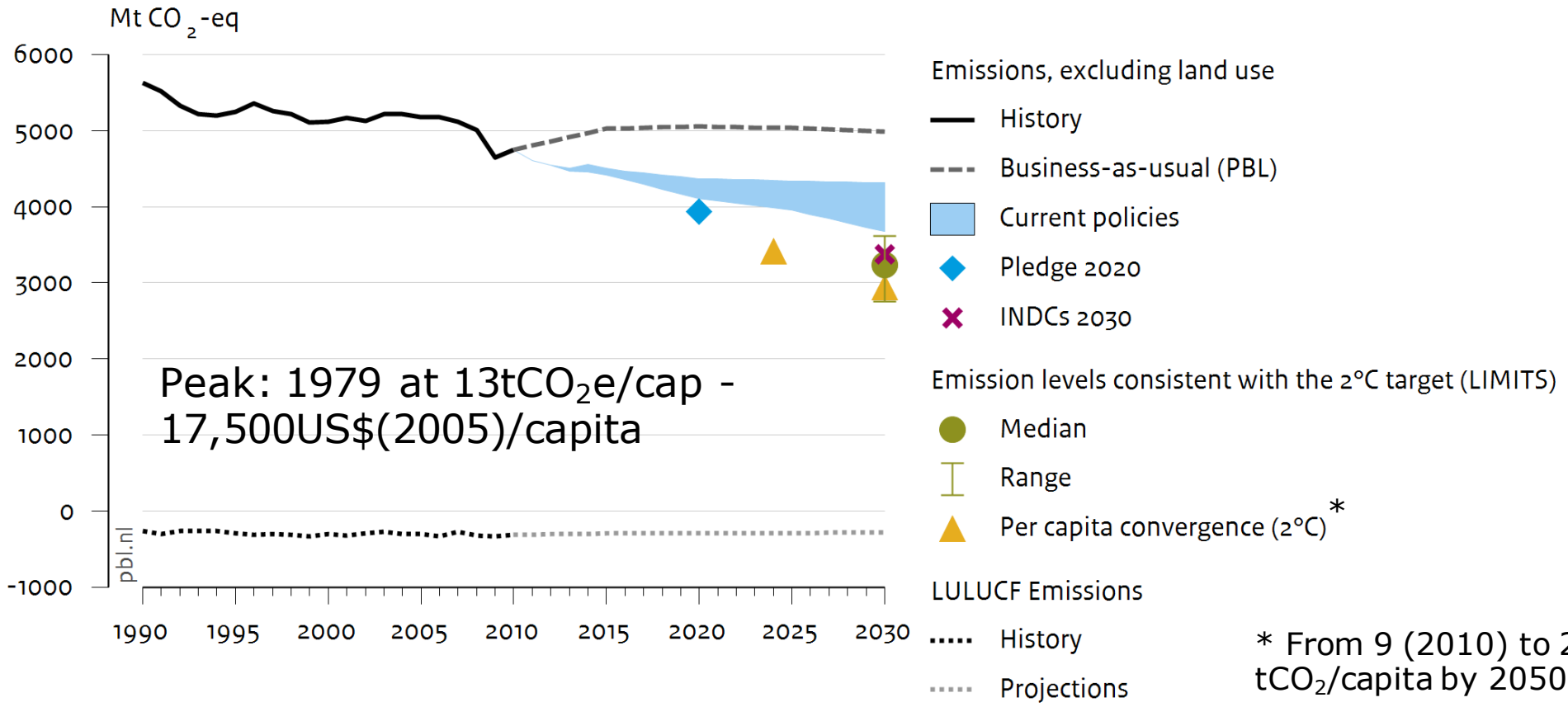
Impact of INDCs and climate policies on greenhouse gas emissions, China



EU INDC: domestic 40% below 1990 levels by 2030

INDC is consistent with 2°C (~42%), but above PC conv range (45%)

Impact of INDCs and climate policies on greenhouse gas emissions, EU-28

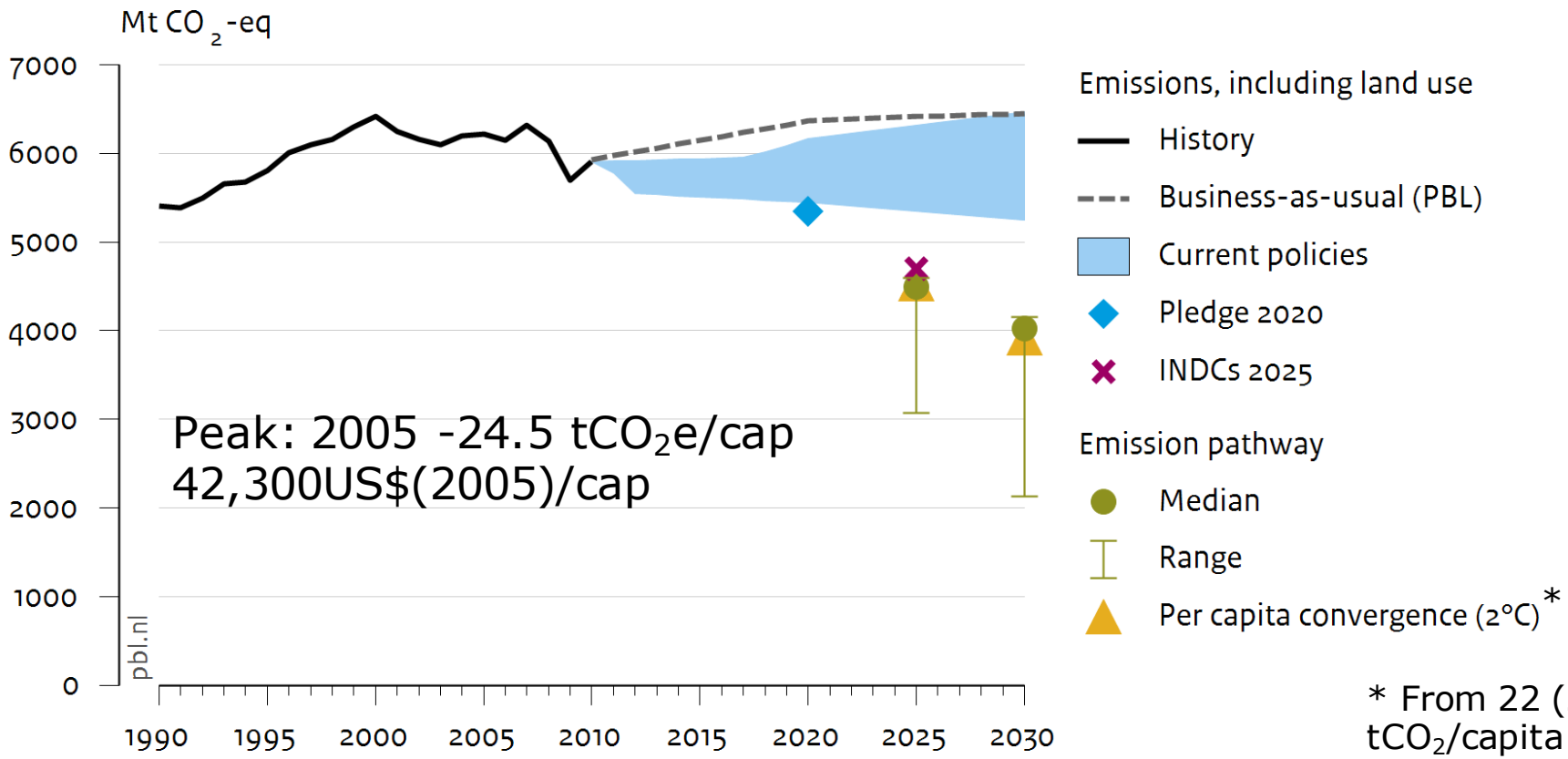


* From 9 (2010) to 2 tCO_2/capita by 2050

US INDC: domestic 26-28% below 2005 by 2025

INDC is above 2°C range, and in PC conv range, but uncertain due to LULUCF

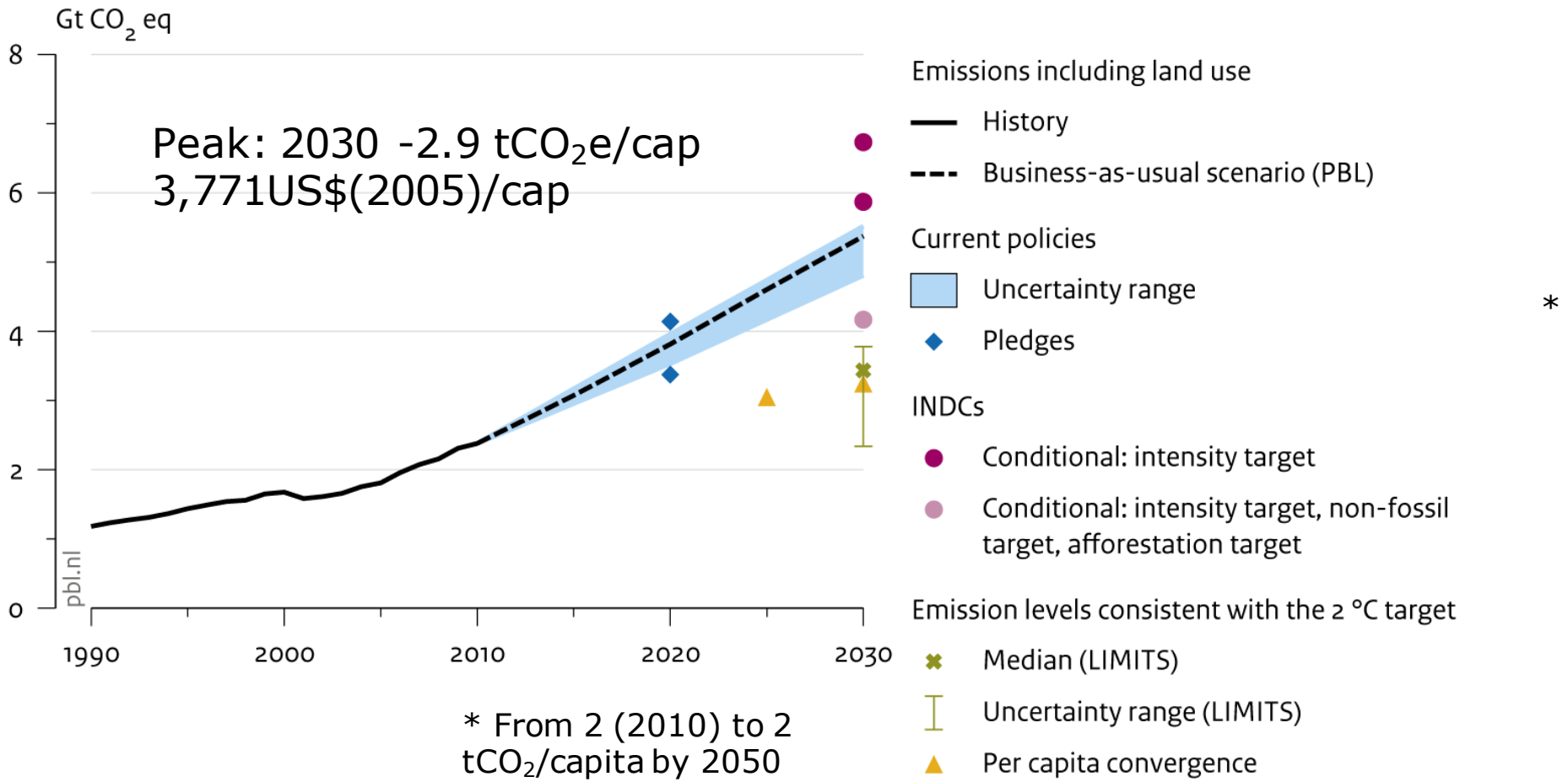
Impact of INDCs and climate policies on greenhouse gas emissions, USA



* From 22 (2010) to 2 tCO_2/capita by 2050

India: INDC 33-35% reduction of CO_2 intensity, non-fossil target

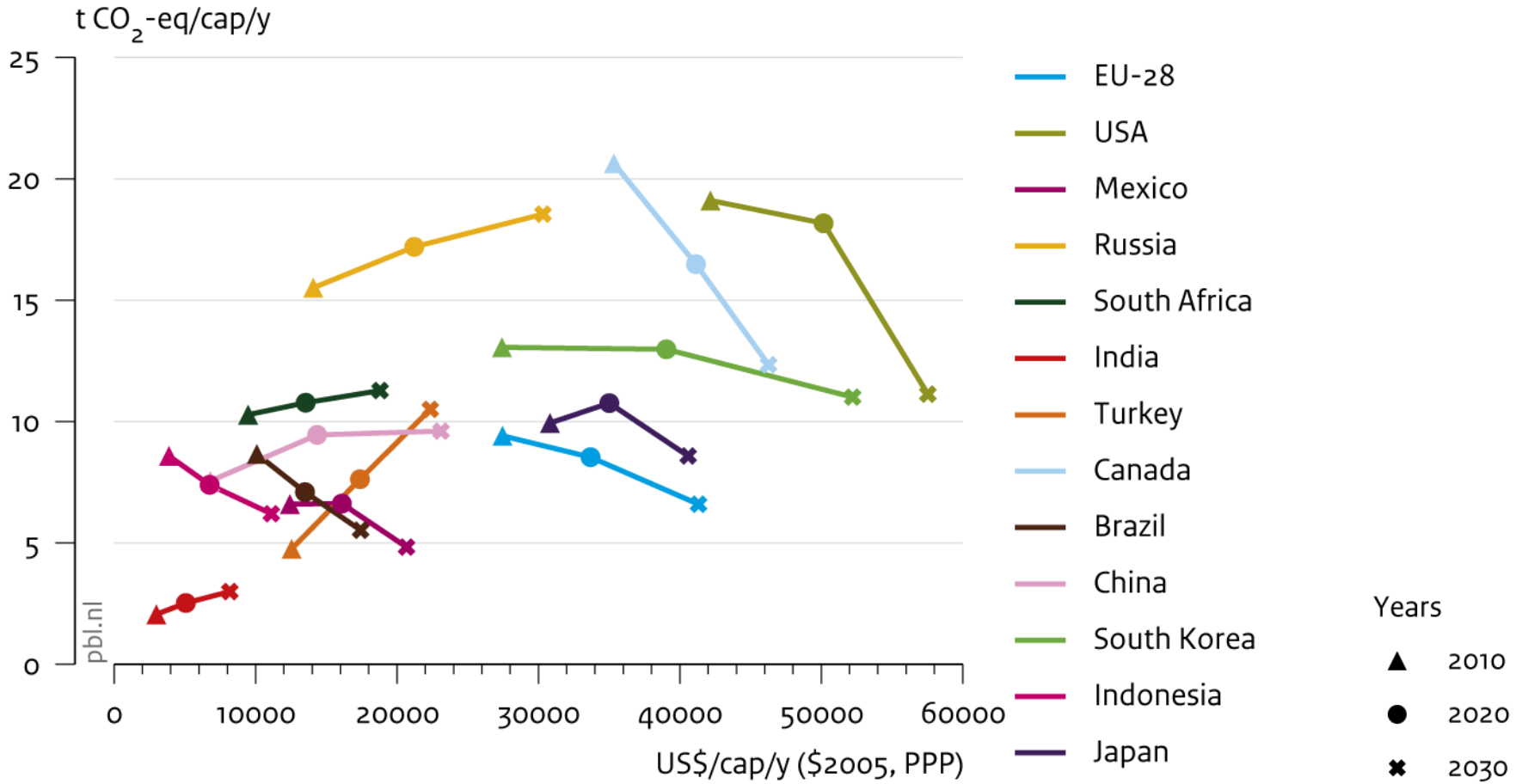
Impact of India's INDC and climate policies on its greenhouse gas emissions



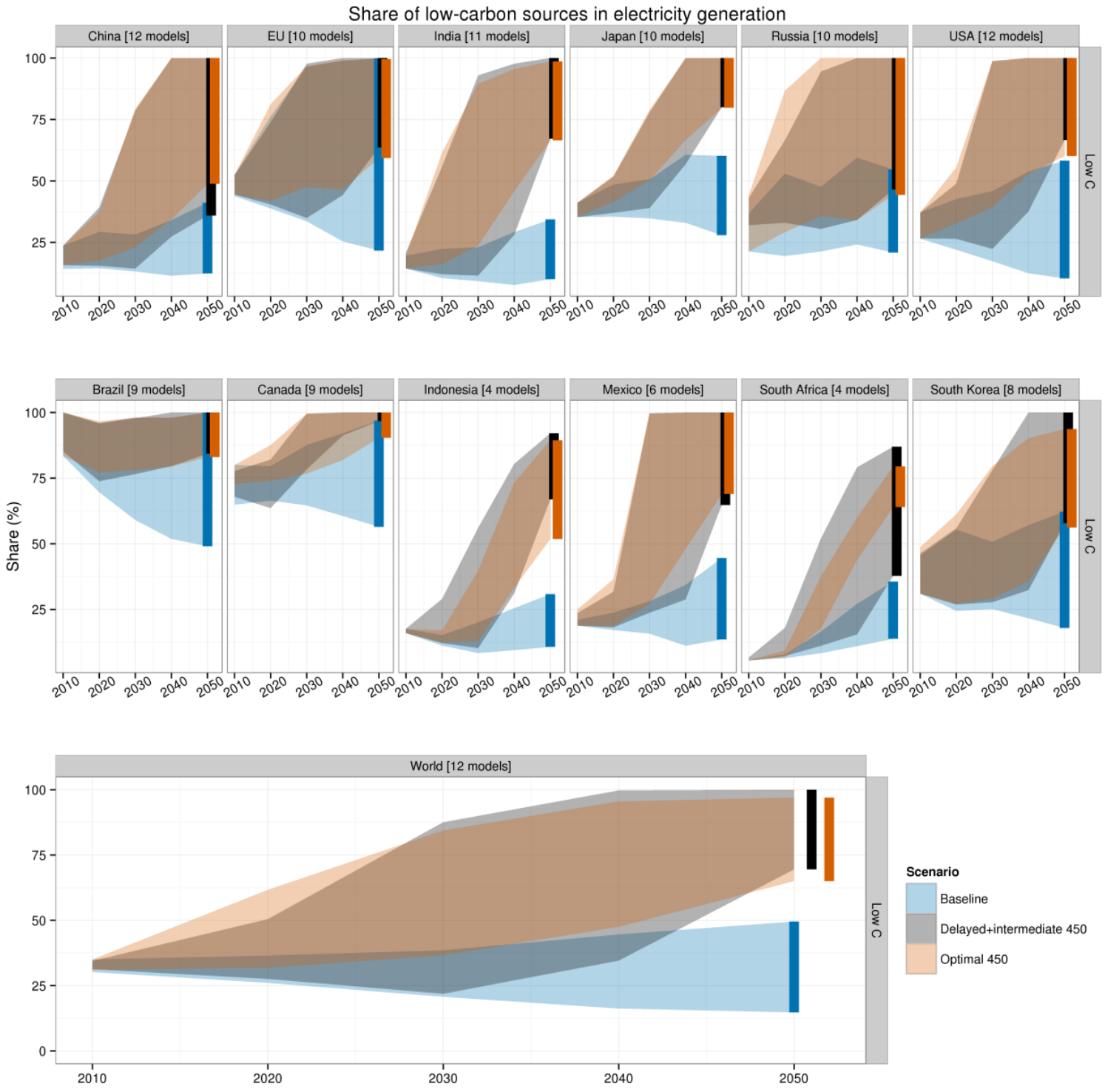
* From 2 (2010) to 2 tCO_2/capita by 2050

Per capita emissions vs. GDP per capita: INDCs

Greenhouse gas emissions per capita versus GDP per capita



Energy


Share of low-carbon sources in electricity generation
China [12 models]
EU [10 models]
India [11 models]
Japan [10 models]
Russia [10 models]
USA [12 models]
Brazil [9 models]
Canada [9 models]
Indonesia [4 models]
Mexico [6 models]
South Africa [4 models]
South Korea [8 models]
World [12 models]
Share (%)
Low C
Scenario
Baseline
Delayed+intermediate 450
Optimal 450