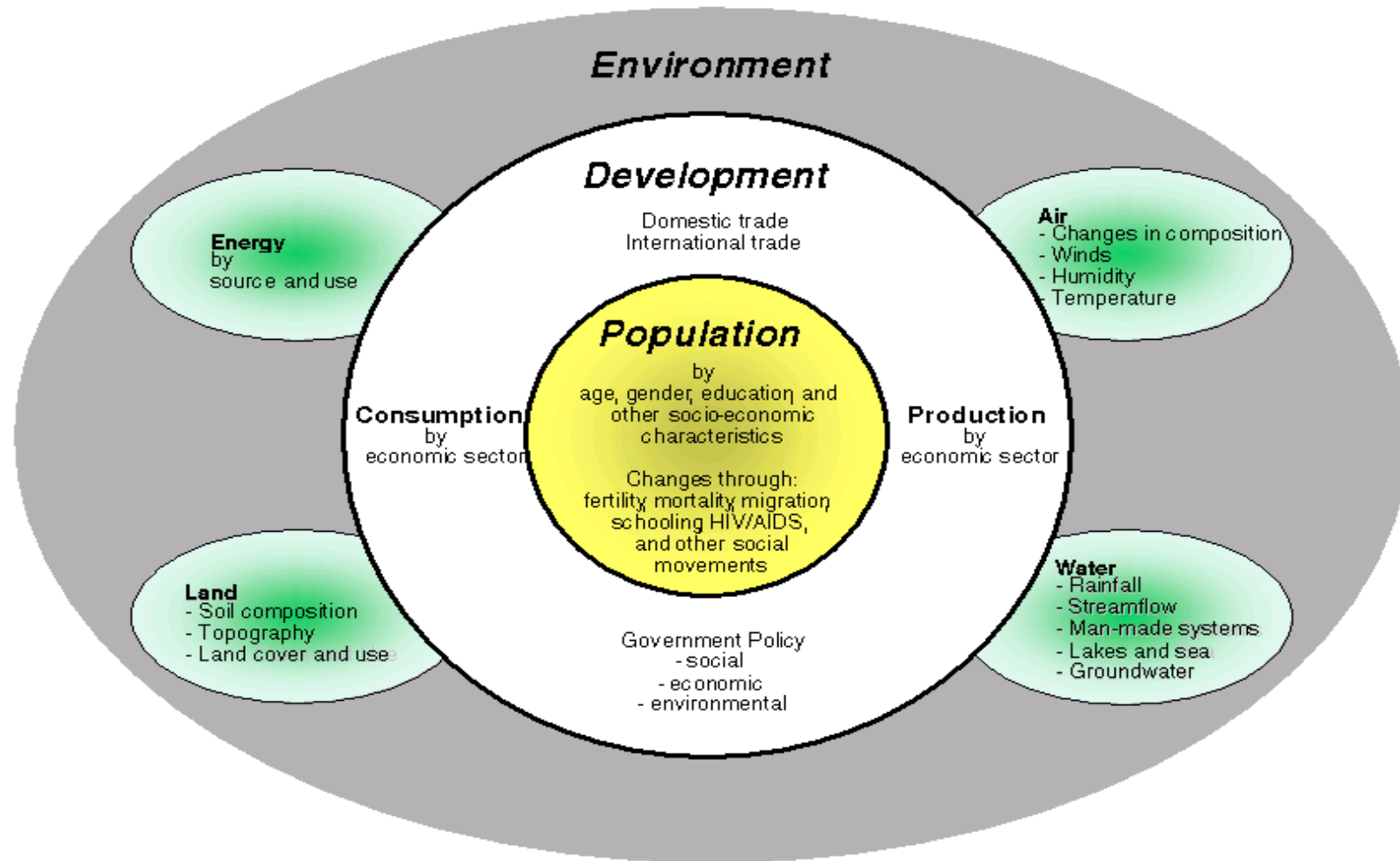


Population Dynamics and their Impacts on Sustainable Development

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National Center for Atmospheric Research

PDE: Human being at the heart for achieving Economic and Environmental Sustainable Development goals



How Population Dynamics Promote or Impede Sustainable Development?

-Demographic Factors Contribute to Environmental Burden

Impacts = **P**opulation x **A**ffluence x **T**echnology

- Demographic heterogeneity: population size, age, gender, household structure, rural/urban residence, education
- Population trends interact with economic development and technological changes

Integrated Assessment of Anthropogenic Environmental Change

- Demographic differences: size, age, urbanization, household structure
- Interactions with economic growth and technology

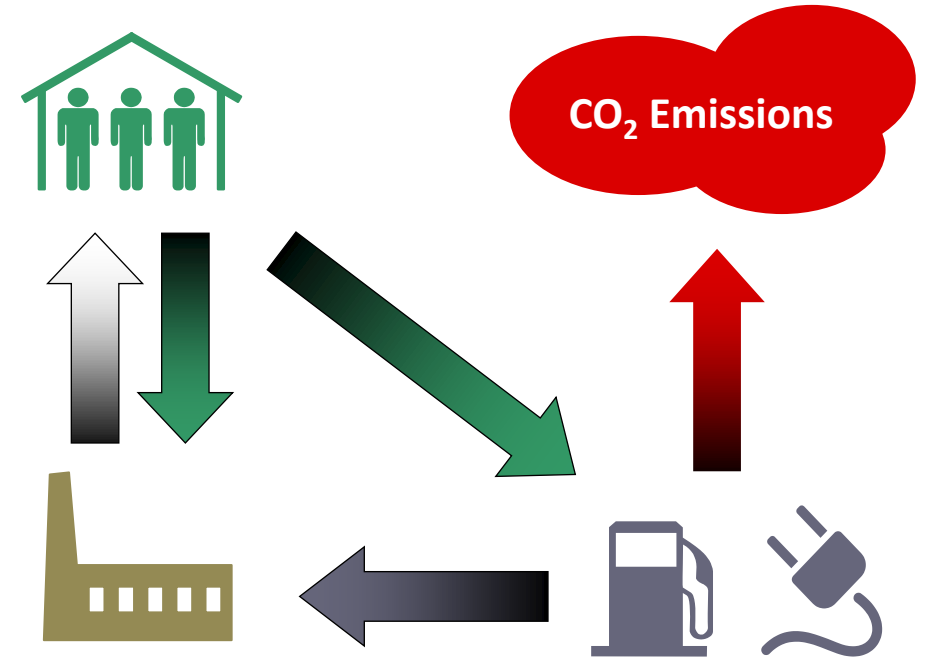
Population growth → Economic growth

Aging/Urbanization → Economic growth

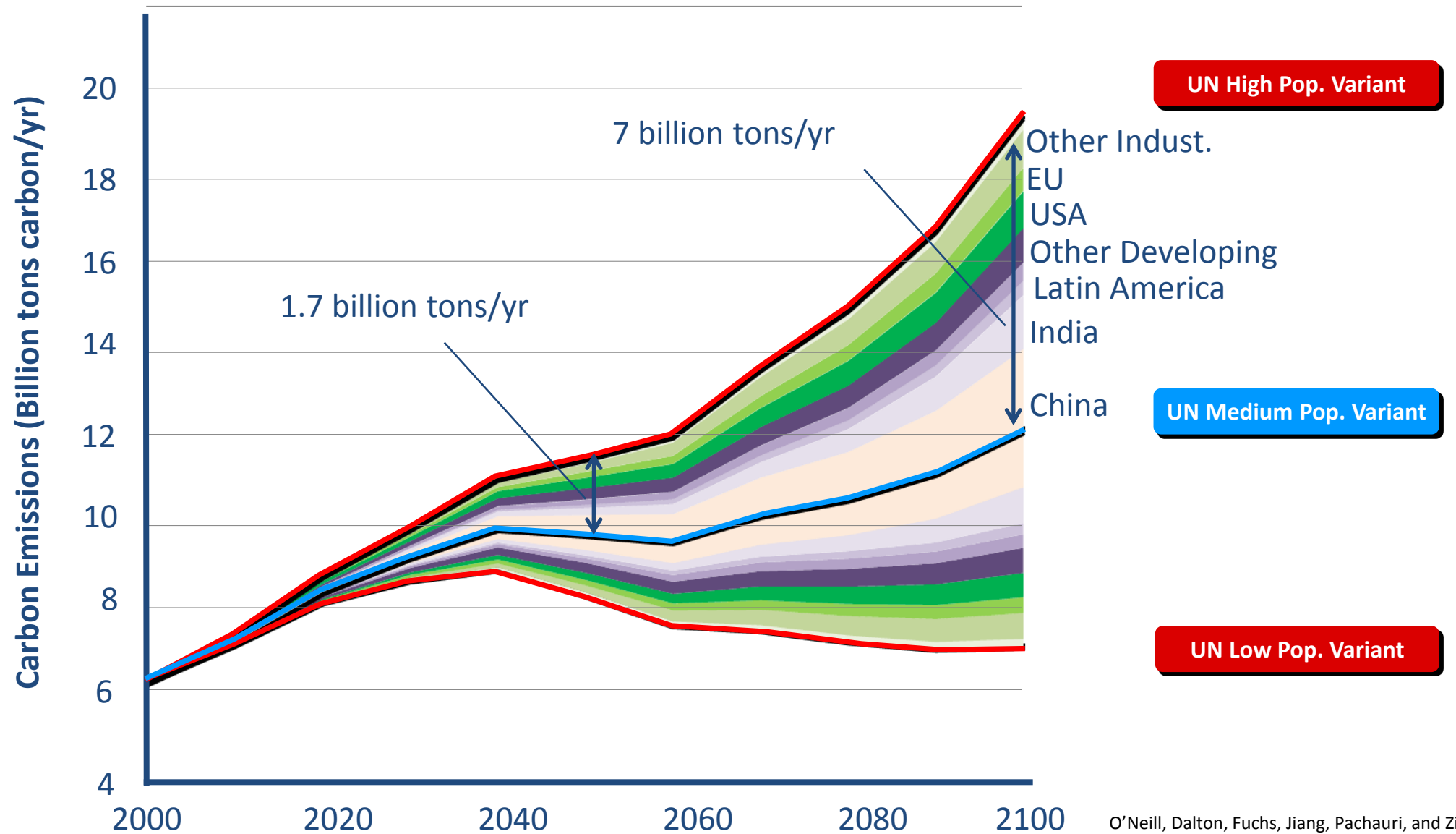
Aging/Urbanization → Consumption patterns

PET Model

Originally created by Lawrence H. Goulder and Michael Dalton, Stanford University

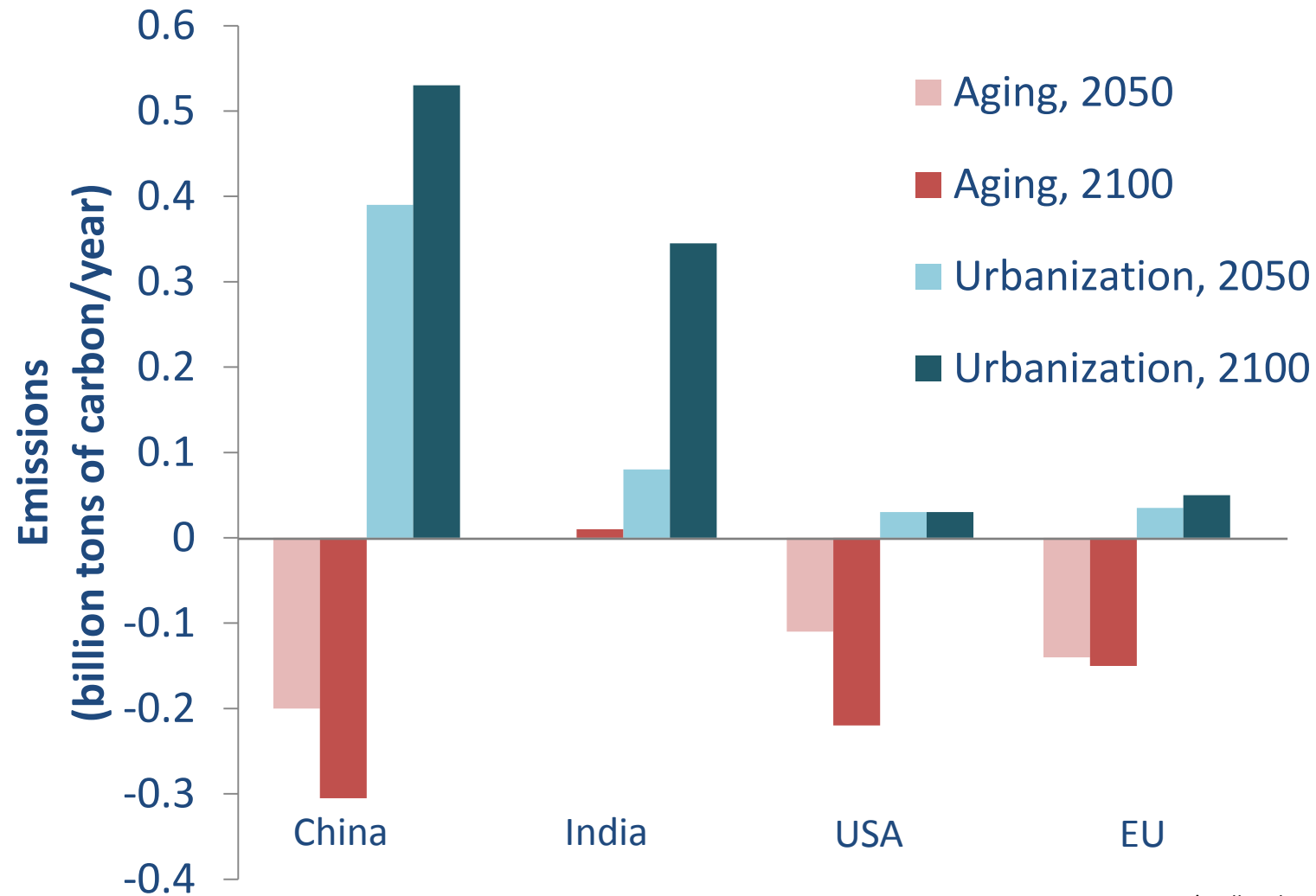


Carbon Emissions Results



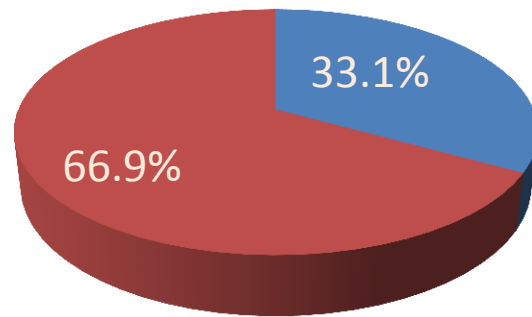
O'Neill, Dalton, Fuchs, Jiang, Pachauri, and Zigova.
2010: Global demographic trends and future carbon
emissions, *PNAS*, 107(41):17521-17526.

Carbon Emissions Results

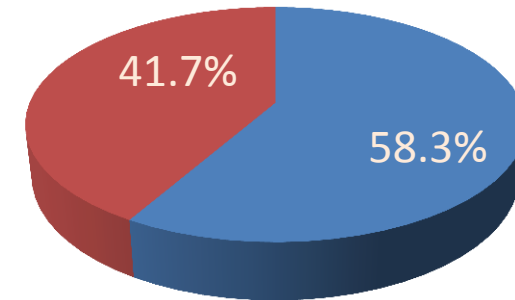


Demographic impacts on changes of carbon emissions in industrialized countries: 1970-1990

I-PAT
(population size)



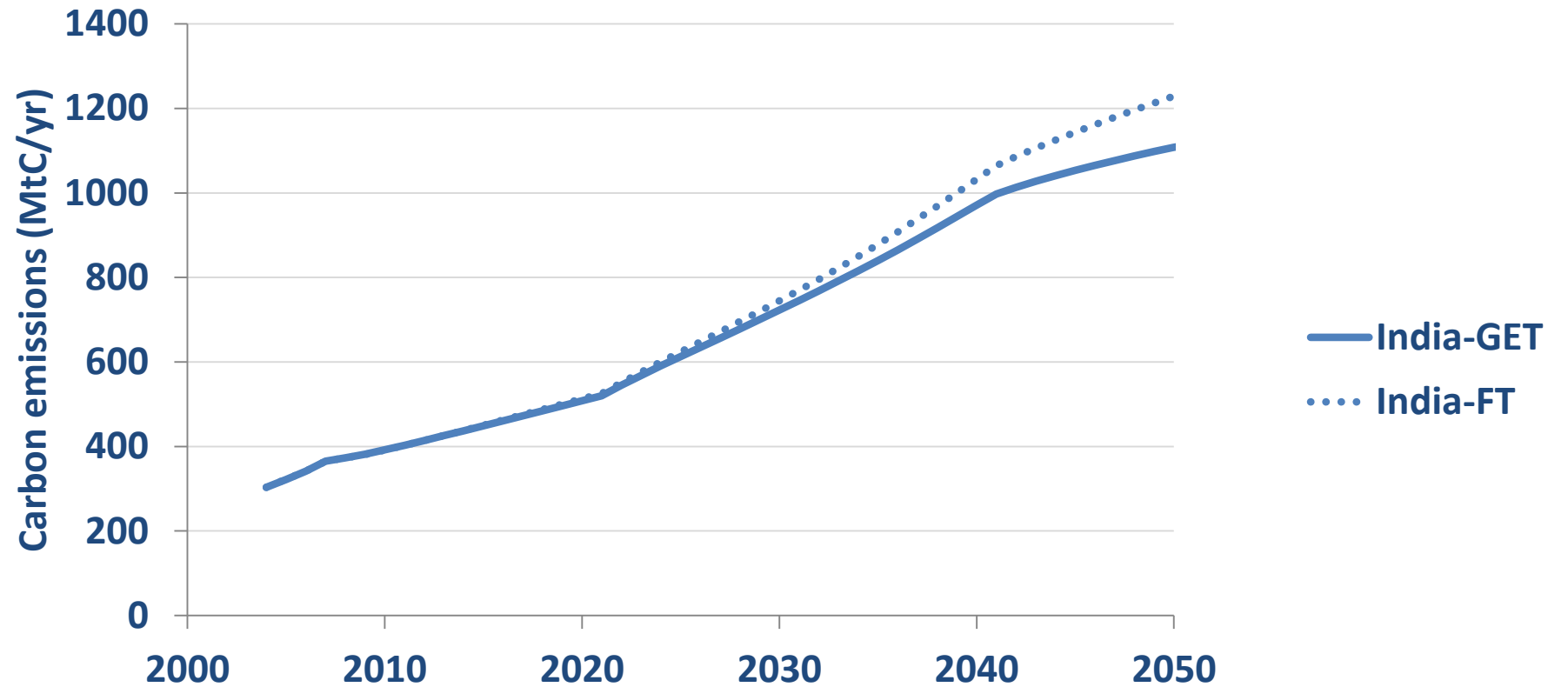
I-HAT
(# household)



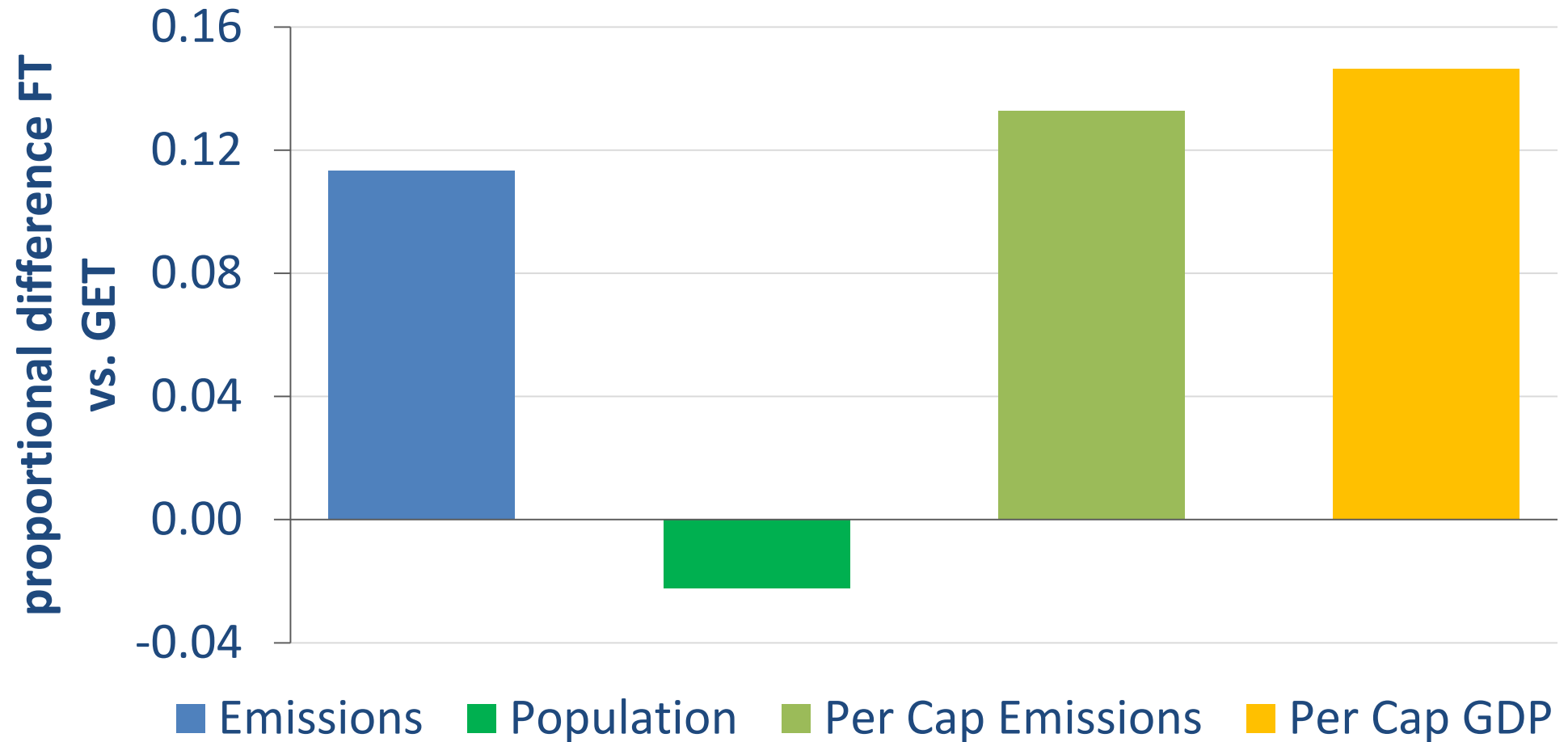
■ Demographic factor
■ Eco. & Tech. factors

Source: MacKeller, Lutz, Prinz, and Goujon 1995.
Population, households and CO2 emissions.
Population and Development Review, 21(4): 849-65.

Carbon Emission Results: India 2000-2050 by Education Scenario



Carbon Emission Results: India 2000-2050 by Education Scenario



Clear Evidence

- Population dynamics are at the center of concerns for sustainable development challenges and of their solutions
- Subpopulations contribute differently to environmental degradation and are at different levels of vulnerability
- Development challenges are most significant where population growth is the highest, human capital is the lowest, vulnerability is the greatest
- Policies treat subpopulations differently and appropriately
- Invest in education and reproductive health