Global mid-term emission scenario with special attention to Asian regions

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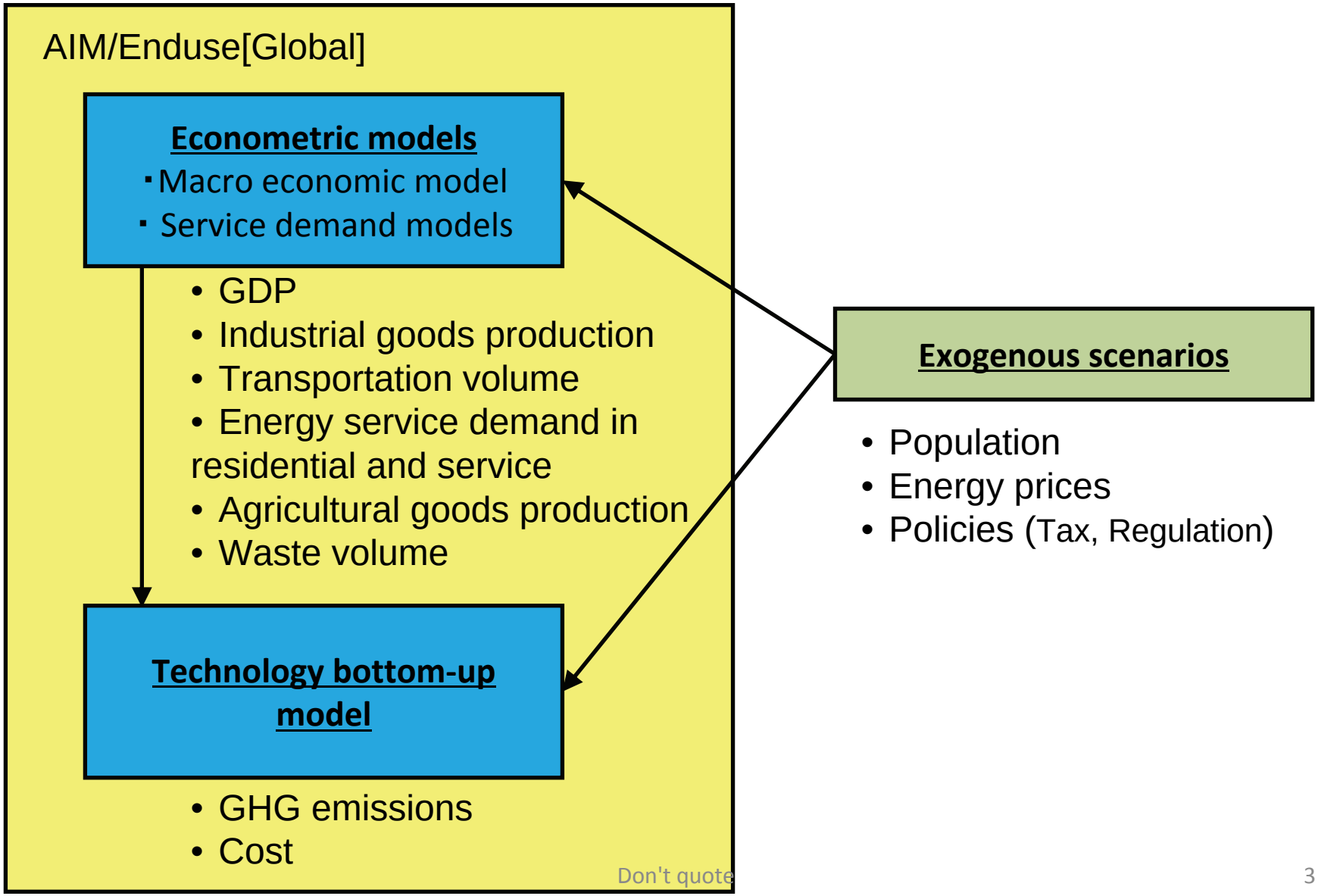
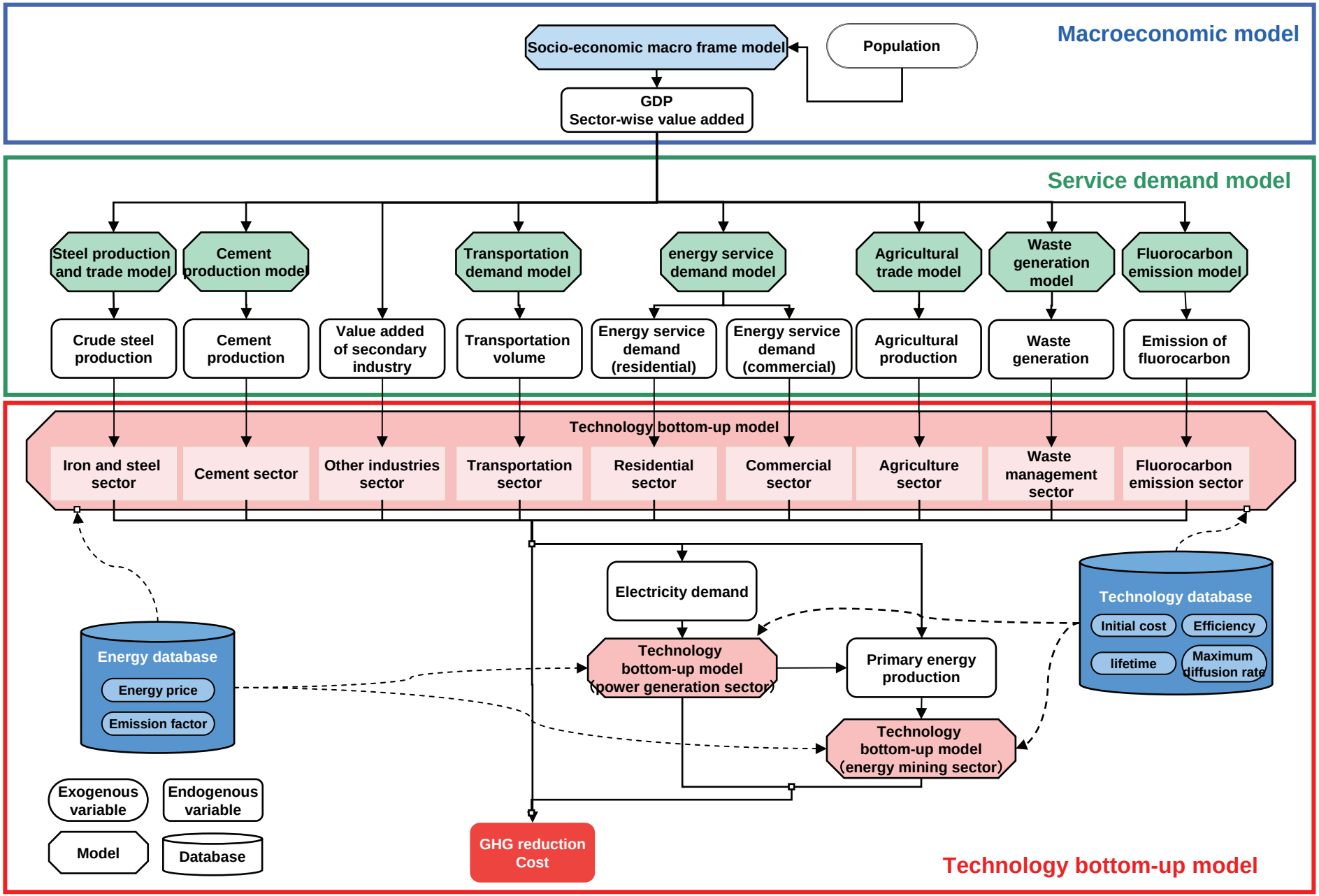
Objective

- <u>of this study</u>
  - ➢ To develop global mid-term scenario
  - ➢ With special attention to Asia region
  - ➢ Contribution to Asian Modeling Excercise
- <u>of this presentation</u>
  - ➢ To share a preliminary result of BaU scenario
  - ➢ Any comments are welcomed especially from the view point of your region's reality

Methodology



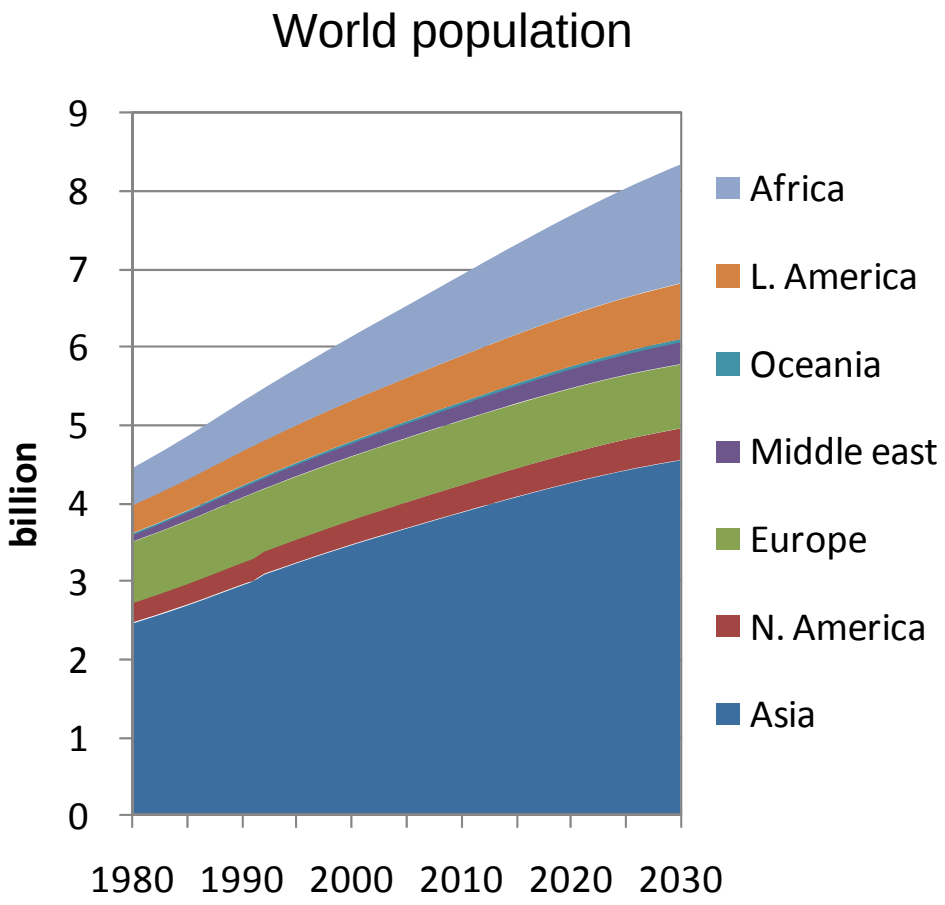
Structure of AIM/Enduse[Global]

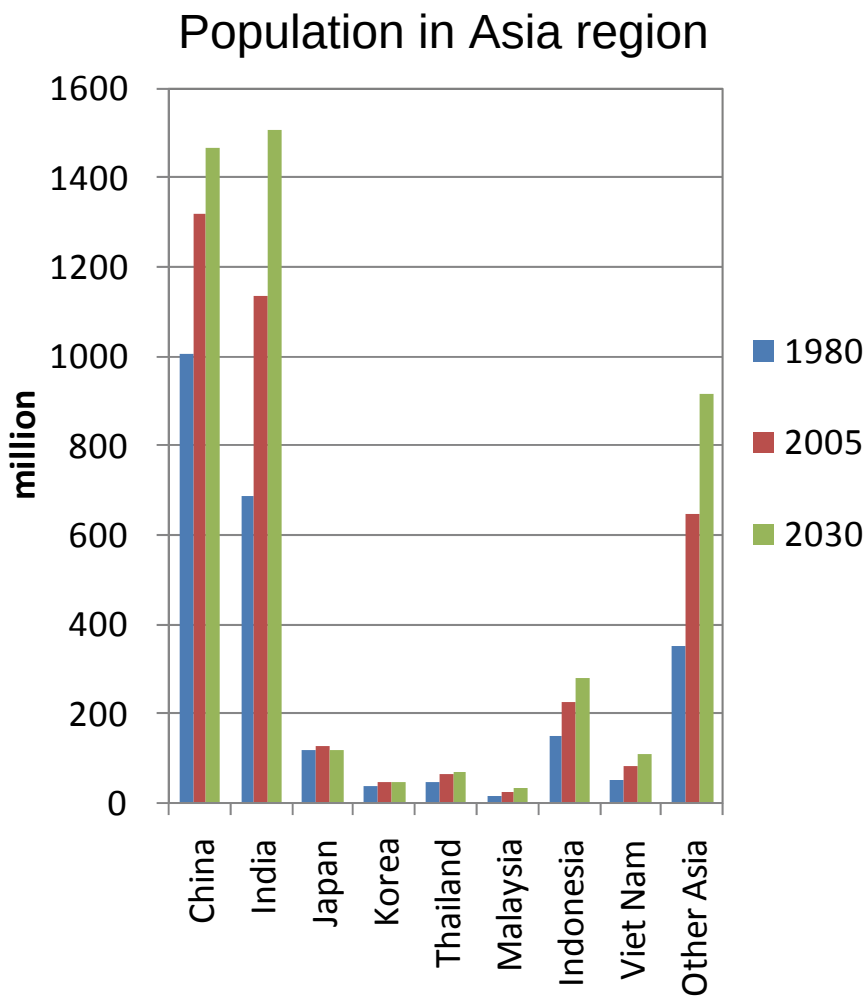


Scope of the models

- **Regions**
  World (32 regions)
- **Sectors**
  Energy demand: Industry, Residential, Service, Transport, Other
  Energy supply: Power generation, Heat generation, Coal transformation, Oil refinery, Gas transformation, Fuel mining
  Non-energy: Agriculture, Waste, F-gas
- **Gas**
  CO_2, CH_4, N_2O, HFC, PFC, SF_6
- **Time period**
  2005 - 2030 → 2005 – 2050 (in near future)
- **Technologies**
  About 200 technologies in each region

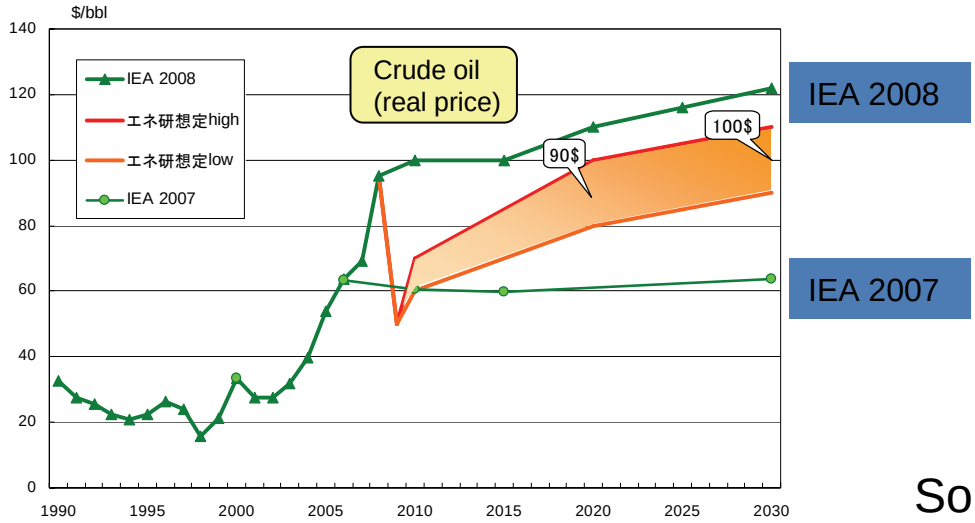
Population scenario





Exogenous scenario: Energy price

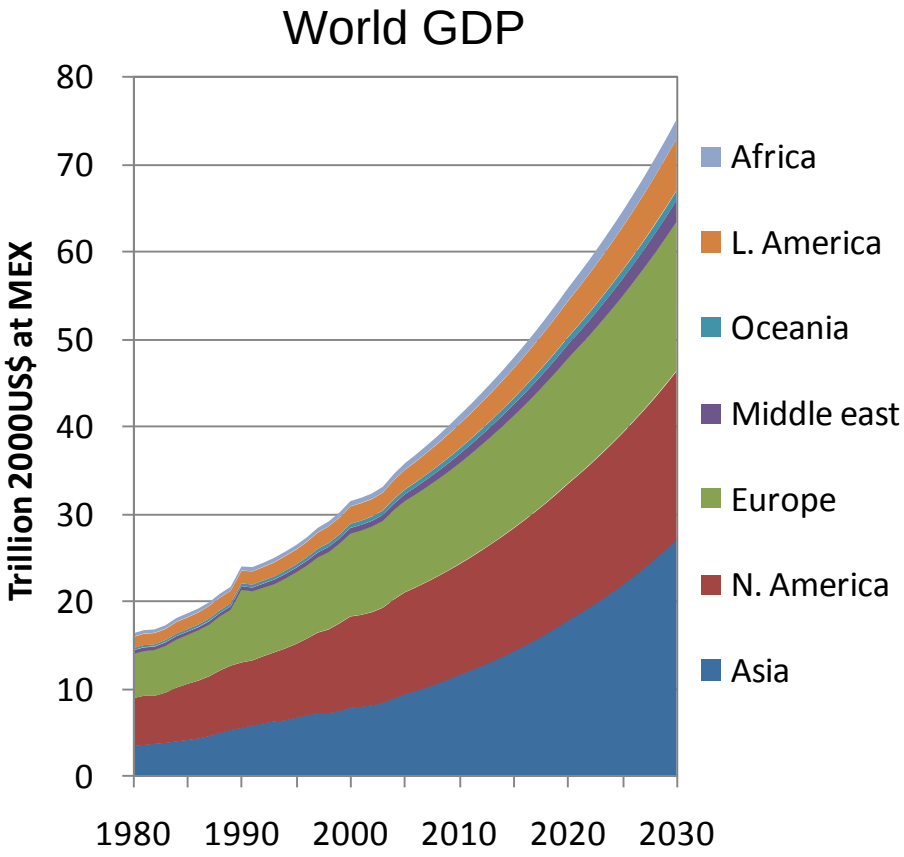
- Future international energy prices : assumptions made by IEEJ (the Institute of Energy Economics, Japan), that lie between the estimates in IEA World Energy Outlook 2007 and IEA World Energy Outlook 2008.

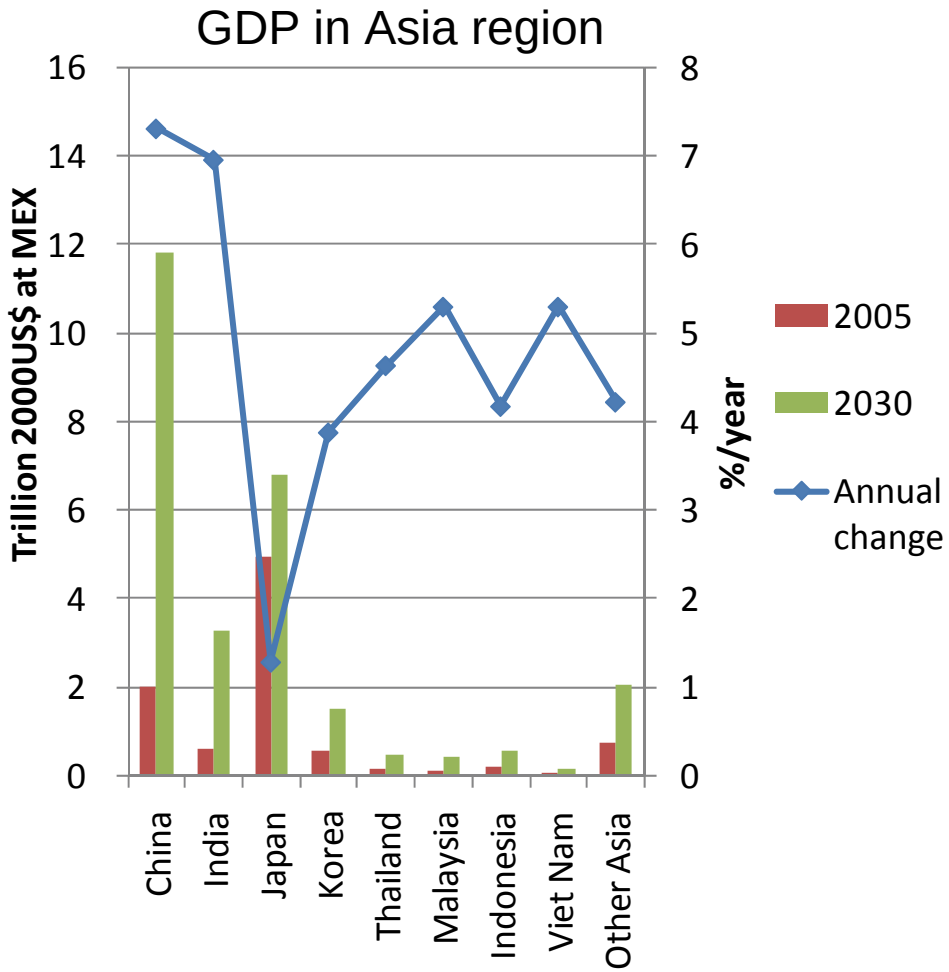


Source) IEEJ

Unit (real price)			2007	2020	2030
Crude oil		$/barrel	69.3	90	100
Gas	US	$/MBtu	6.8	11.2	13.5
	EU	$/MBtu	7.0	12.5	15.4
	Japan	$/MBtu	7.8	16.3	21.1
Coal		$/tonne	72.8	102.2	107.8

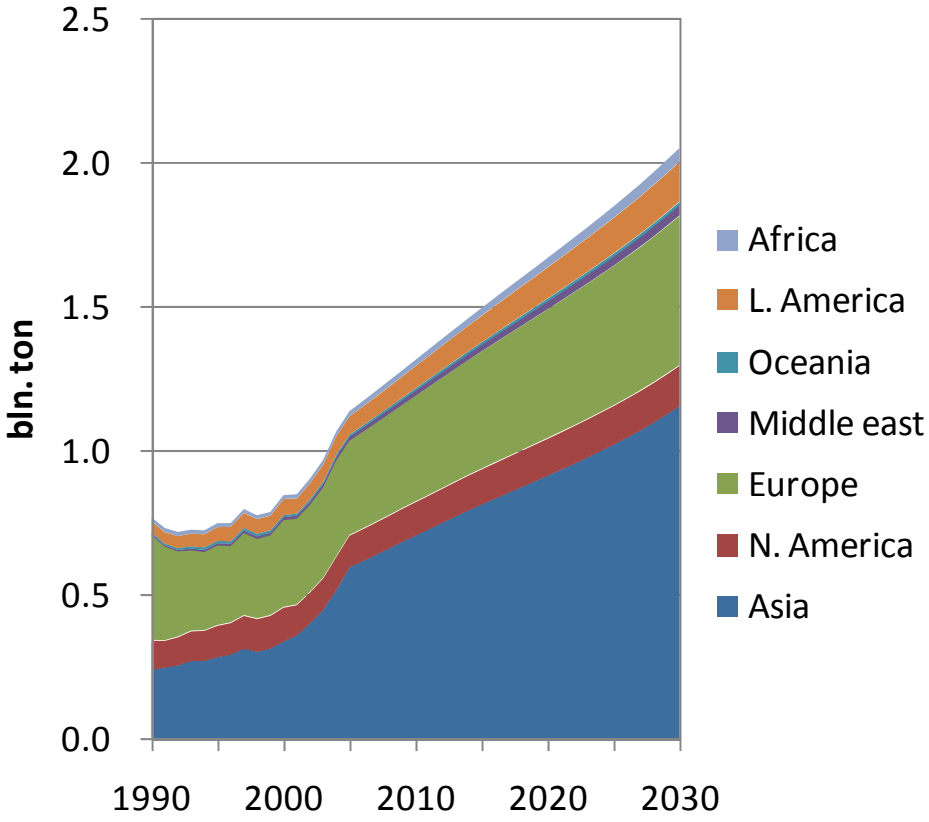
Economic growth



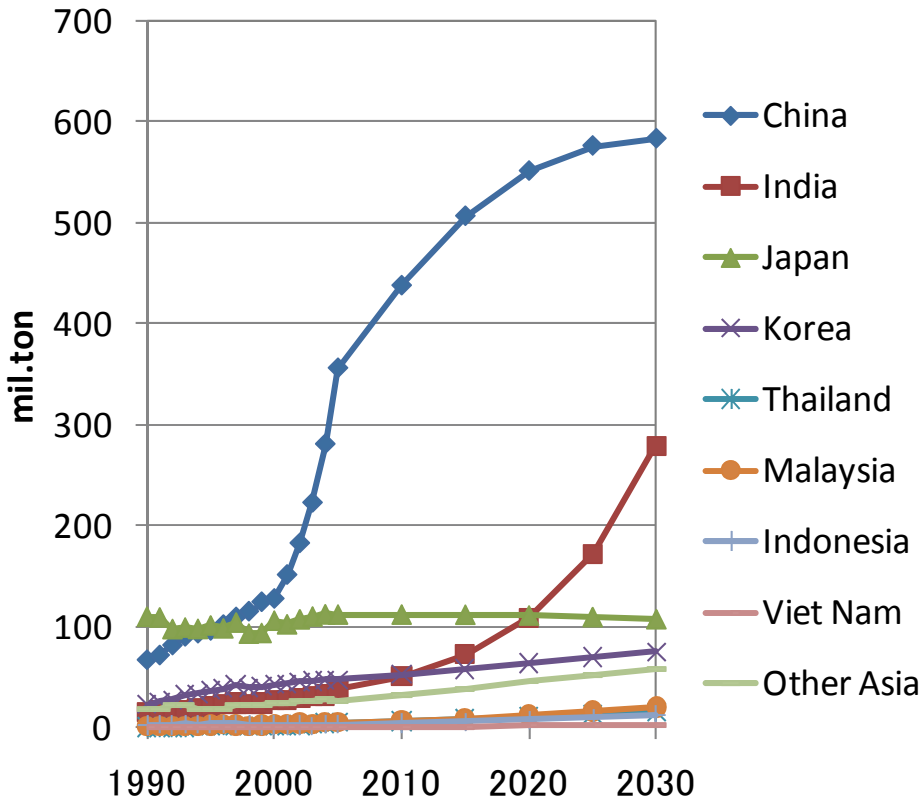


Industrial production: Steel

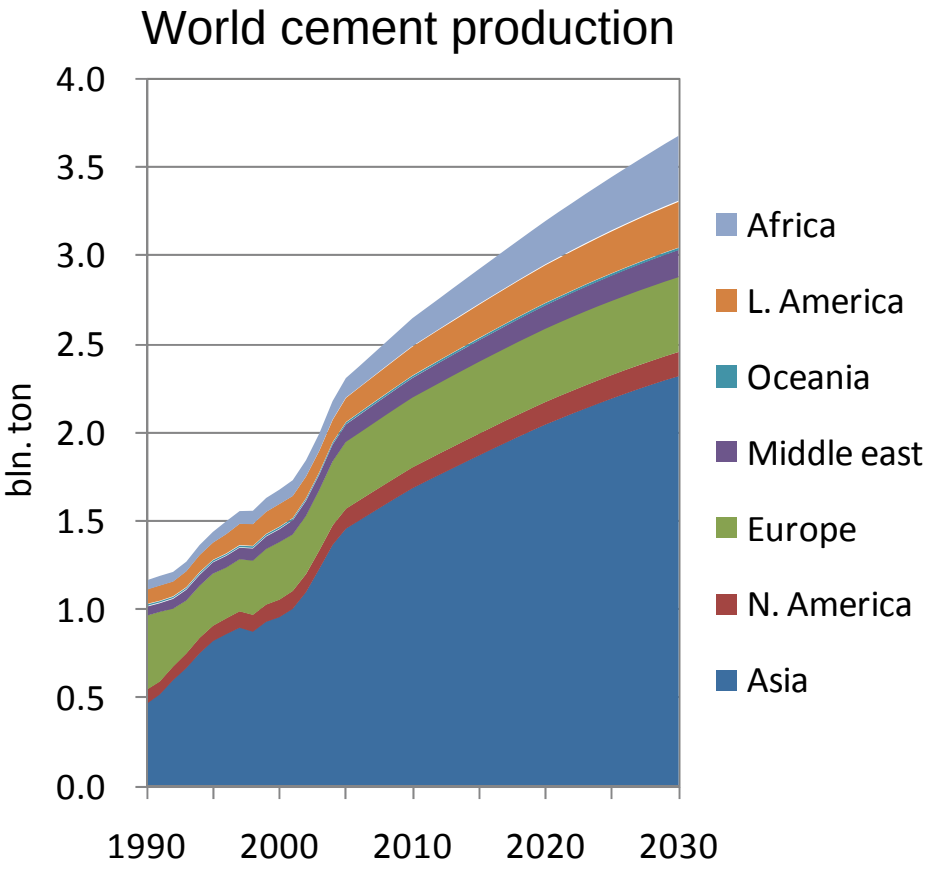
World crude steel production

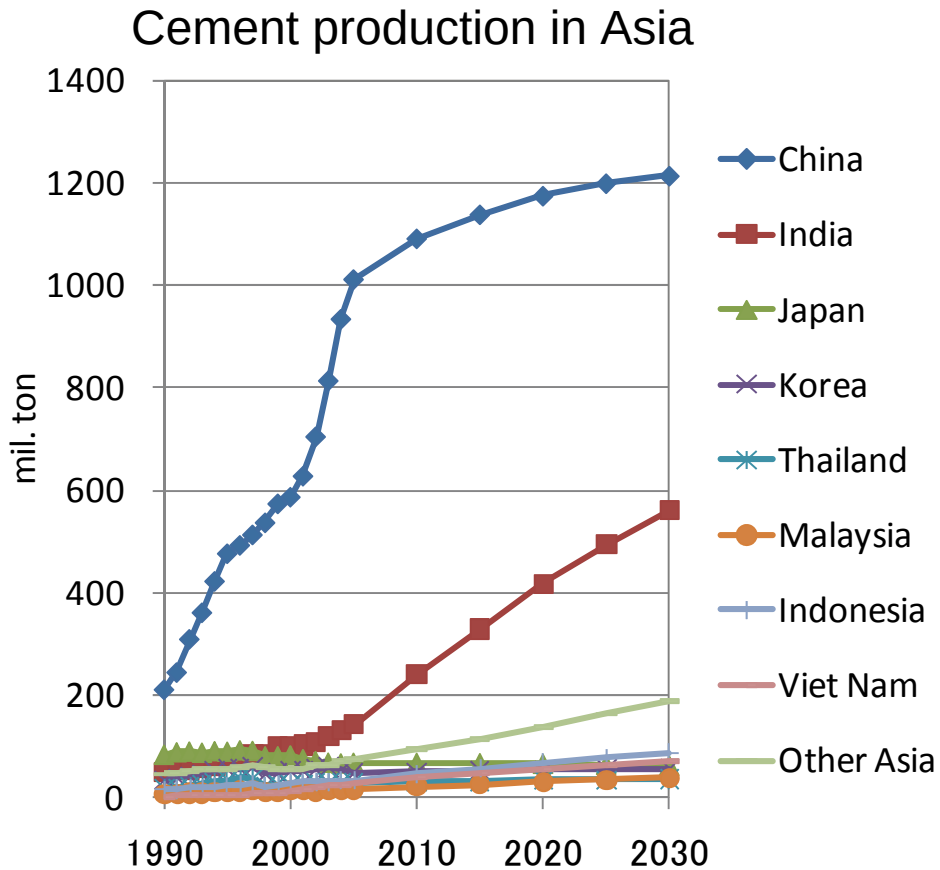


Crude steel production in Asia

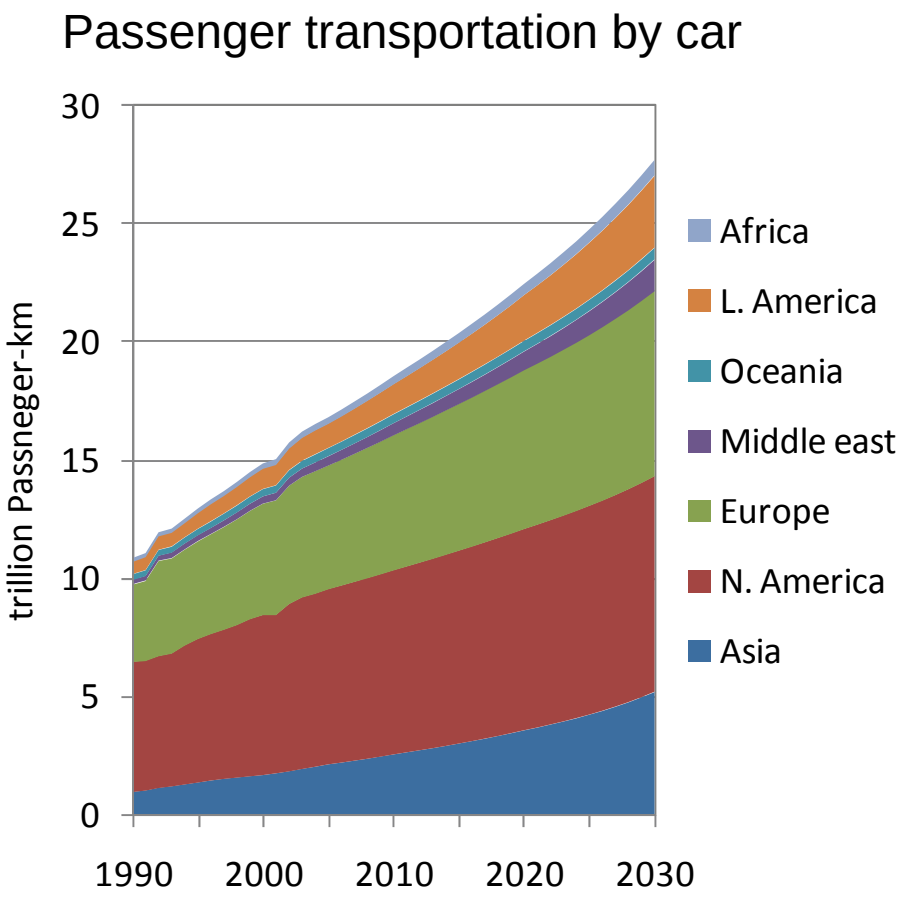


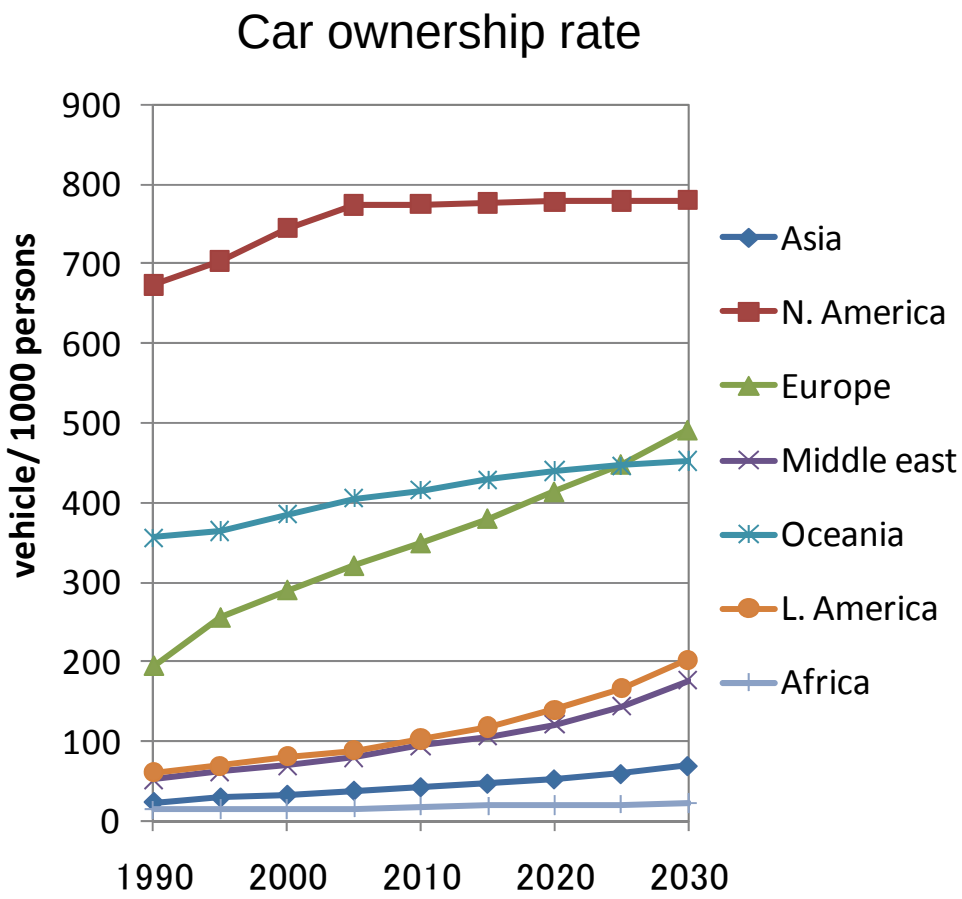
Industrial production: Cement



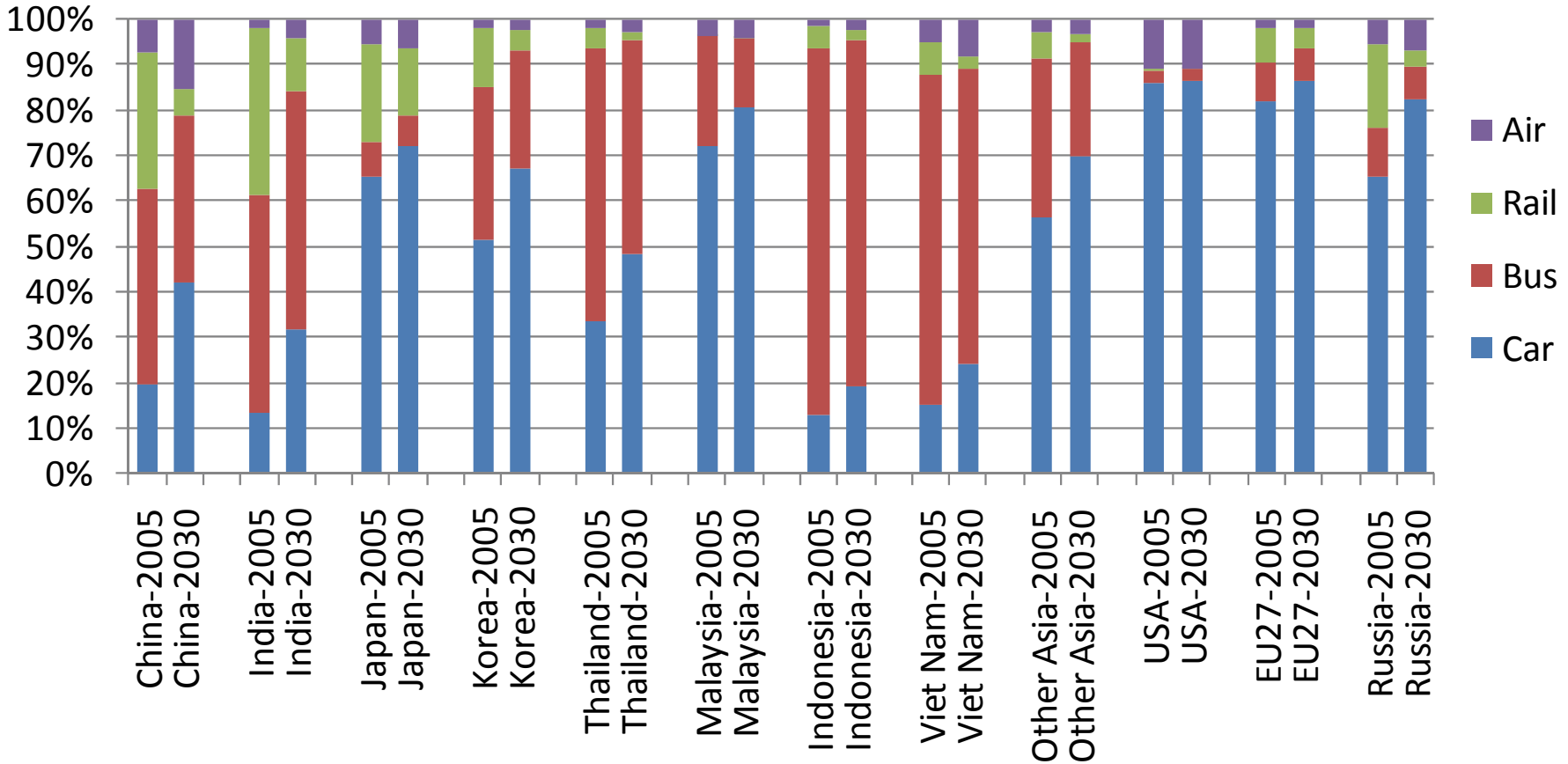


Passenger transportation: Car

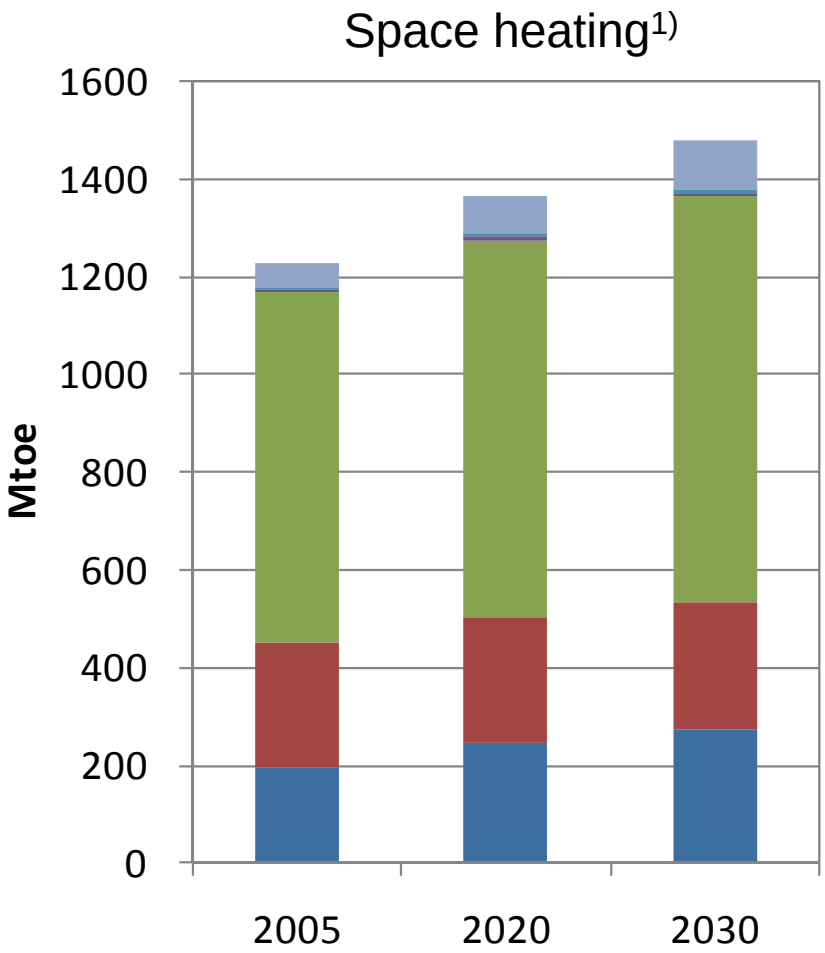


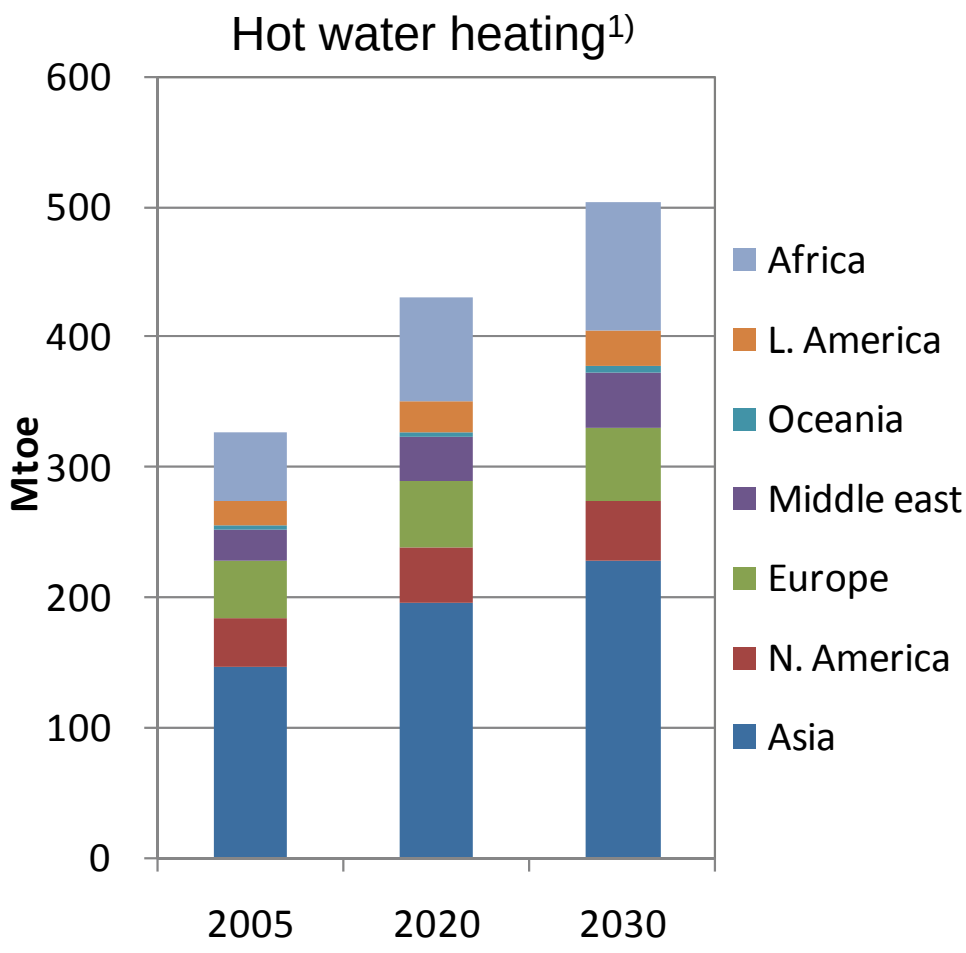


Passenger transportation: Modal share



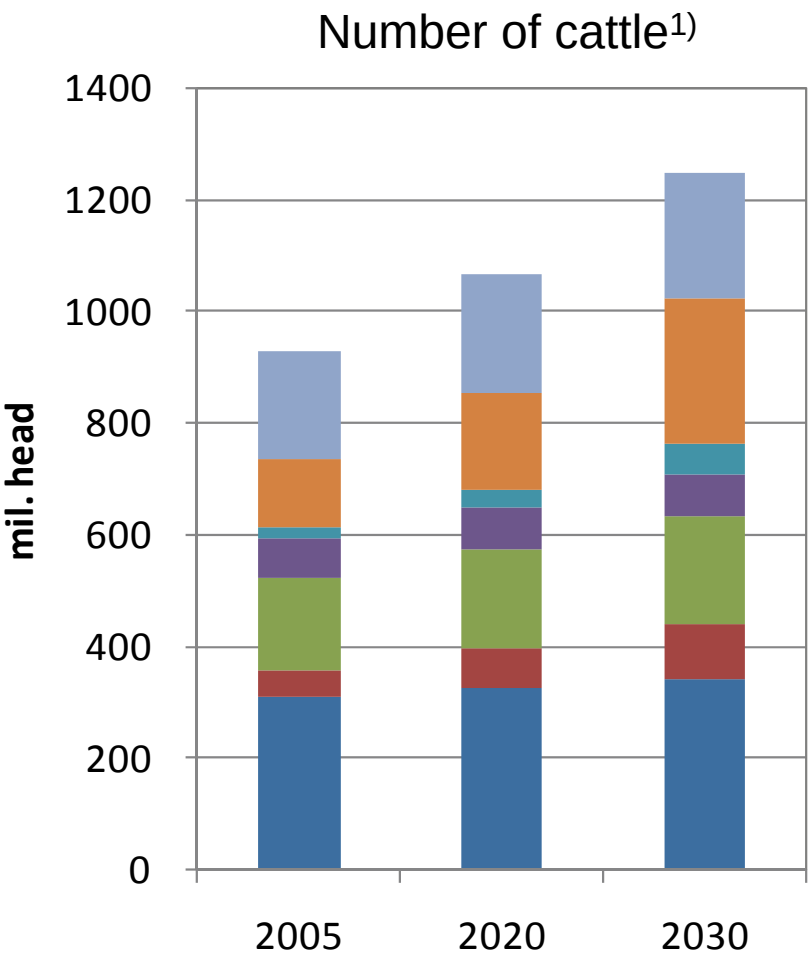
Residential service

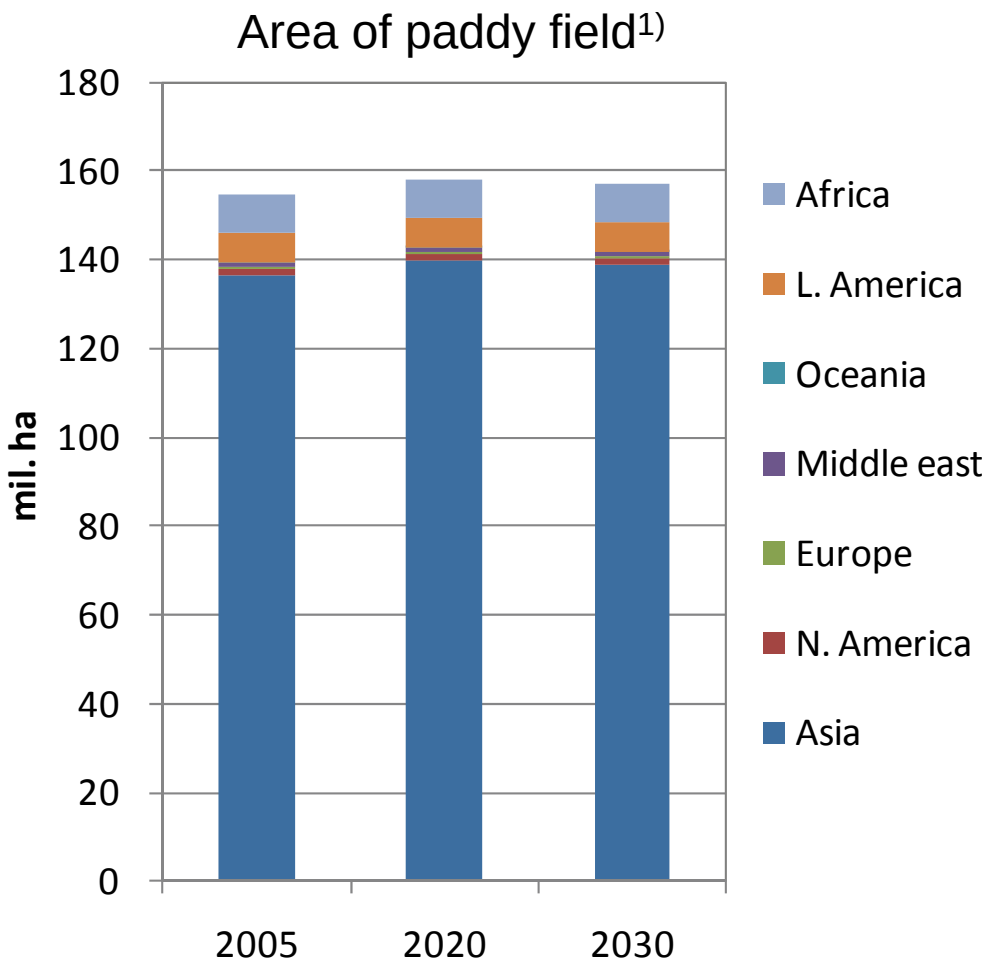




1) Estimated by Dr. Kanamori (2009)

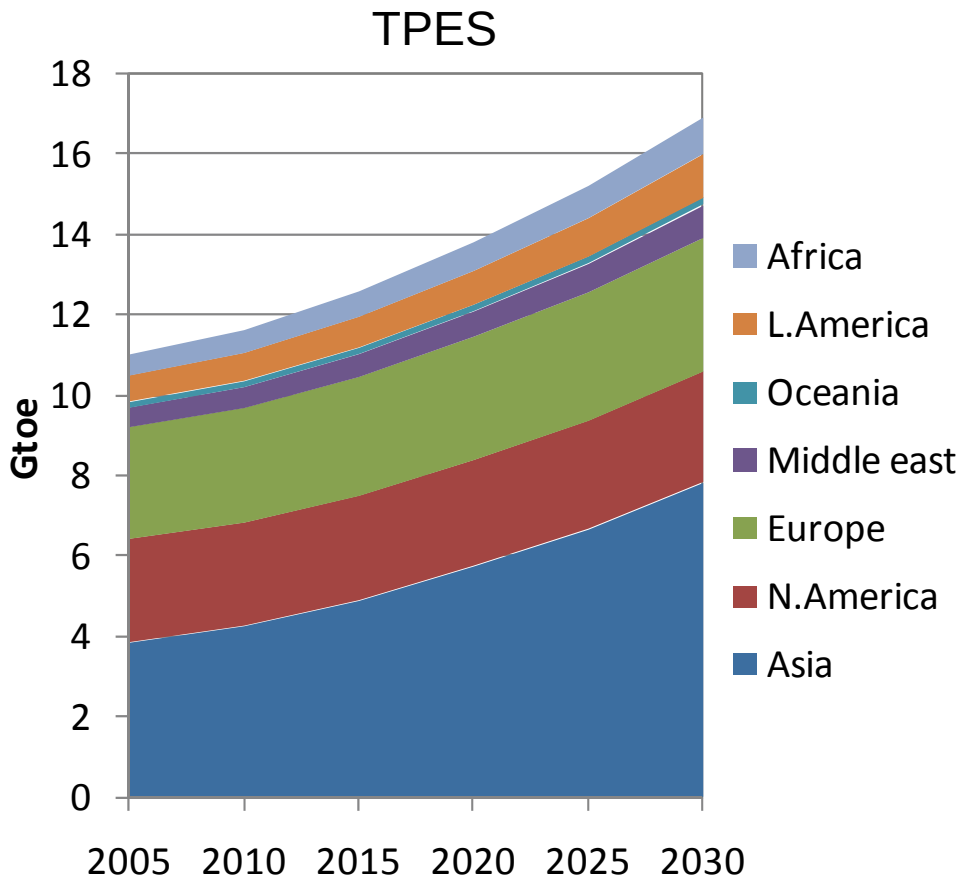
Agriculture

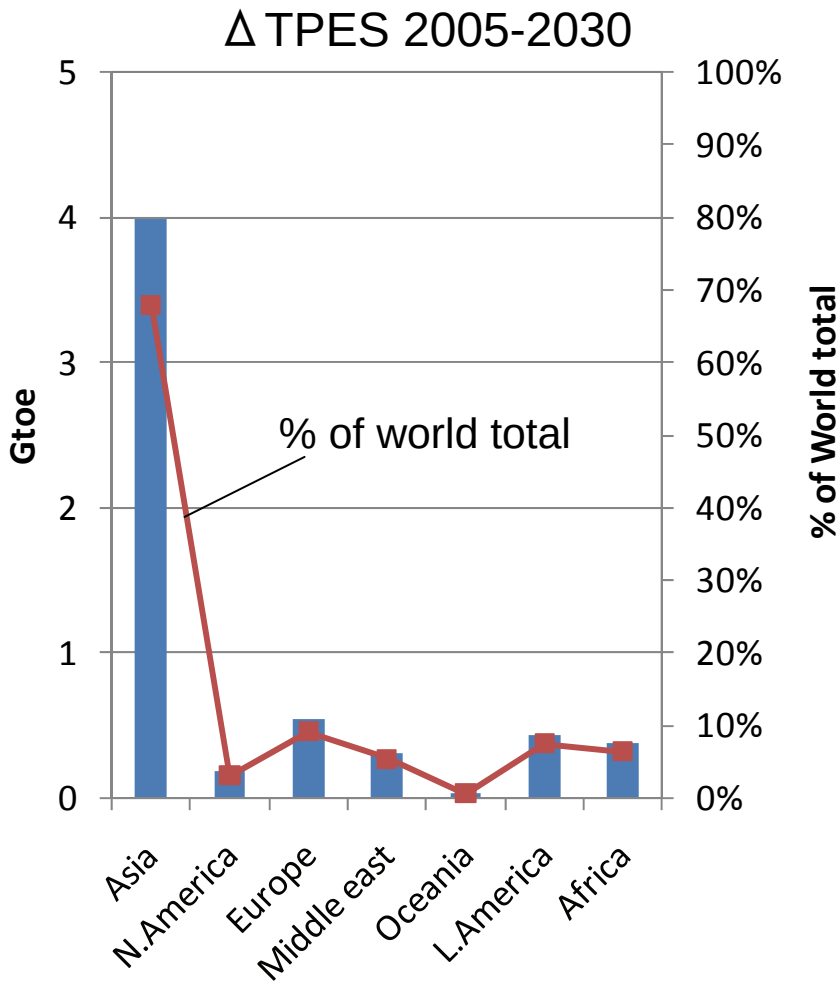




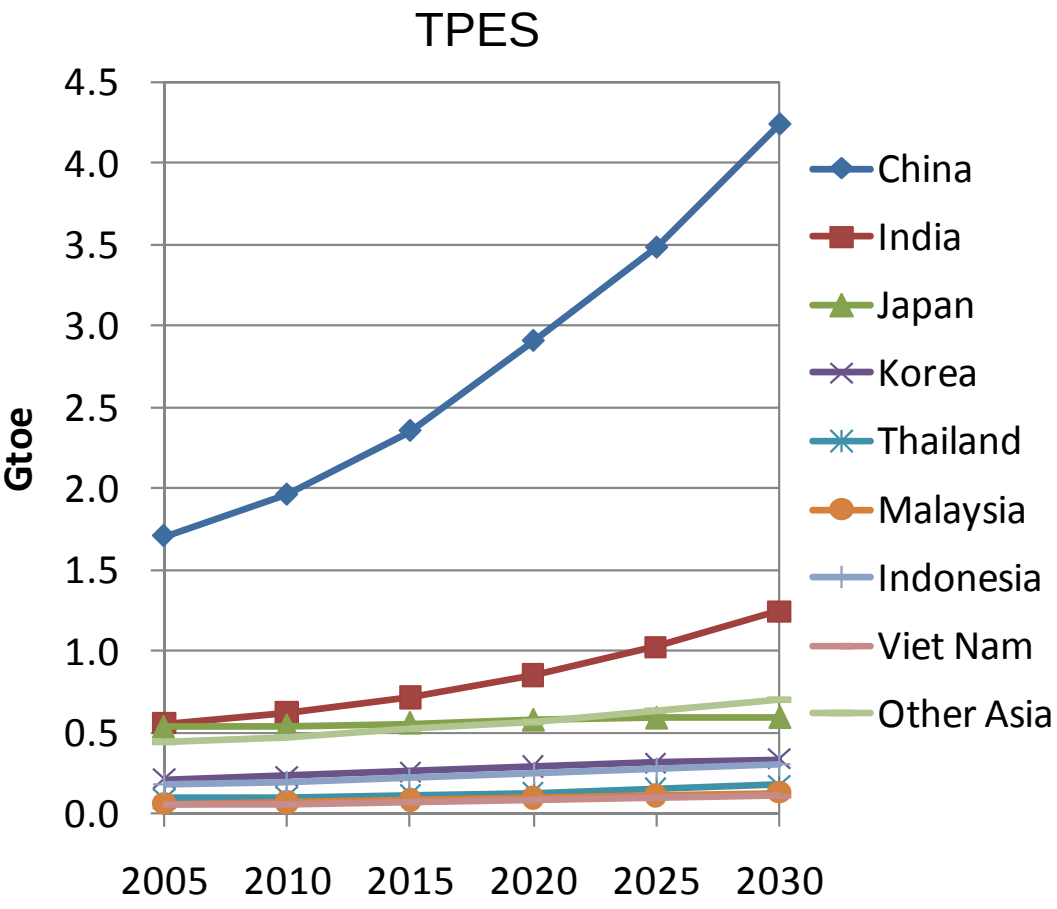
1) Estimated by Ms. Kanamori (2009)

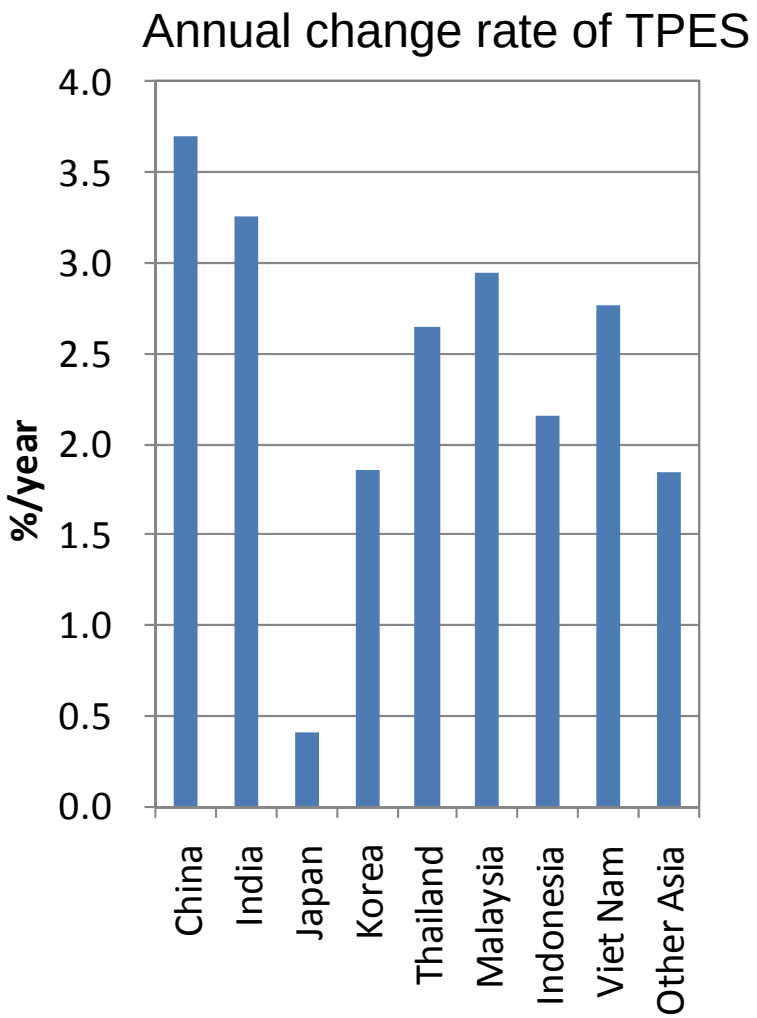
Total primary energy supply



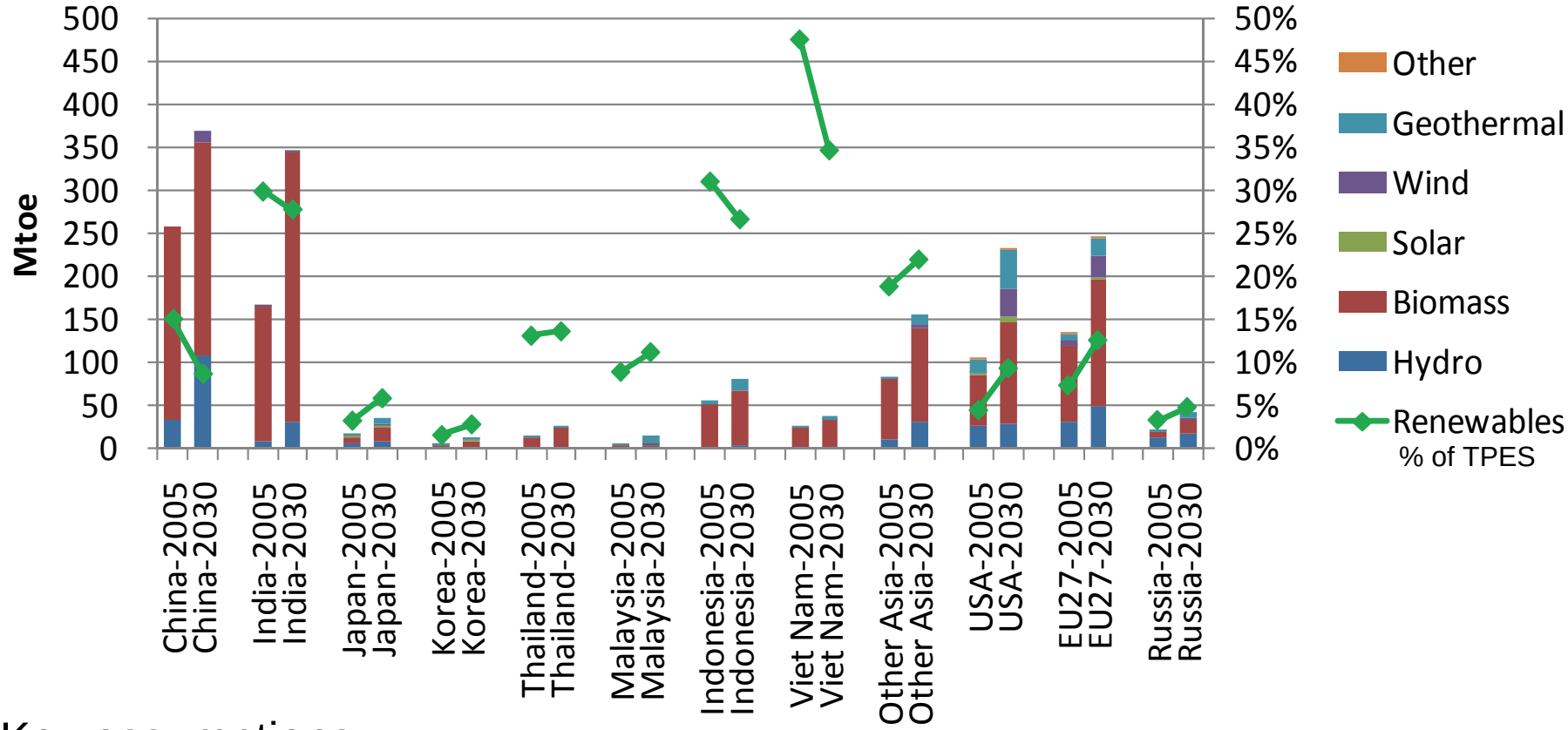


Total primary energy supply in Asia





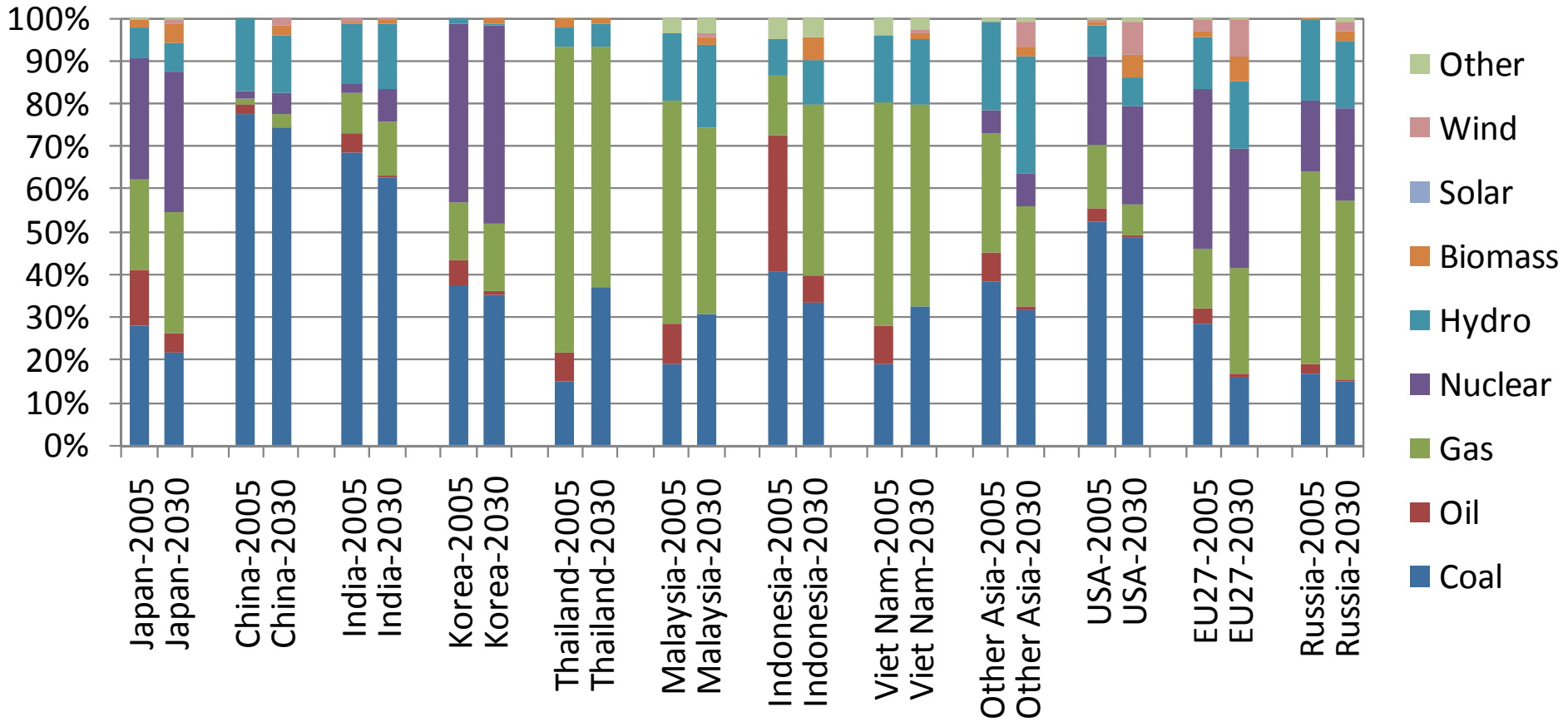
Renewable energy



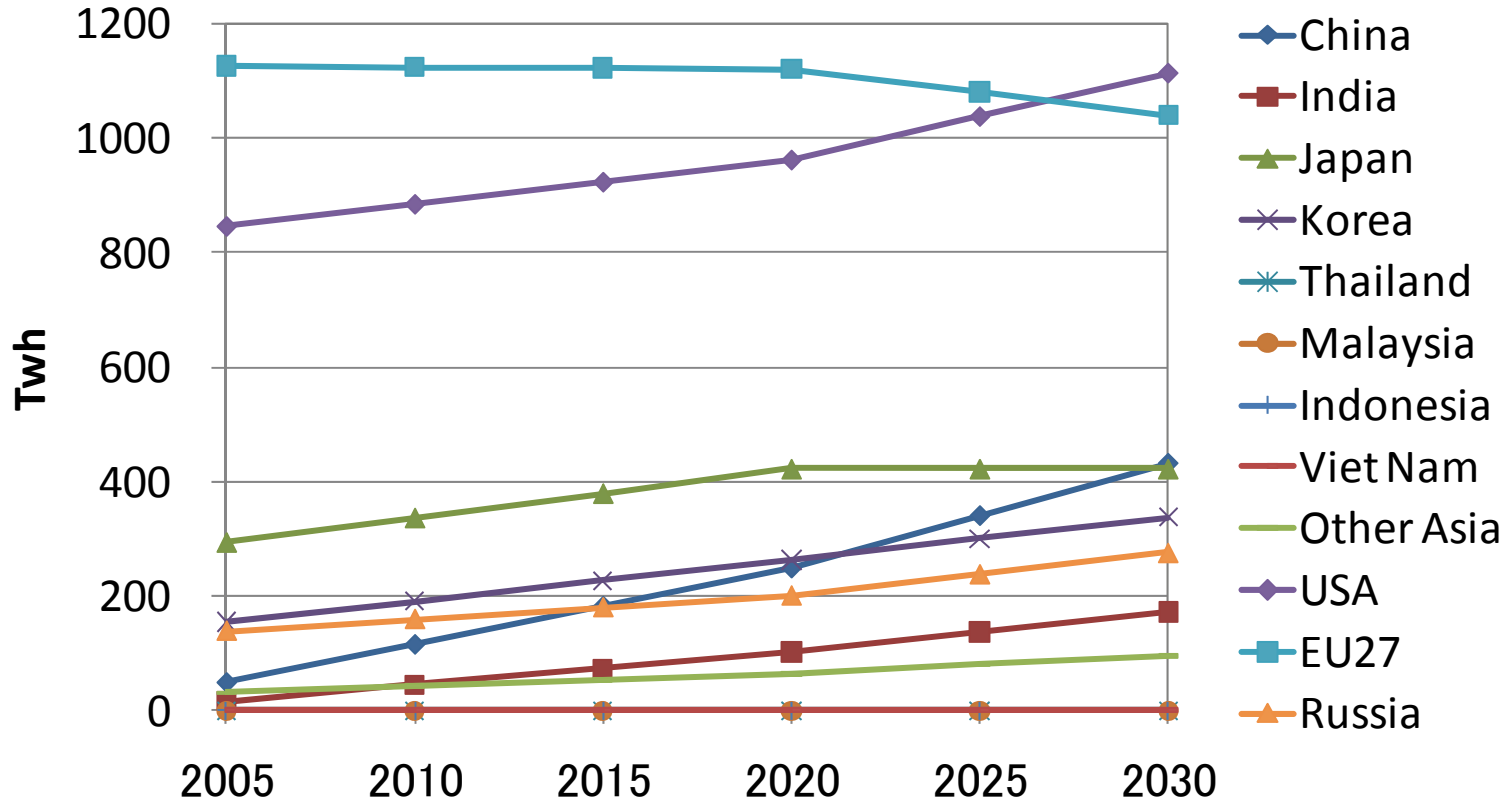
Key assumptions

- Solar&Wind potential: Renewable energy model (Ikegami, 2009)
- Biomass potential: (Fujino, 2003)
- Biofuel potential: WEO2007(IEA, 2007)
- Solar&Wind&Biomass potential in Power gen.: 20%(w/o battery), 30%(w battery)
- Actual volume is determined by model under cost minimization scheme

Power generation by source



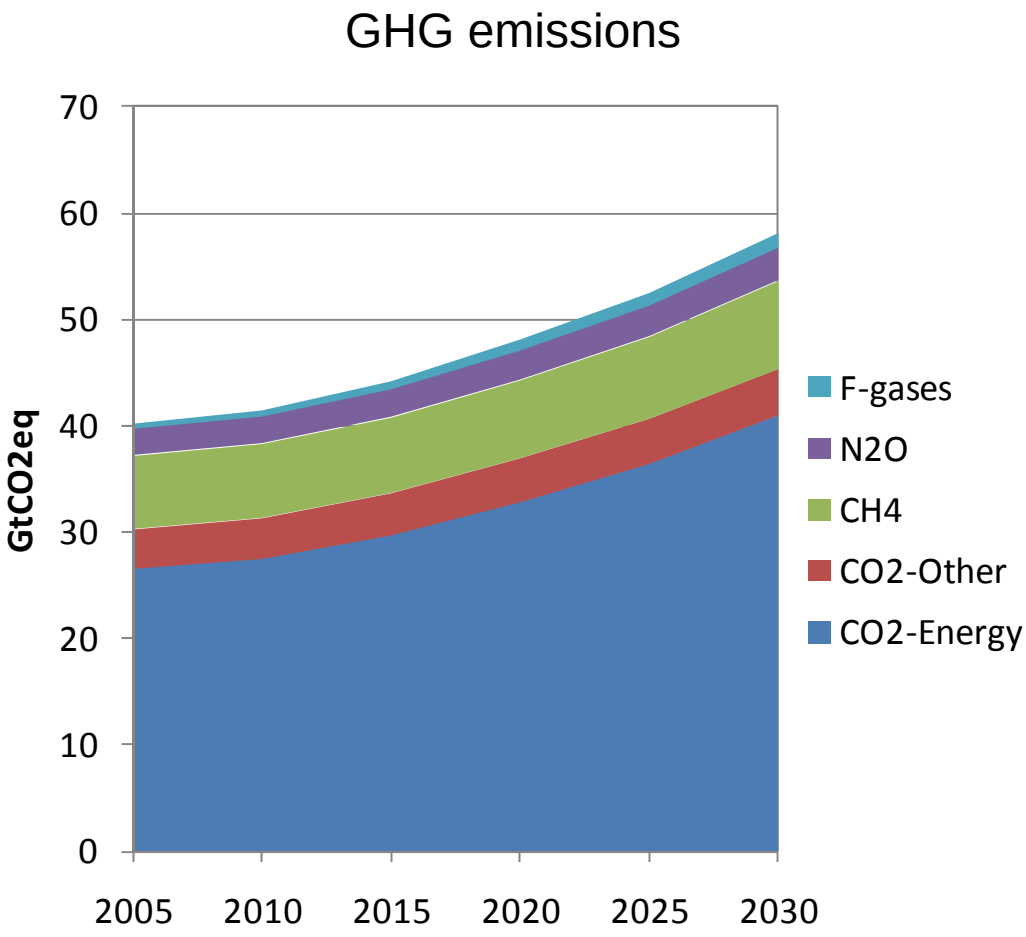
Nuclear power generation

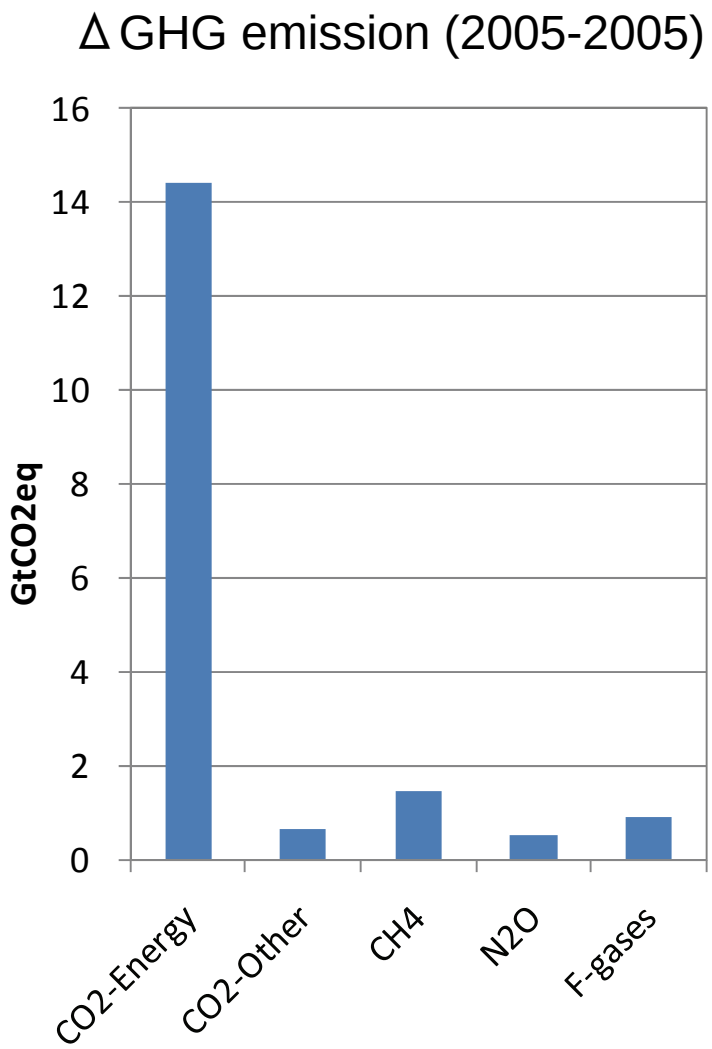


Assumed based on

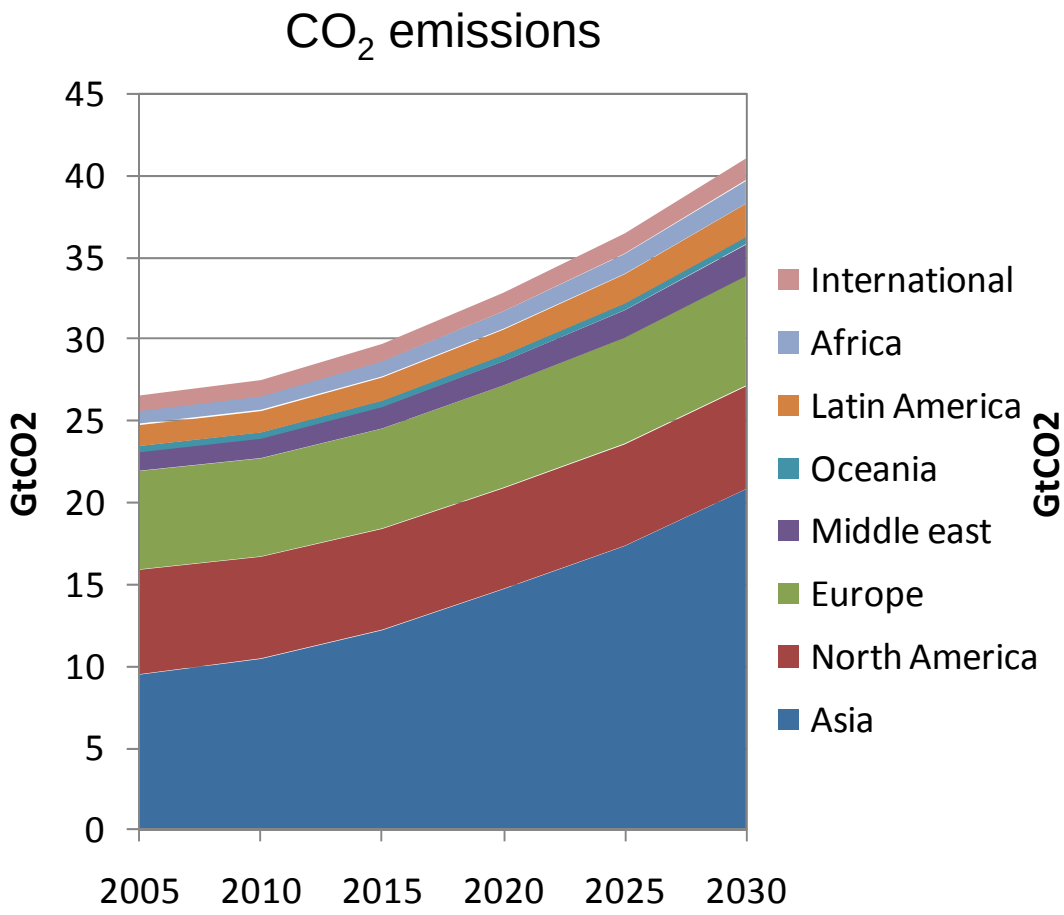
- Japan: Long-term energy supply-demand prospect (METI,2008)
- Other regions: WEO 2007(Alternative policy scenario) (IEA, 2007)

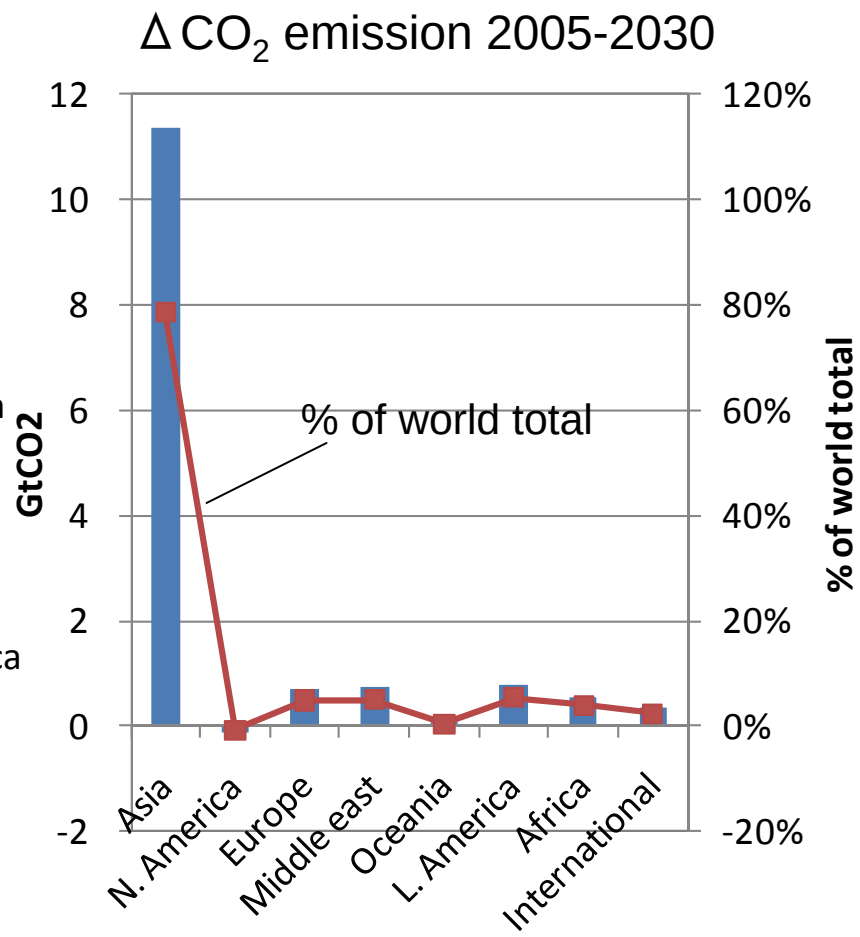
GHG emissions



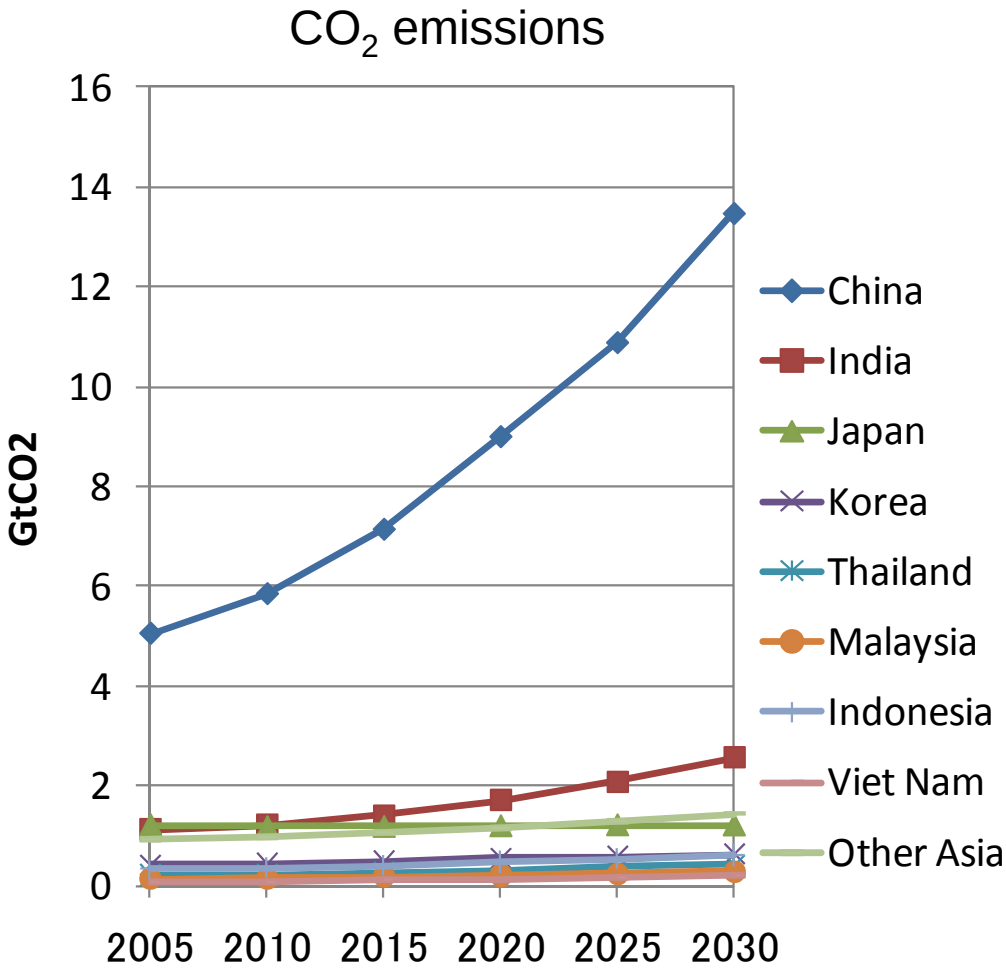


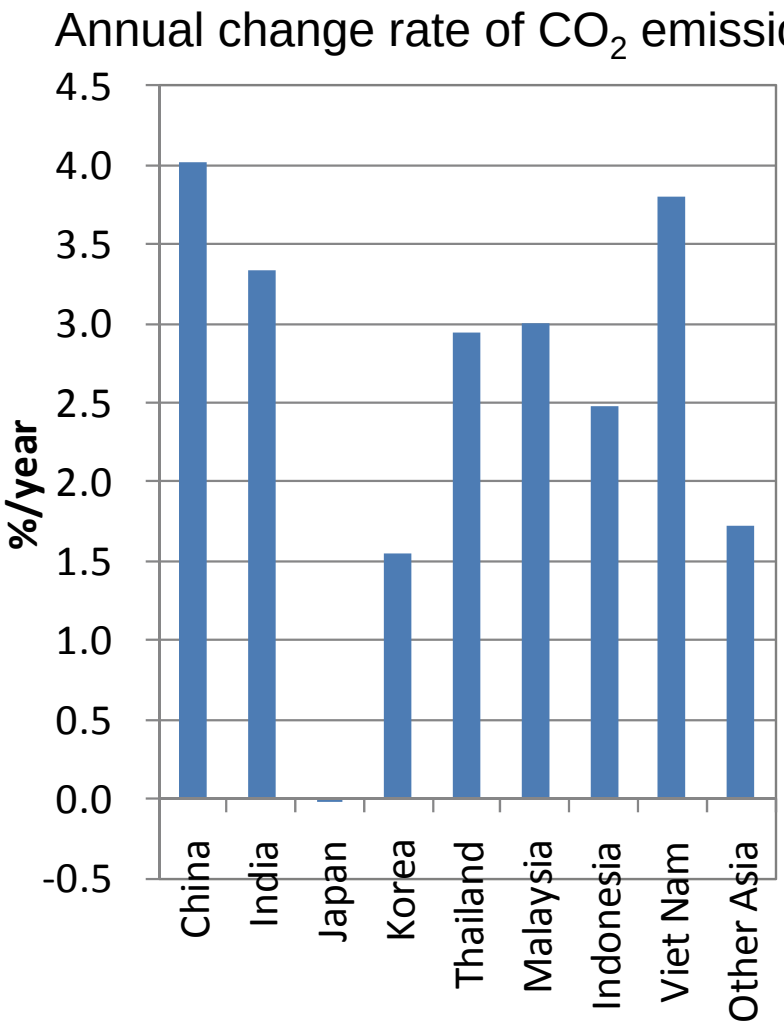
Energy related CO_2 emissions





Energy related CO_2 emissions in Asia



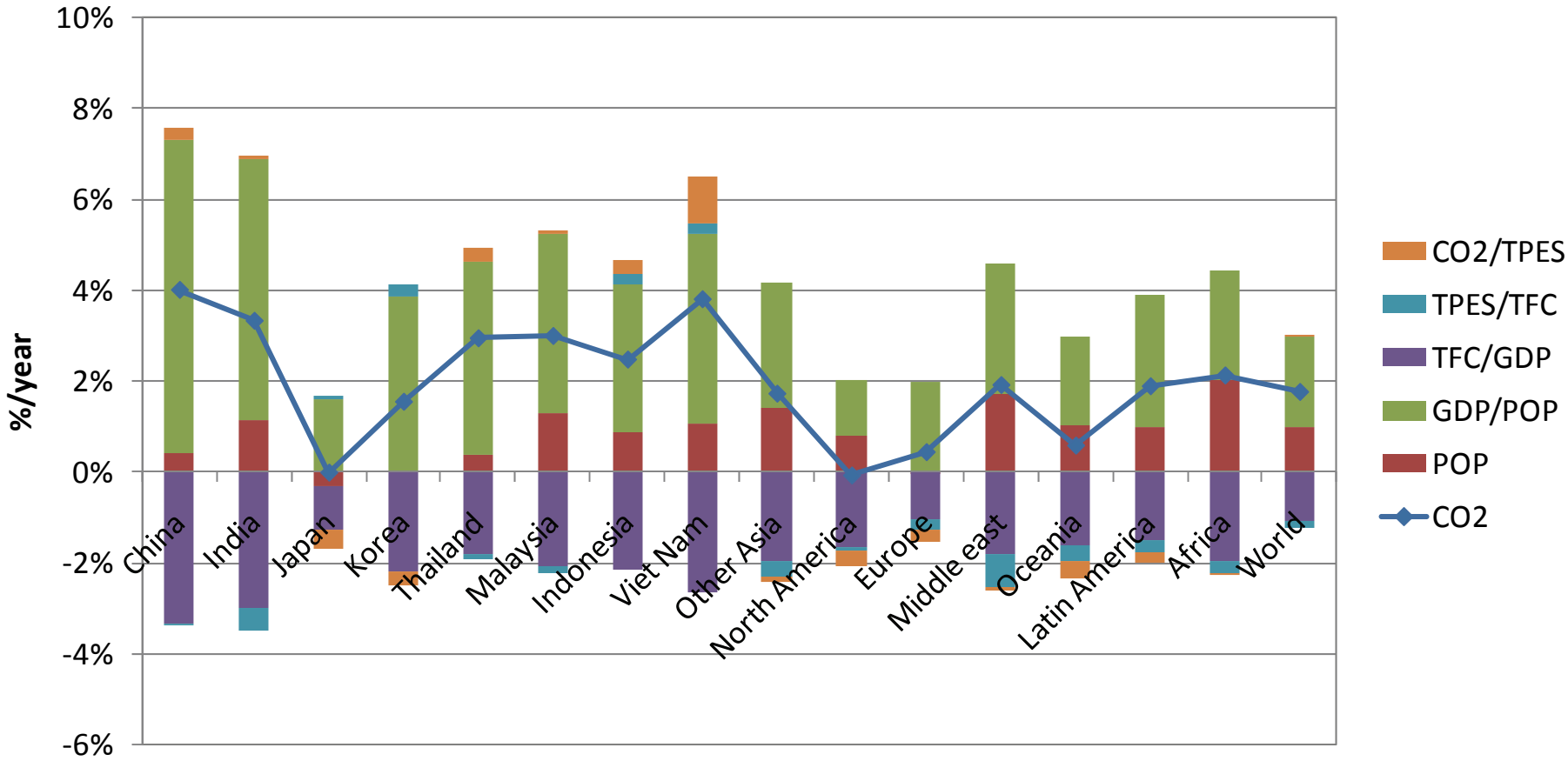


Decomposition analysis

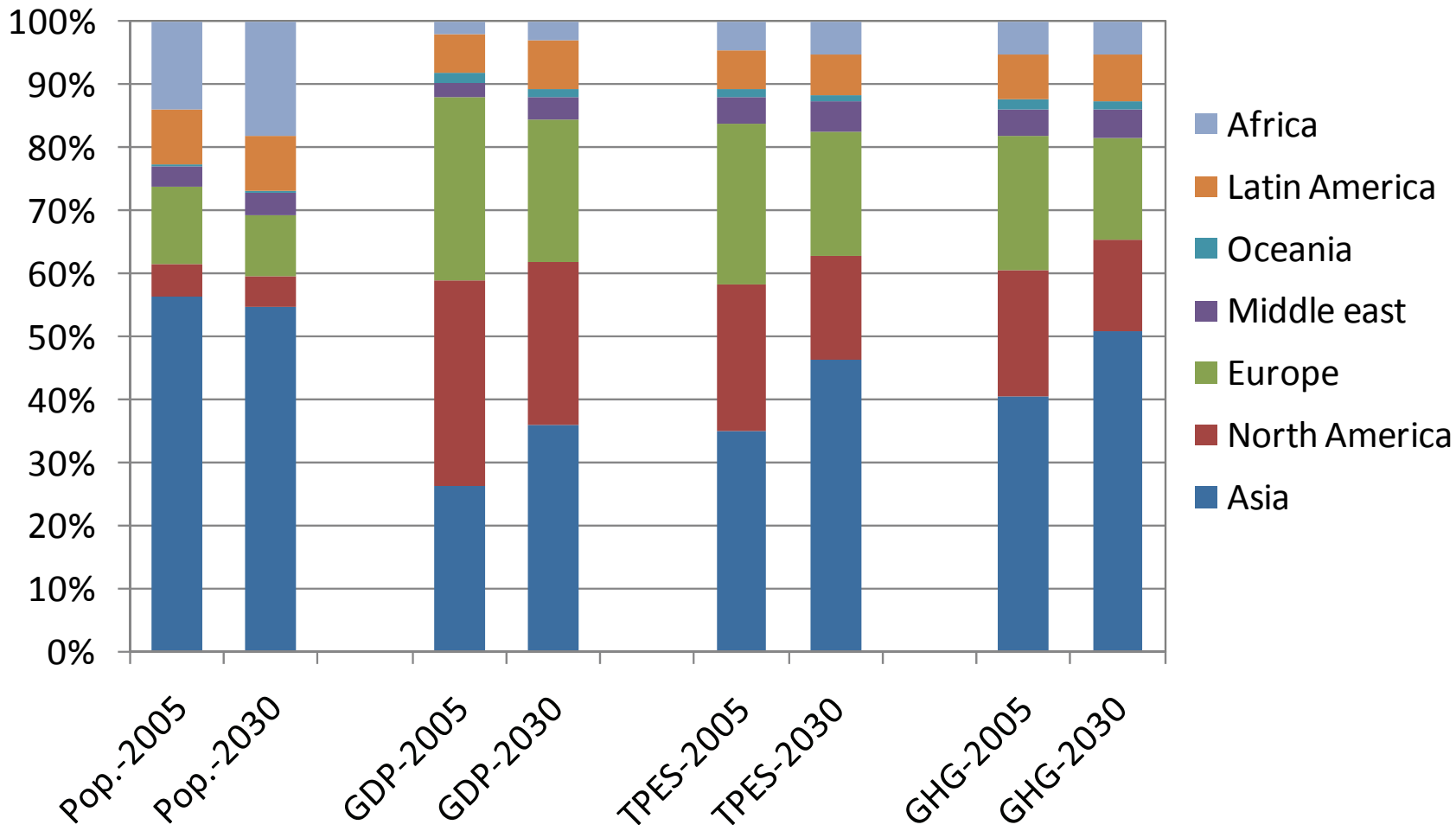
$$\Delta CO2=\Delta POP+\Delta\frac{GDP}{POP}+\Delta\frac{TFC}{GDP}+\Delta\frac{TPES}{TFC}+\Delta\frac{CO2}{TPES}$$

Δ: annual change(%/year)

CO2: Energy related CO2, POP: Population, TFC: Final energy consumption, TPES: Primary energy supply



Presence of Asia



Summary

This study explores mid-term future of global GHG emissions with special attention to Asia regions in BaU case.

Key findings are as follows.

- Global energy consumption increases by about 50% during 2005-2030
- 70% of it comes from Asia
- Global energy related CO_2 emission increases by about 55% during 2005-2030
- 80% of it comes from Asia
- Asia increases it's presence in economy, energy and climate change issue.