



Energy Technologies Area

Lawrence Berkeley National Laboratory

Reinventing Fire: China The Role of Energy Efficiency in China's Roadmap to 2050

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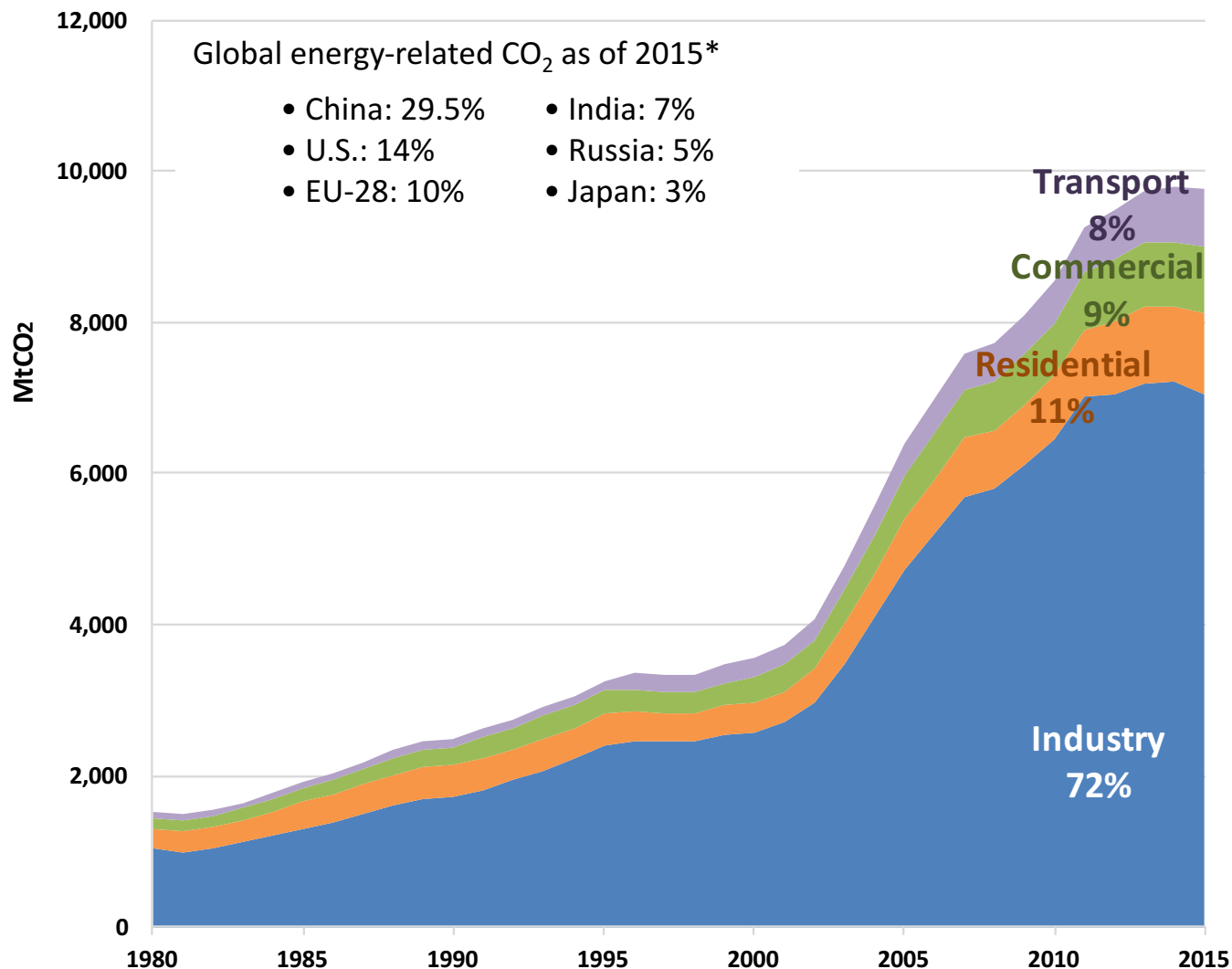
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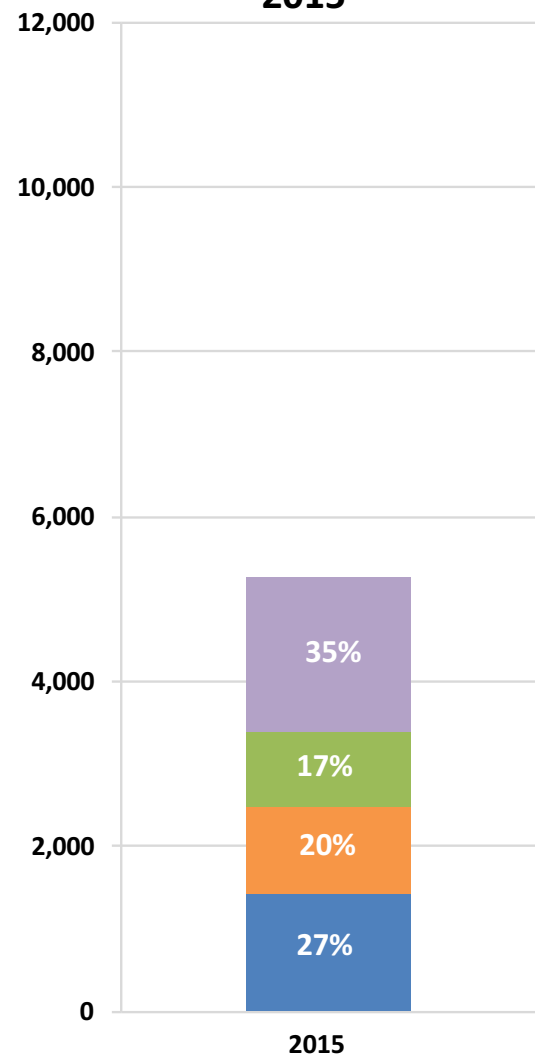


China and U.S. Energy-Related CO₂ Emissions

China, 1980-2015



United States 2015



Sources: NBS, China Energy Statistical Yearbooks; IPCC emission factors; US EIA, 2016.

*Source: PBL Netherlands Environmental Assessment Agency, 2016. *Trends in Global CO₂ Emissions, 2016 Report*.

- **Project Goal:** Evaluate two possible energy pathways for China to 2050:
 - **Reference scenario:** Only policies in place in 2010 continue to have effect, and autonomous technological improvement occurs; this scenario does not consider technological breakthroughs or major policy changes
 - **Reinventing Fire scenario:** China meets its energy needs and improves its energy security and environmental quality by deploying the maximum feasible share of cost-effective energy efficiency and renewable supply through 2050
- **Timeline:**
 - 2013 - Reinventing Fire: China project started
 - 2014 – U.S. China Joint Announcement on Climate Change
 - 2015 – Paris Agreement

RF: China Methodology

- **Data and information**

- Conducted research on Chinese situation
- Documented global best practices
- Conferred with leading Chinese think tanks and industrial associations
- Guided by Advisory Panel of senior Chinese energy leaders



- **Sector-based, detailed modeling** of China's economy combined with **cost-effectiveness calculations for technologies and measures**

Kaya Identity

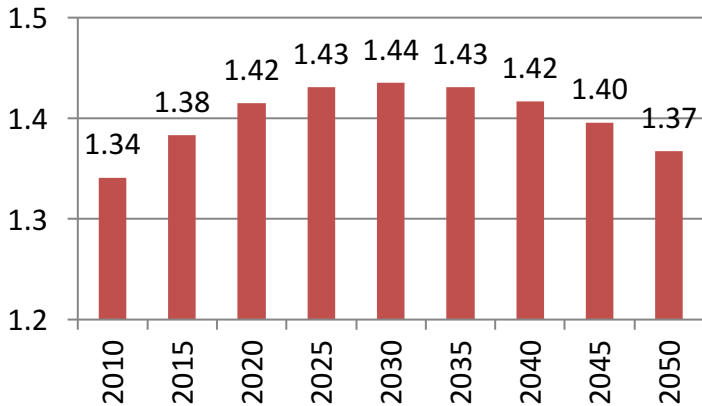
- Activity x Energy Intensity = Energy
- Energy x CO₂ emission factors = CO₂ emissions

Drivers of Energy Use and CO₂ Emissions

- Activity: GDP, population, urbanization
- Energy intensity: technologies, practices, policies
- CO₂ intensity: energy resources, electrification
- Structural shift: industrial structure (heavy/light), share of industry overall

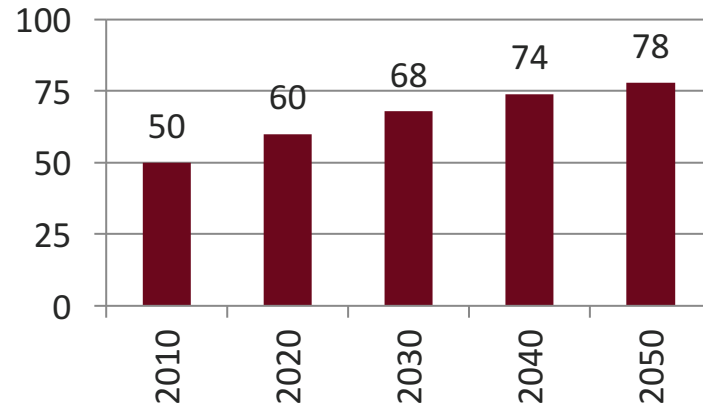
Population

Billions



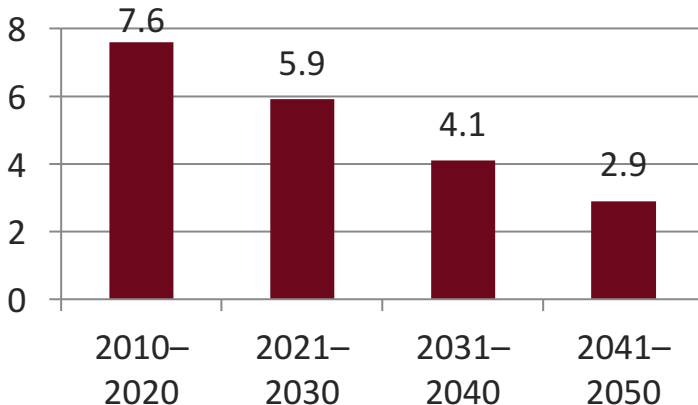
Urbanization Rate

Urban % of total population



GDP Growth Rate

Annual %, Same for Ref and RF Scenarios

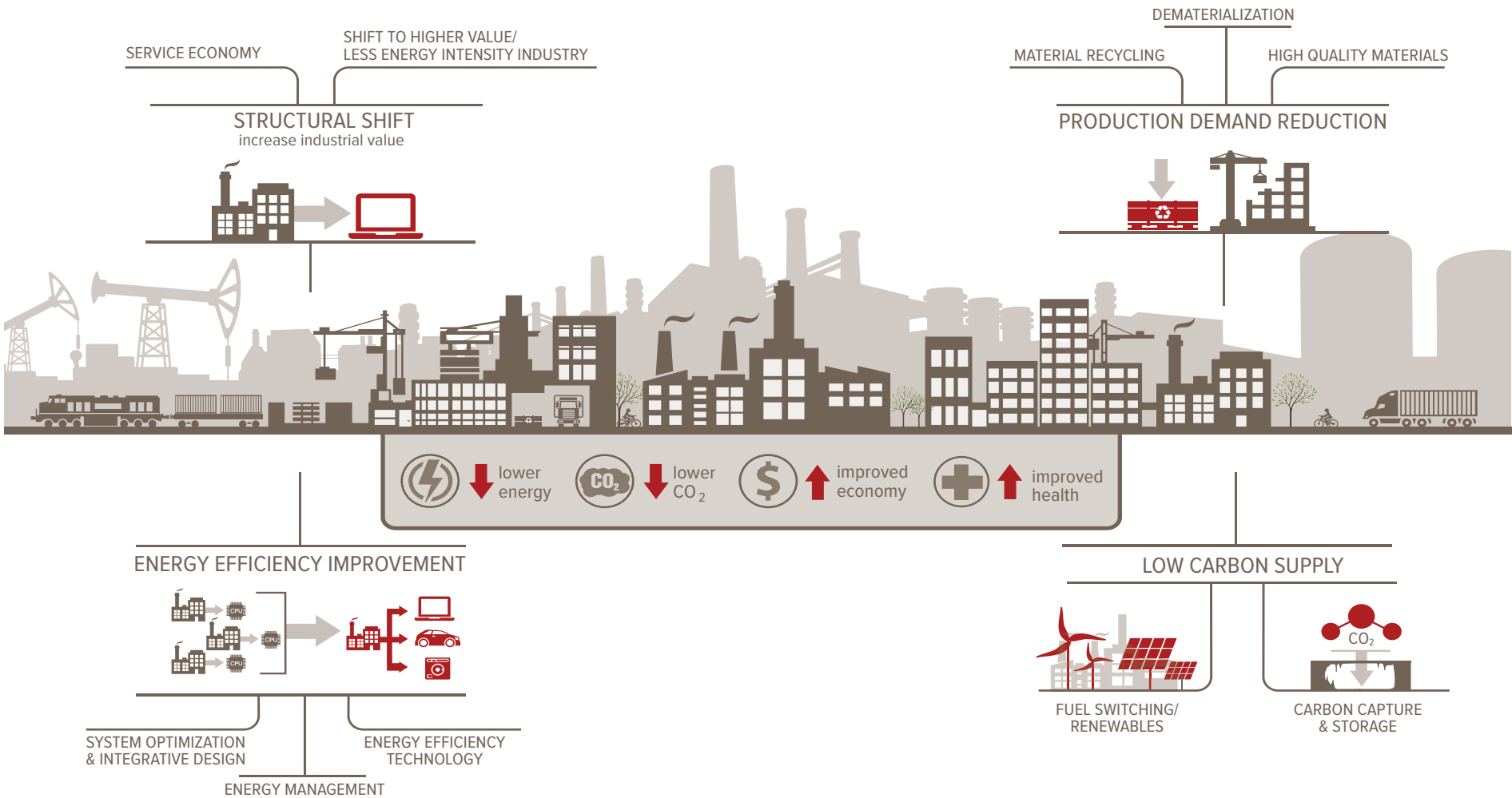


Other key Macro Assumptions

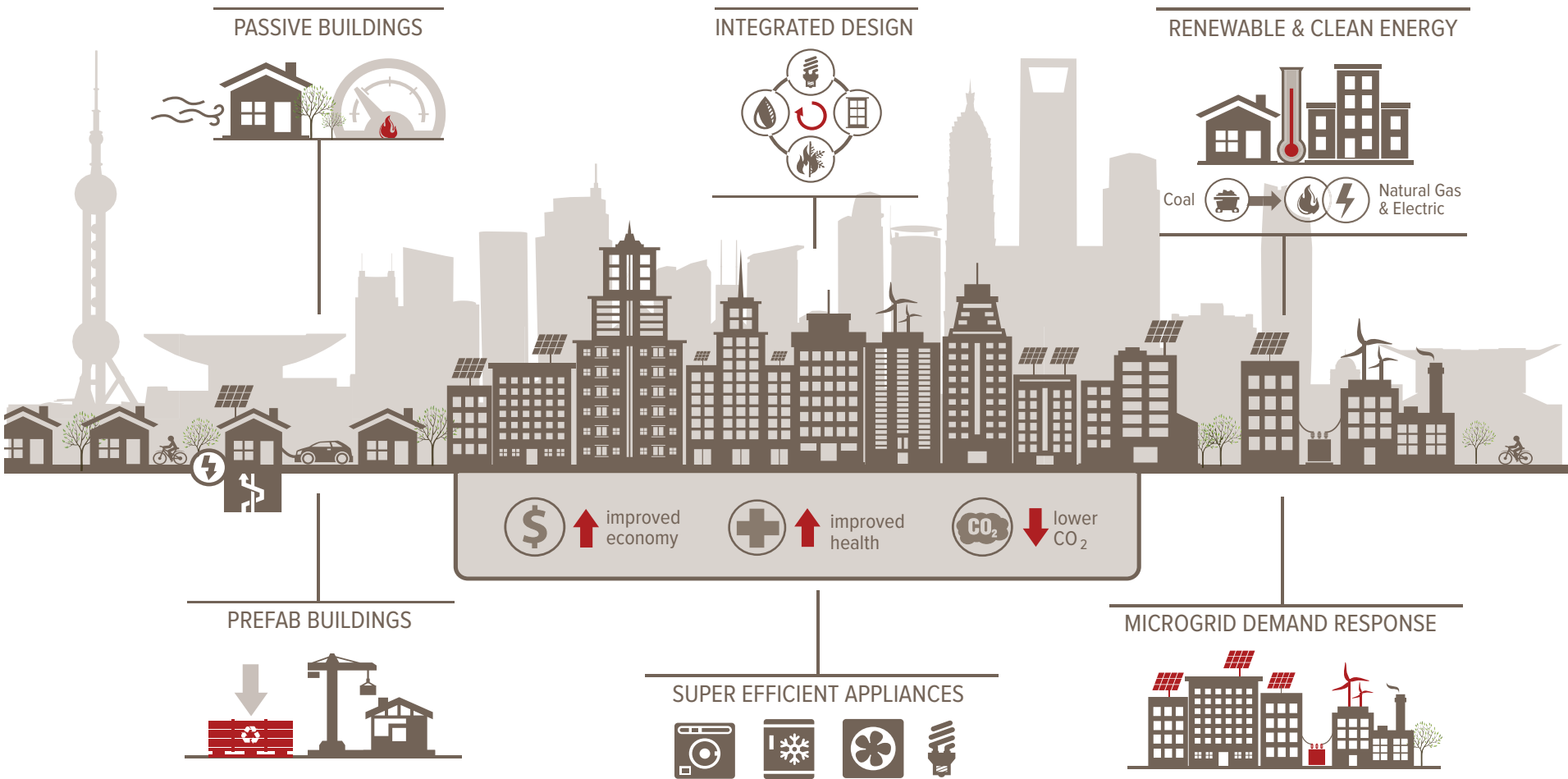
- No new technologies: minimum criteria of having been demonstrated at scale with data on costs
- Cost effective technologies: NPV positive, some technologies assume learning curve
- Economics assume a societal discount rate of 5%

Sources: China's National Bureau of Statistics and the Chinese Academy of Social Sciences

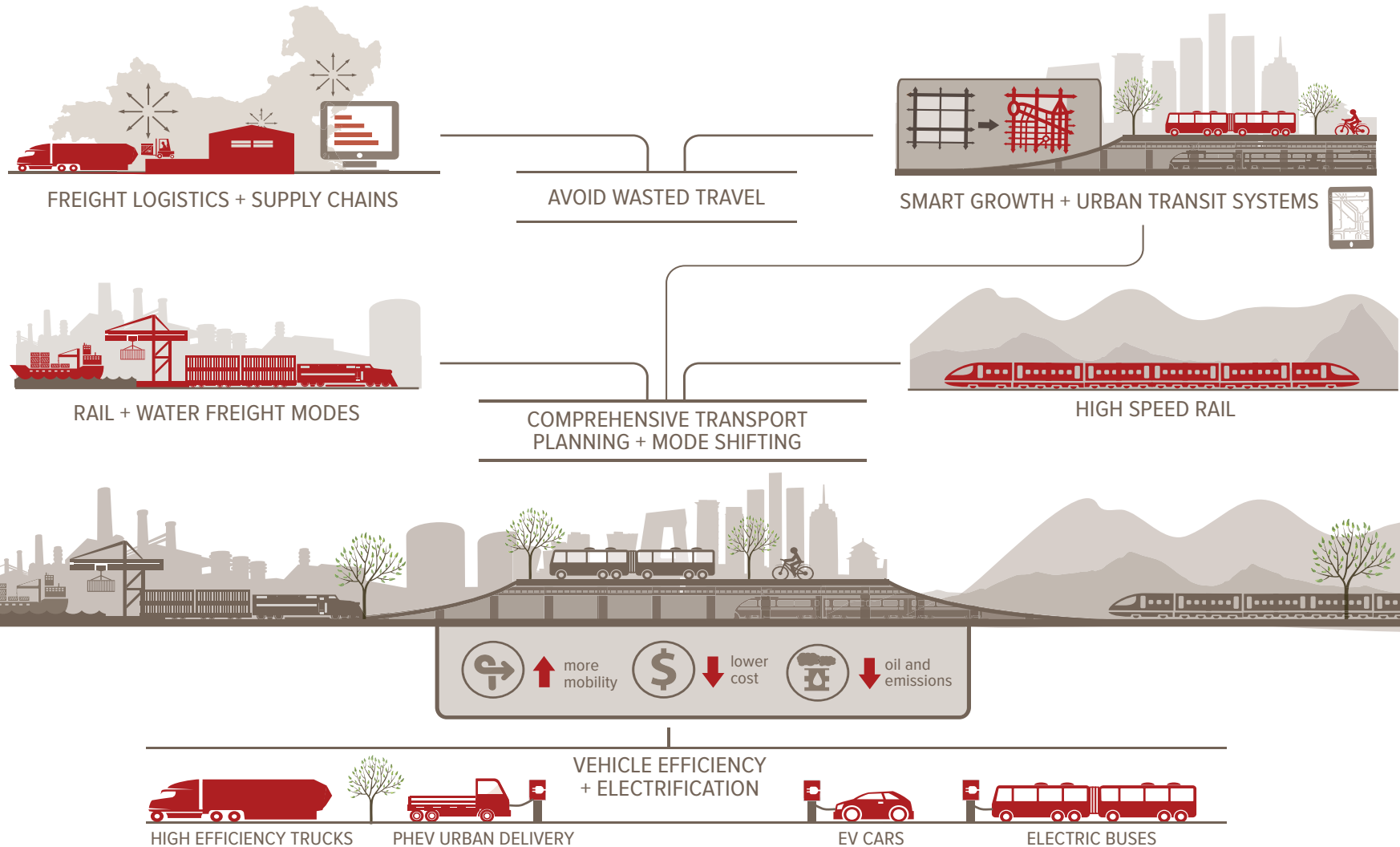
RF: China - Industry



RF: China - Buildings



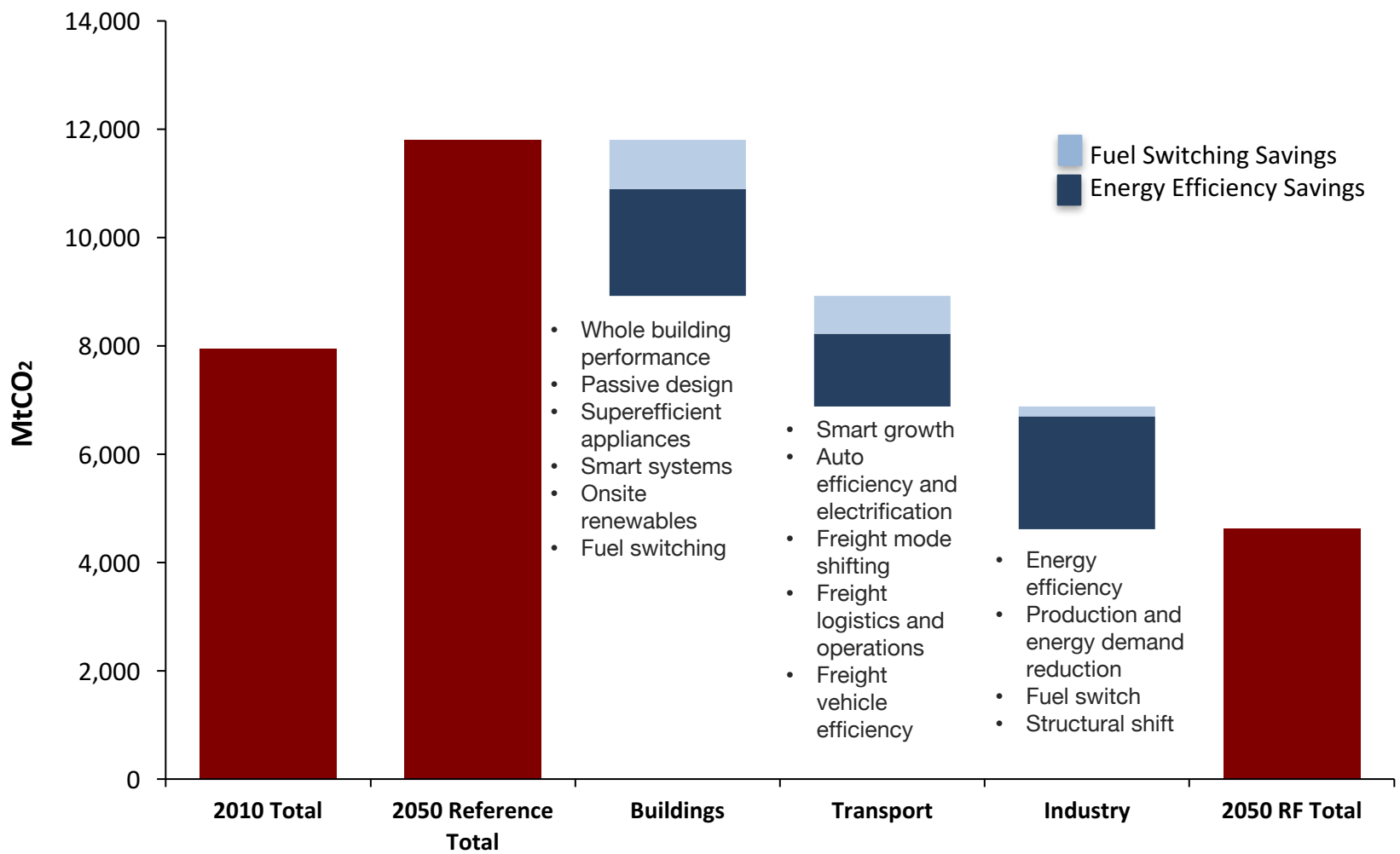
RF: China - Transportation



RF: China CO₂ Emissions Reductions



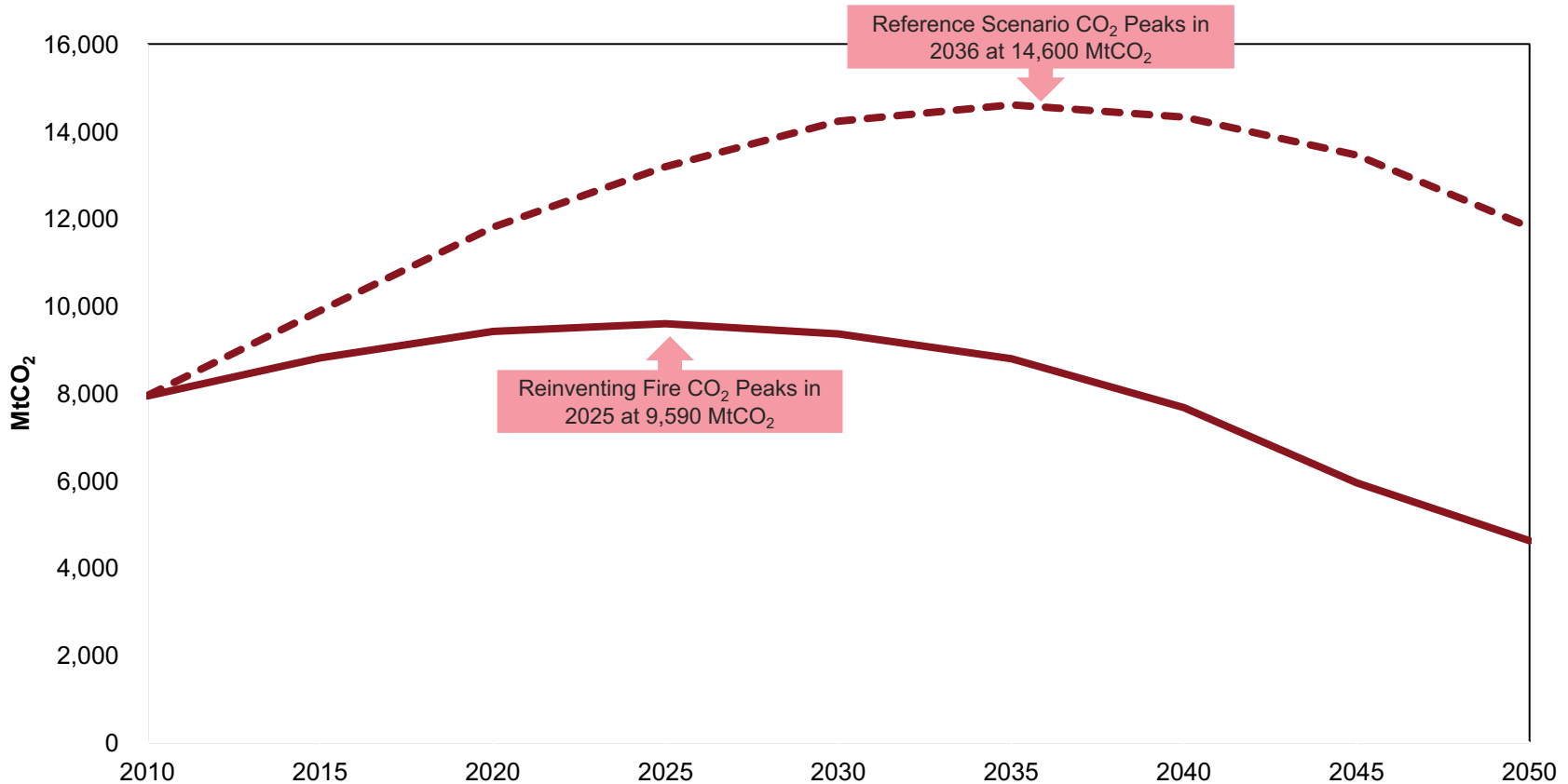
China's CO₂ Emissions



Source: *Reinventing Fire: A Roadmap for China's Revolution of the Consumption and Production of Energy to 2050.*

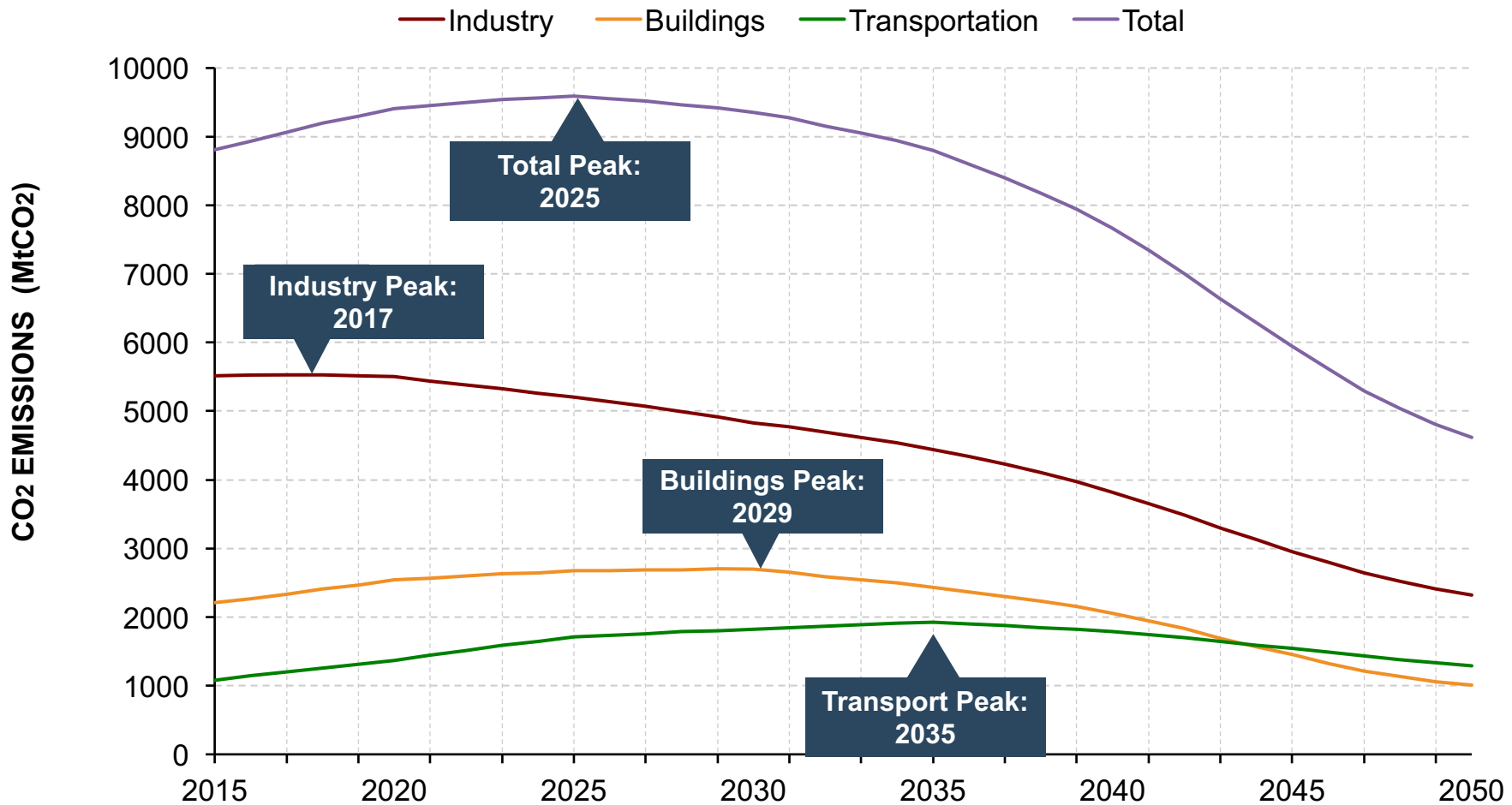
RF: China – CO₂ Emissions Peaks

CO₂ EMISSIONS



RF: China - CO₂ Emissions Peaks by Sector

CHINA ENERGY RELATED CO₂ EMISSIONS IN REINVENTING FIRE SCENARIO (2015-2050)



Questions? Discussion?

News about report and link for downloading:
<https://china.lbl.gov/news/reinventing-fire-china-report-released-g20>



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