Energy Technologies Area Lawrence Berkeley National Laboratory

Reinventing Fire: China

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

重塑能源：中国2050路线图中能源效率的角色

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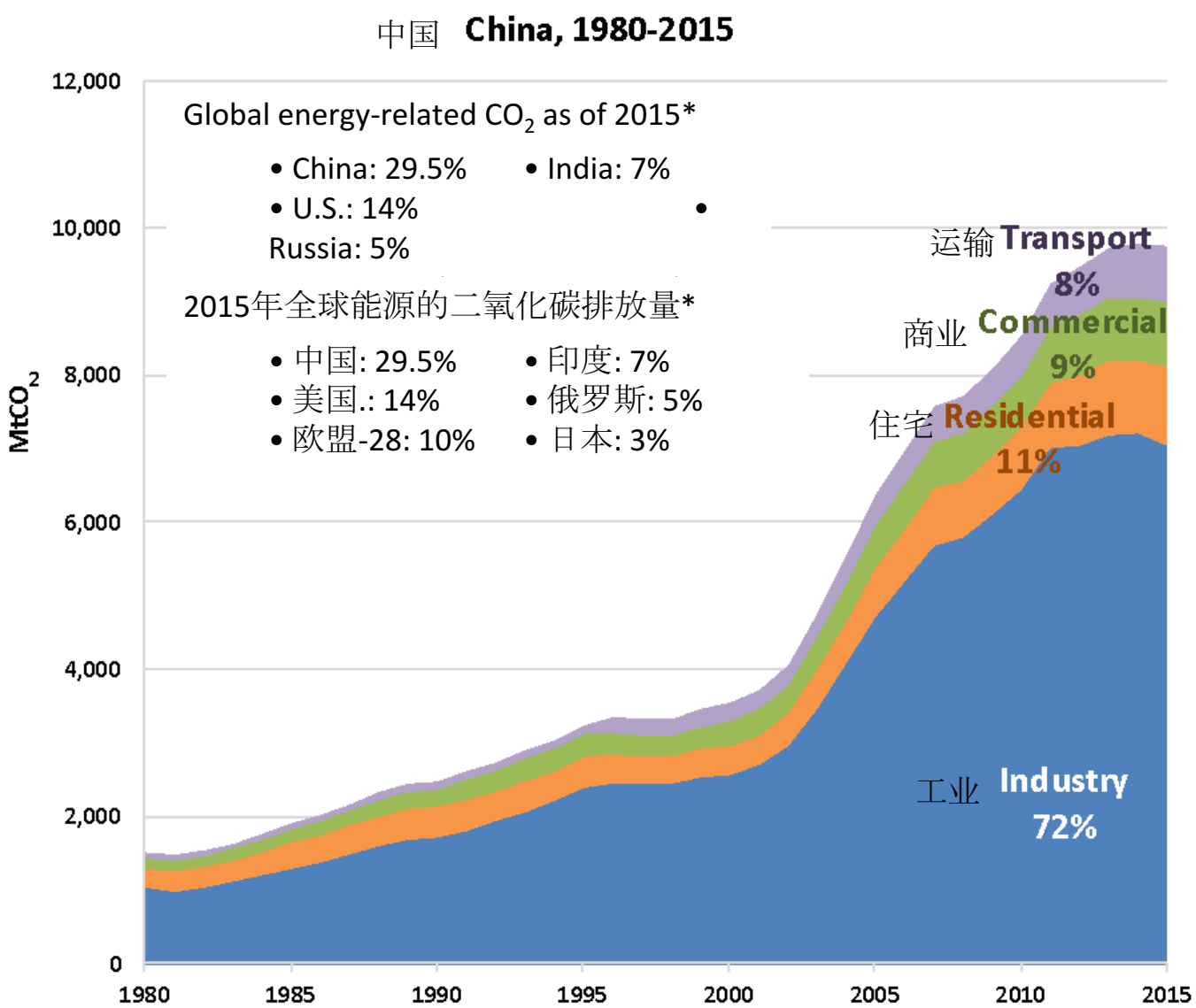
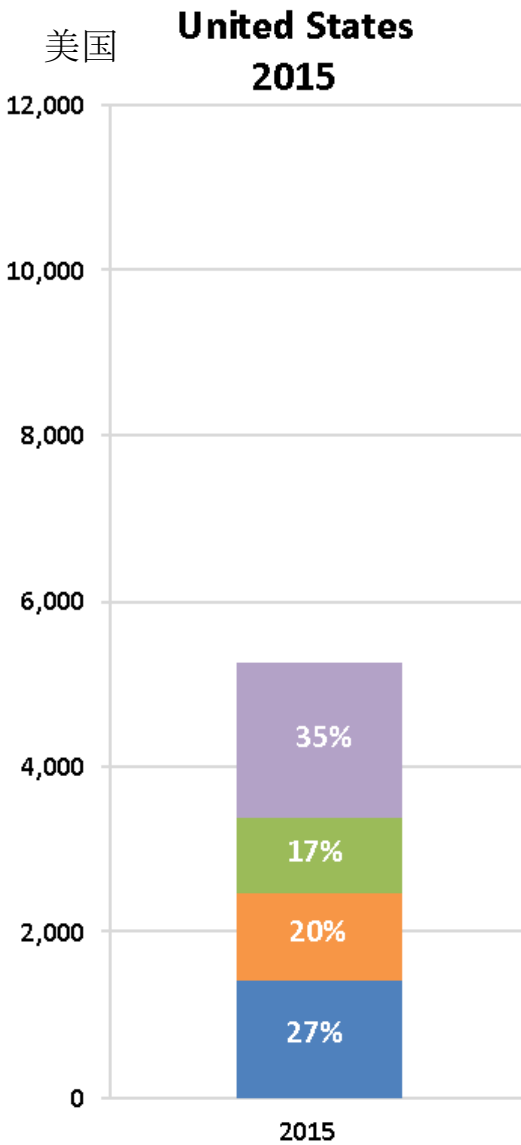
China and U.S. Energy-Related CO_2 Emissions
中美能源相关CO_2排放





Sources: NBS, China Energy Statistical Yearbooks; IPCC emission factors; US EIA, 2016.
*Source: PBL Netherlands Environmental Assessment Agency, 2016. *Trends in Global CO_2 Emissions, 2016 Report*.

Introduction – Reinventing Fire: China
前言-重塑能源：中国

- Project Goal: Evaluate two possible energy pathways for China to 2050:
- 项目目标：评估两条有可能的中国2050能源路线
  - ***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
  - 参考情景：2010年的政策继续有效且产生技术自主改进；这个方案并未考虑技术突破或重大政策变化
  - ***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
  - 重塑能源情景：中国在2050年前最大限度实施现有成本有效的能源效率和可再生能源，满足能源需求并提高能源安全和环境质量
- Timeline（时间表）：
  - 2013 - Reinventing Fire: China project started （启动“重塑能源：中国”项目）
  - 2014 – U.S. China Joint Announcement on Climate Change（中美关于气候变化的联合声明）
  - 2015 – Paris Agreement（巴黎协定）

RF: China Methodology中国方法

- **Data and information （数据和信息）**
  - Conducted research on Chinese situation 开展关于中国境况的研究
  - Documented global best practices记录全球最佳实践
  - Conferred with leading Chinese think tanks and industrial associations与中国主要智囊团和行业协会协商
  - Guided by Advisory Panel of senior Chinese energy leaders由中国能源高层领导组成的专家委员会领导
- **Sector-based, detailed modeling** of China's economy combined with **cost-effectiveness calculations for technologies and measures （以部门为基础，结合技术措施的成本效益计算）**

Kaya Identity Kaya等式

- Activity x Energy Intensity = Energy （活动x 能源密度=能源）
- Energy x CO_2 emission factors = CO_2 emissions （能源x CO_2排放系数 =CO_2排放量）

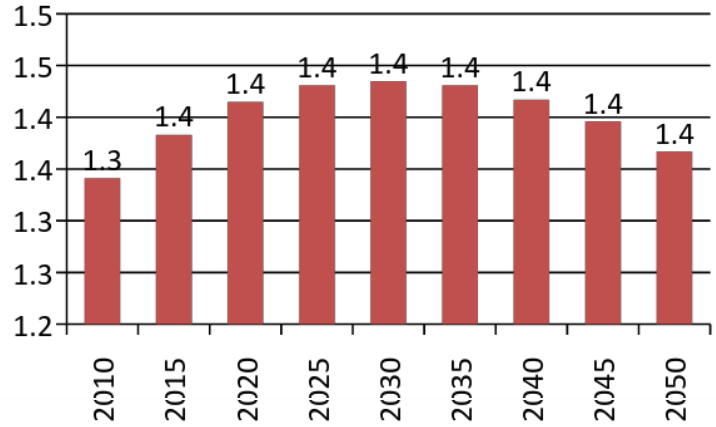
Drivers of Energy Use and CO_2 Emissions 能源利用和CO_2排放的驱动力

- Activity: GDP, population, urbanization （活动：GDP、人口、城市化）
- Energy intensity: technologies, practices, policies （能源密度：技术、实践、政策）
- CO_2 intensity: energy resources, electrification （CO_2密度：一次能源、电气化）
- Structural shift: industrial structure (heavy/light), share of industry overall （结构变动：工业结构（重/轻），工业占比）

RF: China Macro Economic Drivers
中国宏观经济驱动力

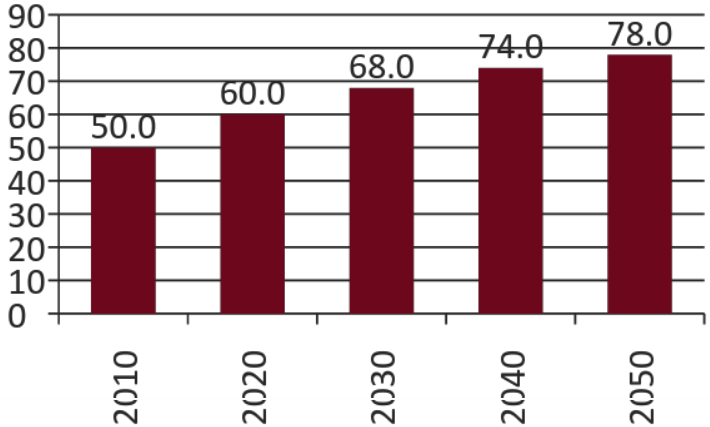
Population（人口）

Billions（十亿）



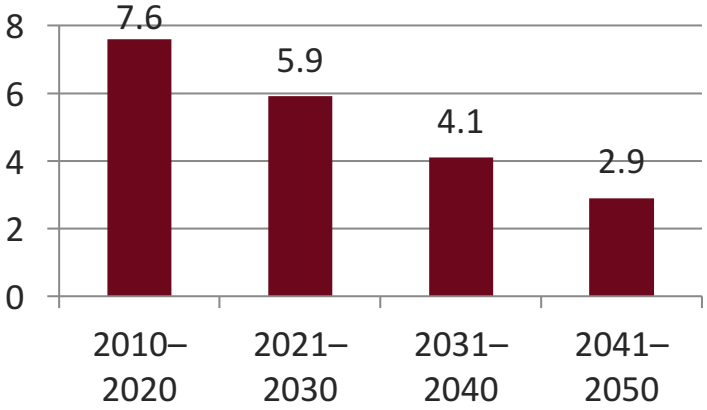
Urbanization Rate（城市化速度）

Urban % of total population（城市人口比例）



GDP Growth Rate（GDP增长率）

Annual %, Same for Ref and RF Scenarios（相同的年度比率）

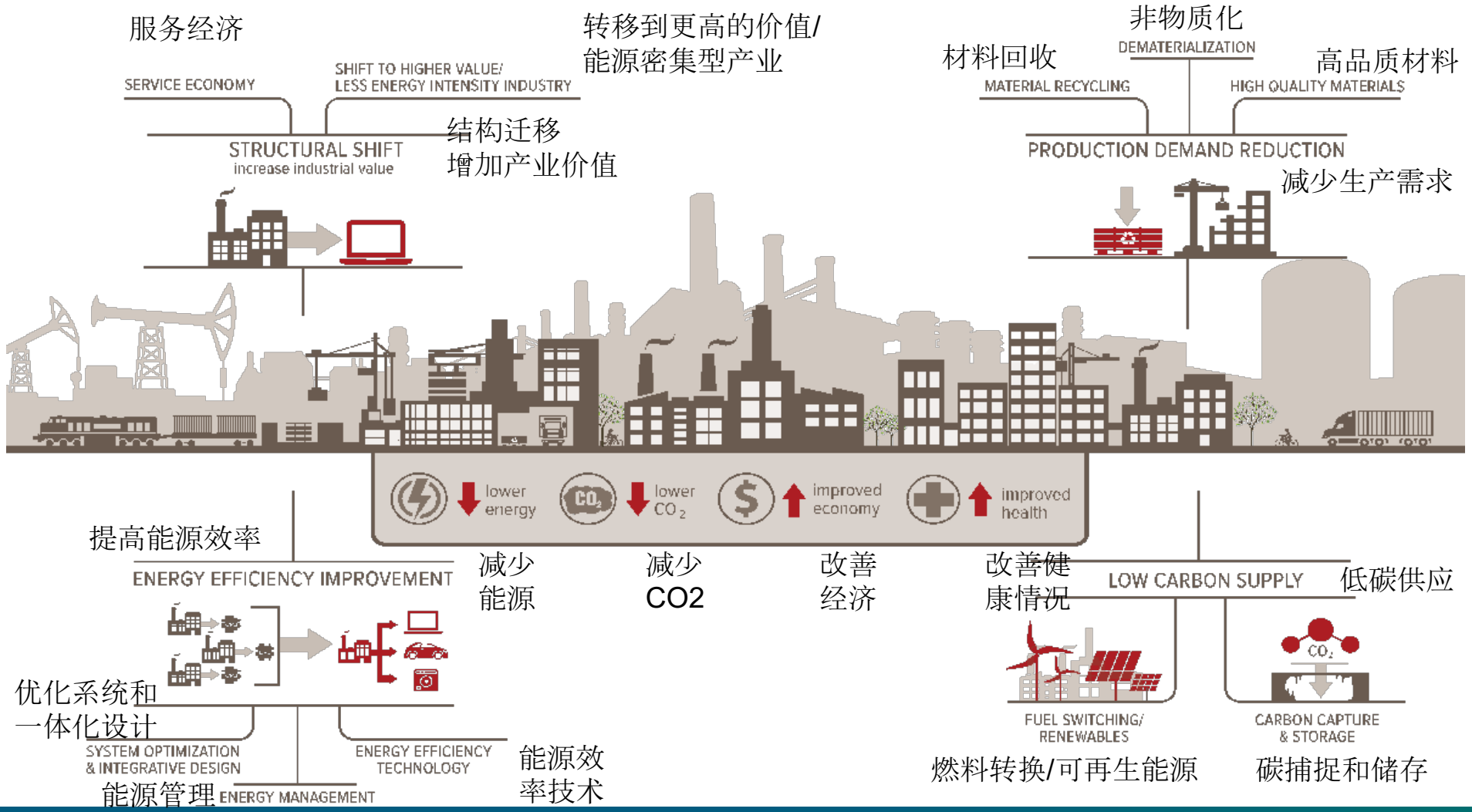


Other key Macro Assumptions（其他关键宏观假设）

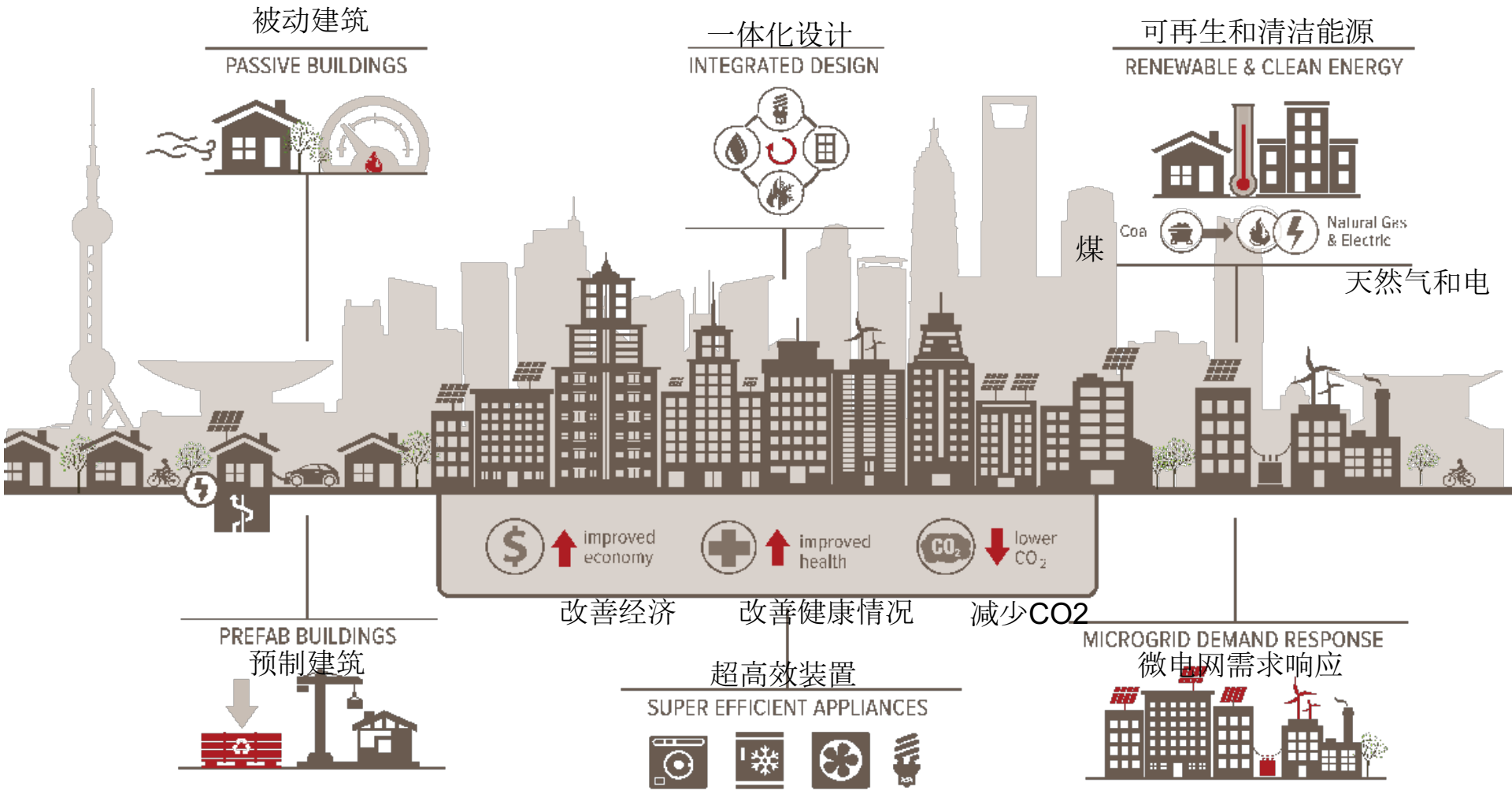
- No new technologies: minimum criteria of having been demonstrated at scale with data on costs无新技术
- Cost effective technologies: NPV positive, some technologies assume learning curve（有效成本技术：正的NPV、一些假设学习曲线技术）
- Economics assume a societal discount rate of 5%（假定经济的社会贴现率为5%）

Sources: China's National Bureau of Statistics and the Chinese Academy of Social Sciences（来源：中国国家统计局和中国社会科学院）

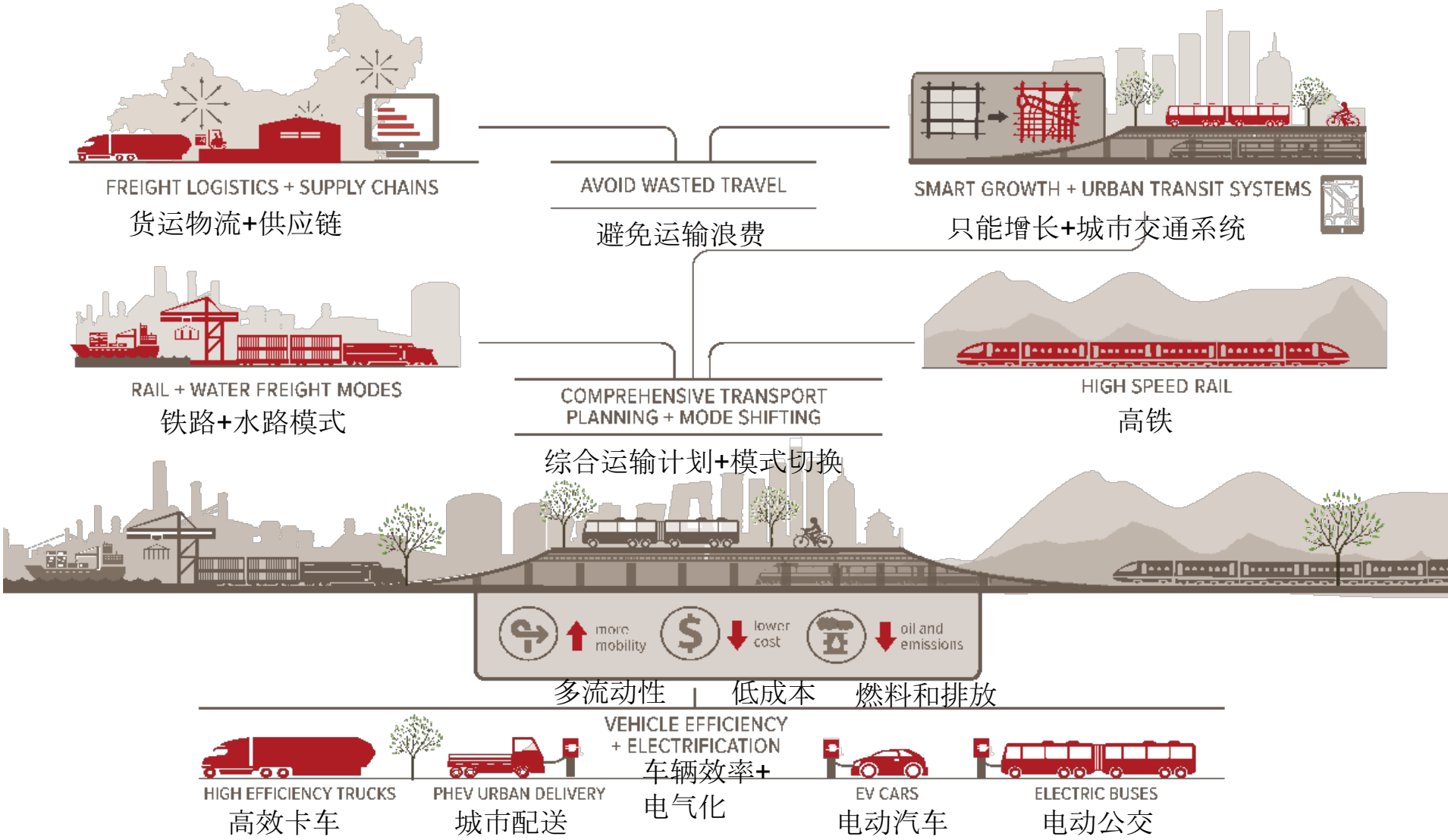
RF: China - Industry （工业）



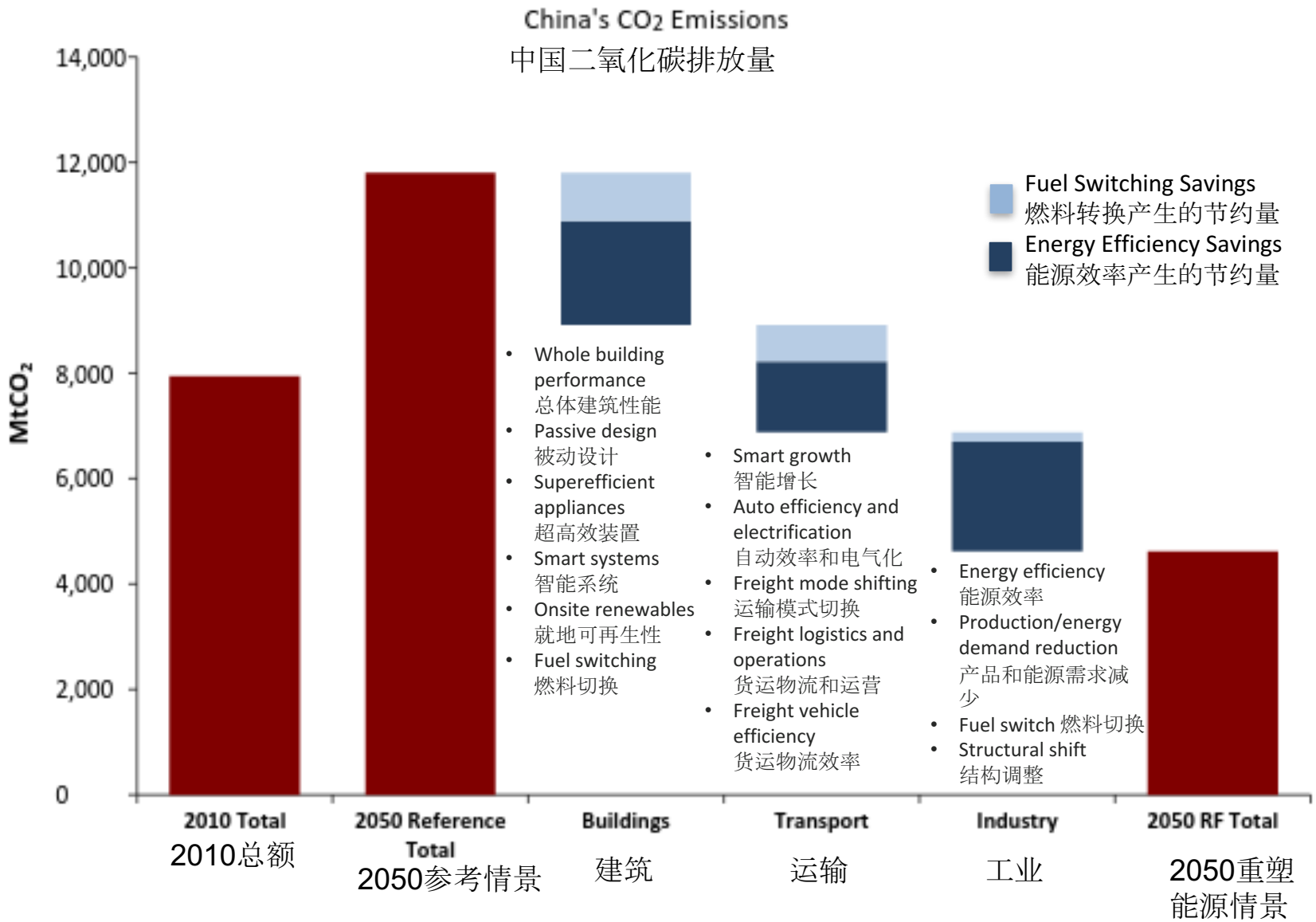
RF: China - Buildings （建筑）



RF: China - Transportation （交通运输）

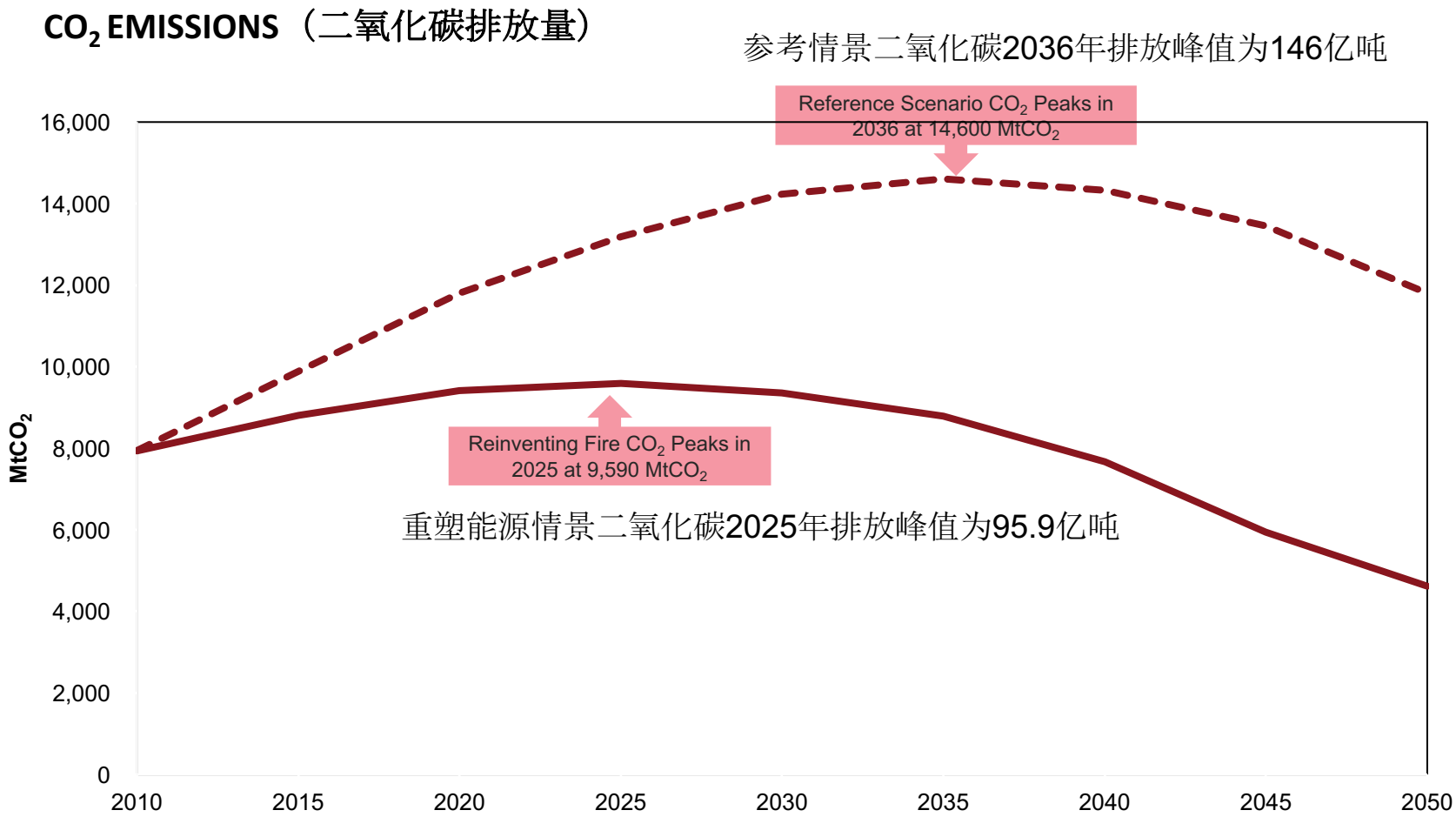


RF: China CO_2 Emissions Reductions
中国二氧化碳排放减少量



Source: *Reinventing Fire: A Roadmap for China's Revolution of the Consumption and Production of Energy to 2050.*
来源：重塑能源：2050中国能源生产和消费改革路线图

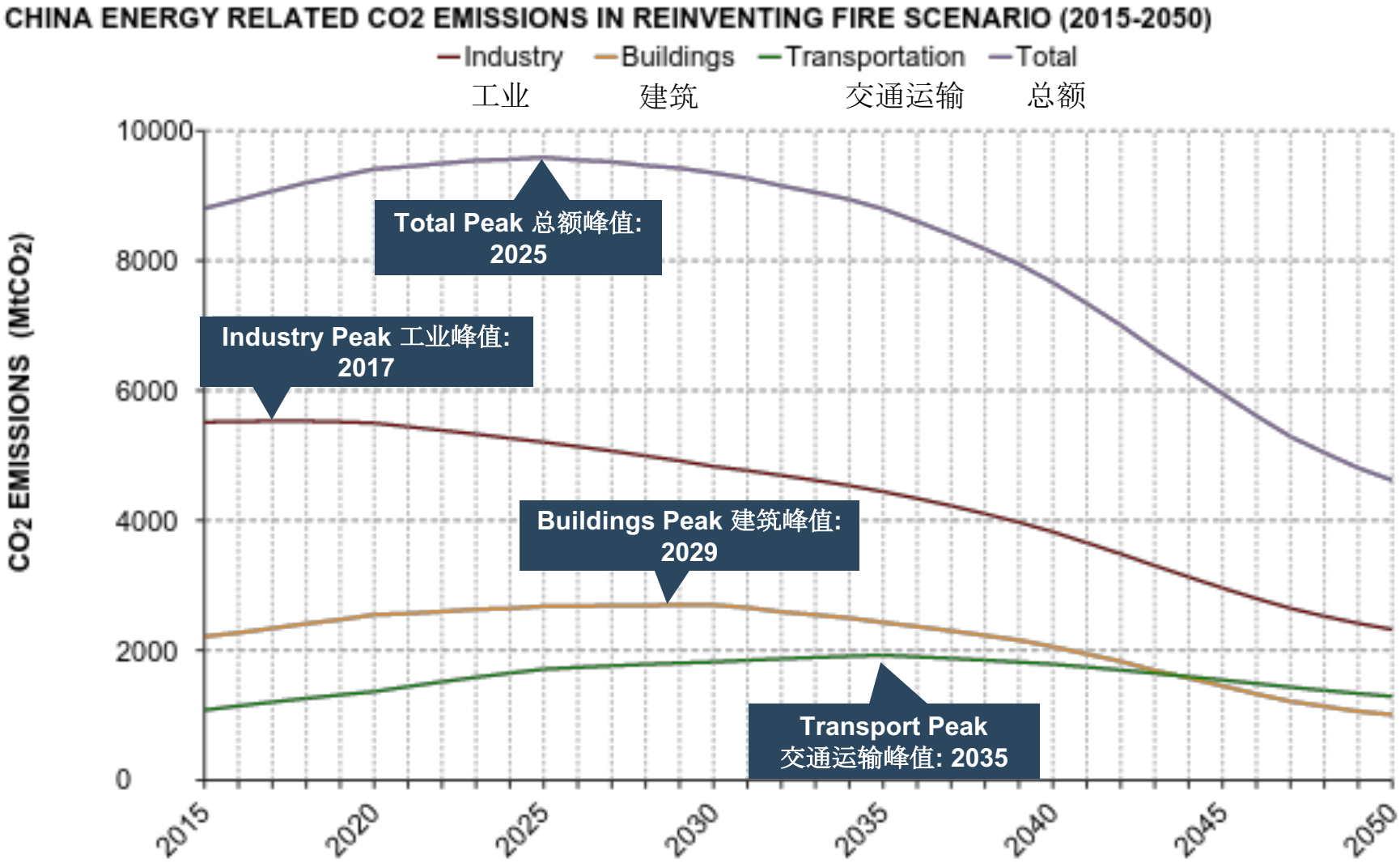
RF: China – CO_2 Emissions Peaks
二氧化碳排放峰值



Source: *Reinventing Fire: A Roadmap for China's Revolution of the Consumption and Production of Energy to 2050.* 来源：*重塑能源：2050中国能源生产和消费革命路线图*

RF: China - CO_2 Emissions Peaks by Sector
中国各部门的二氧化碳排放峰值

重塑能源情景中国能源相关二氧化碳排放



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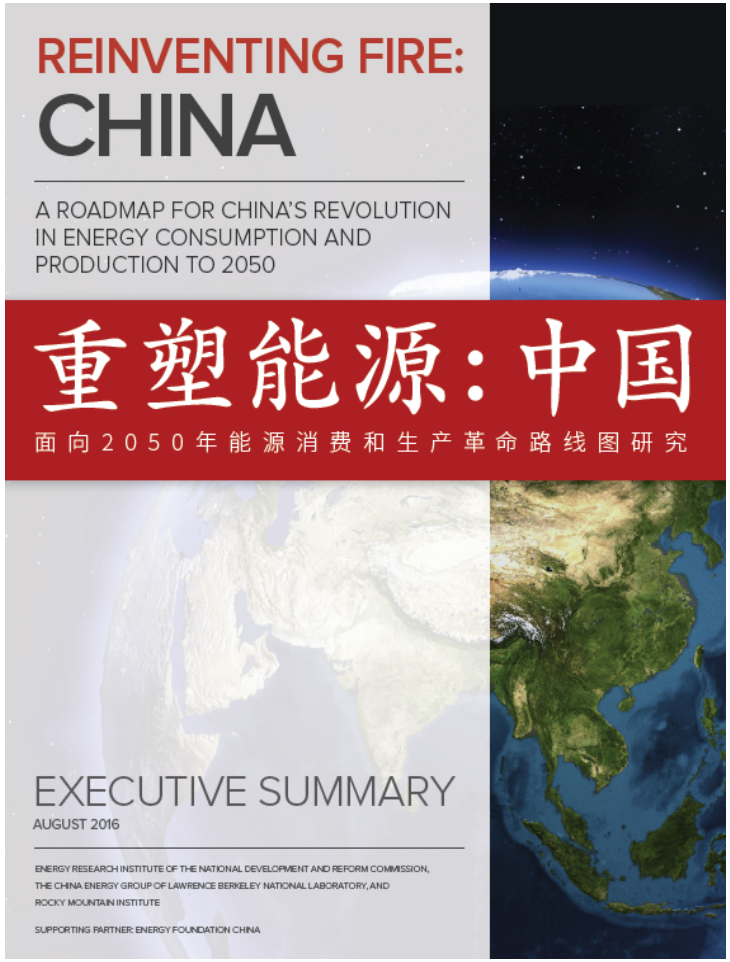
Questions? Discussion?问题？讨论？

News about report and link for downloading（信息下载地址）：
https://china.lbl.gov/news/reinventing-fire-china-report-released-g20



LBNL was supported by Energy Foundation China through the U.S. Department of Energy under Contract No. DE-AC02-05CG11231 能源基金会通过美国能源部合同为LBNL提供资助