China's Future Generation

Assessing the Potential for Maximum Renewable Power Sources in China to 2050

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Q: How close can China get to 100% renewable electricity…? /国多接近100%可再生能源？

~80% with bold energy efficiency and conservation. 80%. 前提是大刀阔斧实施节能.

Lower cost than system dependent on coal. 总成本比依赖于煤电低.

China 8760 Grid Model results:
8760 中国电网模型预测：

- Energy efficiency is the fundamental driver of any low carbon electric future / 高能效是实现未来低碳发电的根本驱动力
- China's domestic renewable resource base can cost-effectively supply 80 percent of its 2050 electric power needs IF it fully incorporates / 在完全采用的情况下，中国的可再生能源发电可以满足国内2050年80%的用电需求
  - … every known or anticipated efficiency technology in the system / 系统包含各类已知的和预计的节能技术
  - … improvements in new grid balancing technologies / 新电网平衡技术的改进

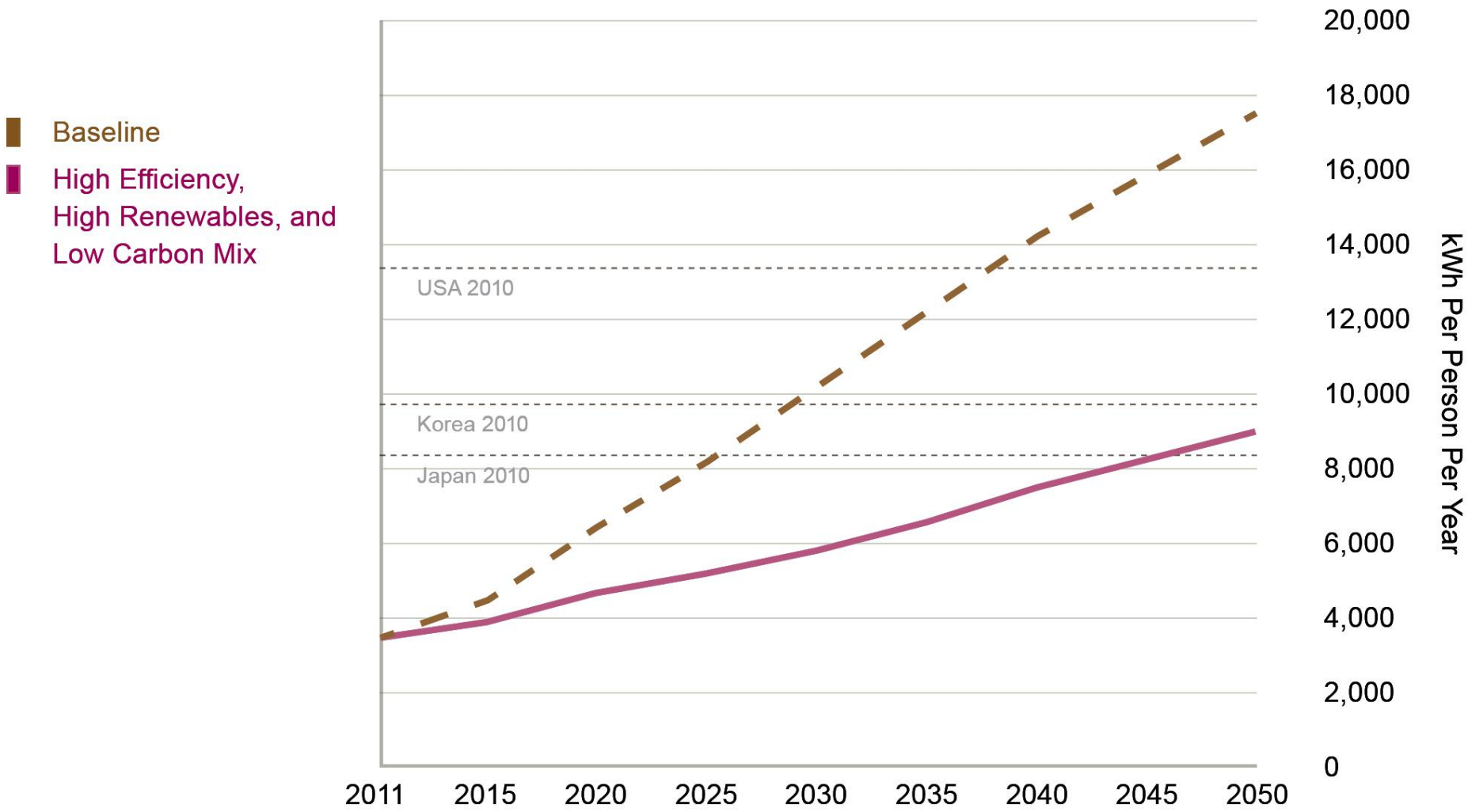
Improved tools for this study
模型改进

- Model now tests the feasibility of renewables meeting load hour-by-hour for next 40 years / 模型可以测试在未来40年可再生能源是否满足每小时的负荷
  - The model includes an hourly load curve / 模型包含电力负荷曲线（按小时）
  - The model includes renewable generation based on weather data and probabilistic analysis / 模型通过气象数据和随机过程分析预测可再生能源发电量
- Extended the model to the year 2050 /将模型的预测能力扩展至2050年

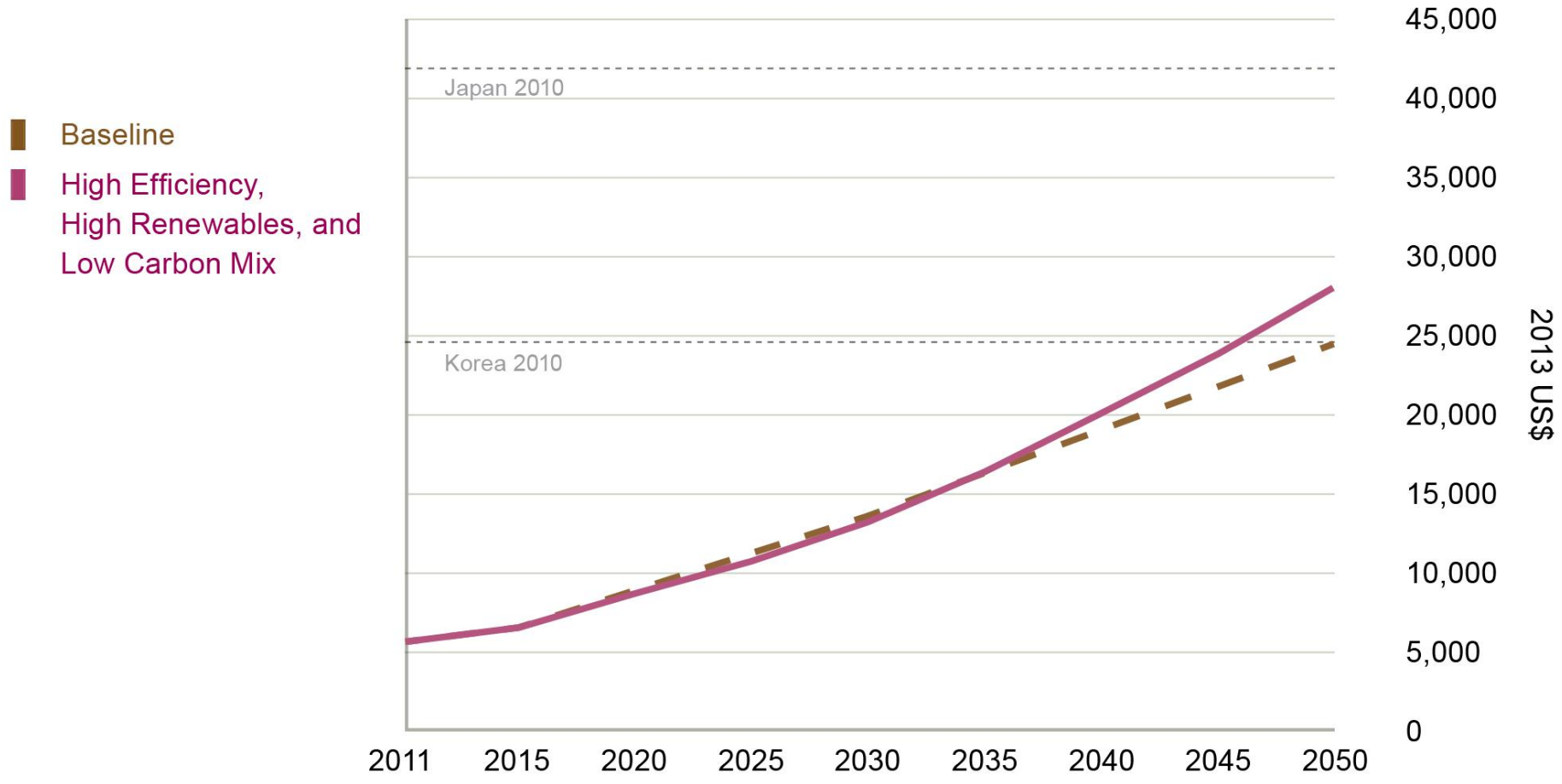
Key Elements of Each Scenario

Scenario	Reforms Economy	Mandates Efficiency	Mandates Renewables	Expands Nuclear	Regulates Carbon
Baseline	✖	✖	✖	✖	✖
High Efficiency	✔	✔	✖	✖	✖
High Renewables	✔	✔	✔	✖	✔
Low-Carbon Mix	✔	✔	✔	✔	✔

Chinese Electricity Use Per Capita



Chinese GDP Per Capita



How to double or triple China's 1,000 GW?
如何使中国的电力供应翻倍？

- **Double coal use? / 加倍煤电供应？**

  … Coal use to move west / 用煤向西部地区转移？

- **Increase nuclear? / 增加核电供应？**

  … Limited to 400 GW /限制在400GW

How to double or triple capacity? (cont.)
如何使电力装机翻倍？

- **Go renewable?** / 可再生能源发电？

  Wind ~ 1,500-2,500 GW 风电 ~ 1,500-2,500 GW

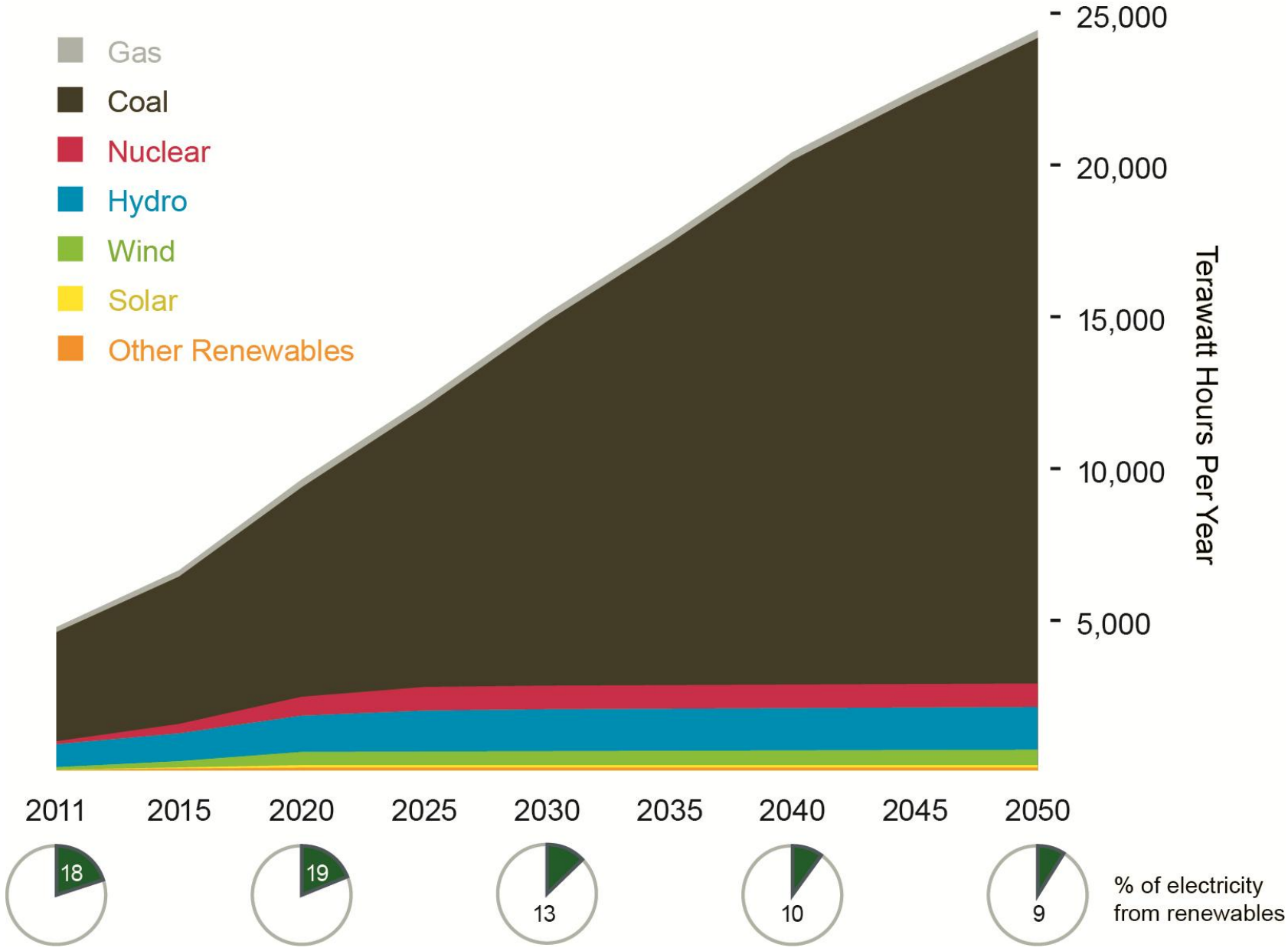
  Hydro ~ 500 GW 水电 ~ 500 GW

  PV ~ 1000 GW 太阳能发电 ~ 1000 GW

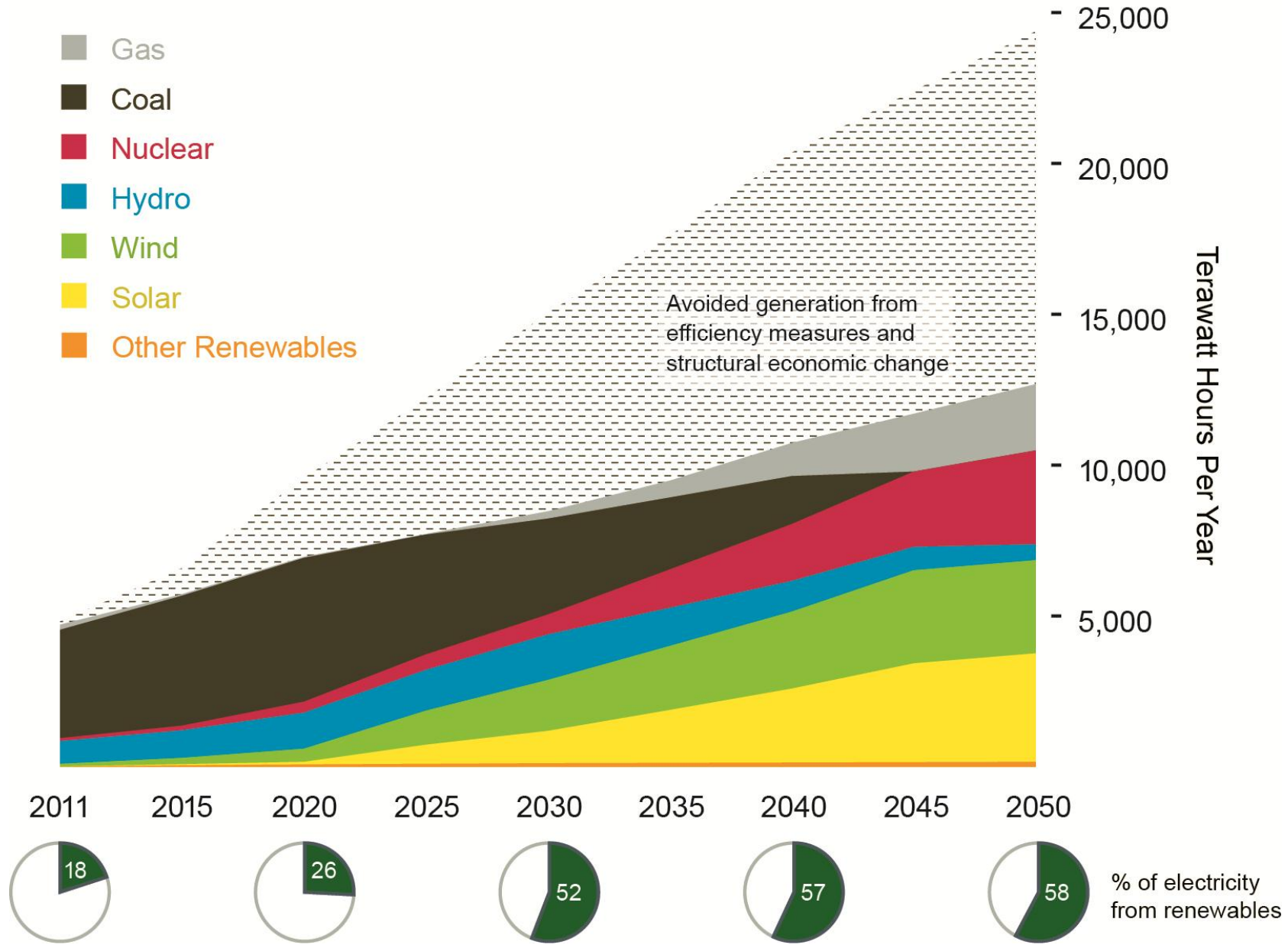
- **Go for gas?** / 天然气发电？

  CBM, conventional ~ 750 GW 煤层气、常规天然气发电 ~ 750 GW

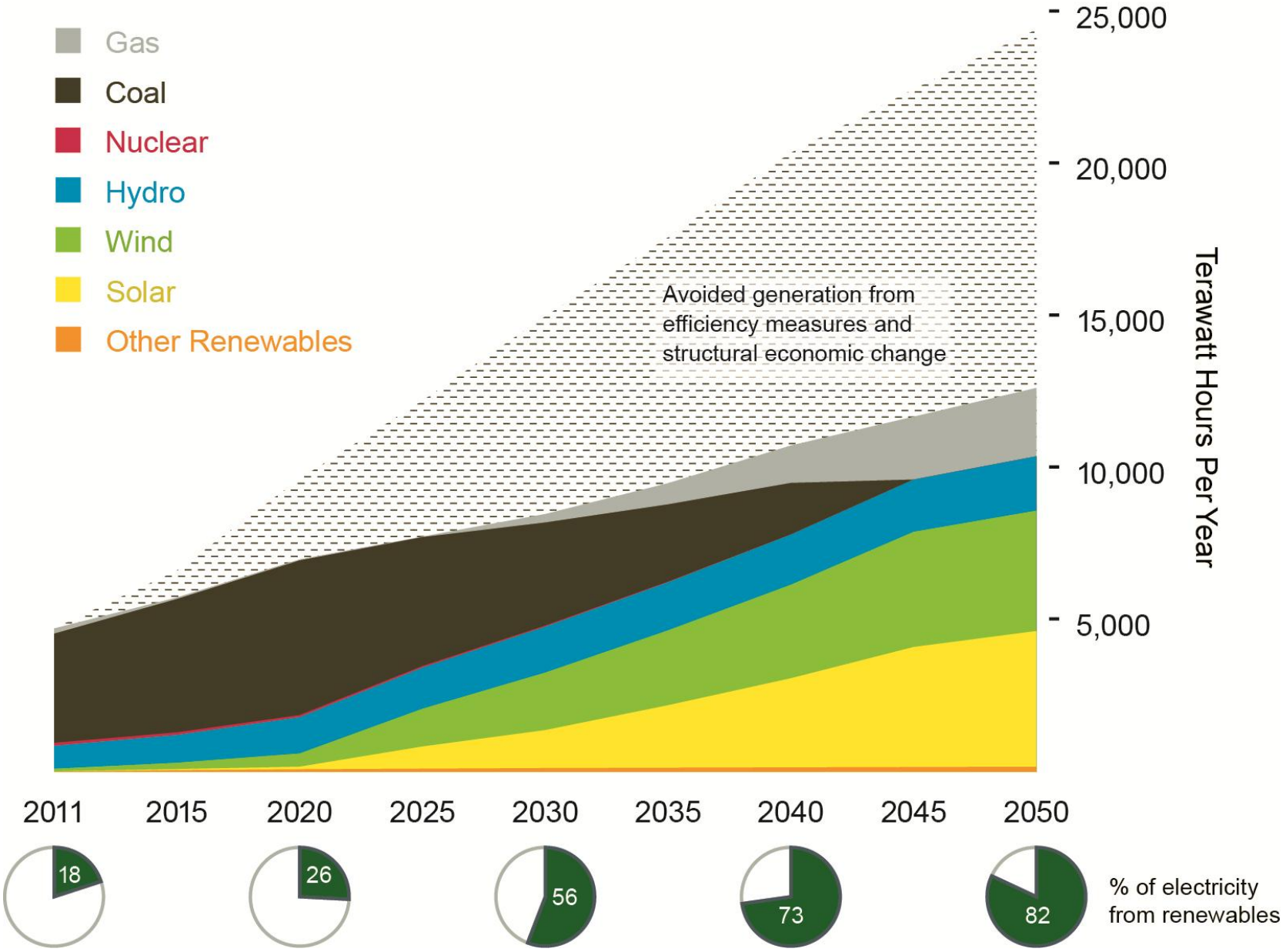
Electricity Generation, Baseline Scenario



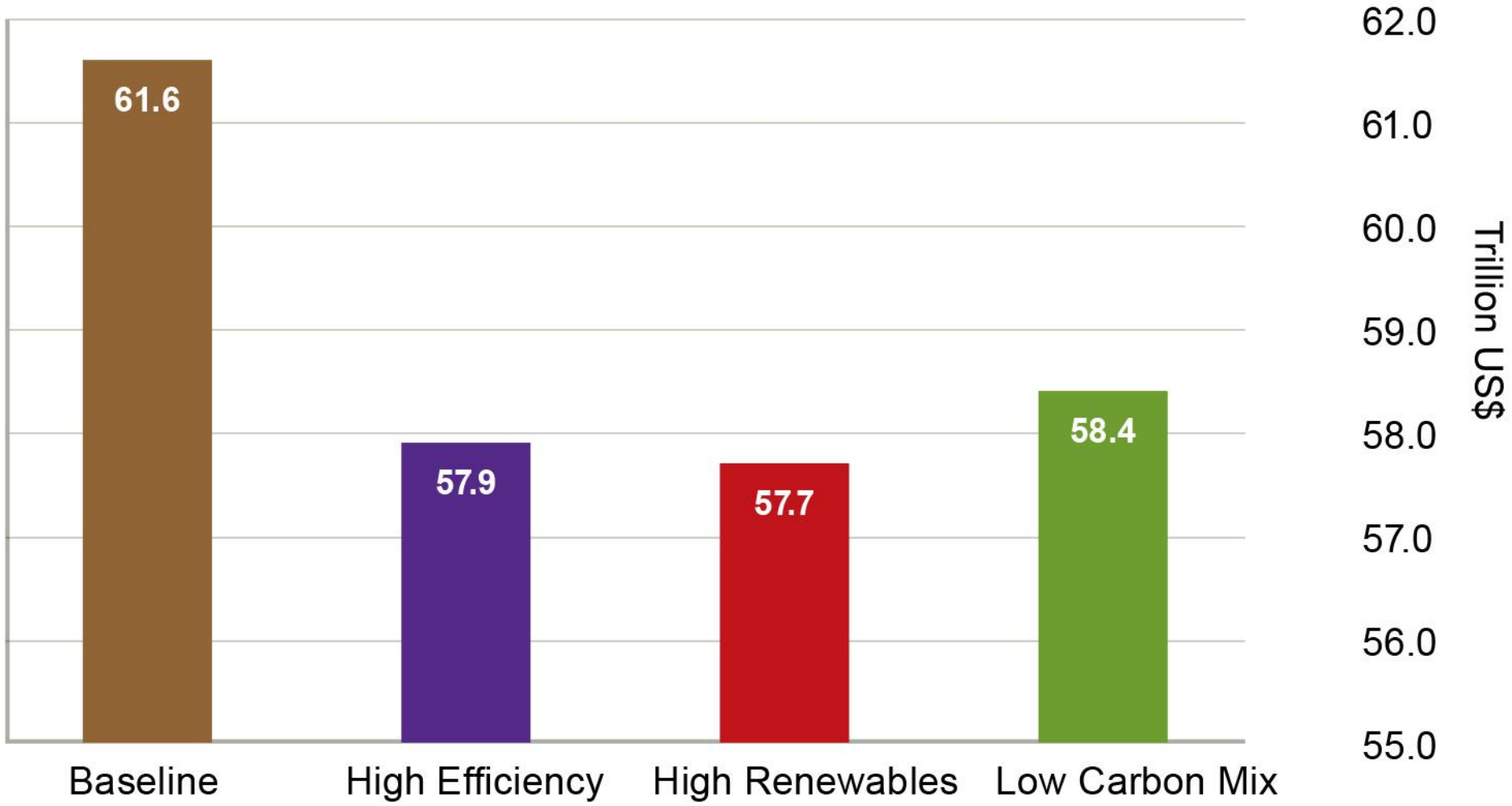
Electricity Generation, Low-Carbon Scenario



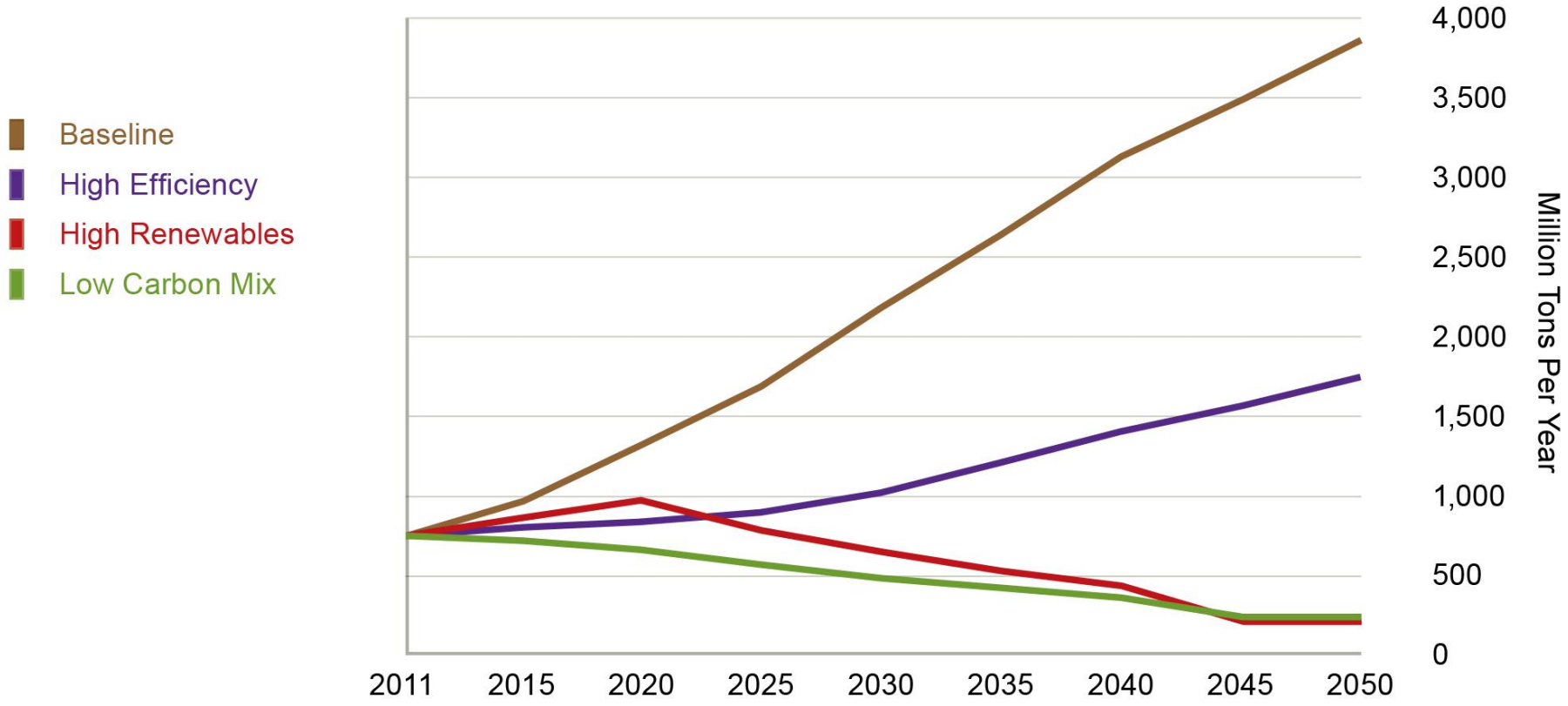
Electricity Generation, High Renewables Scenario



Total Cost of the Electric Power System 2011–2050



Carbon Emissions



Barriers to low carbon generation
低碳发电的障碍

- Monopoly in transmission and distribution / 电力输配垄断
- Real prices not reflected in electricity markets/电力市场没有反映真实价格
- Insufficient energy conversation signals to key emitting sectors/节能信号没有充分传递给重要的排放行业
- Insufficient signals to electric producers to shift away from fossil fuel generation/没有充分信号传递给发电企业让其远离化石能源发电
- Insufficient administration of some renewables subsidies/一些可再生能源补贴管理有待改进

Policy recommendations-1 / 政策建议-1

Public Welfare / 公共福利

- Adopt a carbon standard for power generation / 采用碳排放标准
- Increase transparency of data essential to serious environmental impact assessment / 提高环境影响评估所涉及的重要数据的透明度
  - Data collection and publication / 数据收集和公布
  - Assessment of ongoing projects / 实施的项目评估
  - Education and training / 教育和培训

Policy recommendations-2 / 政策建议-2

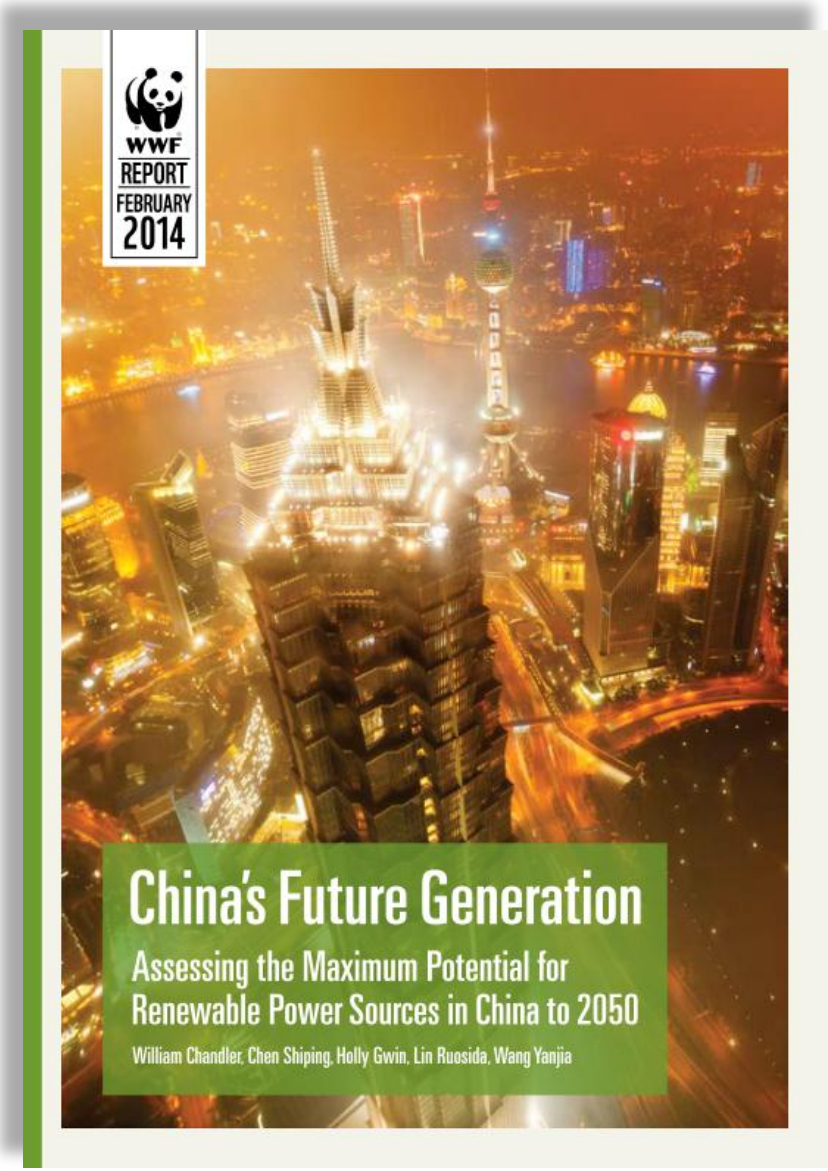
Utilities / 电力公司

- Make end-use efficiency a service obligation of the grid companies / 使终端效率改进成为电网公司的服务义务
- Support DSM by making clear how grid companies can recoup their costs of implementation / 通过明确电网公司如何回收实施成本来支持需求侧管理（DSM）
- Set renewables targets to pay attention both to construction and operation (kW *and* kWh) / 制订可再生能源发电量目标，而不仅仅是装机容量目标

Policy recommendations-3 / 政策建议-3

Industry / 工业, Customers / 消费者

- Issue timely and technology-forcing industrial process standards / 定期颁布（更新）工业生产能效强制标准
- Apply a demand charge to commercial and residential electricity consumers / 对商业和居民用电实行容量收费



English version available now online at:

http://www.worldwildlife.org/chinaenergy

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