

Decarbonize China's Energy Sector

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The World Bank

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Structure of the Presentation

- **A tale of two Chinas:** the largest coal consumer and the largest renewable power capacity in the world
- **Decarbonize China's energy sector:** strong government's commitment, but facing serious challenges. Need to rely on conducive policies and green financing
- **Green financing:** greening the banking sector and adopt result-based approach
- **Conducive Policies:** phase out coal generation quota to unlock renewable energy grid integration

Air Quality in Jing-Jin-Ji: A Long Way to Go



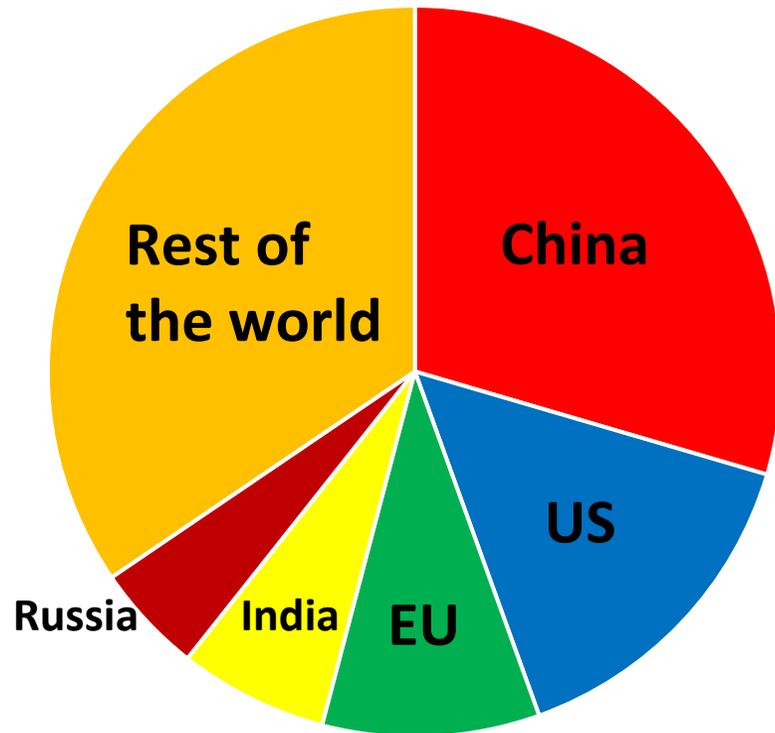
December 22, 2015



August 19, 2016

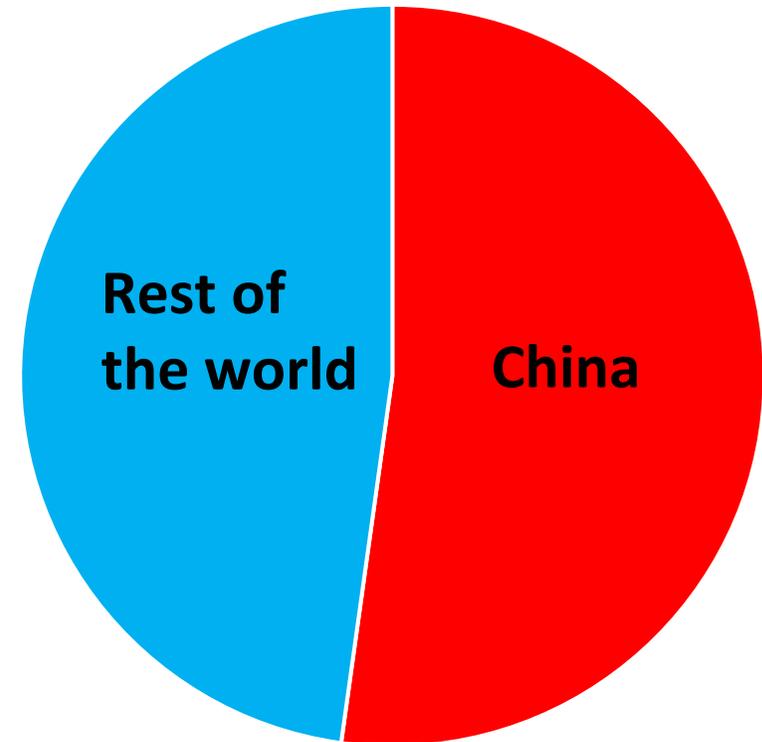
China: the largest CO2 emitter and coal consumer in the world

China emits more CO2 than the EU and US combined



Source: WRI CAIT, 2014

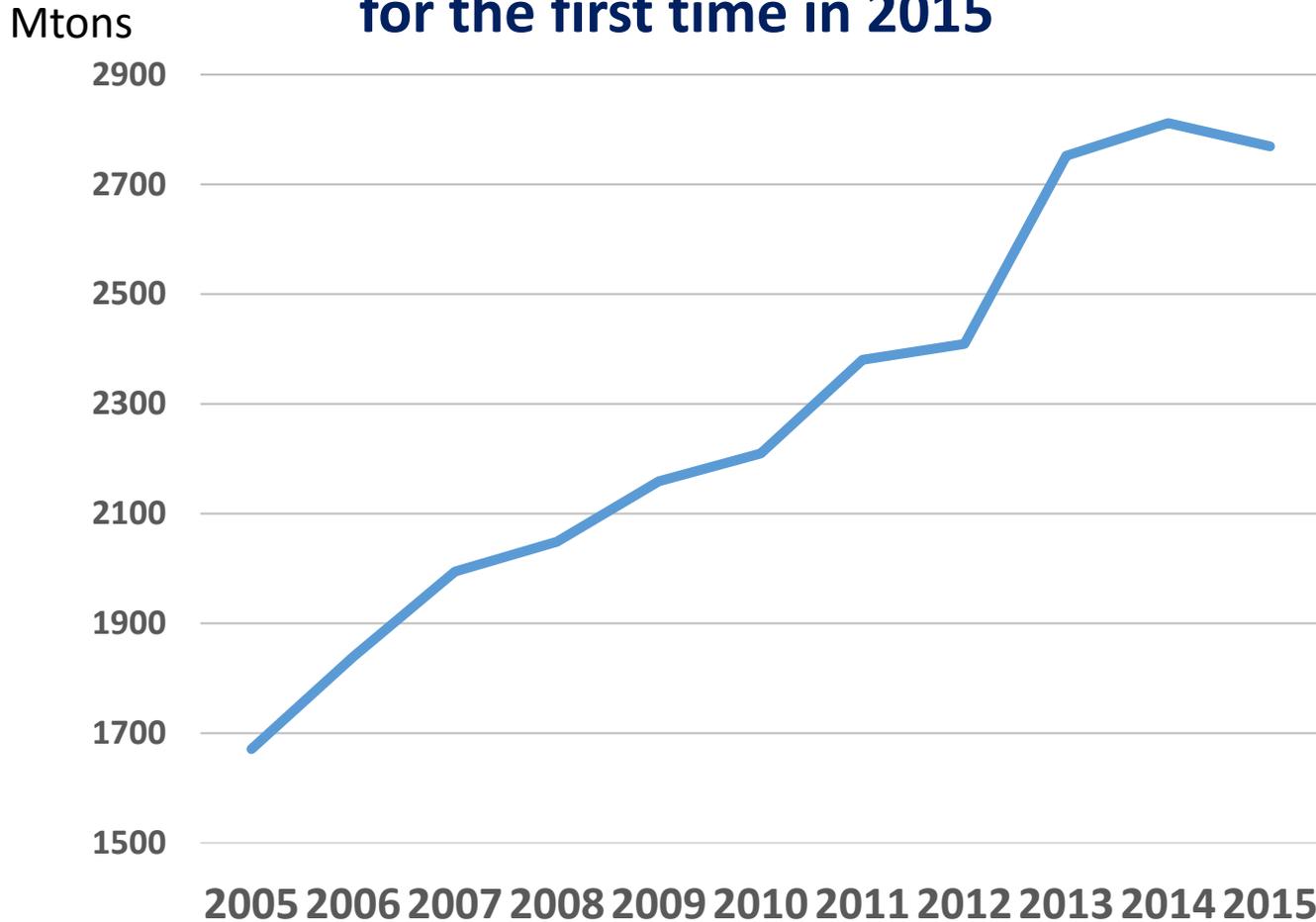
China burns more coal than the rest of the world combined



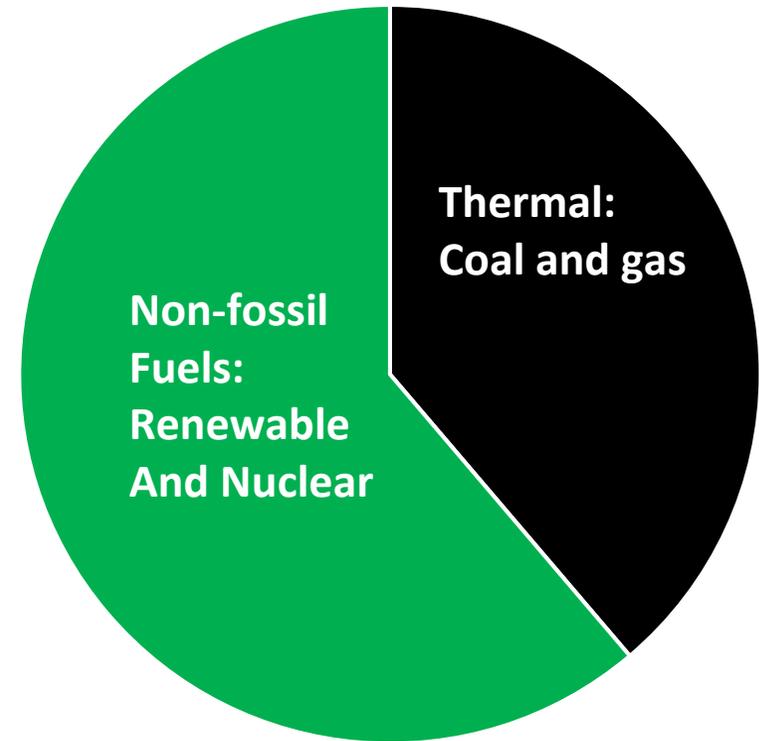
Source: IEA, 2014

China's coal started to decline

China's coal consumption declined for the first time in 2015



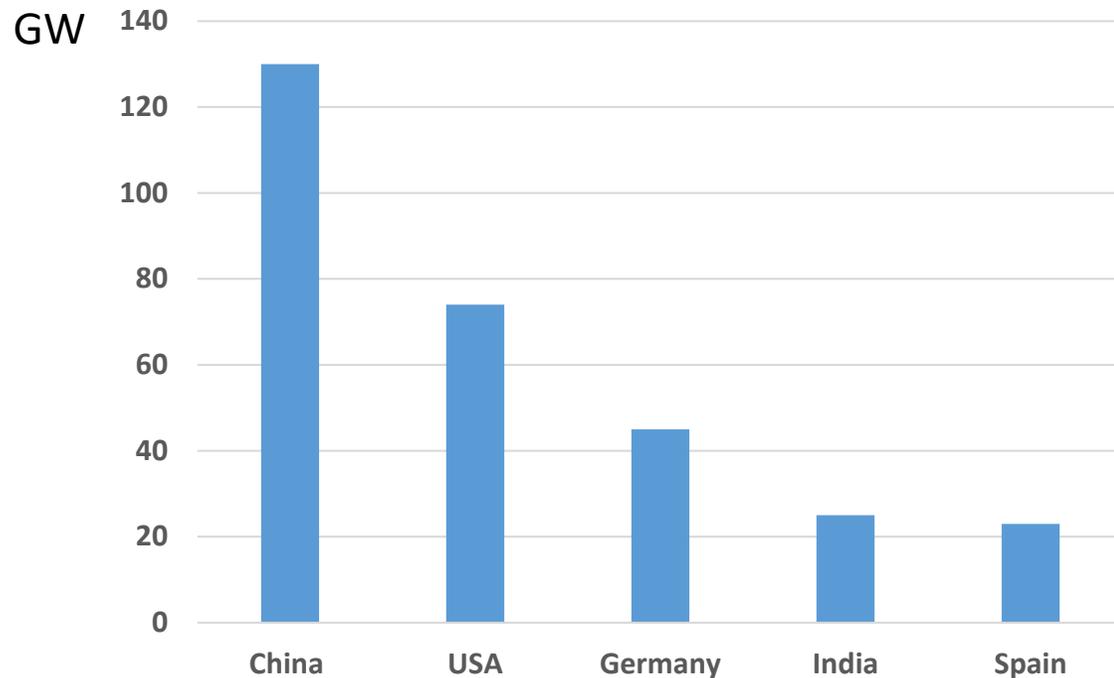
Thermal power accounted for less than half of Newly added power capacity in 2013



China: a global leader in renewable energy and energy savings

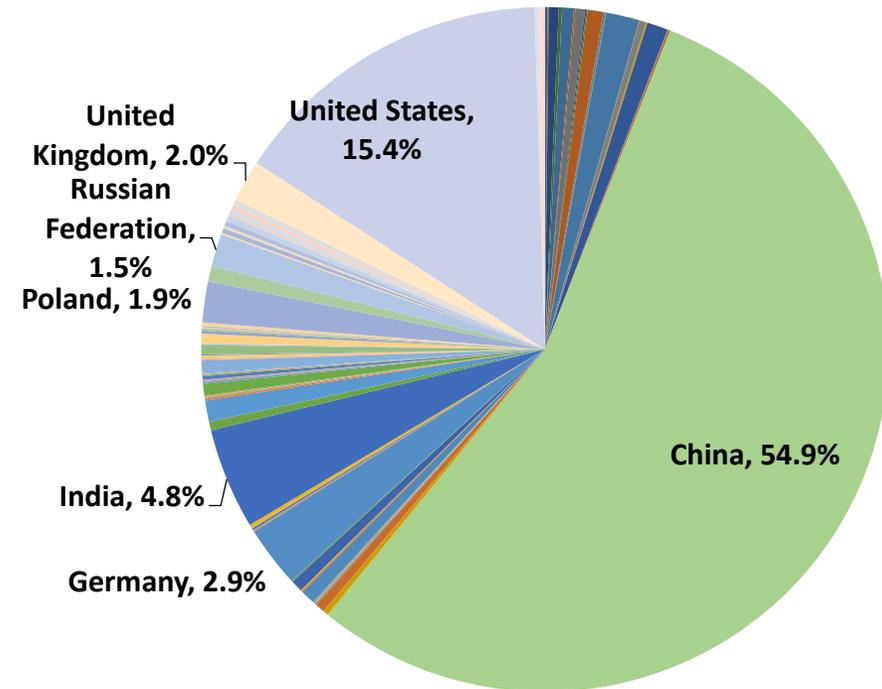
China has the world's largest wind and solar capacity

Top 5 wind power producing countries in 2014



Source: Global Wind Energy Council

China contributed to more than half of the global energy savings 1990-2010

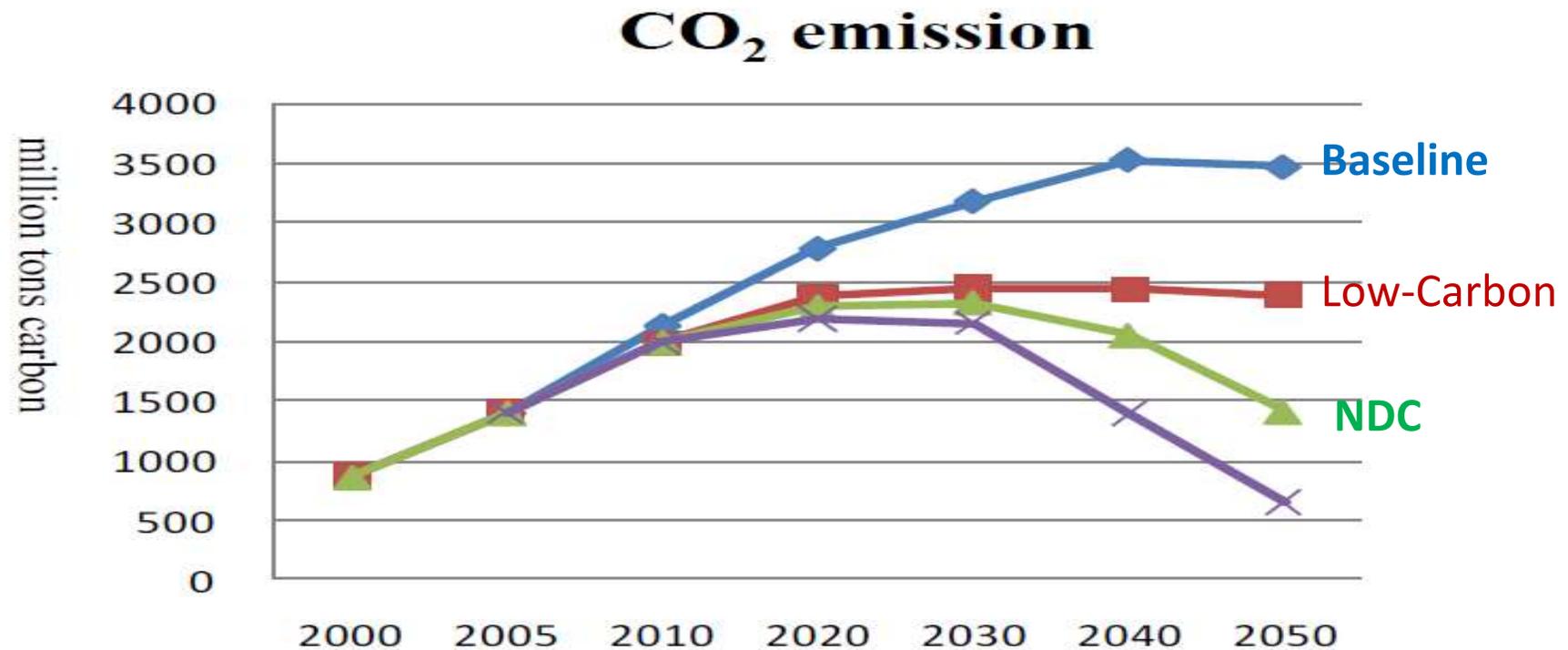


Source: WB Global Tracking Framework

The government is committed to bend the curve

China's NDC under Paris Agreement:

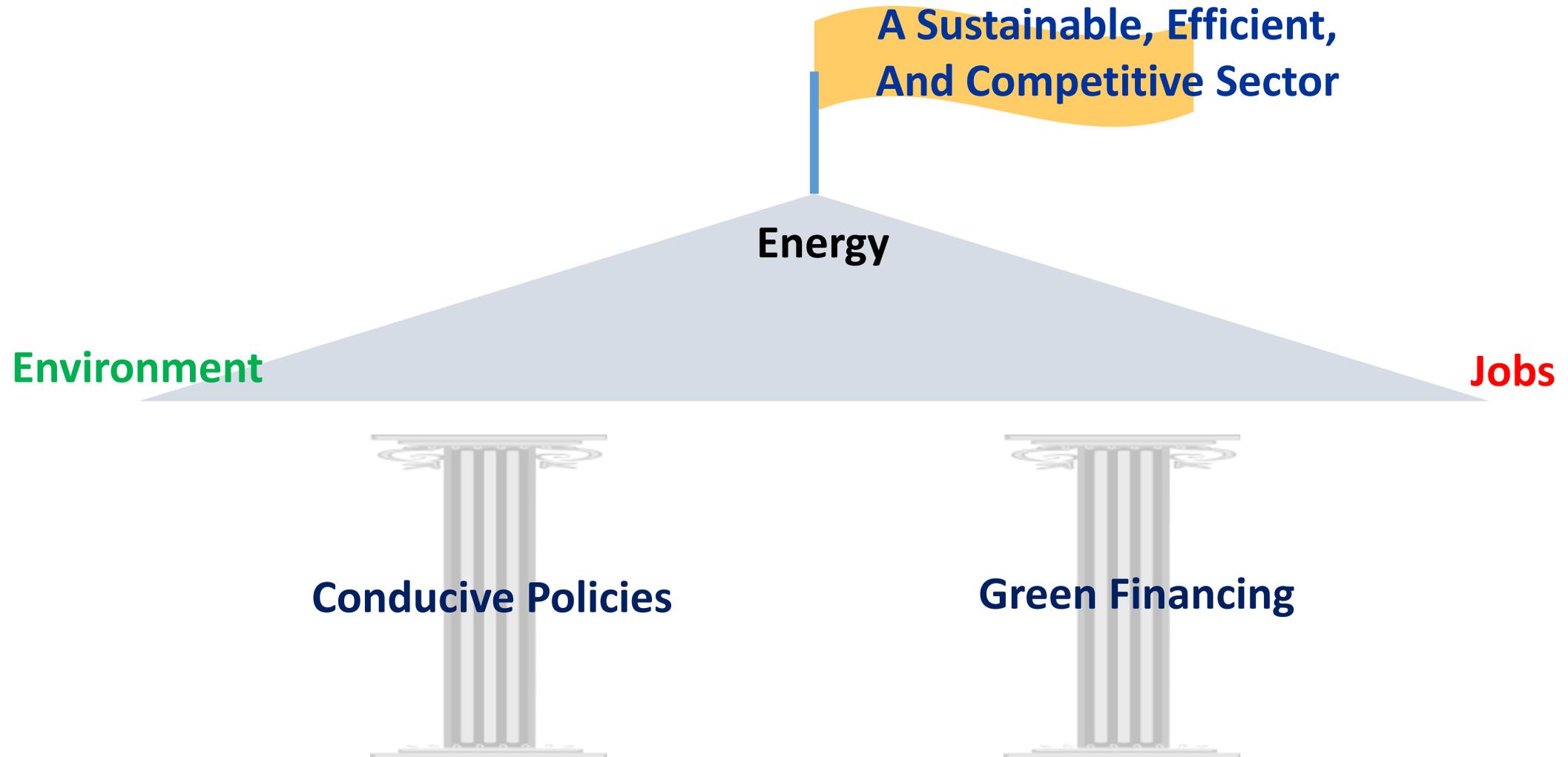
- CO₂ peaks by 2030
- Carbon intensity reduces 60-65% from 2005-2030
- Non-fossil fuel reaches 20% in primary energy mix by 2030



Challenges to decarbonize the energy sector

- **Shut down coal mines and coal power plants:** social issues
- **Scale up RE penetration:**
 - ***Serious wind curtailment:*** 15-20% of wind power curtailed. Growing overcapacity of coal power plants making it more difficult to dispatch RE
 - ***Coping with increased RE subsidies:*** Chinese consumers are paying \$13B/year now to cover the incremental costs of feed-in tariff for RE, and this would need to increase to \$30B/year by 2020 to meet the govt. non-fossil fuel target. 55 billion RMB gap NOW.
- **Cap total energy or coal consumption:** How to cap incremental increase in energy consumption and how to enforce?
- **Increase gas penetration:** high price and supply security concerns
- **Leapfrog to new technologies:** high costs and technology risks

Decarbonizing China's Energy Sector

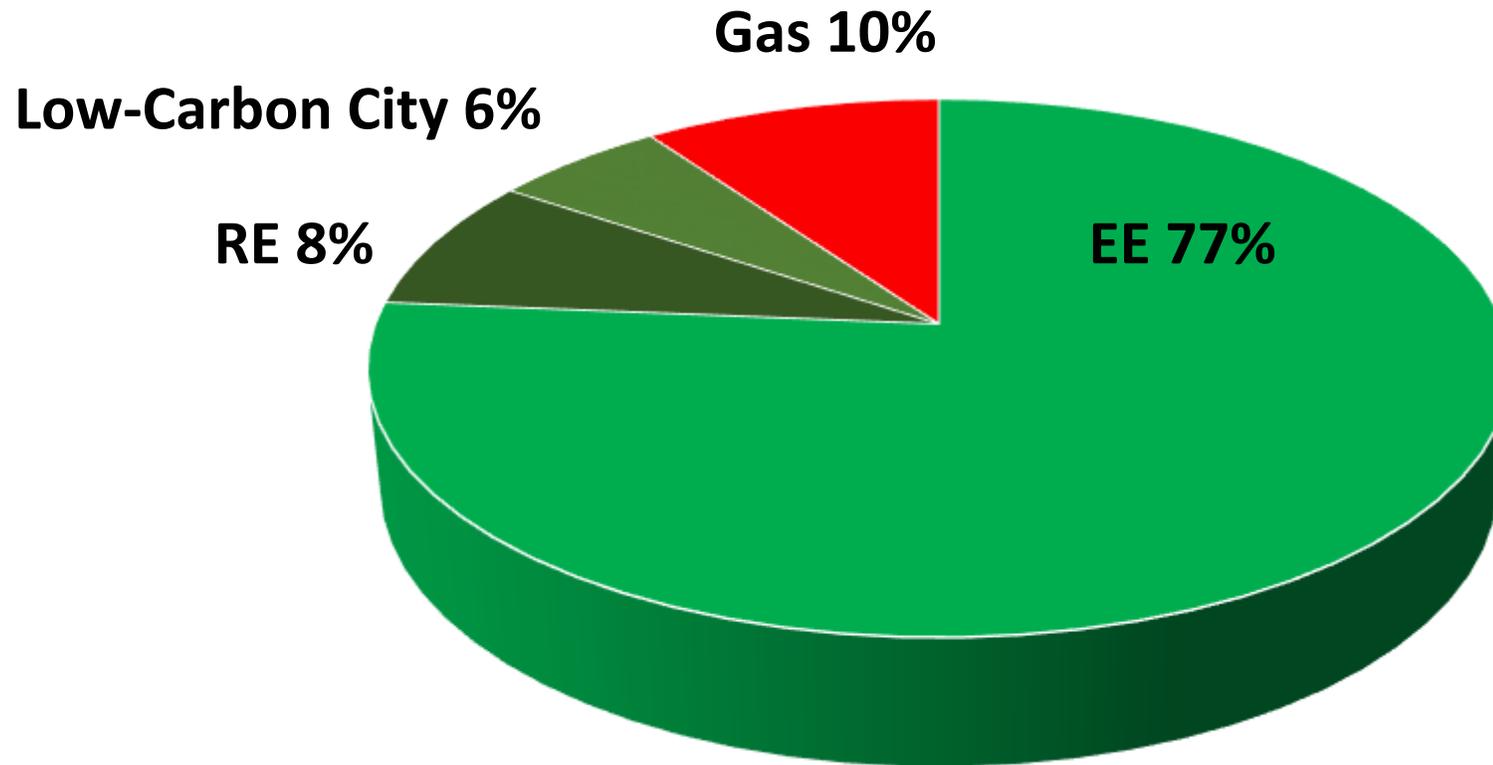


The World Bank Group: Committed to Climate Change and Leader in Climate Financing

- **The World Bank Group climate financing: \$11 billion per year**
- **The World Bank has a broad range of financing instruments:**
 - ***IBRD/IDA***: Long-term development financing
 - ***Climate Investment Funds (\$8 billion)***: Long-term concessional financing
 - ***Grants from Global Environmental Facility and other trust funds***: Grant for policy advice, technical assistance, capacity building, and pilot innovative financing mechanisms
 - ***Carbon financing***: Enhance the revenue stream of mitigation projects
 - ***BioCarbon Fund***: Fill the funding gap to address deforestation
 - ***Green Bonds***: issued \$2.4 billion (World Bank) and \$290 million (IFC)

Green Energy Dominates WB China Energy Portfolio

- Current Portfolio of IBRD and GEF: \$2 billion
- 90% green -- energy efficiency and renewable energy



Financing Instruments: Tailored to Market Segments, Barriers, and Local Context

- **Credit Lines:** Effective at increasing banks' capacity and confidence in EE/RE investments to **large and medium sized** clients/projects and providing **longer term tenure** for RE projects; **BUT** supporting SME EE investments is a challenge
- **Risk Guarantees:** Effective at increasing banks' confidence in the clients at **margins of credit ratings such as first time ESCOs**, mitigating **technology risks** (e.g. geothermal) and extending loan tenure; **BUT** only reduce banks' **perceived** risks
- **Dedicated Funds:** Effective at increasing access to EE financing for **SMEs and public sector projects**, and when **domestic banks are not ready** for RE financing; **BUT** leverage, sustainability, and scale-up key challenges
- **Concessional Project Financing:** **When sound policies not in place** as an interim measure; or **kick start new technologies**. **BUT** limited funds cannot lead to large **scale**
- **Utility EE/DSM Funds:** Effective at increasing electricity efficiency at **end-user level**; **BUT** they need strong **regulatory incentives**
- **ESCO Financing:** Effective at **aggregating** small deals; **BUT** not a magic bullet. **Super-ESCO** emerged as a viable model for government facilities
- **Mezzanine Financing:** Effective at bridging the equity/debt gap for **SMEs and start-ups**
- **Equity Funds:** Effective at supporting **SMEs, ESCOs, new technologies, and start-ups**
- **Consumer financing:** Effective at helping consumers **overcome high upfront cost** barrier, **BUT** regulatory system needs to allow utility on-bill financing

World Bank Introduces Market-based Financing Mechanisms

China Energy Efficiency Financing Program (CHEEF):

- **WB loan (\$400M): credit line** to three local banks for EE investment (EXIM, Hua Xia Bank, Minsheng Bank)
- **GEF grant (\$13.5M): policy support** to NDRC on priority EE programs for the 12th and 13th FYP, and **capacity building** to participating banks
- **Achievements: \$315M IBRD leveraged \$2,570M.** Annual energy savings of 4.3 Mton of coal equivalent and CO₂ emission reduction of 10.5 Mtons
- **Outcome:** Substantially increased participating banks' interests, capacity, and confidence in EE lending
- **Lessons learned:**
 - **Participating banks' internal organization** (Management commitment, dedicated teams, and incentives to staff) **are the most important success factor**
 - **Technical Assistance** to participating banks is critical with high pay-off
 - **Generating sufficient deal flows has not been easy**, particularly under the economic slowdown, and low hanging fruits have mostly been harvested
 - Encouraging participating banks to expand **support to SMEs has been a major challenge**

The first Program for Results Operation in China

Innovative Financing for Air Pollution Control in Jing-Jin-Ji

- **Program for Results (PforR) Instrument:**

- PforR supports the government's own program: Air Pollution Prevention and Control Action Plan
- PforR funds are disbursed upon the achievement of agreed program results
- PforR relies on the government's own systems and procedures

- **Program development objective:** to reduce air pollutants and carbon emissions through increasing energy efficiency and clean energy, with a focus in the Jing-Jin-Ji and neighboring regions

- **Program Leverage:**

- \$500 million World Bank loans, \$500 million Hua Xia Bank loans
- At least \$400 million from enterprises
- Syndication with other banks and green bonds
- Mainstreaming green financing reaching 150 billion Yuan at the end of program implementation

- **GEF Grant (\$4.5M):** business development, technical assistance, capacity building, and result verification

Innovative Financing for Air Pollution Control in Jing-Jin-Ji: Three Result Areas

- **Result Area 1: Reduced coal consumption from increased energy efficiency and renewable energy**
 - Energy efficiency in the industrial and building sectors
 - Renewable energy: wind, solar PV, biomass, solar water heaters, geothermal
- **Result Area 2: Reduced air pollutants' emissions from pollution abatement measures**
 - End-of-pipe control: particulates removal, desulfurization, and denitrification
 - Replace coal with natural gas
 - Replace gasoline/diesel vehicles with electric and CNG vehicles
- **Result Area 3: Strengthened institutional capacity of the Hua Xia Bank**
 - Establish a Green Finance Center
 - Develop and pilot innovative financial products: project-based lending, asset securitization, aggregation of small-scale projects, green bond, syndication with other banks
 - Expand clientele to underserved market such as ESCOs

Policy Support: CRESPP Made Significant Contributions to China's Renewable Energy Scale Up

China Renewable Energy Scale-Up Program (CRESPP)

- **CRESPP Phase I** (\$40M GEF and \$187M IBRD): made significant contributions to China's renewable energy scale-up. Three pillars:
 - **RE Policy studies:** RE Law and regulations--essential pre-requisite for RE scale-up
 - **Technology improvements for wind and biomass:** critical for quality improvement and cost reduction to build a strong local manufacturing industry
 - **RE investments:** support large-scale RE investments through direct project financing (IBRD) and pilot demonstrations/feasibility studies (GEF) in 4 provinces
- **CRESPP Phase II** (\$27M GEF): focusing on efficiency improvement, cost reduction, and grid integration. Support five areas:
 - Support RE policies 政策支持: 13th RE FYP, RE policies, power sector reform
 - Smooth grid integration 促进并网与消纳: regional pilots in Northern China
 - Pilot distributed generation in New Energy Cities 分布式供能和新能源城市
 - Technology Improvement: reduce costs and improve efficiency 技术提高: 降低成本提高效率
 - Support investment and build capacity 能力建设

Unlock Renewable Energy Grid Integration and Move the Power Sector Towards Competition and Efficiency

Phasing out coal generation quota:

- Set clear timelines to phase out coal generation quota and stop coal generation quota for all new coal power plants
- Adopt bilateral contracts, and design spot market in parallel
- Adopt transparent economic dispatch rules
- Implement simple method to implement grid pricing urgently, and allocate grid pricing to different voltage levels
- Put Renewable Energy Obligations on power distributors/retailers

Reform VAT system from production-based to consumption-based for across-provincial trade