

# 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



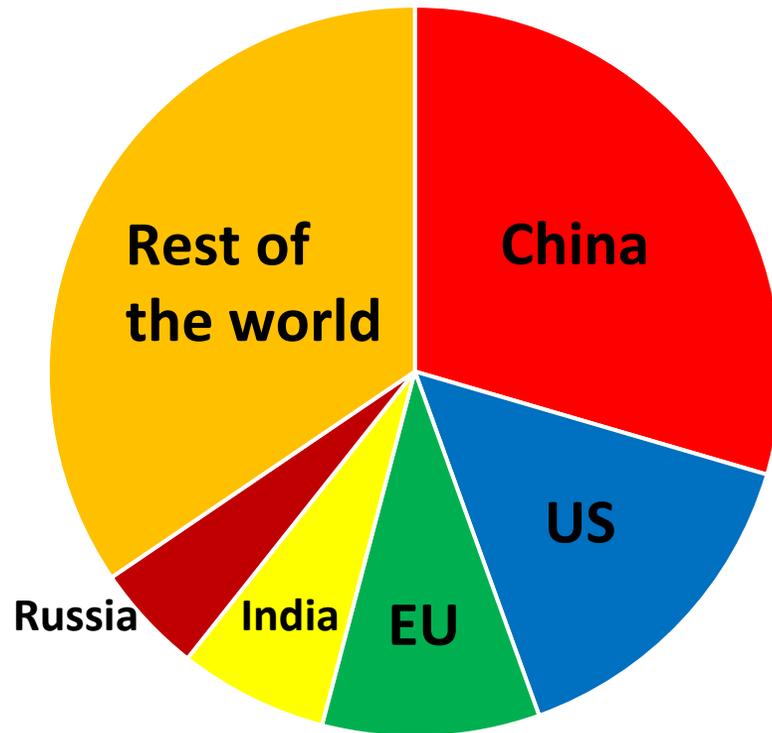
**December 22, 2015**



**August 19, 2016**

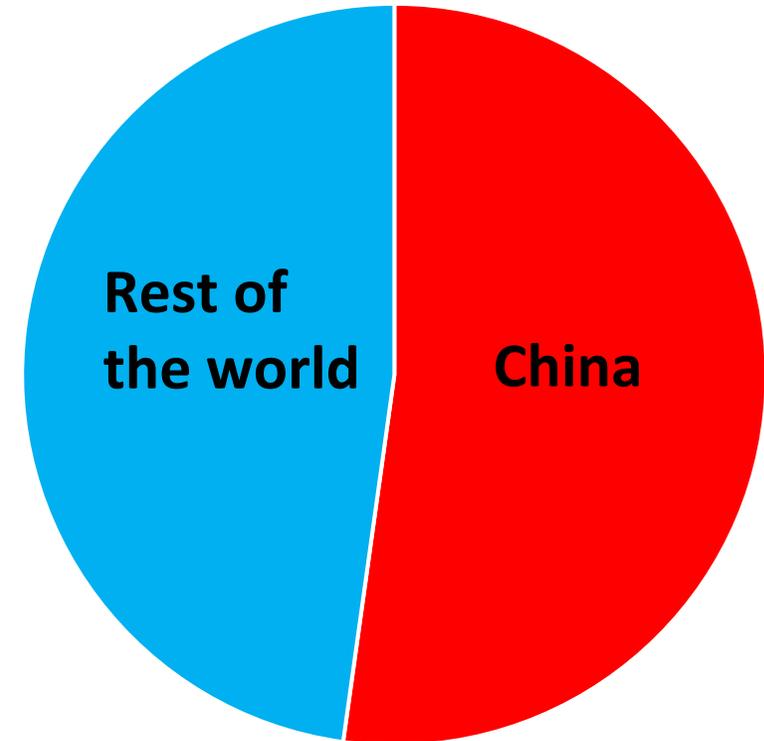
# China: the largest CO2 emitter and coal consumer in the world

China emits more CO2 than the EU and US combined



Source: WRI CAIT, 2014

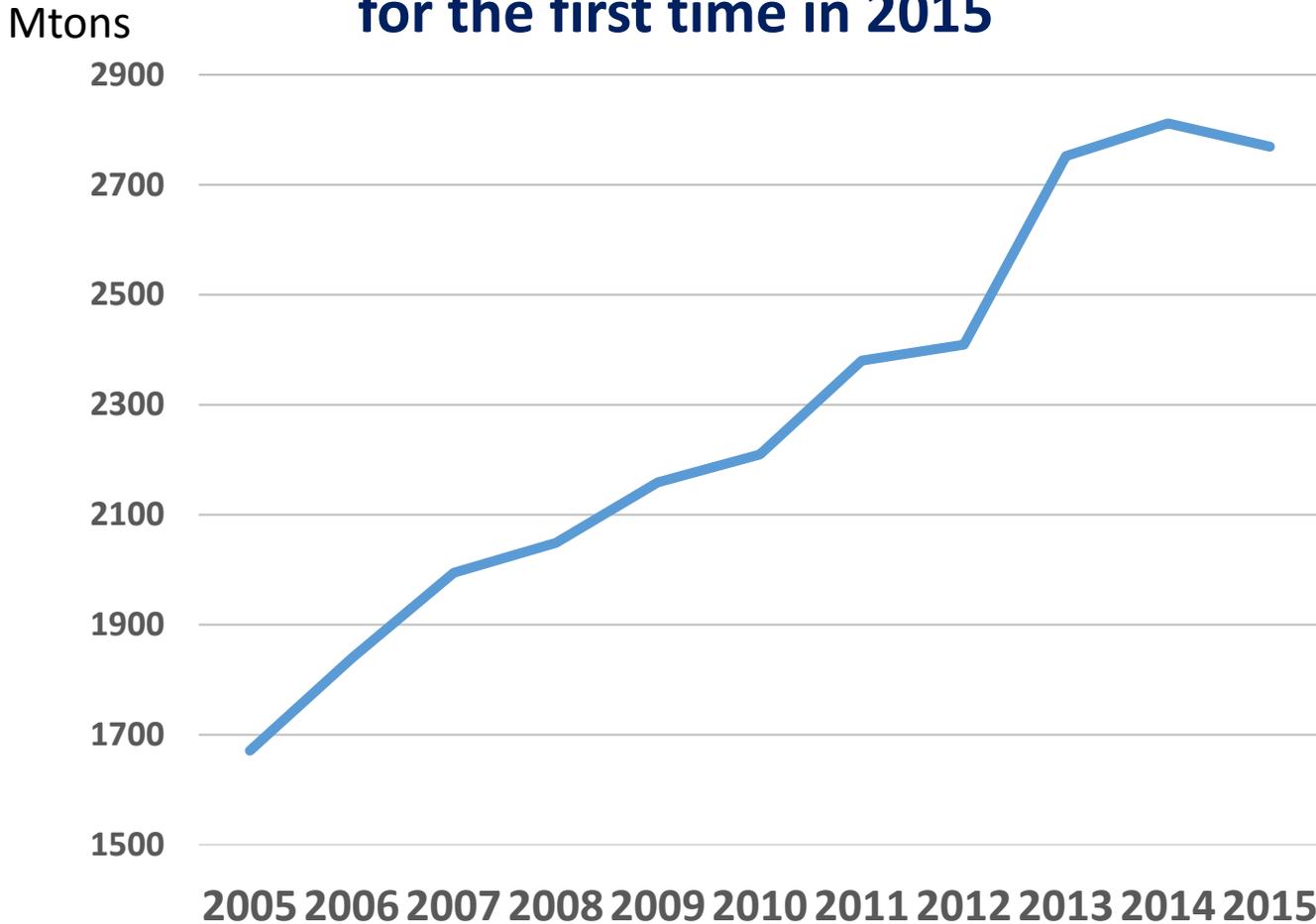
China burns more coal than the rest of the world combined



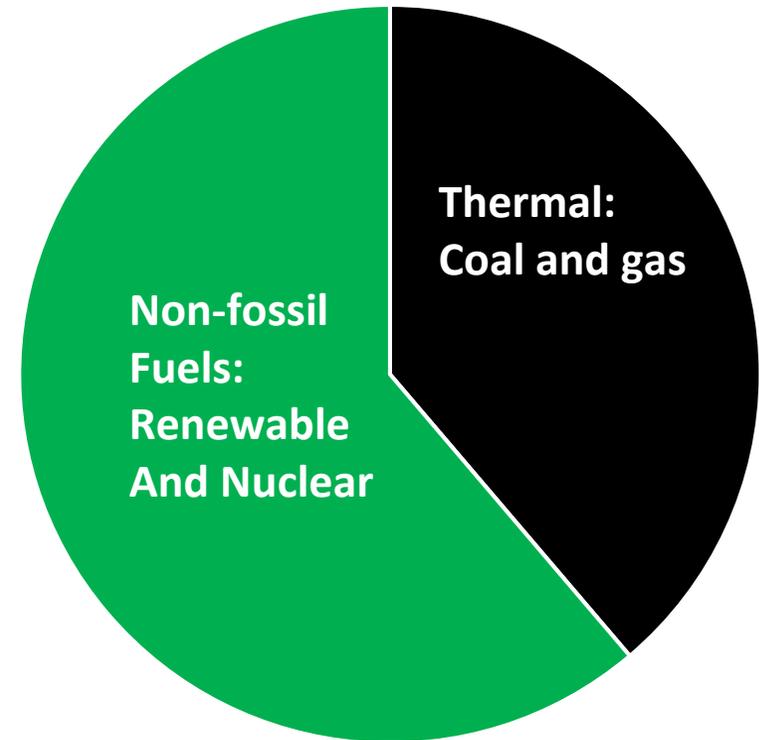
Source: IEA, 2014

# China's coal started to decline

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



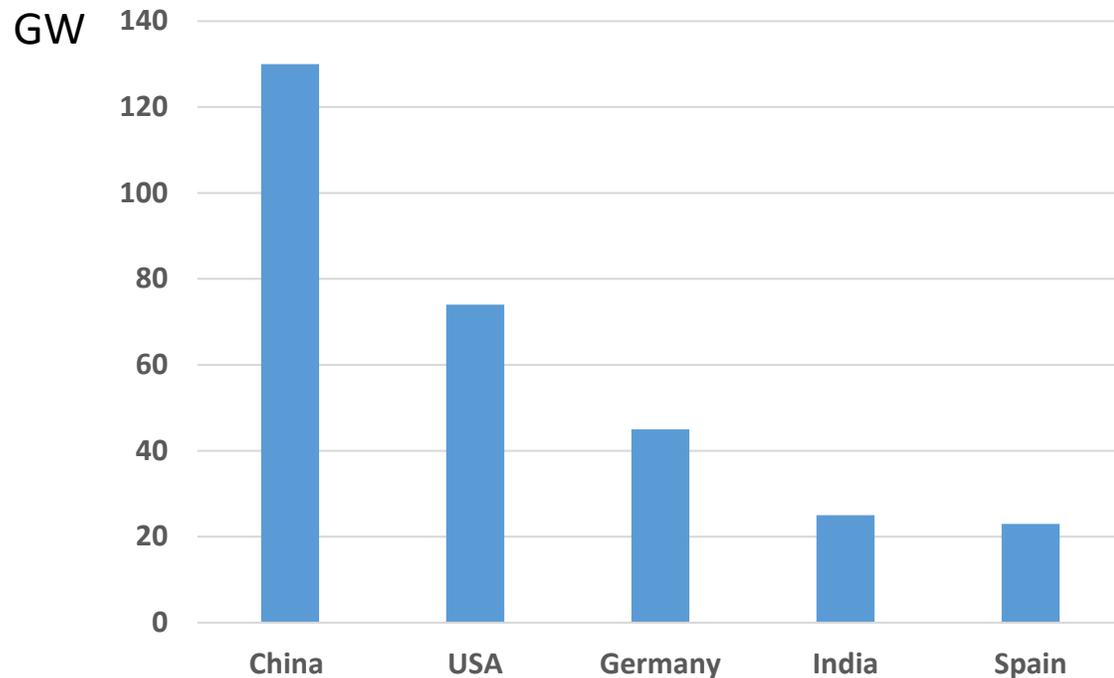
## Thermal power accounted for less than half of Newly added power capacity in 2013



# China: a global leader in renewable energy and energy savings

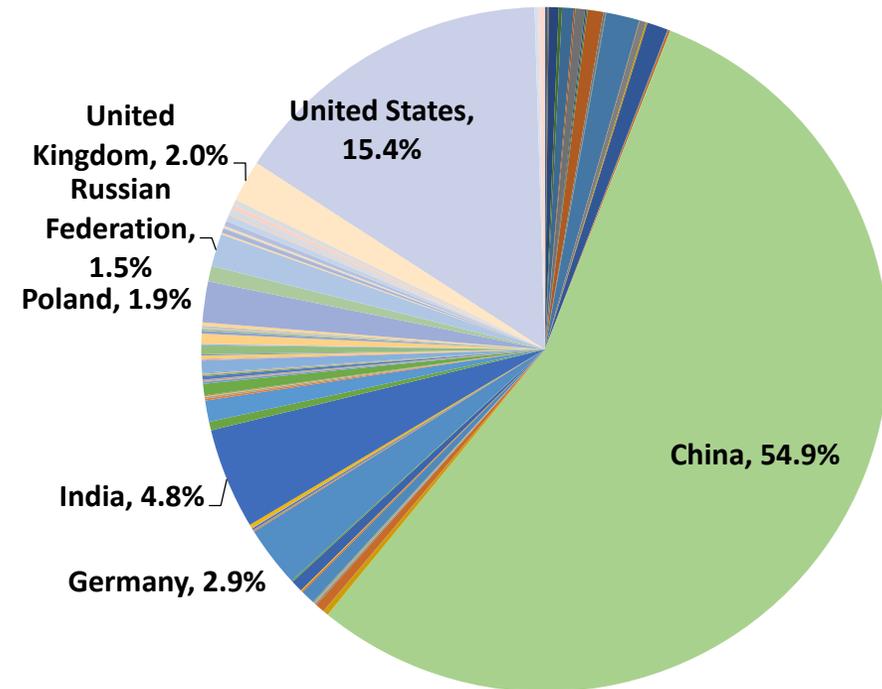
**China has the world's largest wind and solar capacity**

**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**

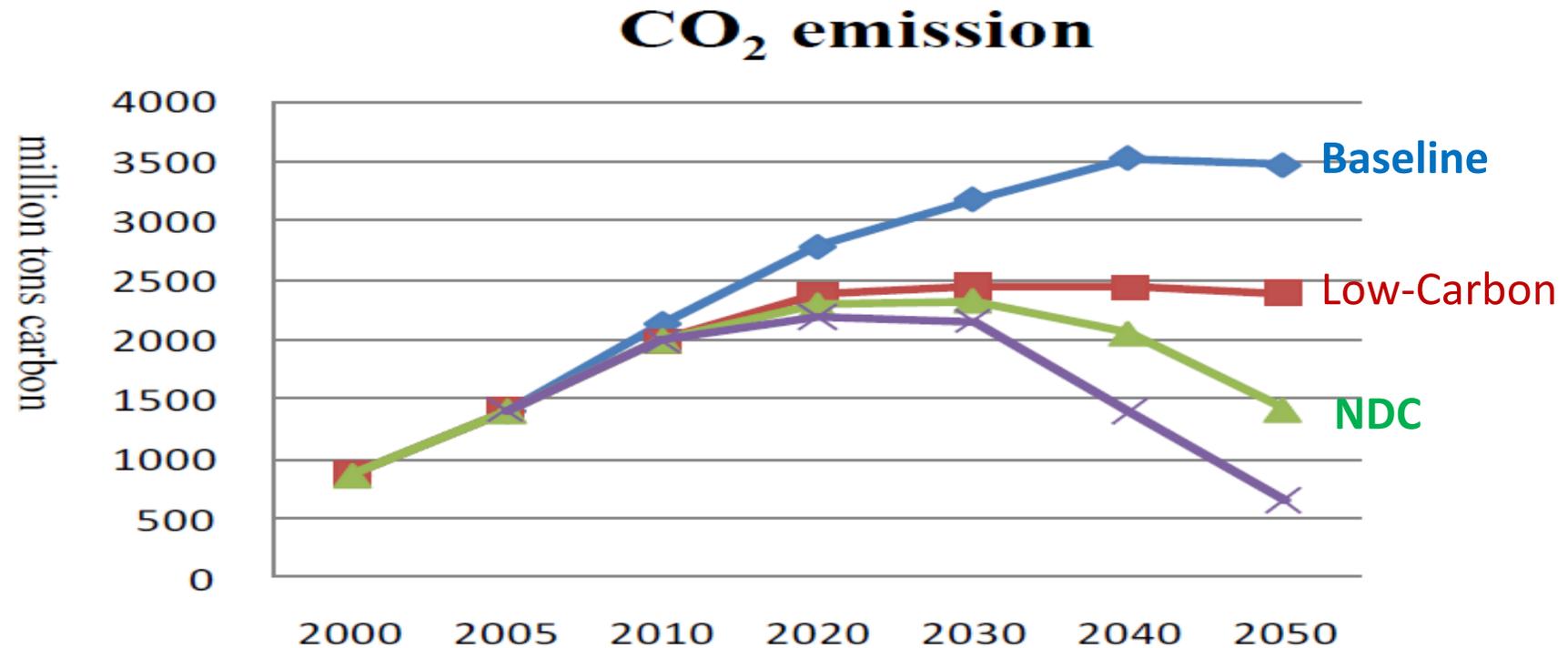


Source: WB Global Tracking Framework

# The government is committed to bend the curve

China's NDC under Paris Agreement:

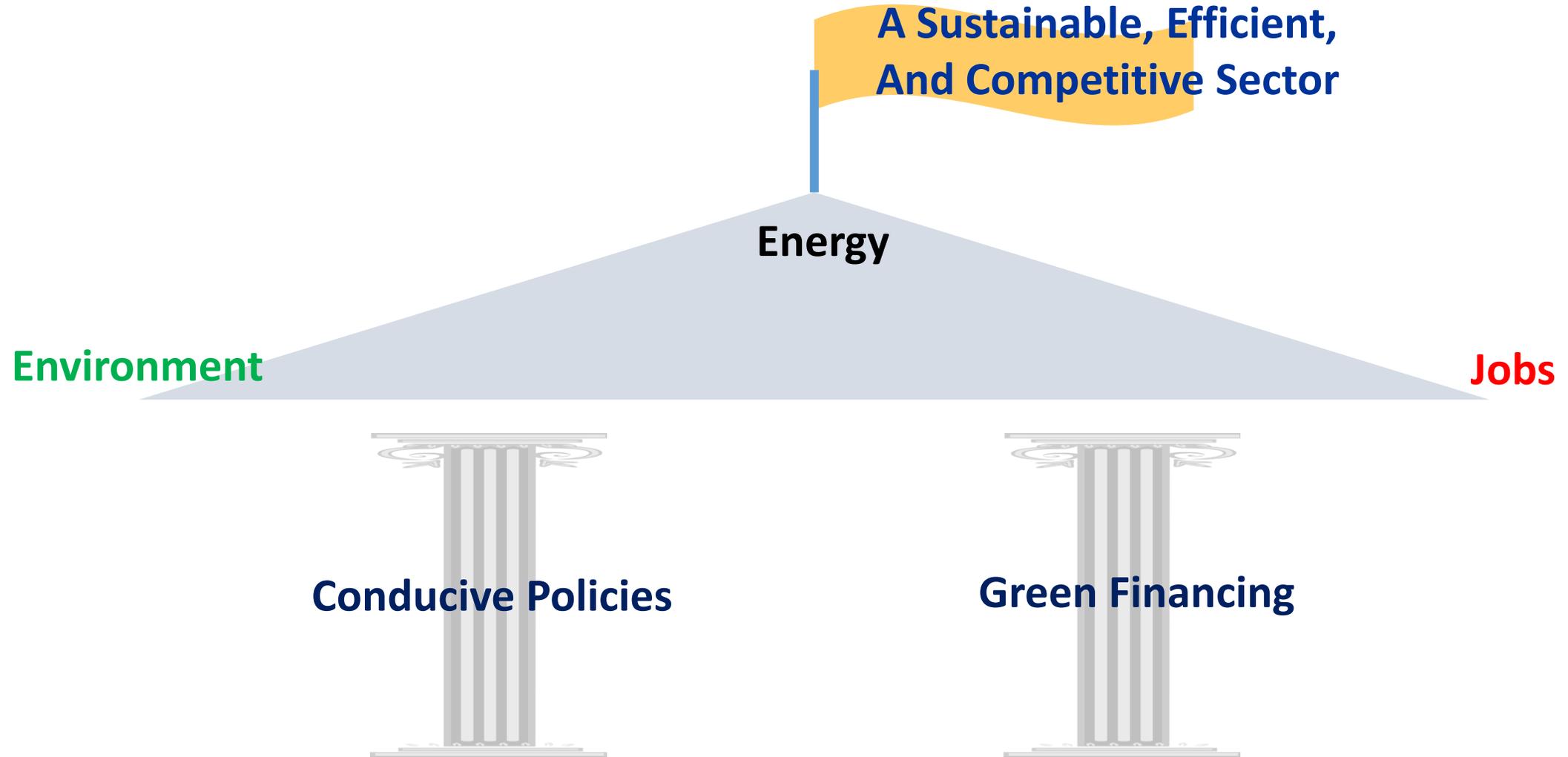
- CO<sub>2</sub> peaks by 2030
- Carbon intensity reduces 60-65% from 2005-2030
- Non-fossil fuel reaches 20% in primary energy mix by 2030



# 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

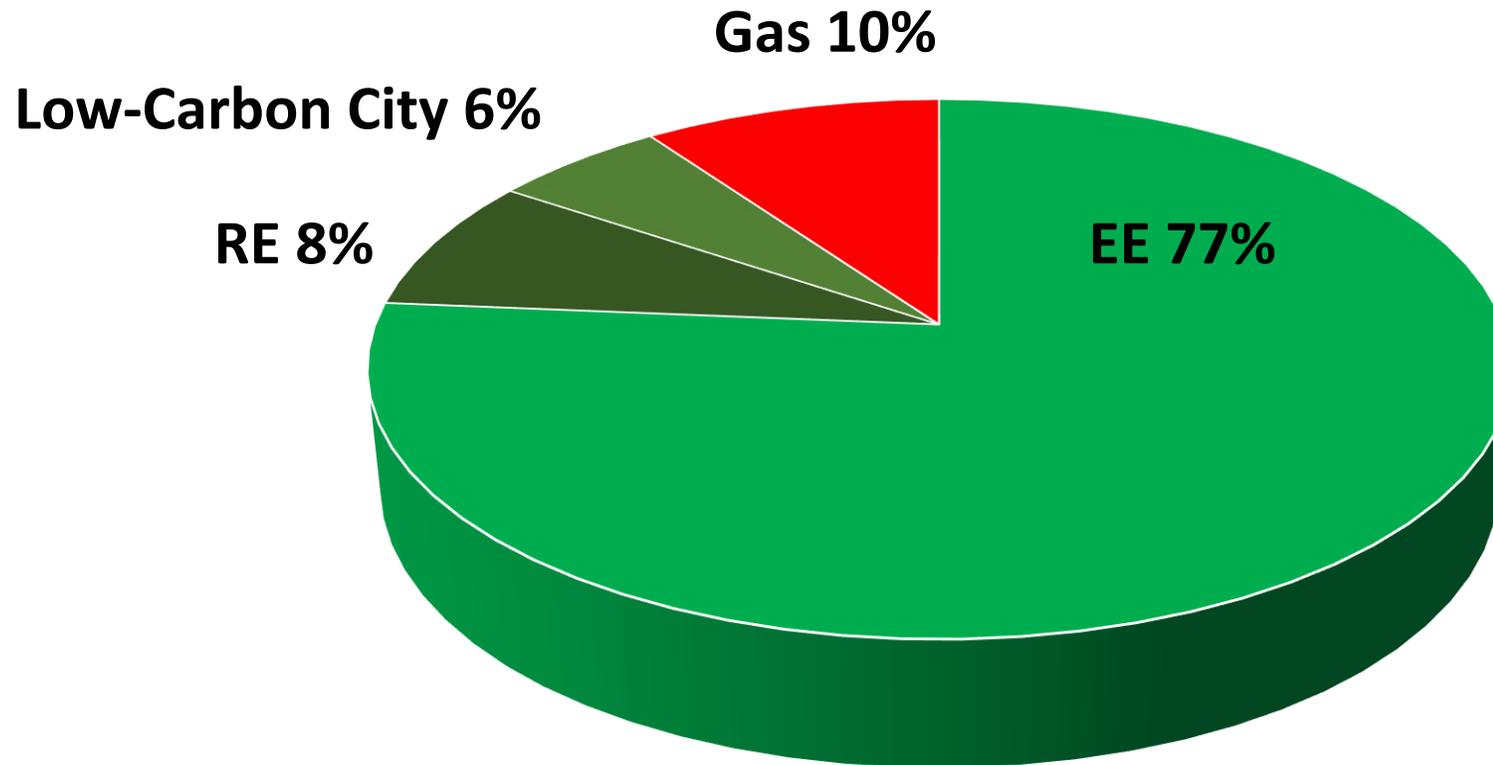


# The World Bank Group: Committed to Climate Change and Leader in Climate Financing

- **The World Bank Group climate financing: \$10-11 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 12<sup>th</sup> and 13<sup>th</sup> FYP, and **capacity building** to participating banks
- **Achievements: \$315M IBRD leveraged \$2,570M.** Annual energy savings of 4.3 Mton of coal equivalent and CO<sub>2</sub> 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: 13<sup>th</sup> 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**