

# China Energy Outlook 2020

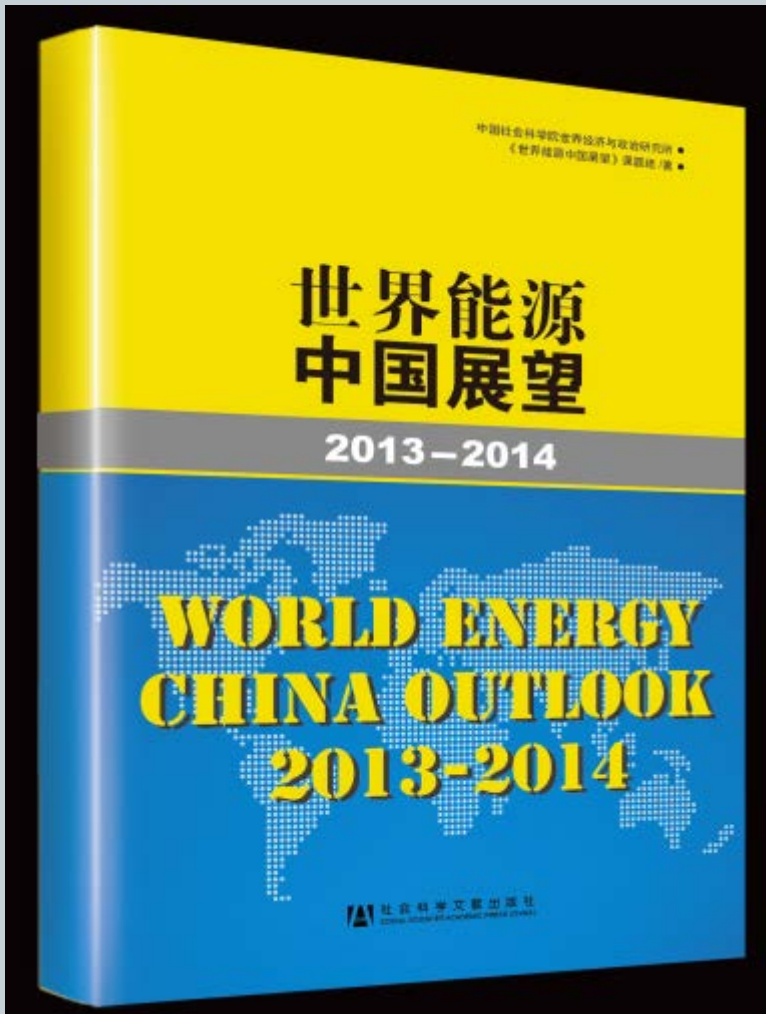
1

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# World Energy China Outlook 2014-2015

2



## Annual interactive Energy Outlook

Mid-year Updates

IWEP Energy  
Chinese Academy of Social  
Sciences

# Content

3

**I. Scenarios, Assumption and Database**

**II. Some Findings**

**III. Conclusions**

# Outlook Scenario: EES

4

- Our research emphasizes energy policy and its implications on energy developments with a set of assumptions.
- We conduct a comparative review between our report and IEA World Energy Outlook 2012 and 2013 Editions finding IEA's New Policy Scenario, its central scenario is not fully developed to fit China's realities.
- We decided to develop our own central policy scenario, i.e., Eco-friendly Energy Strategy, to back up our research and outlook within the outlook period (2011-2030).

# Assumptions

5

	IEA's CPS	IWEP's EES
1. GDP \$ Industries	Global GDP growth rate 3.6% in 2011-2035 while China GDP 8.1% in 2011-2020, 5.7% in 5.7% in 2011-2035	<b>China GDP growth rate 7.67% in 2013, 7.5% in 2014-2015), 7.0% in 2016-2020; elasticity=0.5</b>
2. Population & Urbanization	Worldwide: 7-8.7 billion from 2012 to 2035 with annual growth rate at 0.9%	<b>China: 1.354 billion in 2012, projected to be 1.44 billion with annual growth rate 0.77%. 1.47 billion in 2030 with annual rate 0.21%</b>
3. Pricing & Subsidies	Oil: imported at \$113/bbl in 2020 and \$128/bbl in 2035. Gas price gap narrowed. Coal price remain lower than oil.	<b>China: oil product prices will be international. Domestic gas price will be reformed upward as benchmarking in Asia by 2020.</b>

# Assumptions *continued*

6

	IEA's CPS	IWEP's EES
4. Energy Conversion	Coal Conversion Ratio 38.27% in 2013	<b>Coal Conversion Ratio 38.27% in 2013, 39.63% in 2015 and 40.28% in 2020</b>
5. CO2 Constraints	Global: CO2 emission will increase 34% by 2035 from 8% in 2012. If carbon marketing initiated in all sector, carbon price could \$30 per ton in 2035 from \$10/ton in 2020.	<b>In China, 45% carbon emission will be reduced in 2020. Carbon tax could be better option than carbon marketing.</b>
6. Technology	Technology in use or under development will be cost effective in association of energy supply and demand	<b>Technology innovation presents huge potential in China, esp. clean coal, energy efficiency and CCUS will be expanded wider after 2020. Therefore, outcome of energy saving and emission will outstrip those envisioned by the IEA.</b>

# 10 sets of technologies

	Global	China	Forward Looking
Clean Coal	Coal chemical and coal power integration	Clean coal tech spread around 2020, coal2gas under development	Cost reduction and water solutions to be explored
Unconventional Drilling	US, Poland, Australia, etc.	Development approach toward tight gas, CBM and shale. Unconventional rate will be upward to 67% in 2020	Comprehensive solutions dealing with uncertainties in geology, technology, infrastructure and regulations
Deep Water	Deep and ultra-deep water E&P activities and produce 200 Mt in 2020	Moving to deep water for production 50 Mt in 2020	Further openness and technology & equipment innovation
Renewable electricity	Solar PV capacity grow at 42% while wind capacity grow at 27%	Solar and wind power sector are under restructuring for higher increases	Cost effectiveness and policy supports are required.
Nuclear	Nuclear plants are under review and re-start. 15-20 nuclear plants could be restored, Nuclear power could account for 15%.	Currently, 21 nuclear plants under operations, 28 more plants are planned. 50 GW in 2020	Benchmarking pricing and safety & security, plus public awareness
CCUS	13 large CCS pilot projects are under operation or construction	CCUS (2+9) is listed into its 5-year energy Hi-tech planning	Enhance financing and policy supports, increase pilot projects
Bio energy	Enhance policy supports and further investment dealing with over investments	Promoting bio energy diversification (fuel, power, gas) fitting local requirements	Provide policy incentives to build up confidence and promote R&D while promote international cooperation
HEV/EV	HEV/EV sale increase sharply for better future	Working on HEV technical routes and standards and promote in major cities in 2015	Further reduce battery costs, plus logistics.
Energy Efficiency	Majority of consumers released incentive and policy	Efficiency is developed in details	Diminishing obstacles
Environmental		Release further development energy saving and environmental protection proposals in August 2013	Take energy saving as a new life style by launching “new energy, new life” campaign

# Key Policy under Review

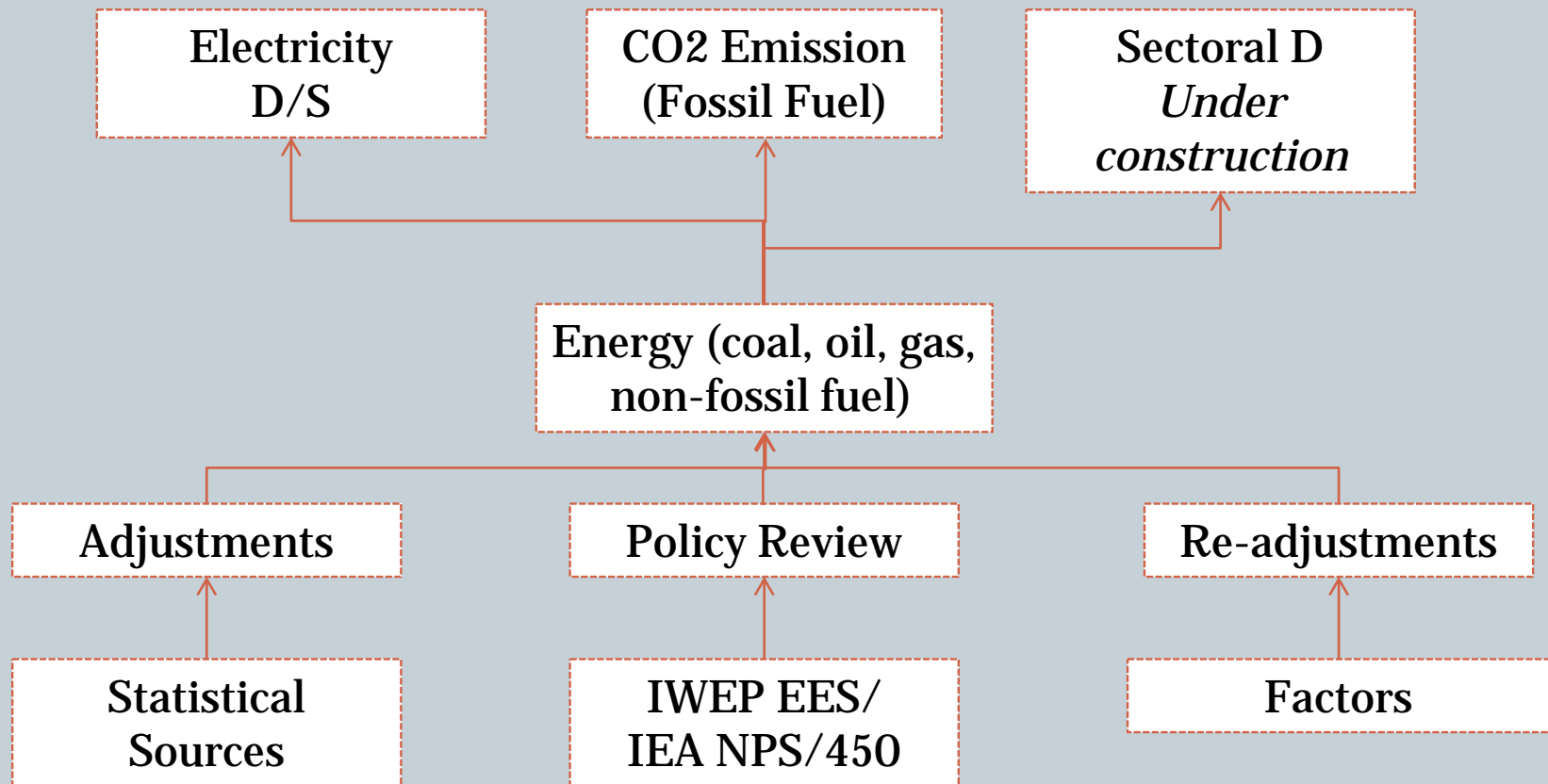
8

#	Dates	Authority	Documents/conference	Types
1	13-1-1	State Council	Five Year Plan for the Energy Industry	Central
2	13-7-1	State Council	Policy Briefing on Solar Sector Development	Central
3	13-8-2	State Council	Policy on Energy Saving and Environmental Protection Industrial Development	Central
4	13-9-1	State Council	Plan for Actions against Atmospheric Pollution	Central
5	13-9-1	Ministry of Environmental Protection, NDRC, MOIL, MOF, NEA	Implementation Details for Actions against Atmospheric Pollution in Beijing-Tianjin-Hebei and neighboring regions	Inter-provincial
6	13-9-2	Hebei Province	Implementation Plan for Actions against Atmospheric Pollution in Hebei	Provincial
7	14-1-1	National Energy Administration	National Energy Conference 2014 – Policy Briefing	Sectoral
8	14-3-1	NDRC, NEA, MOEP	Working Plan against Atmospheric Pollution in Energy Sector	Central
9	14-4-1	State Council	An Establishments of Effective Mechanisms to Enhance Natural Gas Supply – Policy Briefing	Central
10	14-4-1	National Energy Commission	The 2 <sup>nd</sup> National Energy Commission Conference Report	Central
11	14-5-1	State Council	Low Carbon Plan for Actions toward Energy Saving and Reduction of Emission in 2014-2015	Central
12	14-6-1	Central Financial Steering Committee	The 6 <sup>th</sup> Central Financial and Economic Steering Group Conference	Central



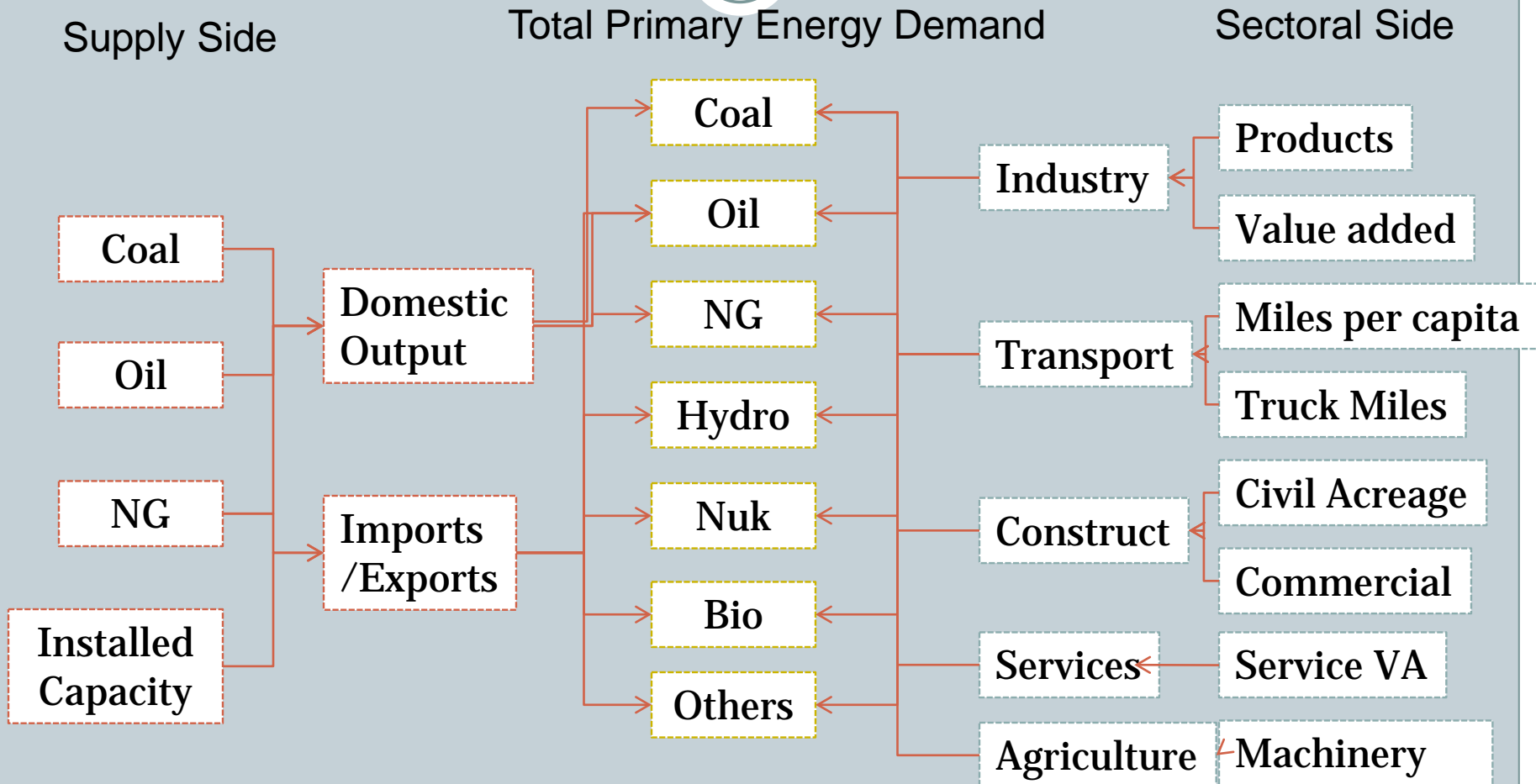
# IWEP Energy Outlook Database

9



# IWEP Energy Outlook Database

10



# IWEP Energy Outlook Database

11

## Energy D/S

- **Demand** : Amount, subsector, growth, mix
- **Supply** : Amount, subsector, growth, mix
- **Storage**
- **Net Import**
- **Elasticity**

## Electricity

- **Installed Capacity** : Amount, subsector, growth, mix
- **Use** : Amount, subsector, growth, mix, average use of hours
- **Elasticity**

## CO2

- **Fossil Fuels** : Amount, subsector, growth, mix, emission parameters
- **Non-Fossil Fuels**
- **Carbon density**

## Sectors

- **Industry, transport, construction, services, agriculture** (*under construction*)

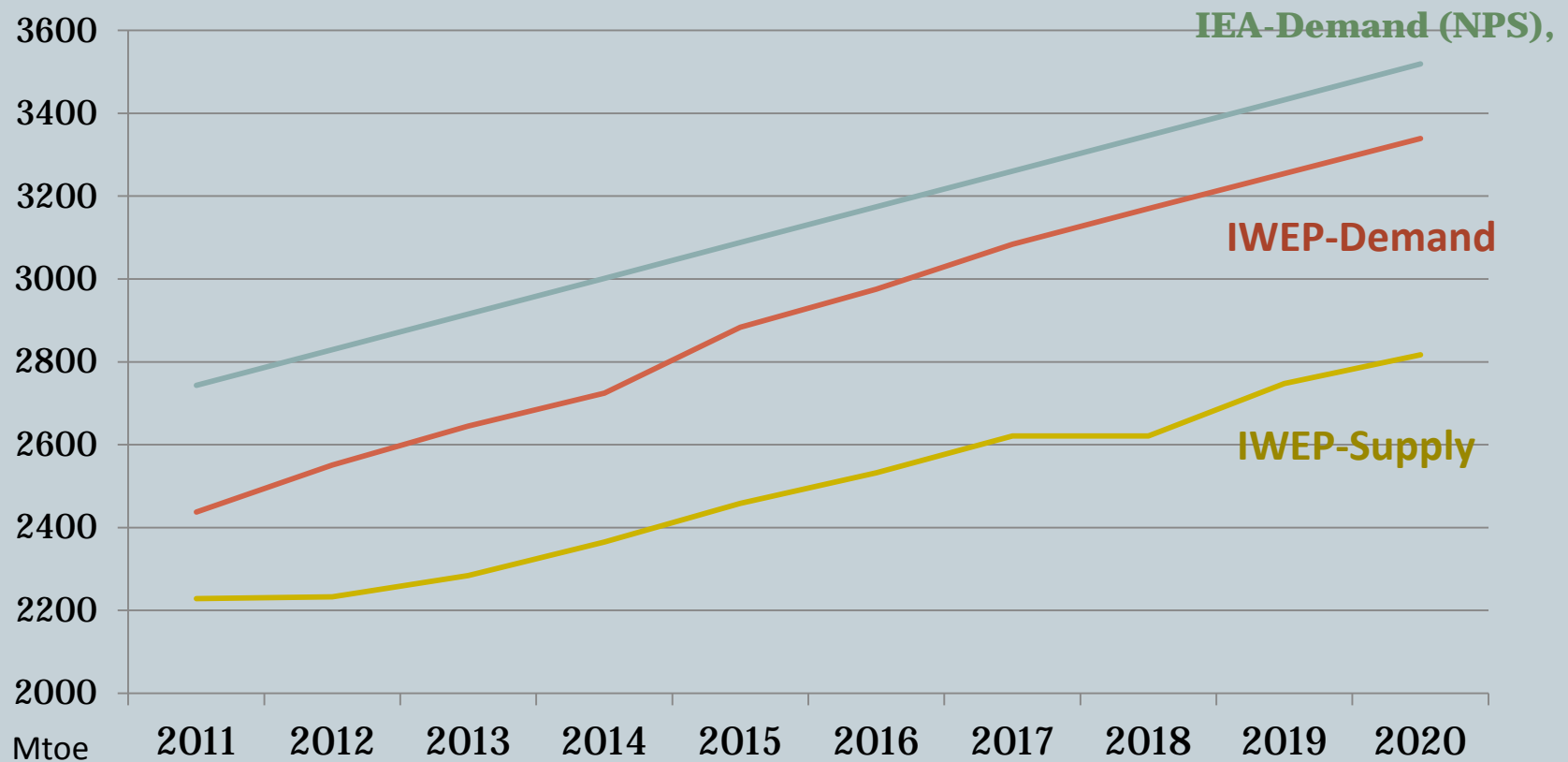
# II. Some Findings

12

- Energy Demand Outlook 2020
- Energy Supply Outlook 2020
- Electricity Use
- CO2 Emission – fossil fuels
- Coal Use Efficiency
- Gas Mix and Foreign Dependency
- Energy Efficiency
- Policy Options: Capacity and Coal Use Reduction

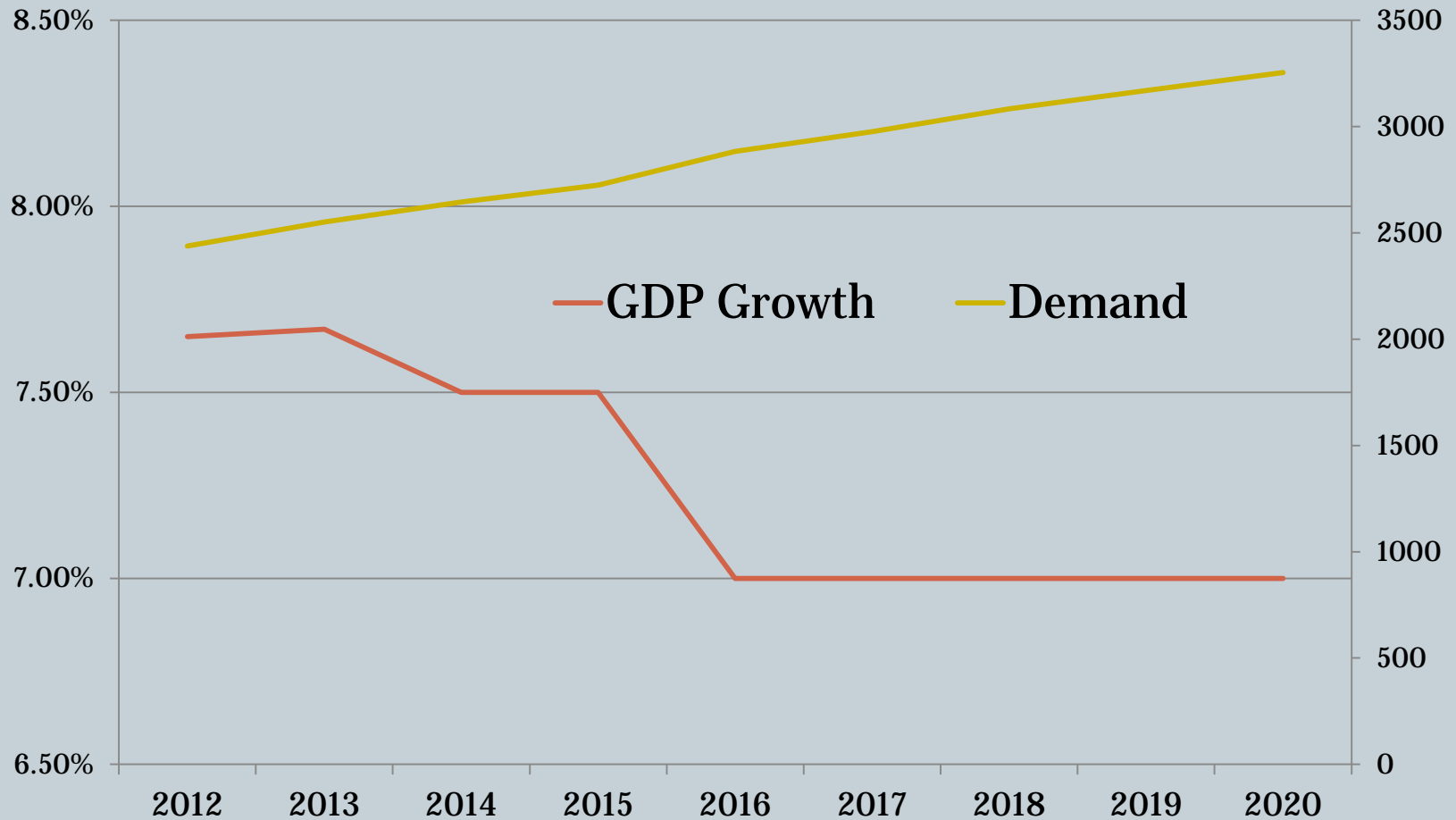
# China Energy Demand Outlook 2011-2020

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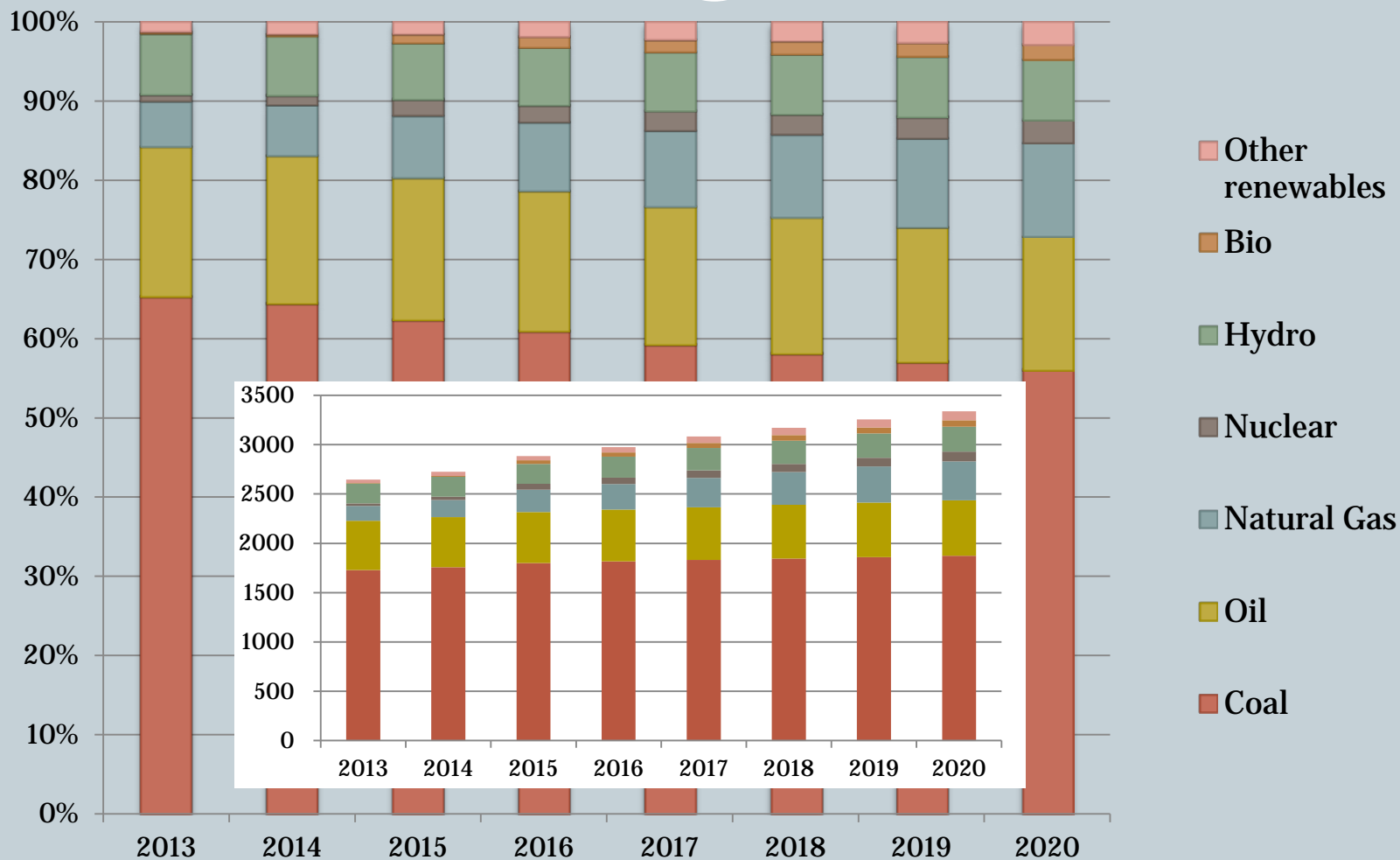


# GDP and Energy Demand

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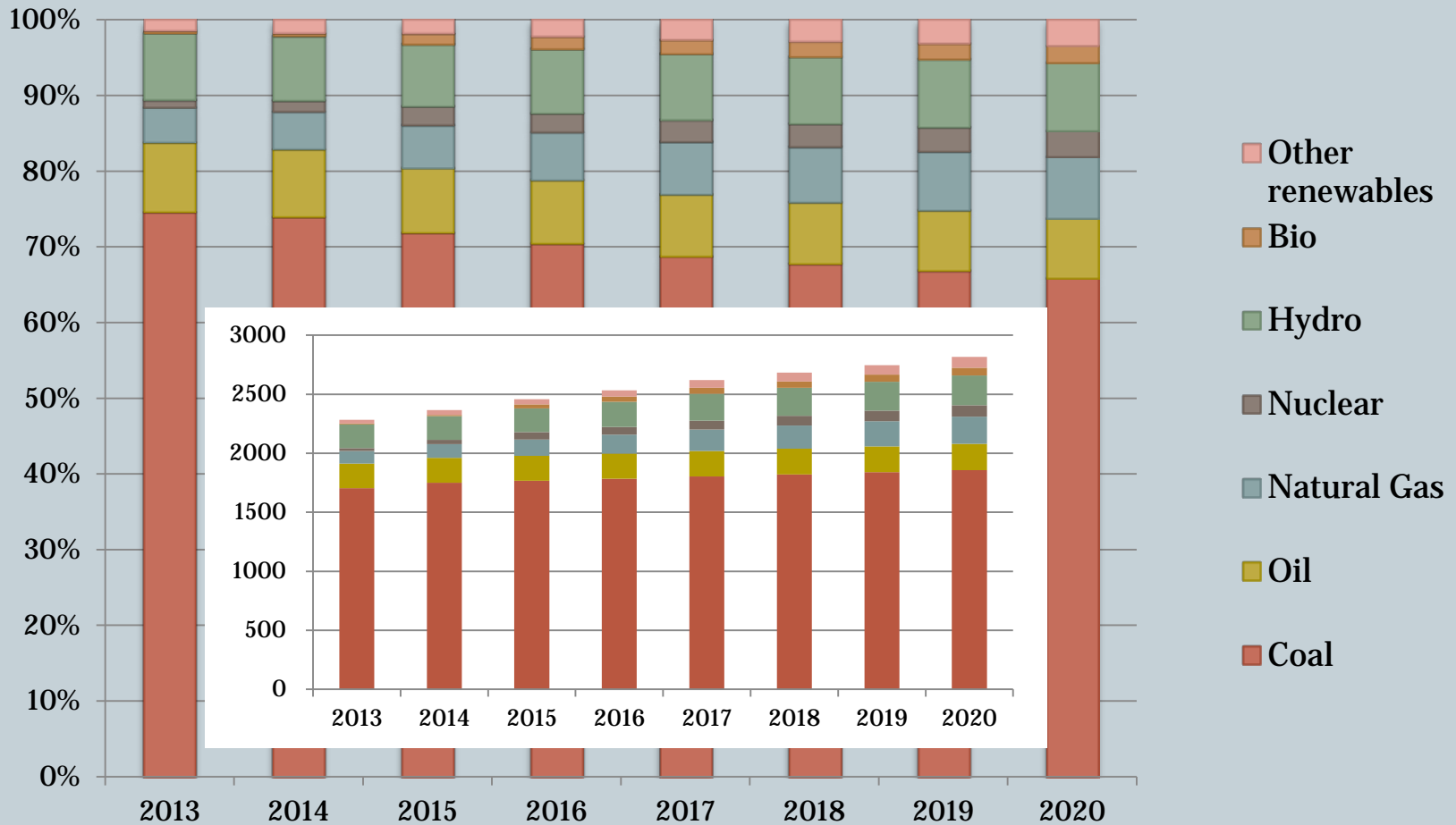


# Energy Mix - Demand



# Energy Mix - Supply

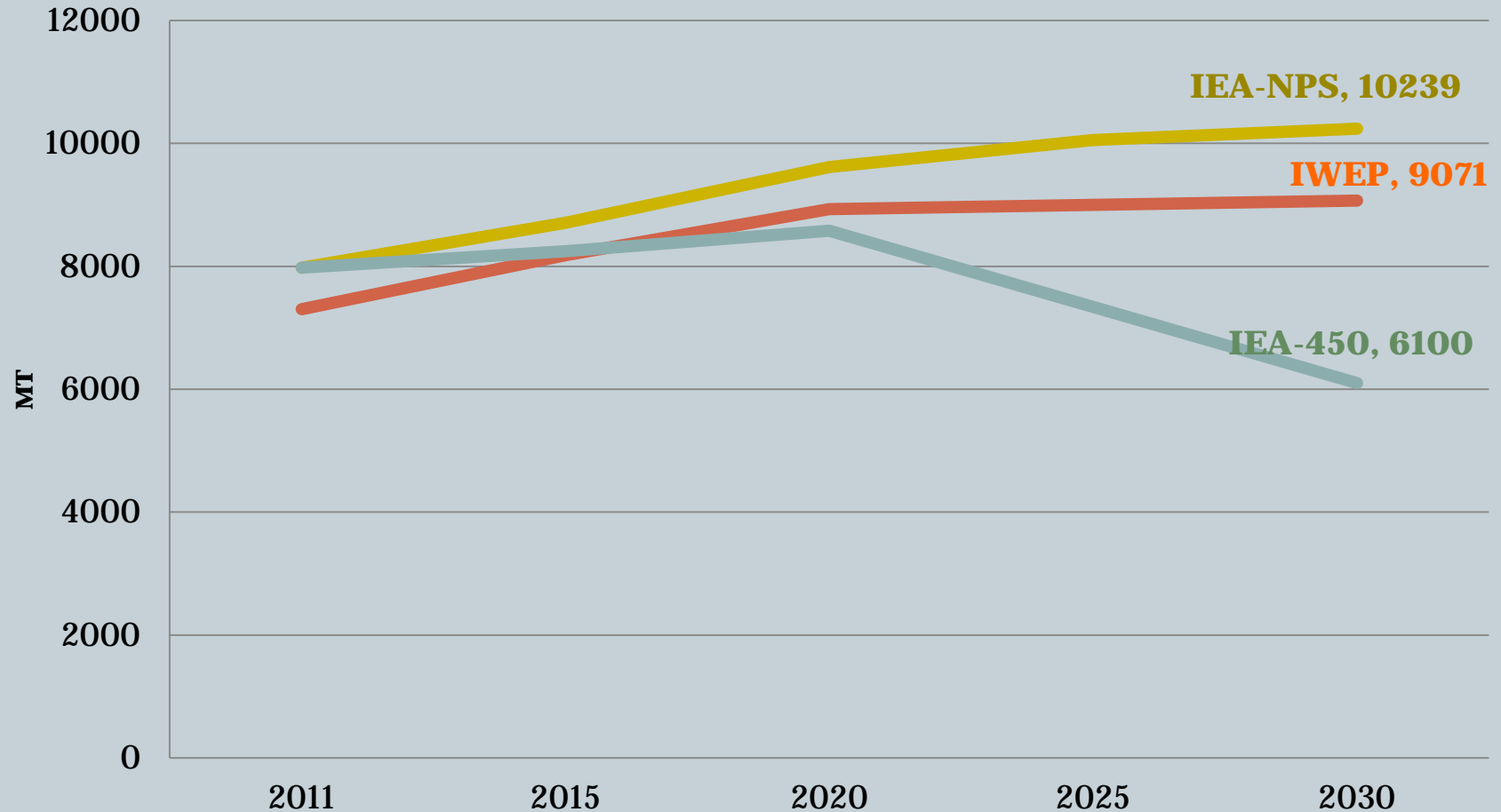
16





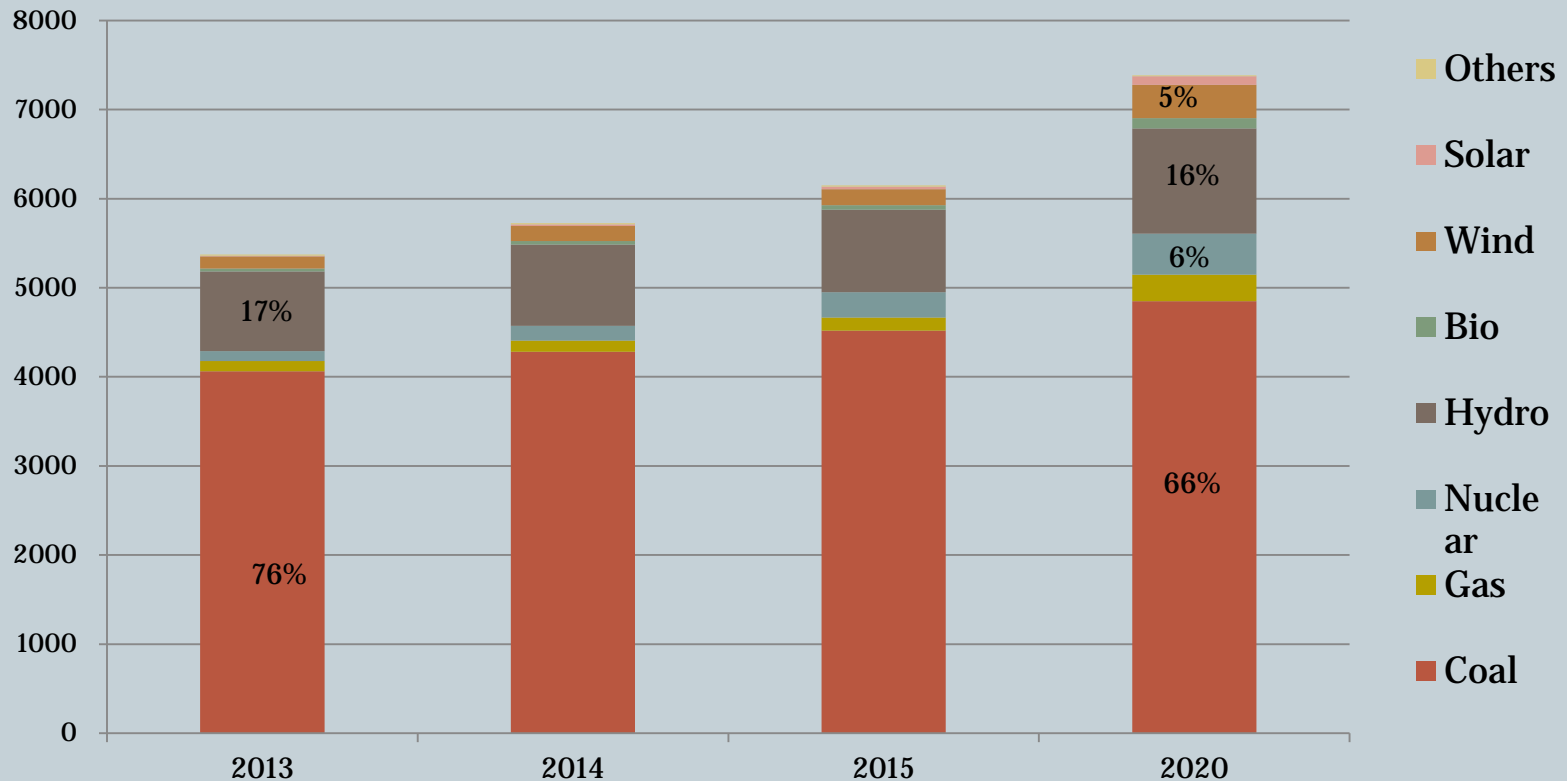
# CO2 Emission – Fossil Fuel

17



# Electricity Use

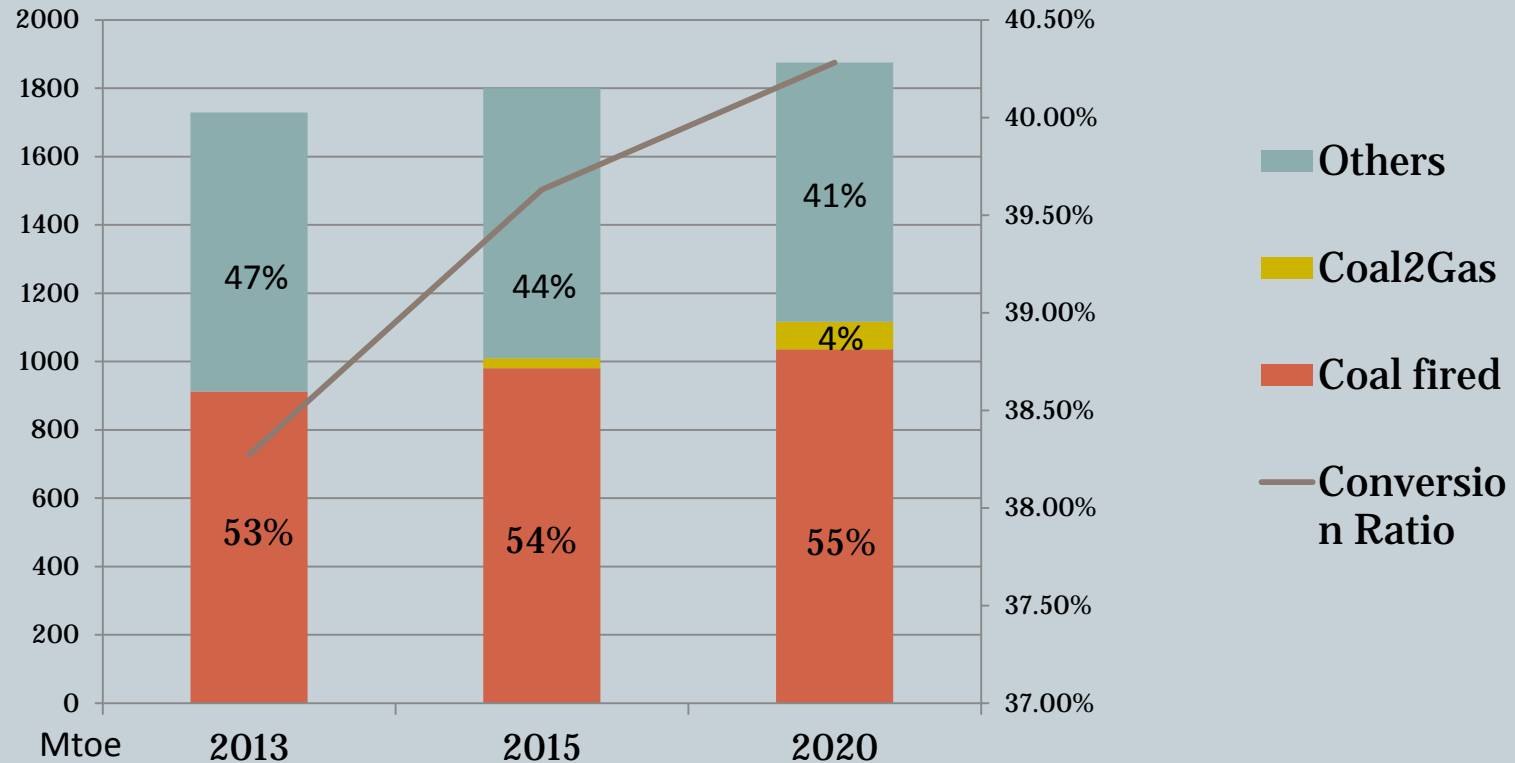
18



- Coal remains cost effective and stable source of power generation while wind plus solar will be seen growth momentum.

# Coal Use Efficiency

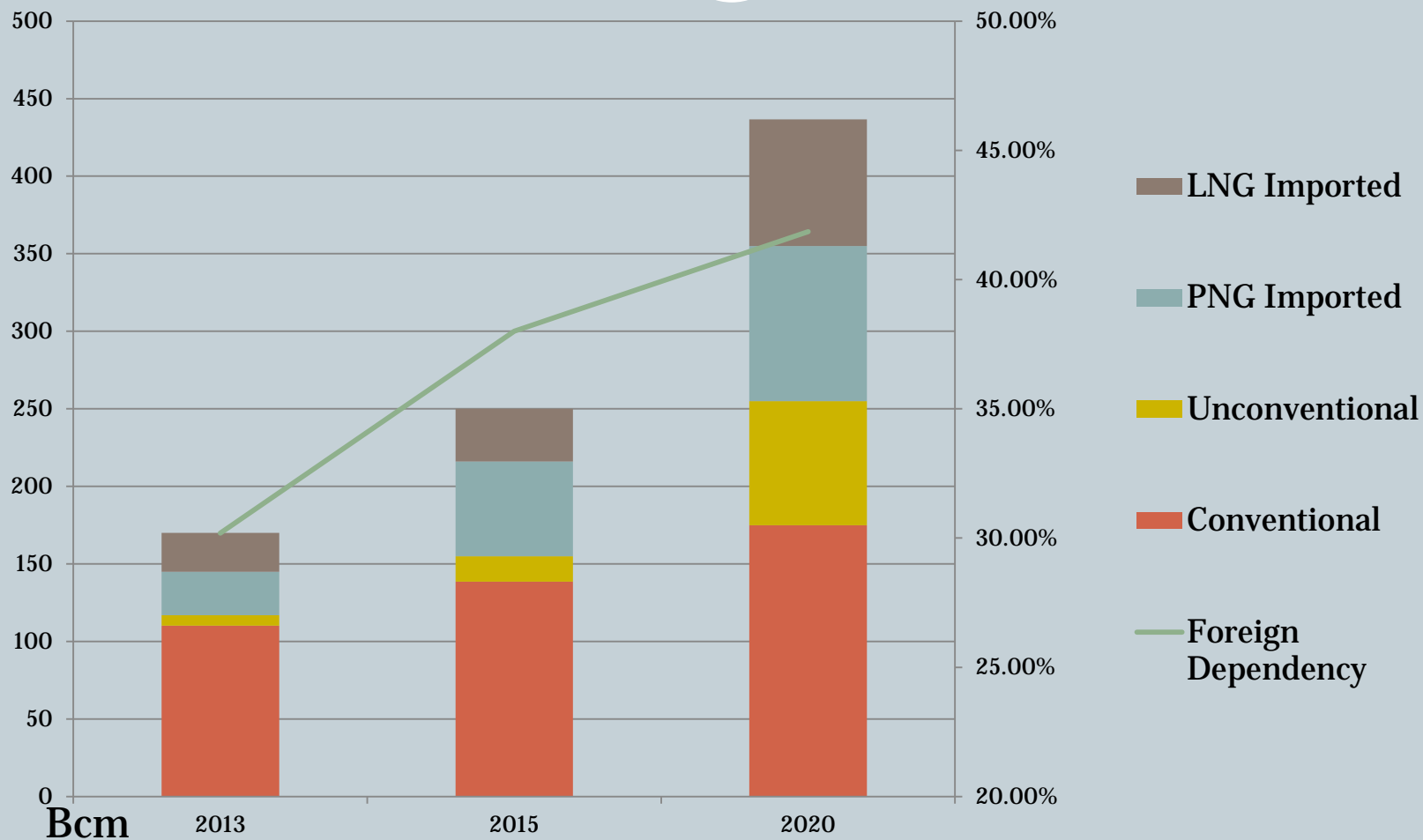
19



- Coal is turning to be both fuels and feedstock in consumption.

# Natural Gas: Mix and Foreign Dependency

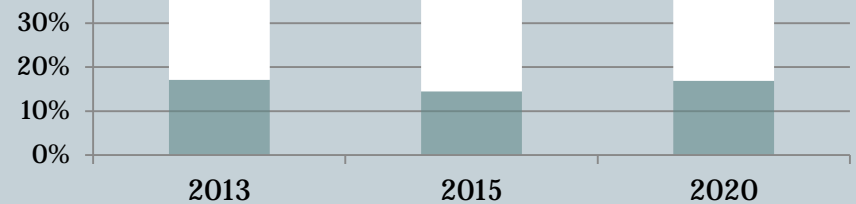
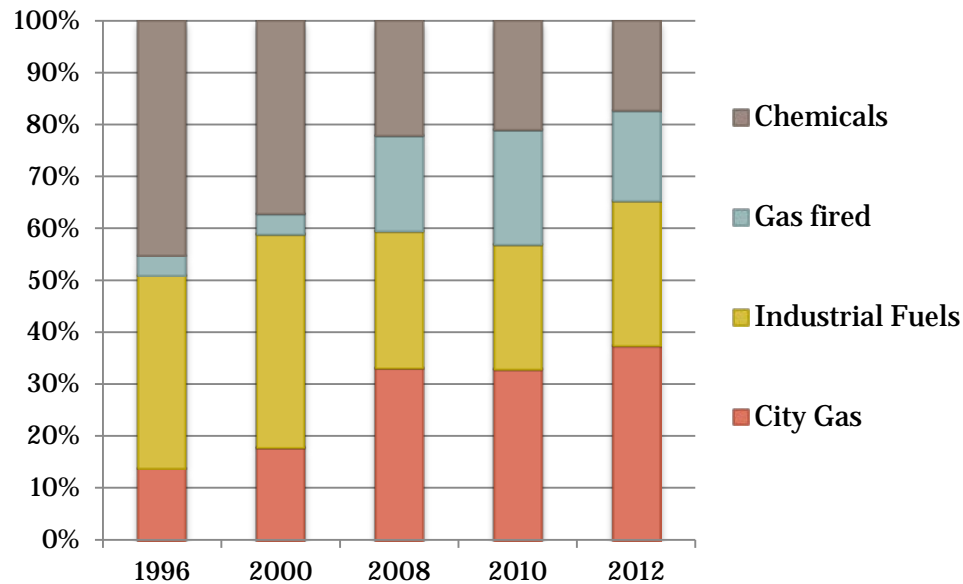
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# Gas fired Use in NG

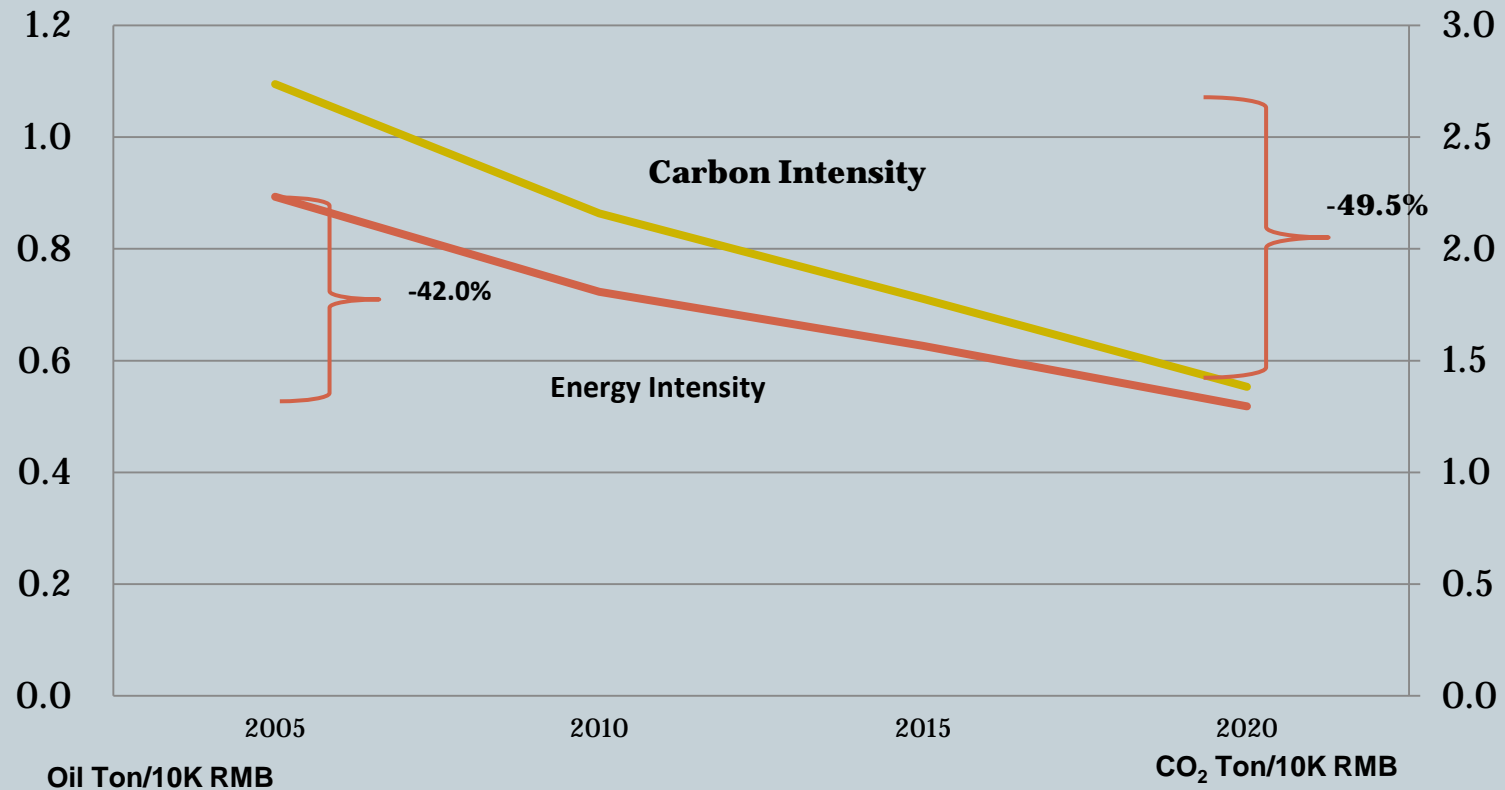
21

- Gas fired generation will be demand variable source and remain at lower level due to costs and interrupted use.



# Energy and Carbon Intensity

22



# Capacity Shut-down by 2015

23

	Output reduction	Unit	Coal saving (10 k standard tones)
Iron-making	1500	10 k tones	600
Steel-making	1500	ibid	900
Cement	10000	ibid	1200
Flat Glass	2000	10 th weight cases	1000
Total			3700

- Over invested capacity is targeted to reduce energy/coal consumption by the end of 2015 and beyond.
- As planned, some surplus of capacity in iron, steel, cement, and flat glass (main user of energy sectors) is slated to shut down with 37 million tone coal standard tones will be shrunk by the 2015.
- Such a shrinking pace will continue.

# Capacity Shut down in Hebei Province by 2017

24

	Shut down Output	Unit	Coal saving (10 k standard tones)
Steel	6000	10 k tones	3000
Cement	6100	ibid	732
Coal	4000	ibid	126
Flat Glass	3600	10 th weight cases	1800
Total			5658

- Taking Hebei province as an example, by 2017, over 5658 million tones of coal use could be diminished.
- This reflects a trajectory of coal use prevailing in three consuming regions (Beijing-Tianjin-Hebei region, Yangtz river region, and Zhu River region) and energy producing provinces in Shanxi, Shangxi and Inner Mongolia.



# III. Conclusions

25

- China energy demand is reviewed at slower growth to 2020 than last year at 2.06%, while energy supply will keep pace up, accordingly. But the gap between the two remains large.
- CO<sub>2</sub> emission will continue to grow but level off a bit than expected.
- Electricity consumption is growing with some uncertainties. Coal, as a quality source of power generation, is expected to be main source but debate remains at present and subject to clean coal technology and policy incentives into the future.
- City gas and industrial fuel will be main sectors of natural gas usage in China while gas fired generation remains at lower level.

# III. Conclusions

26

- Currently, coal use reduction remain a policy option. However, clean coal and efficiency enhancement are critical consideration. Coal use efficiency and conversion rate is expected to increase.
- Renewables is subject to cost reduction, business models and utilization (with fossil fuels and distributed consumption smartly).
- The 13<sup>th</sup> Five Year Plan (2016-2020) turns to be a critical to Chinese expected energy revolution, which could come with further economic reforms including industrial restructuring, efficiency enhancement, plus police incentives.

# Xiaojie Xu

27

- Xiaojie Xu, the Chief Fellow of the annual World Energy China Outlook and heads up the World Energy Division (since April 2009) at Institute of World Economics and Politics, Chinese Academy of Social Sciences in Beijing; a Member of the World Economic Forum's Global Agenda Council on Energy Security, an Editorial Board member of the Journal of World Energy Law and Business, a senior advisor to China Energy Fund, a standing member of petroleum economics sub-committee of China Petroleum Society; Previously, had worked at China National Petroleum Corporation (CNPC, 1983-2009) and was the Director of Institute of Overseas Investment Research, CNPC (2000-2009), has been advising the National Energy Administration on oil and gas policy and international energy policy, and CNPC, CNOOC and some other state owned energy companies on global expansion specializing in geopolitical, economical, commercial, regulatory, and contractual review, business development and risk management; is the author of Petro-Dragon's Rise, what it means for China and the World (English, European Press, 2002) and Energy Black Swan: Global Games for Hydrocarbon Resources and Chinese Options (in Chinese, 2011) along with numerous writing and speeches on energy investment, corporate strategy and governance, and geopolitics of energy in both Chinese and English. Graduated from Zhejiang University in 1983.