China's Climate and Energy Policies and energy transformation strategies

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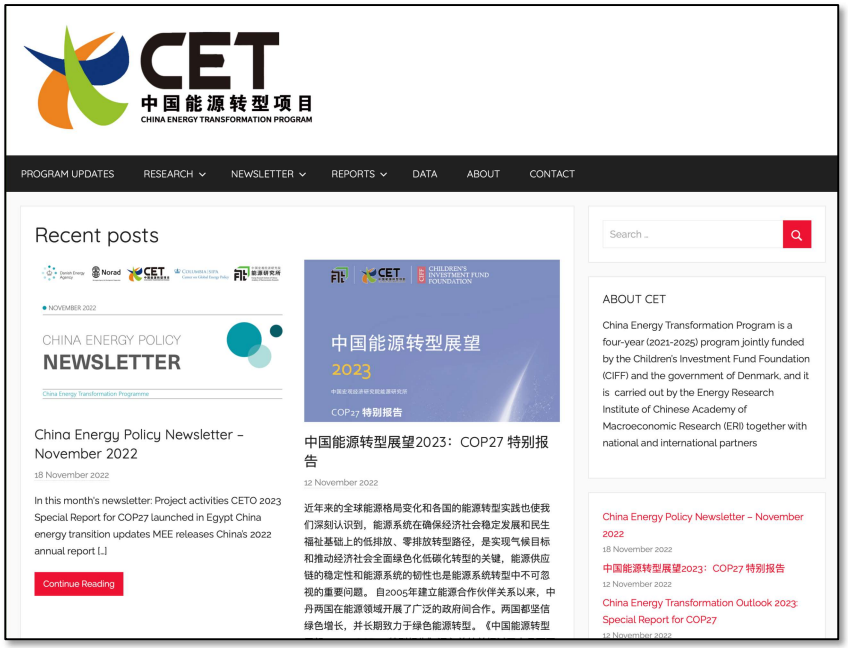

The China Energy Transformation Research Programme

Implementing Unit

中国宏观经济研究院
能源研究所
Energy Research Institute of Chinese Academy of Macroeconomic Research

Financial Support

CIFF CHILDREN'S INVESTMENT FUND FOUNDATION

MINISTRY OF FOREIGN AFFAIRS OF DENMARK

Technical Support

Danish Energy Agency

Ea Energy Analyses

COLUMBIA | SIPA
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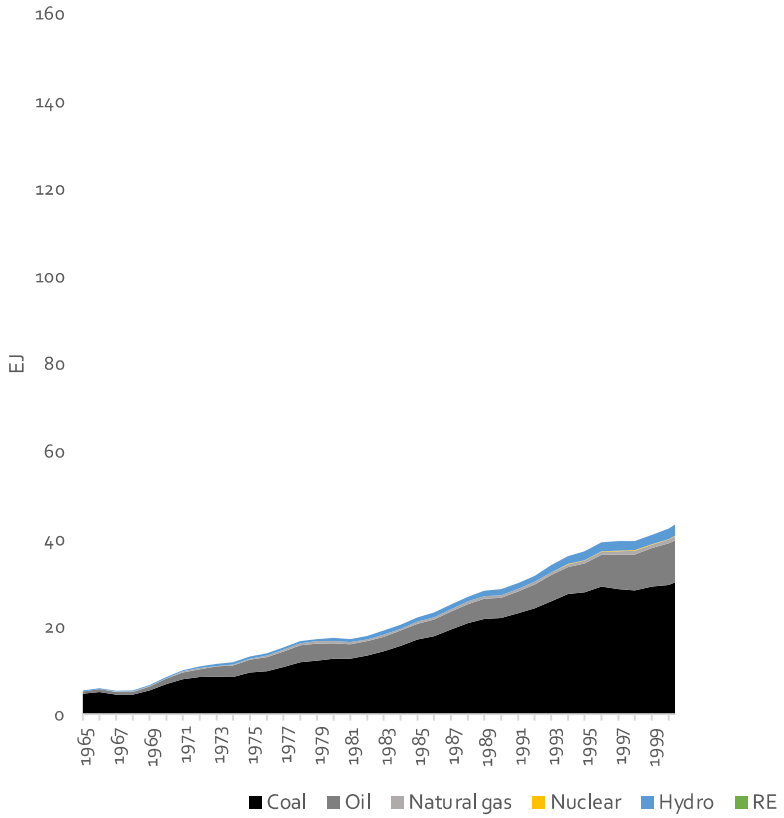
China's primary energy consumption

1965 – 2000: Steady growth

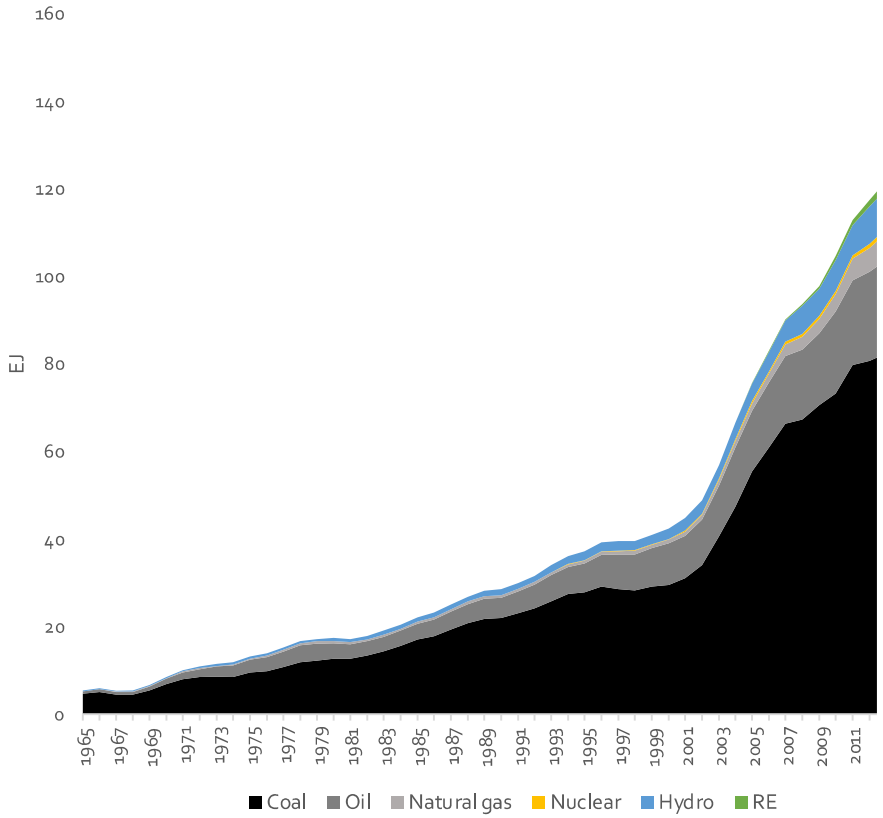


China's primary energy consumption

1965 – 2000: Steady growth

2002 – 2012: Growth explosion

- Focus on delivering energy for economic growth
- Primary energy consumption tripled
- Energy growth mainly covered by growth in coal
- Energy intensity improvements – tce in relation to GDP - weakened



China's primary energy consumption

1965 – 2000: Steady growth

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- Focus on delivering energy for economic growth
- Primary energy consumption tripled
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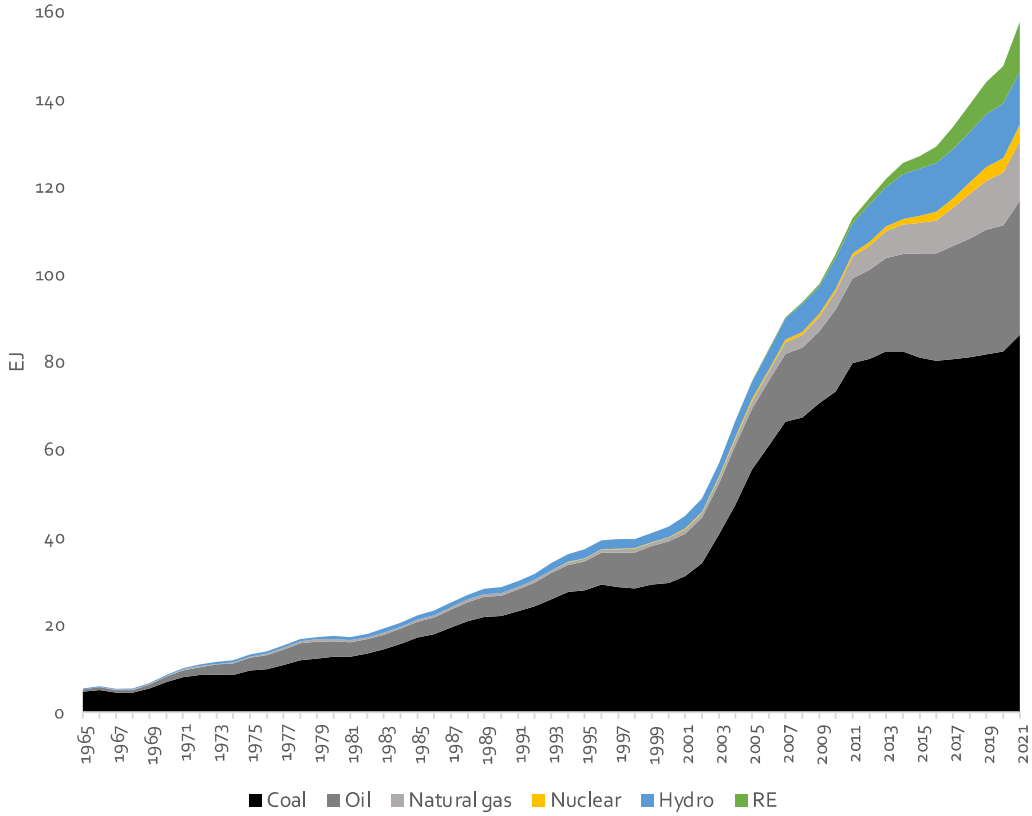
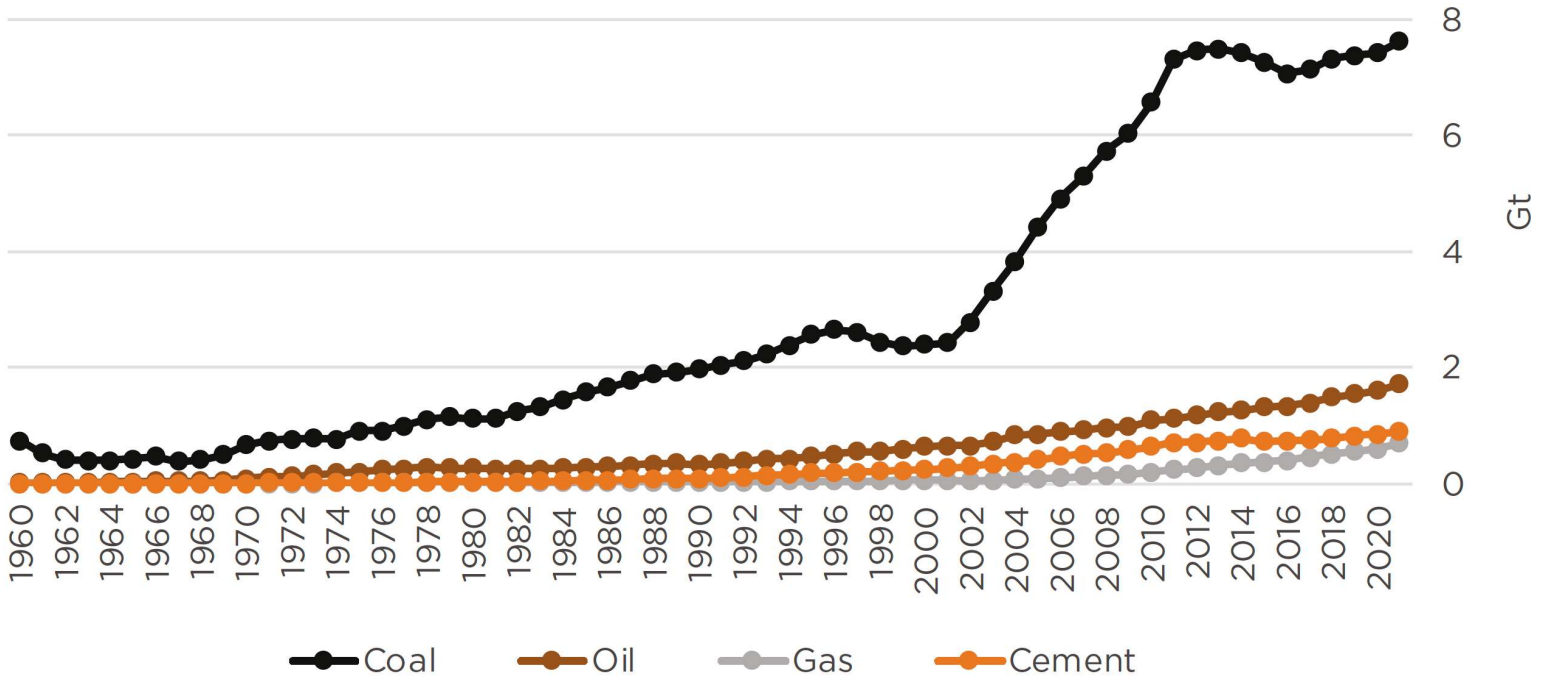
2012 – 2021

- Stagnation in coal consumption
- Steady increase in oil and gas consumption – and in import dependency
- Nuclear and RE become significant



China's CO_2 Emissions by Fuel Type (1960–2020)



Source: The Global Carbon Project's fossil CO_2 emissions dataset[29]

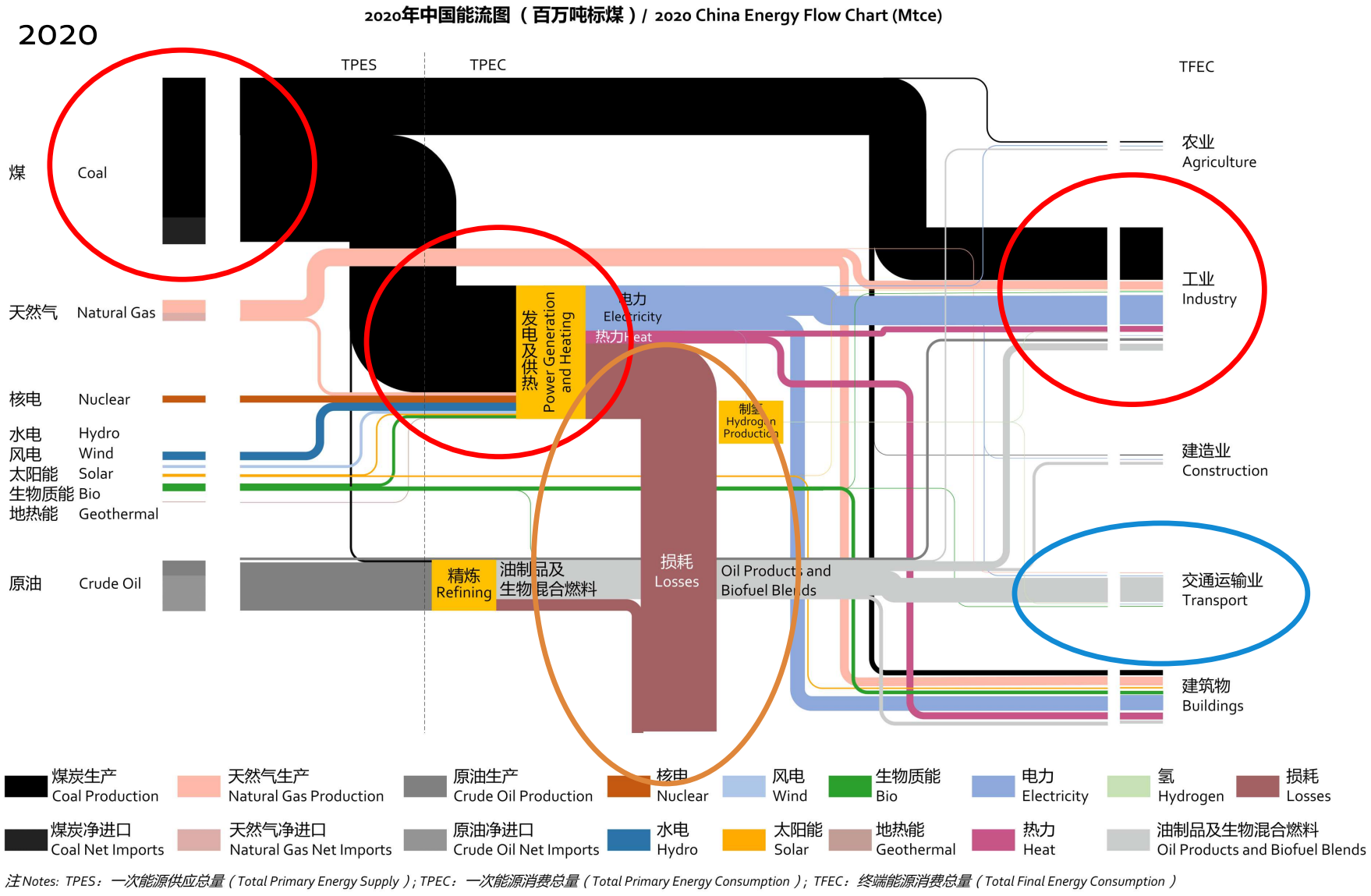
The starting point for the energy transition

Coal dependency in the power and industry sector

Large energy losses in conversion

Oil dependency in the transport sector

2020



注Notes: TPES：一次能源供应总量（Total Primary Energy Supply）; TPEC：一次能源消费总量（Total Primary Energy Consumption）; TFEC：终端能源消费总量（Total Final Energy Consumption）

China's climate policy development

- *10th Five-Year Plan (2001 – 2005)*
  - was the first to mention climate change, China ratified the Kyoto protocol in 2002, RE law passed in 2005
  - The first round of power sector reform was carried out in 2003
- *11th Five-Year Plan (2006 – 2010)*
  - included binding targets for energy efficiency and climate rose on the political agenda.
  - In 2006, the Chinese government released its first "National Assessment Report on Climate Change"
  - the concept of "ecological civilisation" was included in the report to the 17th National Congress of the Communist Party of China in 2007.
  - In 2007, the Chinese government issued the National Climate Change Program, a 60-page report on Chinese climate policies.
  - In 2008, NDRC released its first white paper on climate change—China's Policies and Actions for Addressing Climate Change.
  - The RE law was revised in 2009 – introducing FITs and mandatory access to the grid

China's climate policy development

- *12th Five-Year Plan (2011 – 2015)*
  - was the first with an explicit climate change target. The plan included a chapter on climate change and called for a 17% cut in carbon emissions per unit of GDP (as well as a 16% cut in energy consumption per unit of GDP). To help achieve this target, the State Council released a Work Plan for Controlling Greenhouse Gas Emissions during the 12th Five-Year Plan period.
  - The clean air action plan was introduced in 2014
  - Power market reform restarted in 2015
- *13th Five-Year Plan (2016 – 2020)*
  - Introduced the target of creating a clean, low-carbon, safe and efficient energy system

A Beautiful China

Economic dream
Sufficient economic growth to ensure a reasonable living standard for all

Ecological dream
Clean air, clean water, no resource depletion

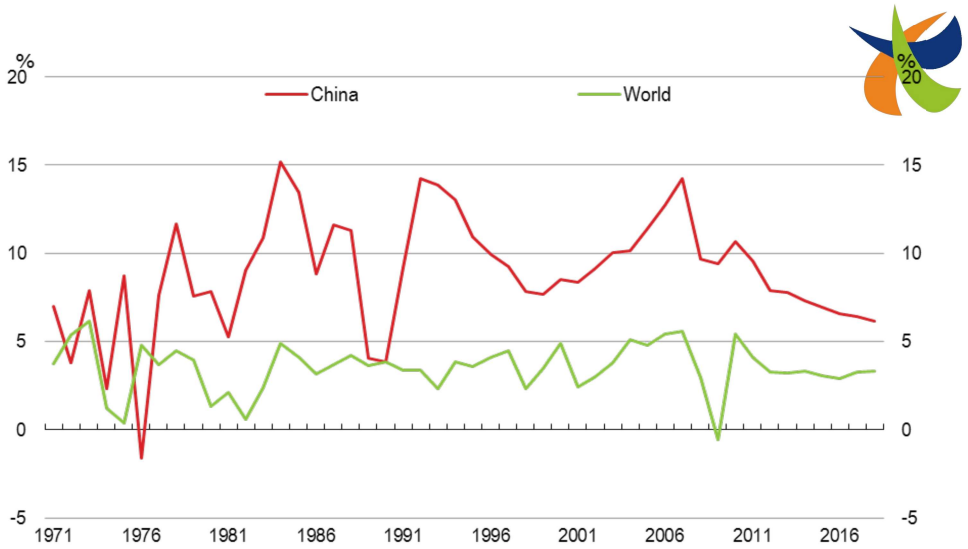
A dream about security
Not critically dependent on other countries

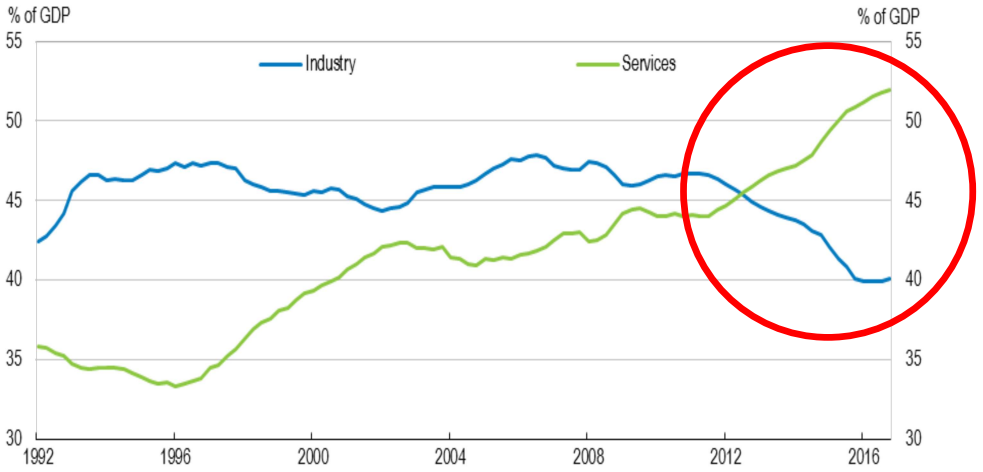
New normal

- Economic growth at a new, lower level
- Shift from Industry to service
- Shift in secondary industry from energy intensive to energy light

=

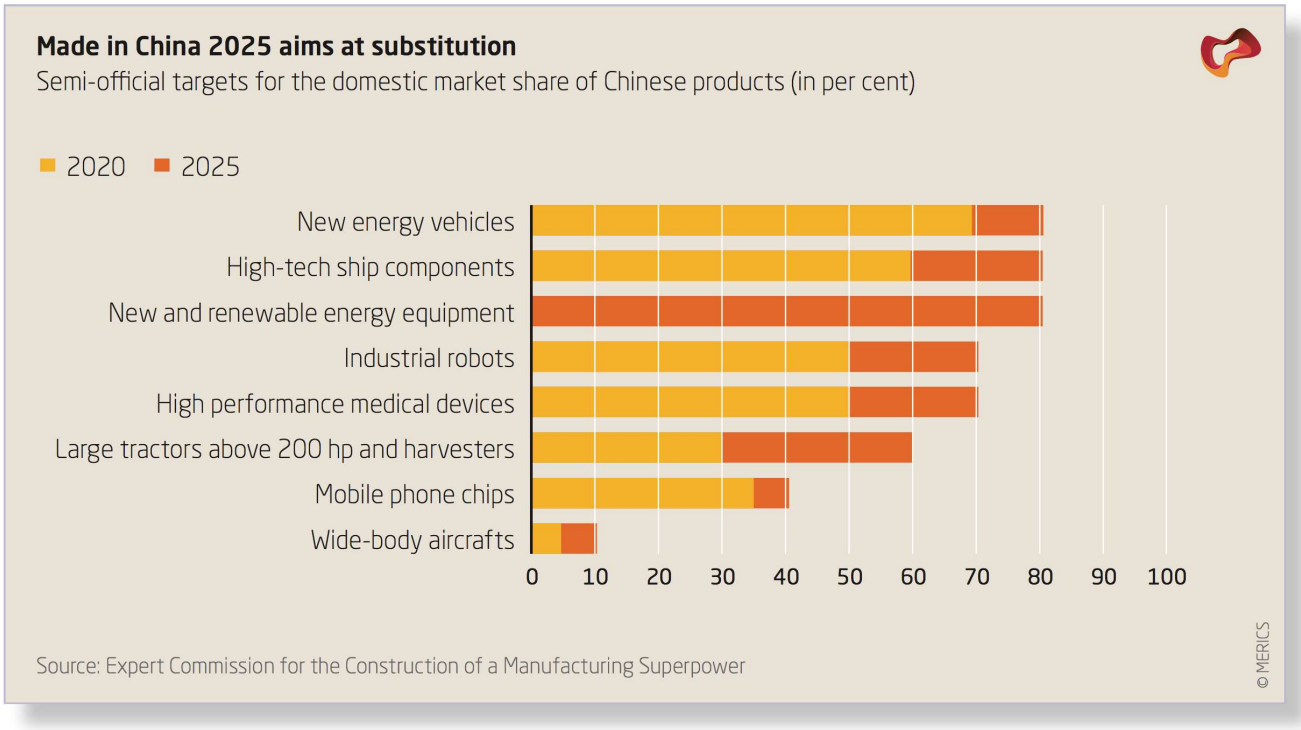
- Reduced need for rapid energy growth





Made in China 2025

- Focus on strategic emerging industries with lower energy intensity
- The Chinese market is a major driver for these industries
- RE industry important future industry for China in today and in the future
- New energy vehicles rapid developing industry



From: China Manufacturing 2025, EU Chamber of Commerce in China, 2017

“China will scale up its Intended Nationally Determined Contributions by adopting more vigorous policies and measures. We aim to have CO2 emissions peak ***before 2030*** *and achieve carbon neutrality* ***before 2060****.”*

—— *President Xi Jinping*

The 75th session of the United Nations General Assembly

22 September 2020

China's National Determined Contributions

- On 28 October 2021, China submitted its updated Nationally Determined Contributions (NDCs the UNFCCC.
- China's updated NDC goals are:
  - aims to have CO_2 emissions peak before 2030 and achieve carbon neutrality before 2060
  - to lower CO_2 emissions per unit of GDP by over 65% from the 2005 level,

    to increase the share of non-fossil fuels in primary energy consumption to around 25%,

    to increase the forest stock volume by 6 billion cubic meters from the 2005 level,

    and to bring its total installed capacity of wind and solar power to over 1200GW by 2030.

1+N policy framework

- "1" refers to the top-level design, including two documents:
  - “Working Guidance for Carbon Dioxide Peaking and Carbon Neutrality in Full and Faithful Implementation of the New Development Philosophy”, issued by The Central Committee of the CPC and the State Council.
  - “Action Plan for Carbon Dioxide Peaking Before 2030”, issued by the State Council.

Ten Actions for Carbon Peaking

- Action for green and low-carbon **energy transition**
- Action for **energy saving, carbon emission mitigation and efficiency improvement**
- Action for peaking carbon dioxide emissions in **industry sector**
- Action for peaking carbon dioxide emissions in **urban-rural development area**
- Action for promoting green and low-carbon **transportation**
- Action for promoting **circular economy** in carbon mitigation purpose
- Action for advancing green and low-carbon **technology innovation**
- Action for consolidating and enhancing **carbon sink**
- Action for green and low-carbon **society**
- Action for promoting **all regions peaking** carbon dioxide emissions hierarchically and orderly

OCTOBER 2022

CHINA ENERGY POLICY NEWSLETTER

China Energy Transformation Programme

More than 60 national and local policies issues by August 2022

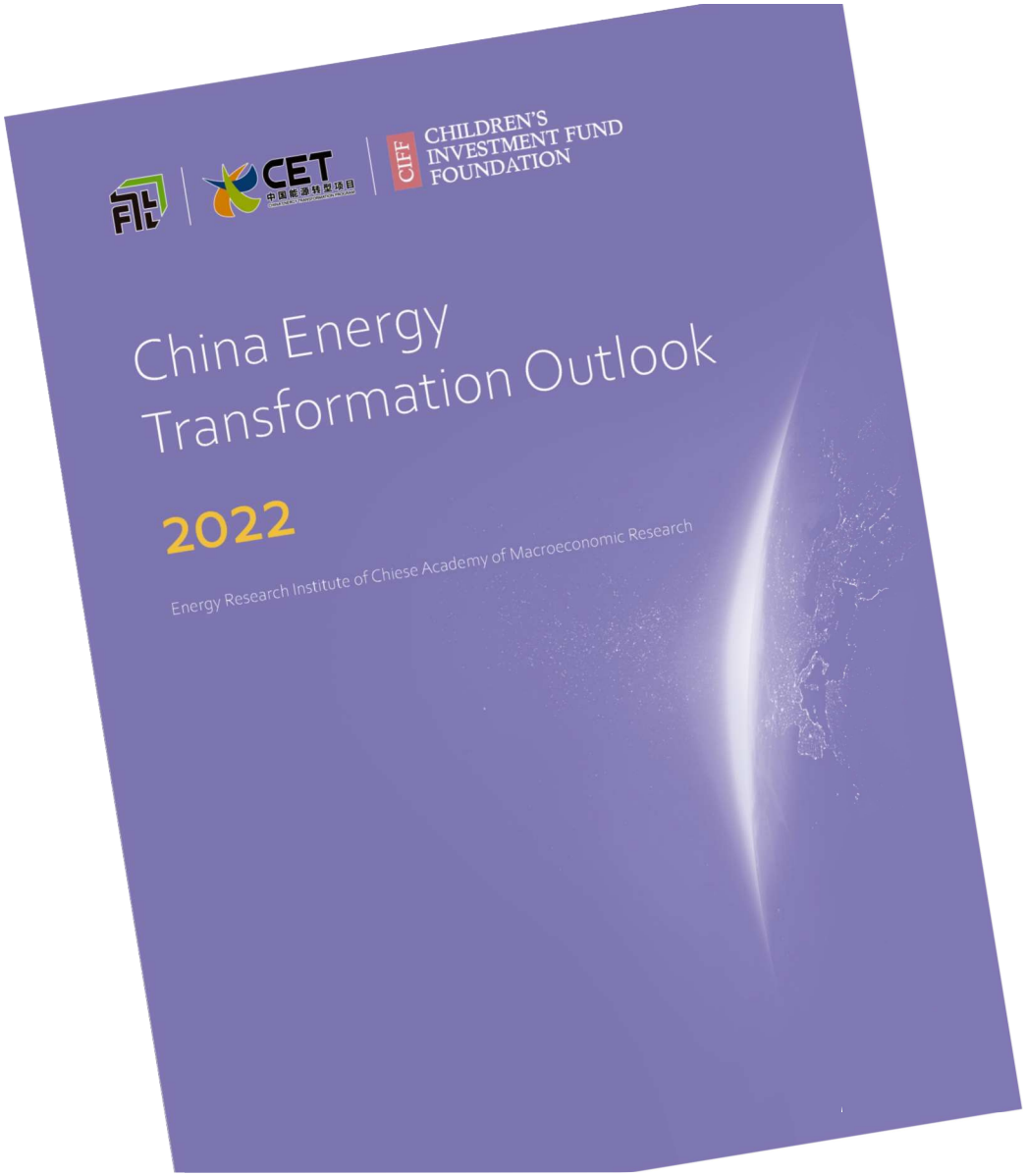
3. China's carbon peaking and carbon neutrality "1+N" policy system has been basically established

As of August 2022, under the framework of the "1+N" policy system for carbon peaking and carbon neutrality, the State Council, national ministries, and provincial governments have successively issued more than 60 national and provincial policies, including carbon peaking action plans covering fields of energy, industry, transportation, urban and rural affairs, and other fields and industries, the "1+N" policy system has been initially established. The policy monitoring team of the China Energy Transformation (CET) program has made corresponding supplements and summaries based on the table created by the Green and Low-Carbon Finance Industry Committee[1] recently.

Overview of the carbon peaking and carbon neutrality "1+N" policy system (as of August 2022)

No.	Date	Authorities	Policy name	Main contents	Link
Top-layer documents					
1	2021-10-26	State Council	"N": Action Plan for Carbon Dioxide Peaking Before 2030, State Council Development [2021] No. 23 (CHN: 国务院关于印发 2030 年前碳达峰行动方案的通知, 国发〔2021〕23 号)	Newsletter (November 2021)	Link
2	2021-10-24	CPC, State Council	"1": Working Guidance for Carbon Dioxide Peaking And Carbon Neutrality In Full And Faithful Implementation of The New Development Philosophy (CHN: 中共中央　国务院关于完整准确全面贯彻新发展理念做好碳达峰碳中和工作的意见)	Newsletter (November 2021)	Link
Carbon peaking action plans					
Energy sector					
3	2022-04-09	NDRC, MIIT, MEE, MoHURD, SAMR, NEA	Notice on Issuing the *Benchmarking and Standard Levels in Key Fields of Clean and Efficient Coal Utilization (2022 Edition)*, NDRC Operation [2022] No. 599 (CHN: 国家发展改革委等部门关于发布《煤炭清洁高效利用重点领域标杆水平和基准水平（2022 年版）》的通知, 发改运行〔2022〕559 号)		Link
4	2022-03-23	NDRC, NEA	Medium- and Long-term Development Plan for Hydrogen Energy Industry (2021-2035) (CHN: 国家发展改革委、国家能源局联合印发《氢能产业发展中长期规划（2021-2035 年）》)	Newsletter (April 2022)	Link
5	2022-01-30	NDRC, NEA	Opinions on Improving the System, Mechanism and Policy Measures for the Green and Low-carbon Energy Reform, NDRC Energy [2022] No. 206 (CHN: 国家发展改革委、国家能源局关于完善能源绿色低碳转型体制机制和政策措施的意见, 发改能源〔2022〕206 号)	Newsletter (March 2022)	Link
6	2022-01-29	NDRC, NEA	Notice on Issuing the *14th Five-Year Implementation Plan for New-type Energy Storage Development*, NDRC Energy [2022] No. 209 (CHN: 国家发展改革委 国家能源局关于印发《"十四五"新型储能发展实施方案》的通知, 发改能源〔2022〕209 号)	Newsletter (March 2022)	Link
7	2022-01-29	NDRC, NEA	Notice on Issuing the *14th Five-Year Plan for the Modern Energy System Development*, NDRC Energy [2022] No. 210 (CHN: 国家发展改革委　国家能源局关于印发《"十四五"现代能源体系规划》的通知, 发改能源〔2022〕210 号)	Newsletter (April 2022)	Link
8	2021-10-21	NDRC, NEA, MoF, MNR, MEE, MoHURD, MARA, CMA, SFGA	Notice on Issuing the *14th Five-Year Plan for Renewable Energy Development*, NDRC Energy [2021] No. 1445 (CHN: 国家发展改革委等九部门联合印发《"十四五"可再生能源发展规划》, 发改能源〔2021〕1445 号)	Newsletter (June 2022)	Link

[1] "中国碳达峰碳中和"1+N"政策体系已基本建立, " Green and Low Carbon Financial Industry Committee of China Energy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China Energy
Transformation Outlook
2022
Energy Research Institute of Chiese Academy of Macroeconomic Research

Energy Transformation strategy

Energy efficiency in end-use sectors – in tandem with economic restructuring

Electricity substitutes fossil fuels in end-use sectors

Solar and wind power substitutes coal power – green and efficient

With carbon pricing and efficient power markets as important means for the implementation

Energy system modelling

- The scenarios are modelled in the CETO modelling suite, covering energy supply, energy transformation and end-use sectors.
- Bottom-up models for the energy demand and for the power system
- Detailed power system model simulating the current dispatch rules as well as an efficient wholesale market dispatch

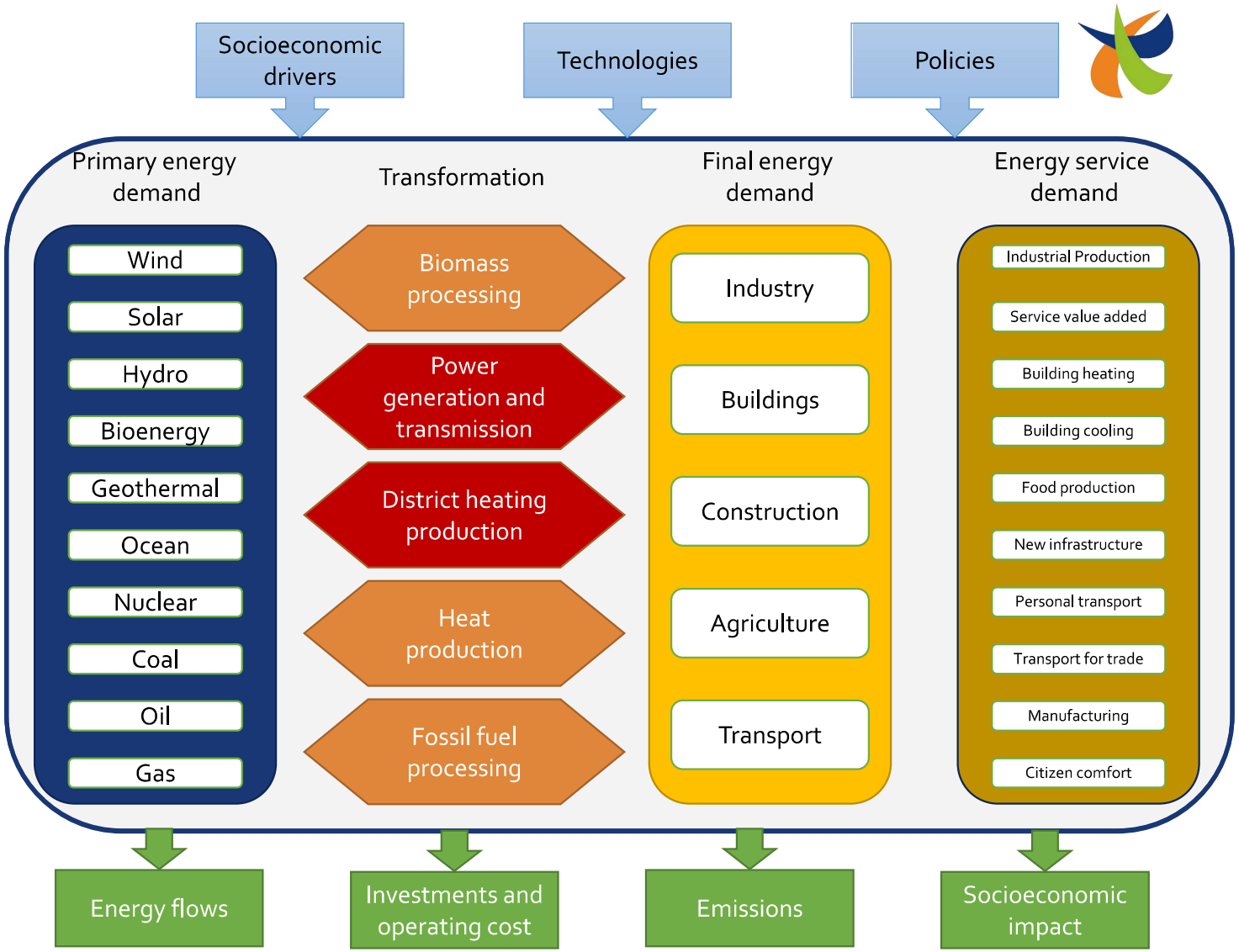
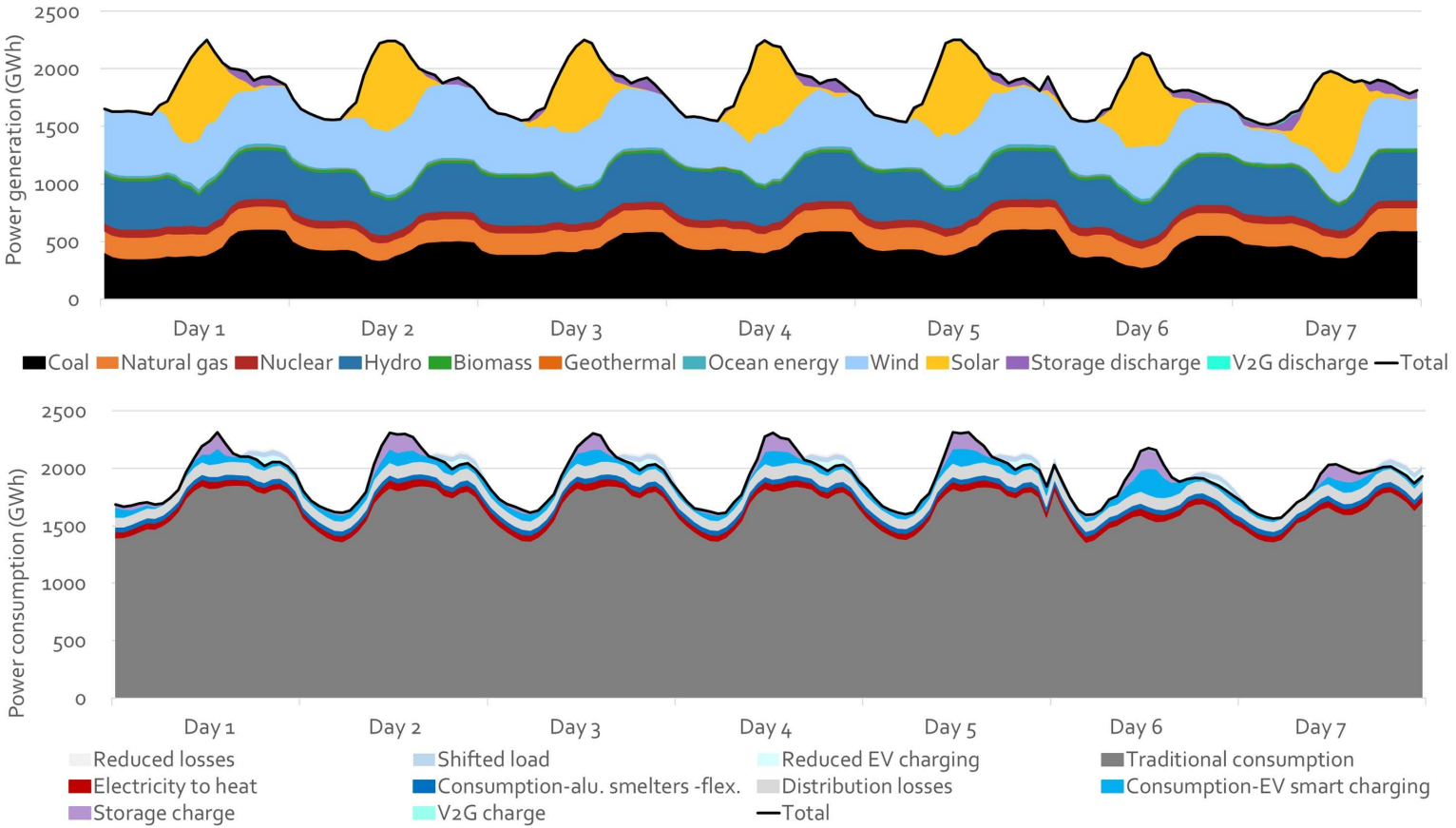
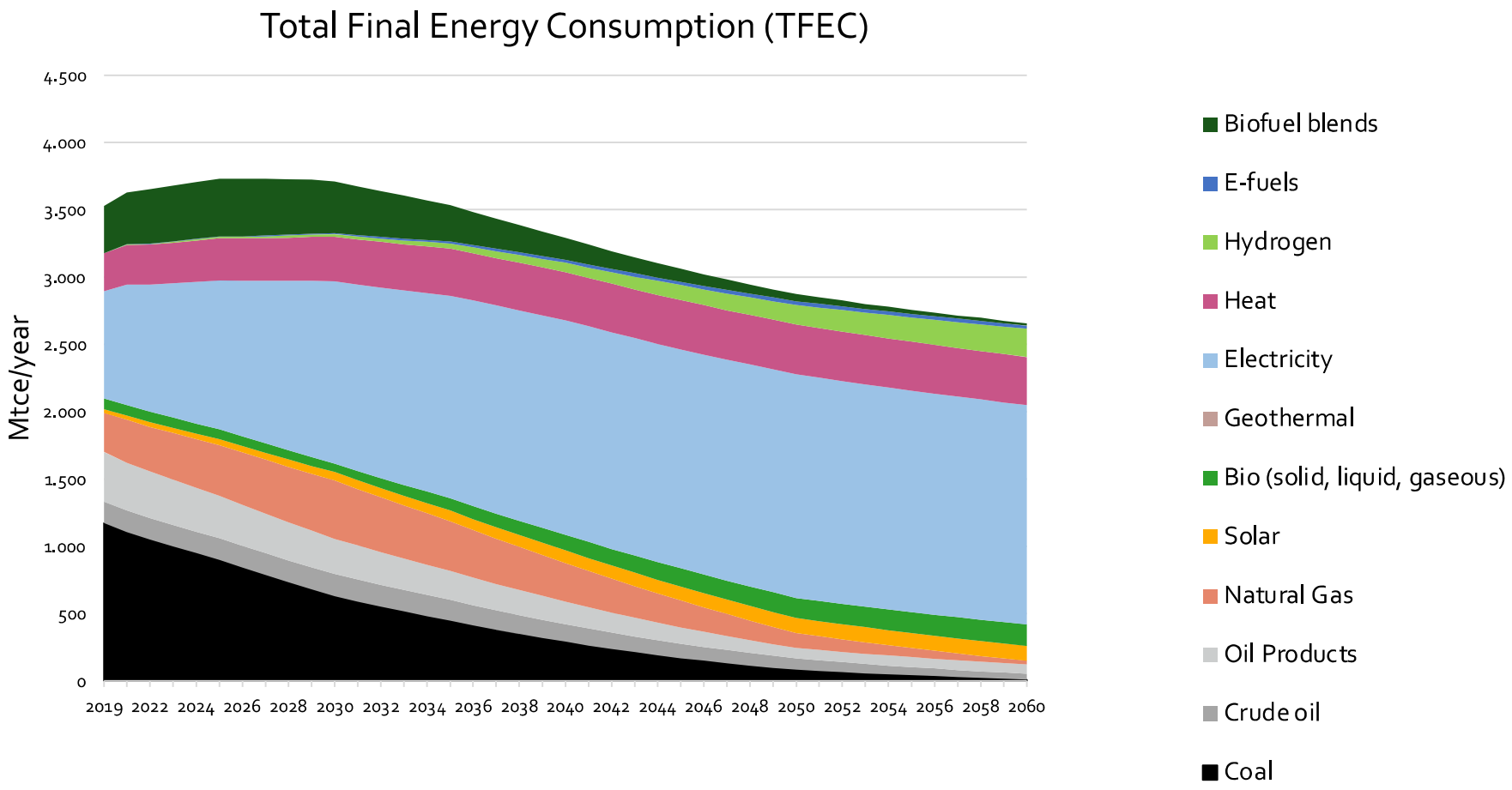


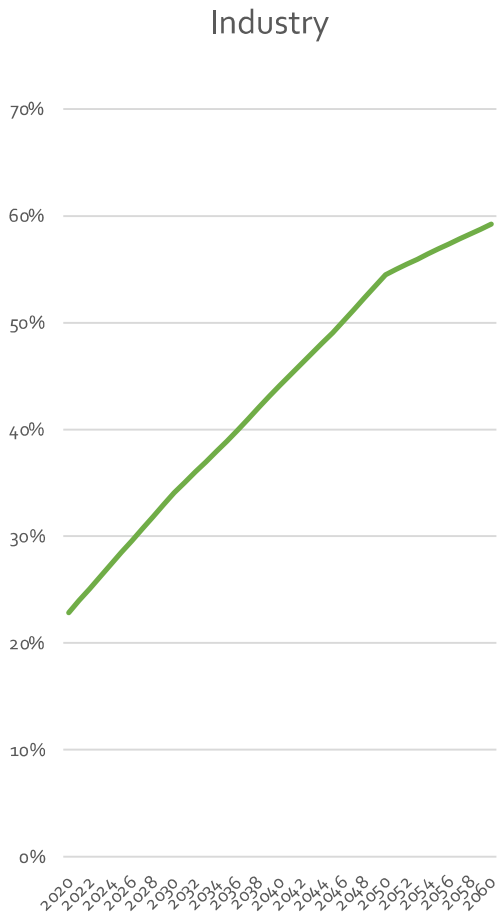
Figure 5-14: Hourly power balance in China's power system in the winter 2035 in the CNS1

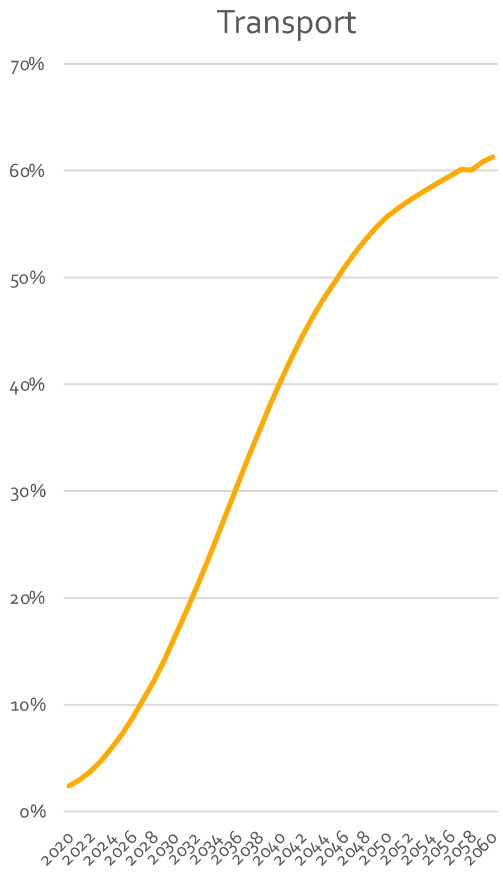


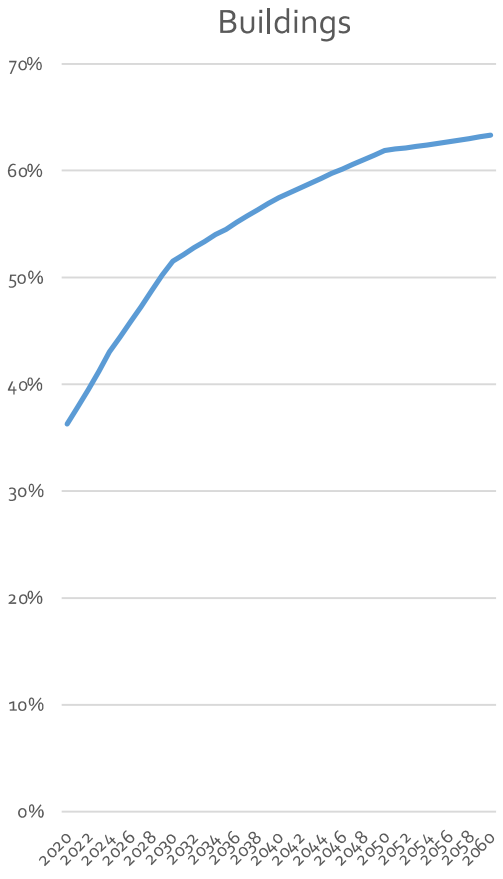
Energy efficiency and electrification in the end-use sectors



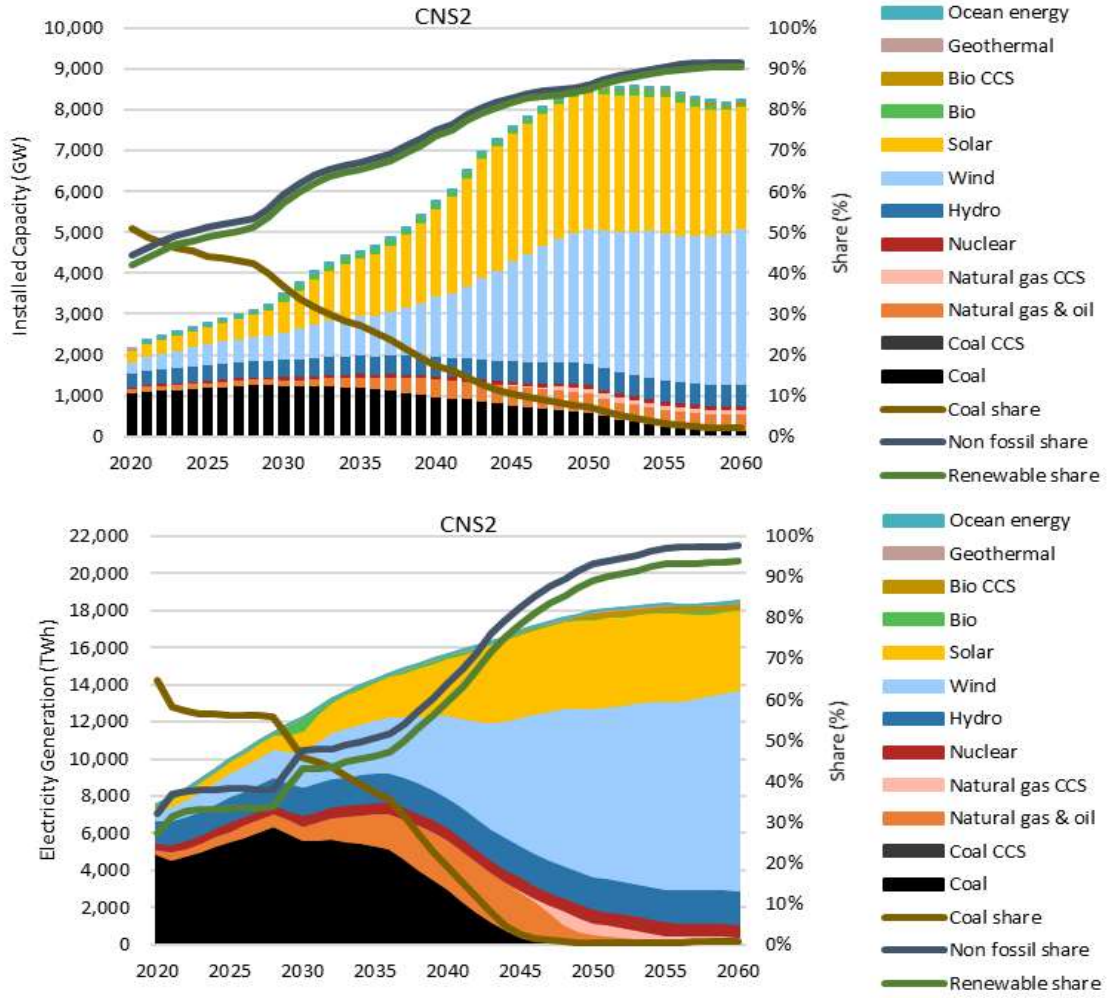
Electrification rate for the main end-use sectors



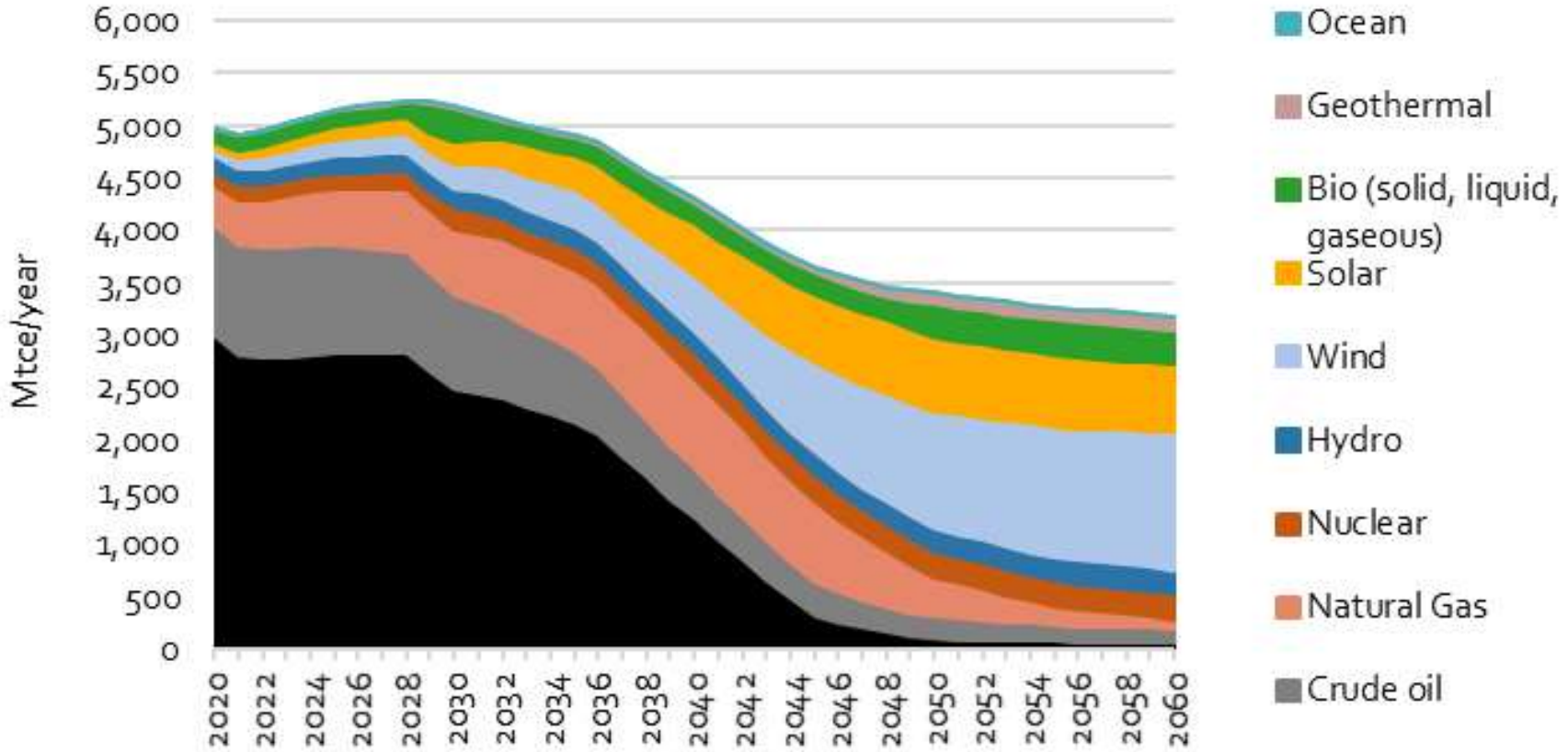




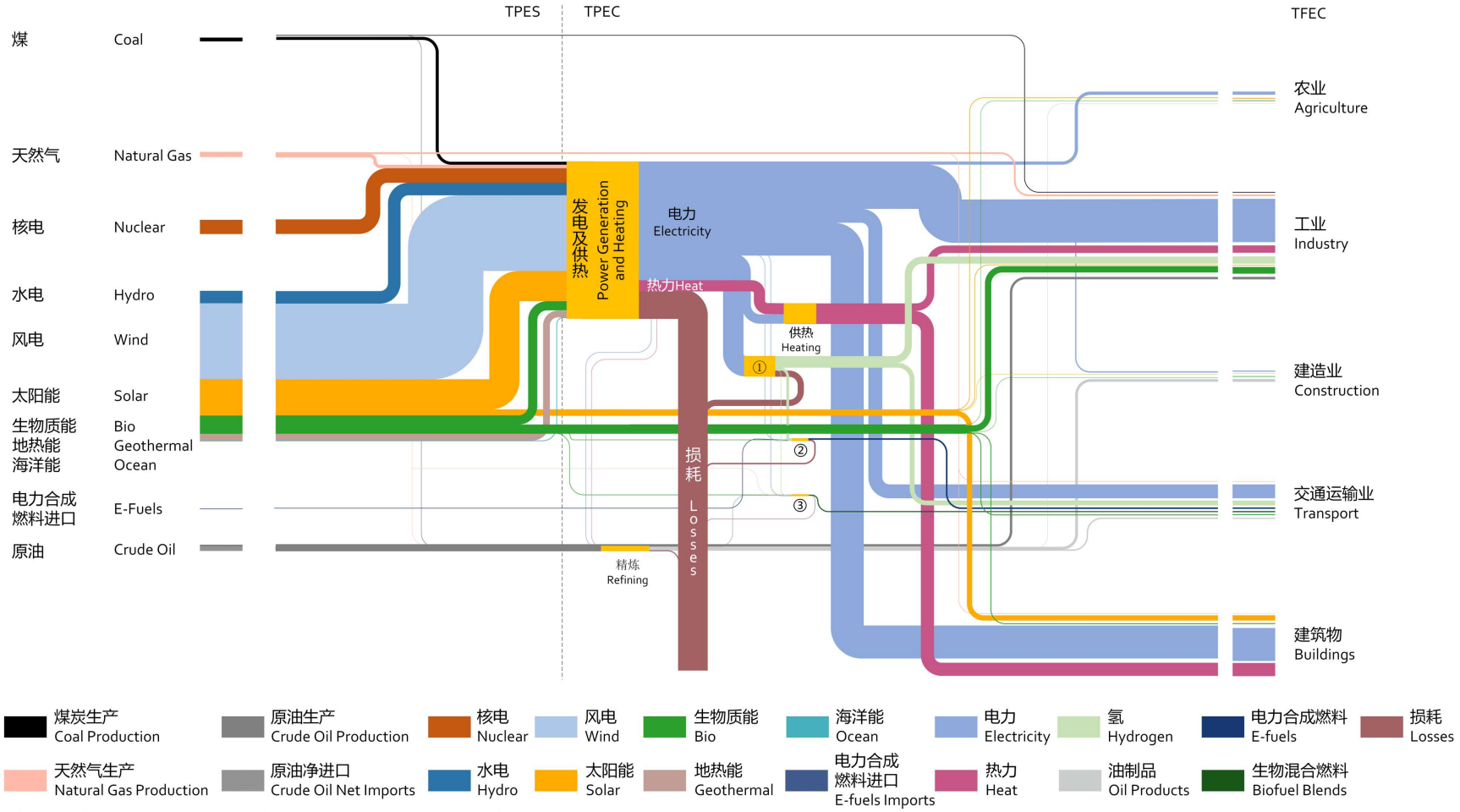
Transformation of the power sector



Total primary energy consumption



2060年中国能流图（百万吨标煤）/ 2060 China Energy Flow Chart (Mtce) - CNS2



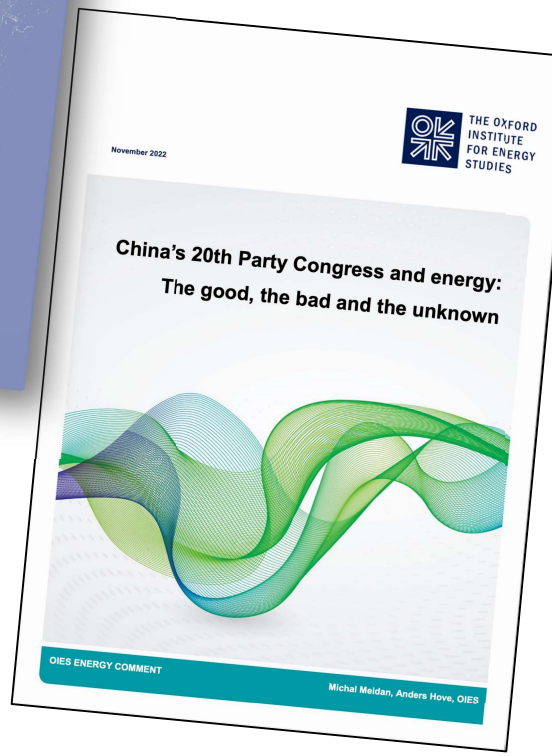
注Notes: ①制氢 Hydrogen Production；②制电力合成燃料 E-fuels Production；③制生物混合燃料 Biofuel Blends Production

TPES：一次能源供应总量（Total Primary Energy Supply）; TPEC：一次能源消费总量（Total Primary Energy Consumption）; TFEC：终端能源消费总量（Total Final Energy Consumption）

Status

- China has reached several tipping points for accelerating the green transformation
  - Wind and solar are becoming cheaper than new fossil fuelled power
  - Clean heating is promoted to reduce air pollution and support rural areas
  - The coal fleet is gradually changing role to flexibility provider
  - Huge grid investments promote RE integration and exchange of power
  - Power markets and the ETS are developing to be crucial drivers
- The dual 2030 – 2060 carbon target has boosted the energy and climate administration and a cascade of new regulation is been promoted
  - Action plans for green transformation, industrial carbon peak initiative, green transportation circular economy low-carbon actions, etc.
- However, several brakes could slow down the speed of transformation (but not the direction)
  - Energy security
  - Supply chain issues
  - Economic slowdown?
- The dual target will be reached, but is it sufficient to ensure the 1.5° Paris agreement target?

More information



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