中国科学院科技战略咨询研究院
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Berlin Summit for EVE

International Cooperation for Realizing a Carbon Neutrality World from a Policy Perspective
政策角度下实现全球碳中和的国际合作前景

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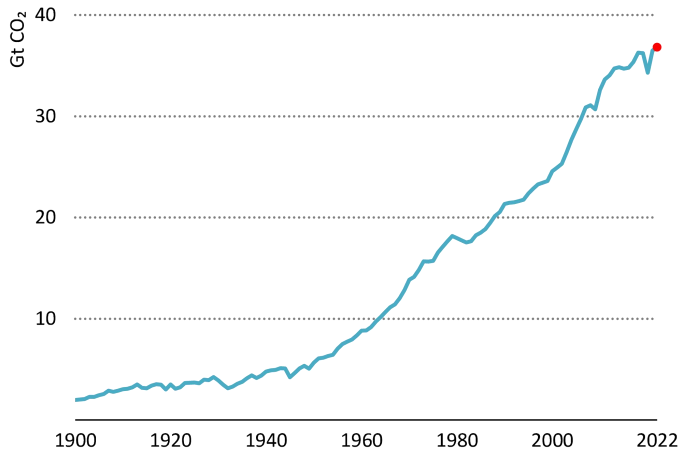
近年全球气候谈判和能源转型的主线、驱动力和挑战

- **New Stage of full implementation of Paris Agreement since 2021**
- **Main storyline: Ambitious Targets vs Pragmatic Actions, UNFCCC COP26-28, CBD COP15**
- **Bottom-up approach:**
  - Best Available Science, **target-driving,** periodic review and NDCs update
  - **Multiple gaps**: tech, fund, capacity, policy and governance, just transition pathway
- **Influences of COVID-19 for 3 years**
  - Mutual trust reduced and misunderstanding increase
  - Rebuilding, restructuring and restoration in a traditional way
  - Opportunities for green transition
- **Geopolitical tension**
  - Russia -Ukraine war causes the mainstream of generalizing of security issues
  - US-China strategic gaming: even the Joint Glasgow Declaration signed in 2021, but mainly in policy fields
  - Increase the cost of green supply chain and energy transition by de-risking and other measures
- **To strengthen cooperation is crucial for a common future, including scientific cooperation like EVE**

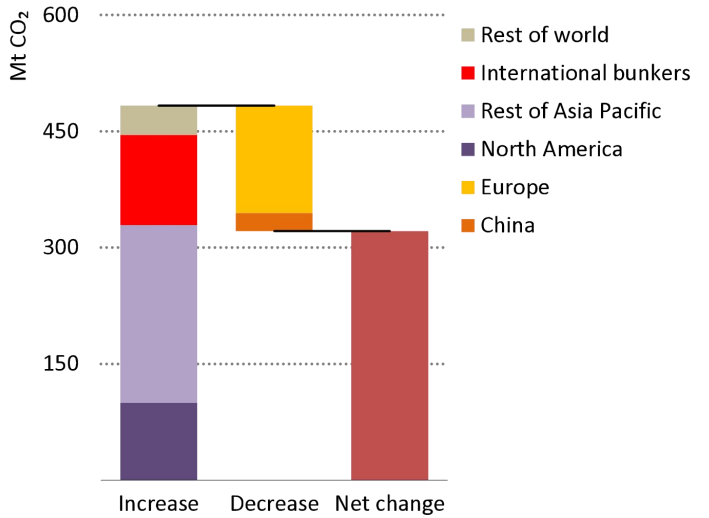
1.1 The overall trend of global energy transition and response to climate change is irreversible
全球能源低碳转型和应对气候变化的总体趋势不可逆转

- **Global CO_2 emissions from energy and industry hit record high in 2022 (36.8Gt, 0.9% increased)**
  - Coal returned in some countries
  - Carbon emissions dropped in Europe and China
- **Countries are more determined to carbon neutrality**
  - More than 140 countries and regions had proposed or were considering to propose net-zero/carbon neutrality targets, covering 88% of global CO_2 emissions and 92% of global GDP
  - By the end of 2022, installed capacity from renewables reached 3,372GW. Renewables contributed 83% to the global new installed capacity in 2022.
- **Bilateral and multilateral climate communication and cooperation have been enhanced as COVID-19 closed**



Source: IEA

CO_2 emissions from energy combustion and industrial processes



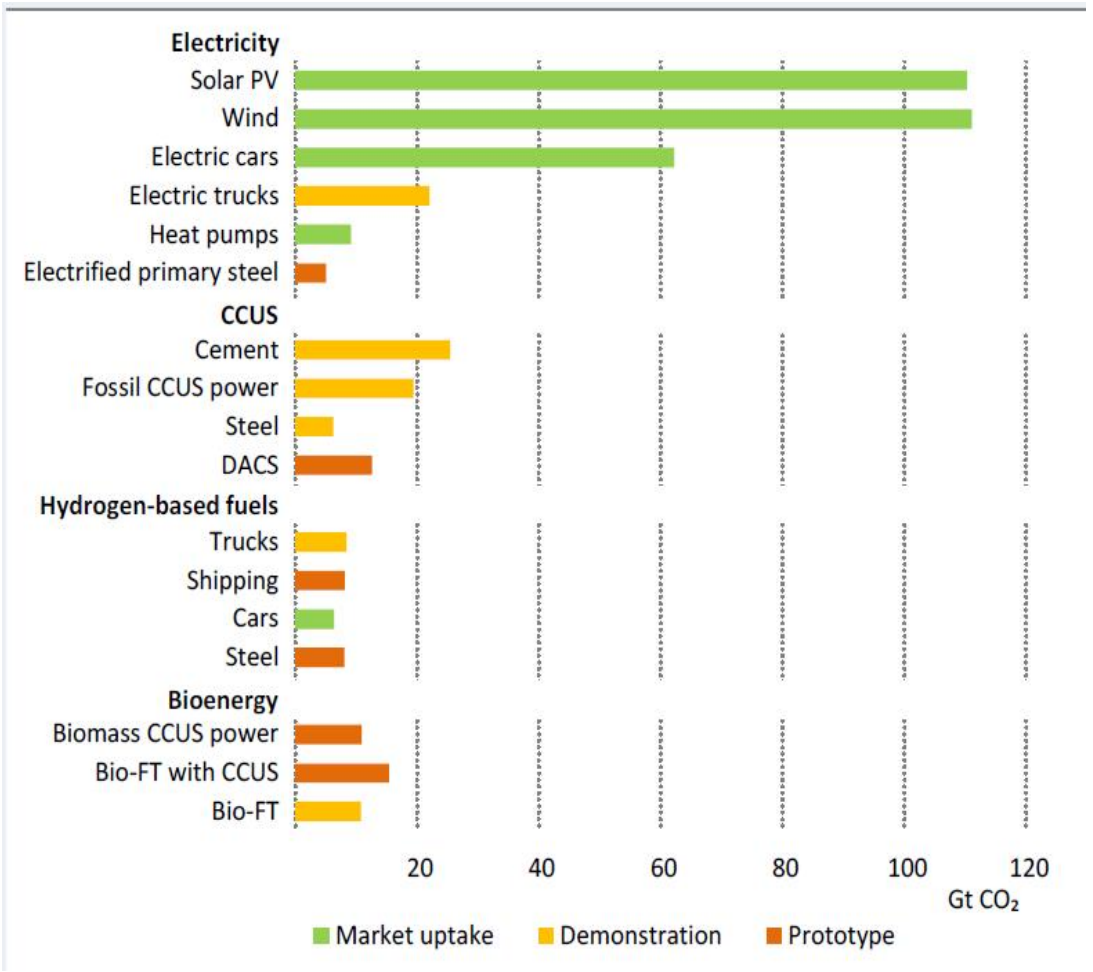
Change in CO_2 emissions by region, 2021-22 *Source: IEA*

1.2 The pathway to net-zero emissions is fraught with challenges & uncertainties
迈向净零排放的道路充满不确定性挑战

- **The economic uncertainties and a confrontation thinking have exacerbated the global climate governance deficit**
  - The growth of global economy is slowing down and on a trajectory of medium- to low-speed growth
  - Climate finance is inadequate as few developed countries are stepping up climate financing to implement the existing commitments
  - At the COP26, the U.S. pledged $11.4 billion of climate aid annually to developing countries by 2024, but as of now, the U.S. Congress has made good on only $1 billion
- **Energy security problems are prominent, but there is a lack of appropriate solutions**
  - Geopolitics increased impacts on global energy market and green transition by de-coupling, de-risking, and de-globalization
  - Energy security faces new challenges as energy costs generally rise.
  - The security problems in the high-ratio and large-scale of renewable energy development
  - Developing countries are facing particularly serious energy shortage problems (in 2022, 700 million people still had no access to electricity and 2.4 billion people still used fuel wood and coal as the main sources of cooking energy)

1.3 Green industries are booming globally, but still face challenges (1)
全球绿色产业蓬勃发展，但面临诸多挑战

- **The essential technologies for energy transition have been put in place, but key technologies for carbon neutrality are still a gap**
  - With **the gap in key technologies** for carbon neutrality, nearly half of the emissions reductions by 2050 will come from technologies that are still in the demonstration or prototype phase (IEA)
- **Trade protectionism, export control and insufficient innovation**
- **The gap in climate finance and technology is huge, and the leadership and governance deficits are highlighted**

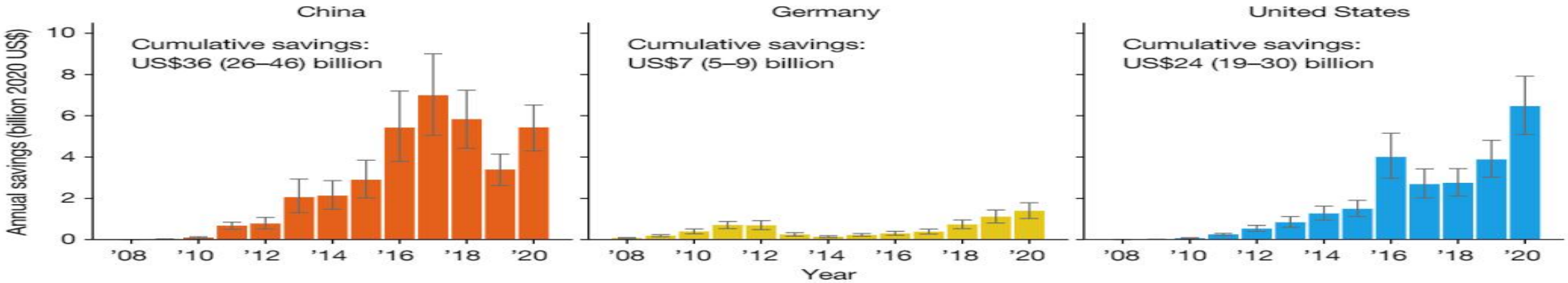


Cumulative CO_2 emissions reductions for selected technologies by maturity category in the NZE

Source: IEA

1.3 Green industries are booming globally, but still face challenges (2)
全球绿色产业蓬勃发展，但面临诸多挑战

- **The latest unilateral policies of industry and trade in Western countries will bring uncertainties to the global green & low-carbon transition**
  - U.S.: IRA, CHIPS Act of 2022, Infrastructure Investment and Jobs Act
  - EU: CBAM, Net-Zero Industry Act, Critical Raw Materials Act
  - Decoupling of industrial and supply chains will raise the cost of global low-carbon transition, impede the rapid deployment of low-carbon technologies on a large scale, and **undermine the global green industrial transformation**
  - Developed countries' energy transition and climate policy systems will create **global inequities**, especially for developing countries

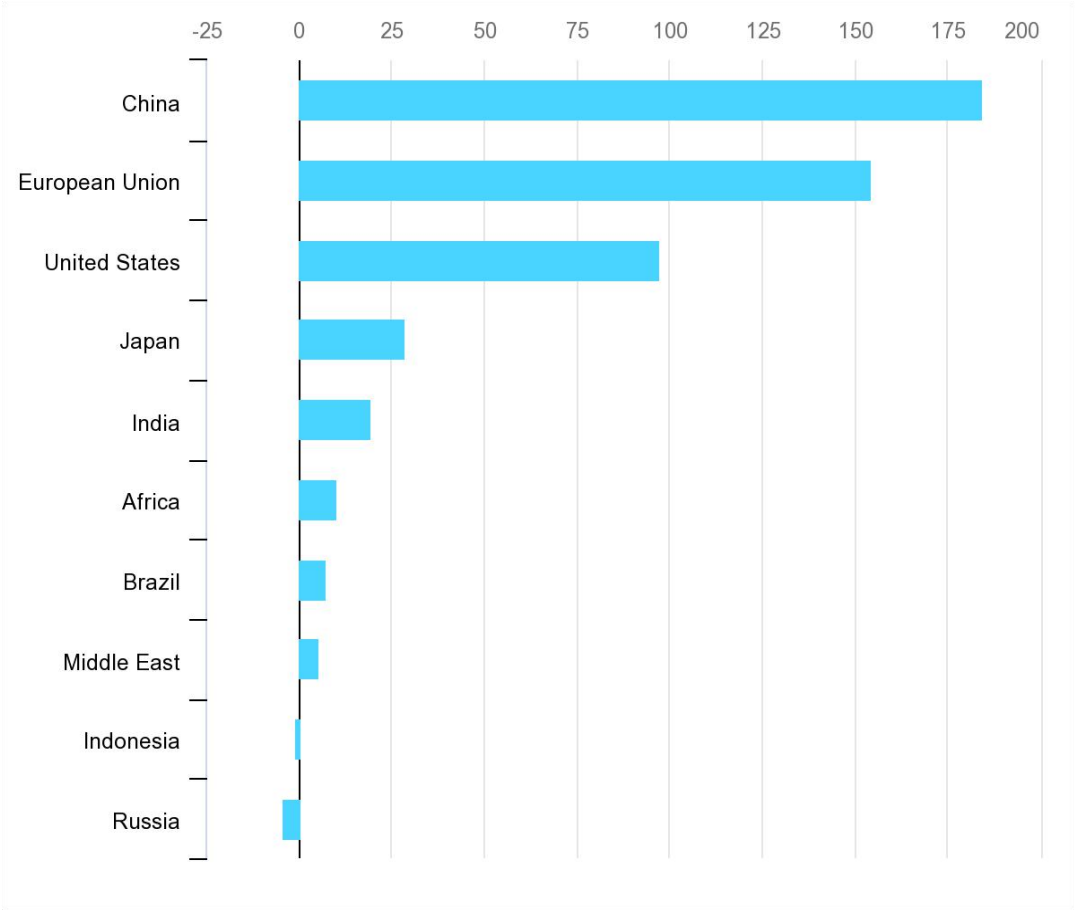


Estimated annual savings from deployed annual solar PV modules using global versus national market scenarios in China, Germany and the United States (2008–2020)

Source: John Paul Helveston, Gang He& Michael R. Davidson, Nature, 2022

1.4 The Global South needs more nation-based support for clean energy transition
需加强对南方国家能源转型和气候应对的支持，并要因地制宜

- **The Global South** and emerging economies are actively accelerating energy transition, but risks and challenges faced
  - ➢ Financial support, technology assistance and transfer, and uneven allocation
- Global clean energy investments have grown significantly, but more than **90%** take place in developed economies and China, with few in other developing countries
- Some countries in the Global South are still highly dependent on fossil fuels, with no effective solutions to social, energy security and other problems brought by transition
  - ➢ COP28 President Al Jaber Calls for Phase-out of **Fossil Fuel Emissions,** leaving the door open for the continued use of fossil fuels while ramping up technologies to capture the carbon pollution produced from burning them
- Power grids and other infrastructure are too weak to support large-scale renewable energy deployment



Change in annual clean energy investment in selected countries and regions between 2019 and 2023e

Source: IEA, 2023

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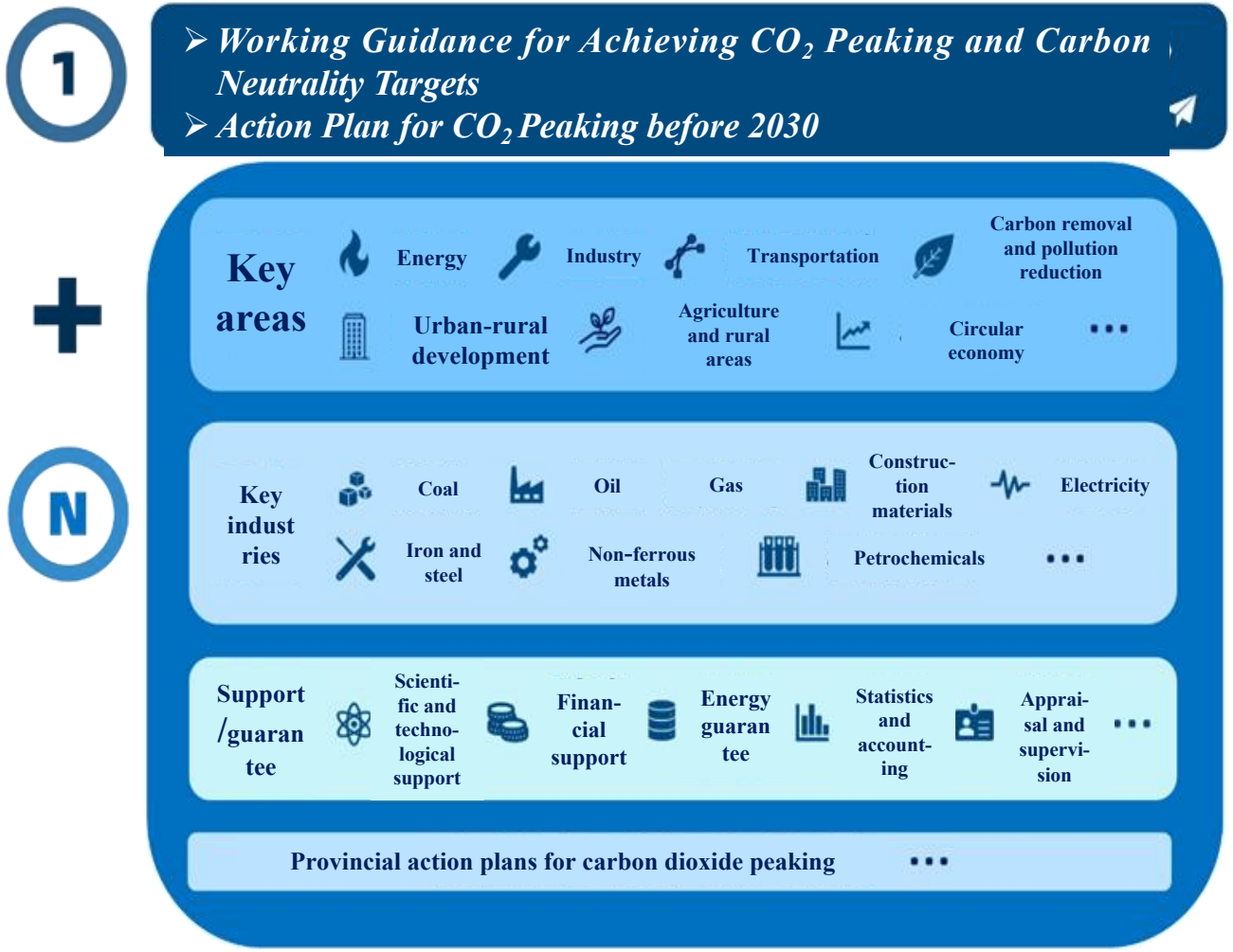
2.1 China has established a “1+N” policy framework for carbon peaking and carbon neutrality
中国系统构建双碳“1+N”政策体系

➢ **China‘s “1+N” policy framework for dual carbon targets has been put in place and gradually improved: A systems approach for overall green transition (legislation, planning, policy, etc.)**

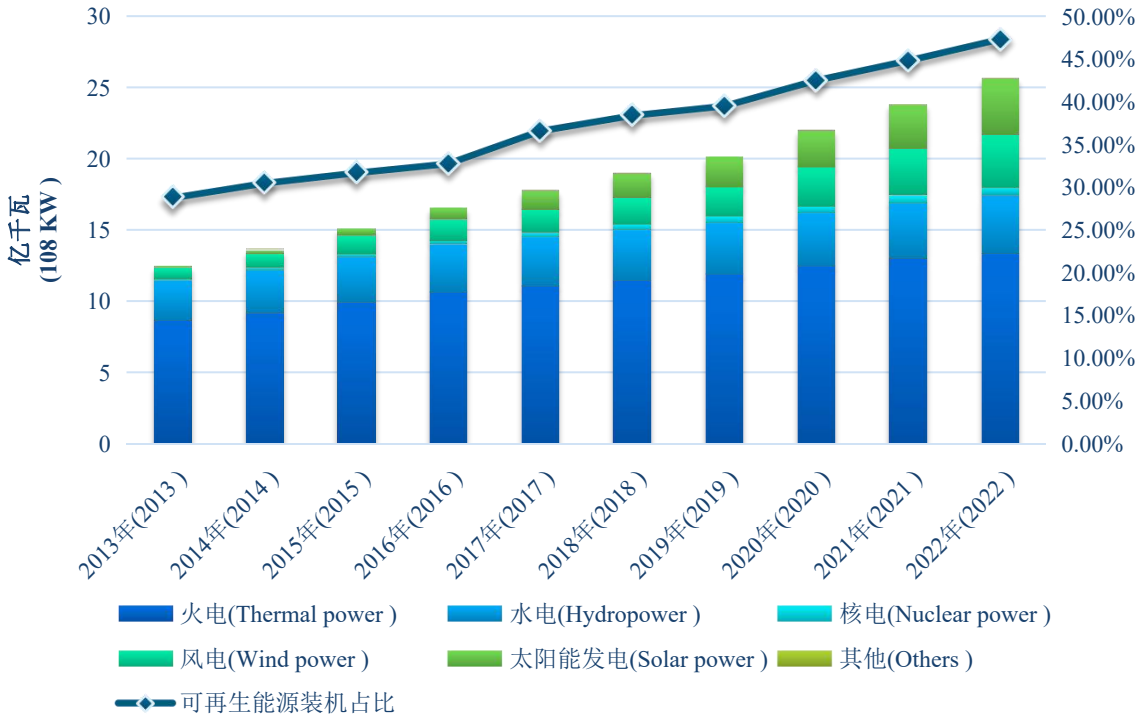


Sector	Targets for 2030
Overall objectives	• CO_2 peaking will be achieved before 2030 • CO_2 emissions per unit of GDP will have dropped by more than 65% compared with the 2005 level
Energy	• The share of non-fossil energy consumption will reach around 25% • Total installed generation capacity of wind and solar power will reach above 1,200GW
Industry	• The proportion of short process steel production will exceed 20% • The share of renewable energy used for electrolytic aluminum production will exceed 30%
Transportation	• The share of incremental vehicles fueled by new and clean energy will reach around 40%
Construction	• Electricity consumption will account for more than 65% of building energy consumption
Forestry	• The forest coverage rate will reach around 25% • The forest stock volume will reach 19 billion m^3
Circular economy	• 4.5 billion tons of bulk solid waste will be used per year • 65% of municipal solid waste (MSW) will be recycled as resources

2.2 China has accelerated renewable energy development, contributing to global energy transition
中国加速发展可再生能源，为全球能源转型做出贡献

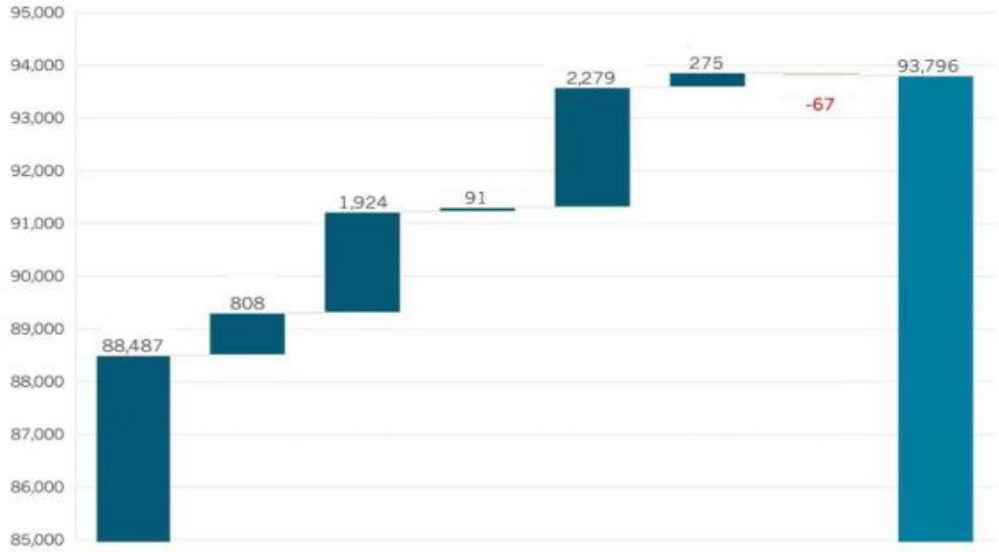
- **The installed capacity of renewable energy has surpassed that of coal power**
  - By the end of 2022, China's installed capacity of renewable energy reached **1,213 GW**, or **47.3%** of the country's total, surpassing that of coal power (43.8%)
  - By the end of 2022, China's total installed capacity of wind and PV reach 365 GW and 392 GW respectively, ranking first in the world for many years by new and total installed capacity
  - In 2021, China contributed 32.8% and 30.9% respectively to the world's installed capacity and power generation from renewable energy, both more than **the U.S. and EU combined**
  - China has reduced the **production cost** of global renewable energy and accelerated the global green & low-carbon transition

2013-2022年中国发电装机容量
China's installed capacity, 2013-2022



2.3 Coal power provides backup & resilience for RE systems in the context of mainstreaming security
安全主流化背景下，煤电为能源系统韧性和安全提供保障

- **The installed capacity of coal-fired power is still growing, though with less generation hours**
  - The number of thermal power generation hours was approximately 6,000 around 2005, which has gradually fallen since then to around 4,300-4,500 currently
- **New electricity demand is mainly met by renewable energy**
  - In 2022, more than 4/5 of the new electricity demand was met by non-fossil fuels
  - New electricity demand is expected to be fully met by non-fossil fuels by the end of the 14th Five-Year Plan period
- **Reasons for coal consumption growth**
  - In 2022, coal consumption (standard) was 3.04 billion tons of standard coal, up 3.6% year on year
  - Gas prices stayed high, bringing down the share of gas consumption from 8.9% to 8.5%
  - Cold weather boosted the demand for coal-fired heating
  - To guarantee large-scale supply of renewable energy power delivery
  - Co-gen technology and heat supply



2023年分能源品种发电量预测

Forecasts of power generation by energy type, 2023

Source: Energy Foundation China

2.4 Updates in China's energy and climate efforts
中国能源和气候工作的新变化新特征

- **Mainstreaming of Energy Security, balance with development and climate targets**
- **Accelerating the transition to a green development pattern: a green and low-carbon socio-economy**
  - Great pressure on green & low-carbon transition amid the economic downturn
  - Working faster to adjust and improve the industrial structure, the energy mix, the composition of the transportation sector, and land use
  - Implementing a comprehensive resource conservation strategy, conserving all types of resources and using them efficiently, and moving faster to put in place a waste recycling system (understanding the role of a circular economy in regional development and industries)
  - Diversifying policy tools to boost green and low-carbon industries, and encourage green consumption
- **Learning by doing:** different energy transition pathways, comprehensive evaluation needed
  - Clean coal + Extra-high voltage electricity transmission + CCS;
  - Wind & PV + Smart grid + Energy storage + Demond-side management;
  - Hydro + Nuke + Solar PV

Ecological development	Infrastructure system	Energy system	Lifestyle	Finance	Green industry	Information system	Property rights	Development mode	Ecological conservation	e development
•Develop green and environmental protection industry	•Build green and smart infrastructure system	•Build clean and decarbonized energy system	•Develop green consumption habits	•Actively develop green finance	•Invest green industry and launch large-scale land greening programs	•Build ecological environment information technology system	•Promote environment property rights system	•Green transition in agriculture, rural and urban development	•Develop ecological function zone, ecological support zone and ecological barrier	•Implement UN 2030 sustainable development agenda

***Best Practice sharing and more opportunities*: co-development *"renewables +"* (co-benefits) & new non-fossil fuel system: storage, smart grid, distributed supply system of energy, various energies' complementation, with digital tech and supporting policies**

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3.1 Prioritized Actions taken for International Climate Cooperation and Beyond
能源和气候领域合作的优先行动

- **Rule-based with multi-lateral mechanism:**
  - UNFCCC, Paris Agreement, and GCP, SIP
  - Best available science, IPCC and SBSTA
- **Other key players: APEC, G7, G20, WB/IMF, etc.**
- **Full implementation of current actions and goals committed,** e.g. NDCs and update
  - Scenarios: Keep the temperature rise in 2100 at around in 1.7℃, in full and on time implementation of the APS (NDCs + longer term net zero emissions targets)(WEO2022, IEA);
  - 2.1-2.4℃ peak assuming in full implementation of NDCs (UNFCCC secretariat, 2022)
- **GST at COP28:** gaps at global level, further analysis and support needed

3.2 Key Areas under the Paris Agreement and other Int'l Climate Rules (1)
国际气候公约和协议下的关键领域

- **Key areas:**
  - **Technology Innovation**
  - **Capacity building and enhancement**:
    - ✓ statistical and accounting system(methodologies, inventory compilation, MRV, energy balance sheet, etc.;
    - ✓ Institutional setting;
    - ✓ governance structure;
    - ✓ training of local officials
  - **Just transition:** coordinating and balanced
    - ✓ by industries, by regions, by sectors, by energies, etc.
    - ✓ What is the modelling's role

3.2 Key Areas under the Paris Agreement and other Int'l Climate Rules (2)
国际气候公约和协议下的关键领域

Bridge the financial gaps with diversified funds:

- **Achieving the 100 bn. of fund promised by developed countries first**
- **Adaptation fund:** urgently and significantly scale up their provision of climate finance, may double adaptation fund
- **Loss and Damage**
- **Other financial requirement,** such as SDGs, biodiversity conservation, etc.
- **MDB reforming**
- **Debt restructuring of developing countries**
- **ESG:** info disclosure first

3.2 Key Areas under the Paris Agreement and other Int'l Climate Rules (3)
国际气候公约和协议下的关键领域

- **Loss and damage:**
  - **Santiago network**: confirm the secretariat and advice body
  - **L & D fund:** party funding based on rules, ways of contributing investment, and how to use the fund, etc.
  - **Glasgow dialogue:** fund arrangements, operation issues, and transition committee.
- **Difficulties**
  - theory and method
  - No clear definition or indicators or scope for L&D
  - Long way to go
- **China's potential contributions:**
  - South-south coop fund on climate
  - Non-financial support: such as technical assistance, knowledge sharing, capacity building, early warning and risk management for vulnerable countries

3.3 Recommendations to Strengthen EU-China Cooperation on Climate
加强中欧气候合作的优先行动和政策建议

- **Strengthening China-EU cooperation on energy and climate: Prioritized actions highlight**
  - **Enhance dialogues to tackle common challenge for the energy transition in China-EU**
  - **Tap into the full potential of energy efficiency improvement**
  - **Work together to coordinate and advocate on a global renewable energy target**
  - **Demo projects on energy transition and urban low-carbon planning**
  - **Sub-national cooperation, and think-tanks, universities, and enterprises**
  - **The 3rd Party cooperation for developing countries**

Thanks for your attention!

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