



Greener Together: Norway-China Green Transition Forum 2025

2025 共筑绿色未来：挪威-中国绿色转型论坛

“十五五” 中国能源转型发展形势

China's Energy Transition Development Situation, 2026-2030

中国石油集团经济技术研究院

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全球能源总量保持增长，能源转型大势不变

Global energy demand continues to grow, and the trend of energy transition remains unchanged

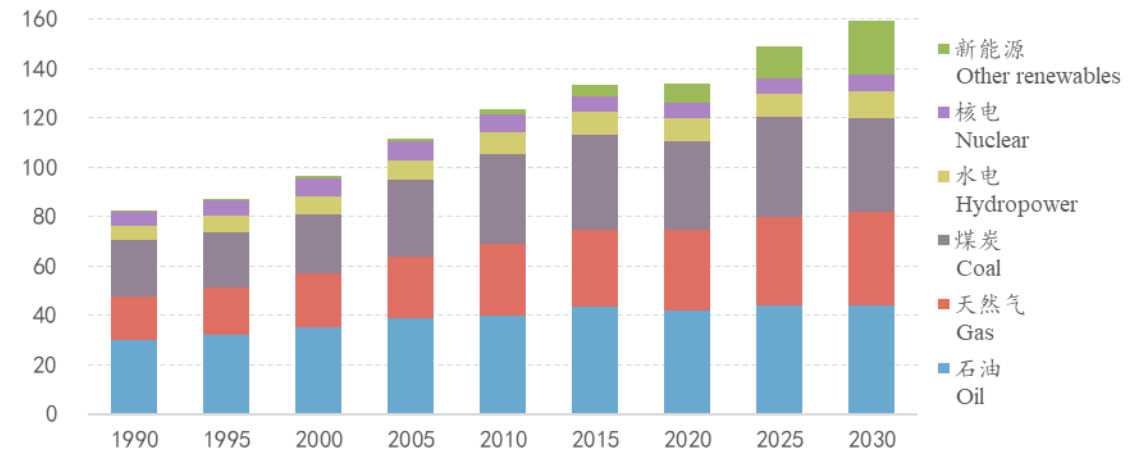
- **全球能源需求增长放缓。**2030年世界一次能源需求增至159.3亿吨标油（228亿吨标煤）。“十五五”时期年均增长1.2%，较“十四五”时期下降1.6个百分点。

Global primary energy demand will continue to rise, though growth will slow. By 2030, demand is expected to reach 15.93 billion TOE (22.80 billion TCE), with annual growth dropping to 1.2% during 2026-2030—down 1.6 percentage points from 2021-2025. Over 80% of this growth will come from Asia-Pacific and Africa.

- **全球能源结构保持向多元化、清洁化发展趋势。**“十五五”期间非化石能源年均增速近5%，在一次能源结构中占比年均提升0.74个百分点，到2030年接近25%。

The energy mix is shifting toward greater diversity and cleaner sources. Non-fossil energy will grow nearly 5% annually from 2026-2030, raising its share to nearly 25% by 2030. Meanwhile, end-use electrification will increase by 0.5 percentage points yearly, reaching around 25% by the end of the decade.

世界一次能源需求（亿吨标油）
World primary energy demand (100 Million TOE)





中国持续推进能源清洁低碳转型，将如期兑现碳达峰承诺

China advances clean energy transition and will meet its carbon peak commitment on time

- **一次能源需求增速逐步放缓。** 2030年一次能源需求达48.3亿吨标油。“十五五”时期，能源需求年均增速为1.9%，较“十四五”时期下降2.4个百分点。

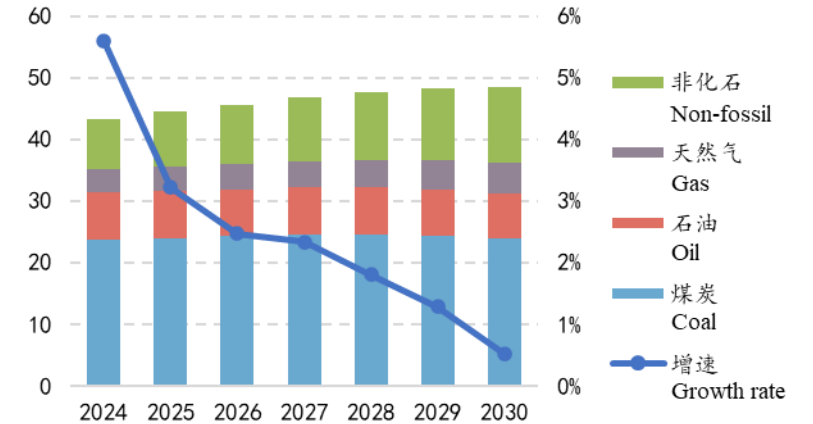
The growth rate of primary energy demand is gradually slowing down.

In 2030, primary energy demand will reach 4.83 billion TOE. During 2026-2030, energy demand will grow at an average annual rate of 1.9 per cent, a decrease of 2.4 percentage points compared with the period 2020-2025.

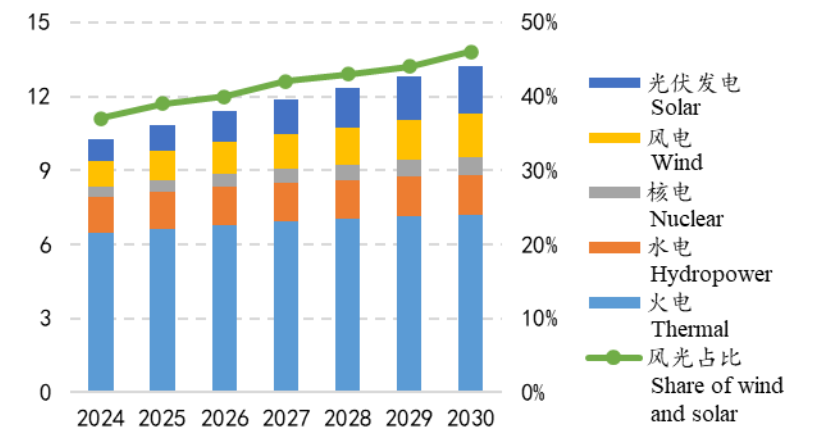
- **电力需求快速增长。** 到2030年用电量突破13万亿千瓦时，年均增速约4.8%，是一次能源消费增速的2倍以上。发电结构中，风电光电占比达46%。

Electricity demand is growing rapidly. By 2030, electricity consumption will exceed 13 trillion kilowatt-hours, with an average annual growth rate of about 4.8 per cent, more than twice the growth rate of primary energy consumption. In the power generation structure, wind power and solar power account for 46 per cent.

一次能源需求及增速（亿吨标油）
Primary energy demand and growth rate
(100 Mtoe)



发电量及风电光电占比（万亿千瓦时）
Electricity generation and share of wind and solar (Trillion kWh)





中国持续推进能源清洁低碳转型，将如期兑现碳达峰承诺

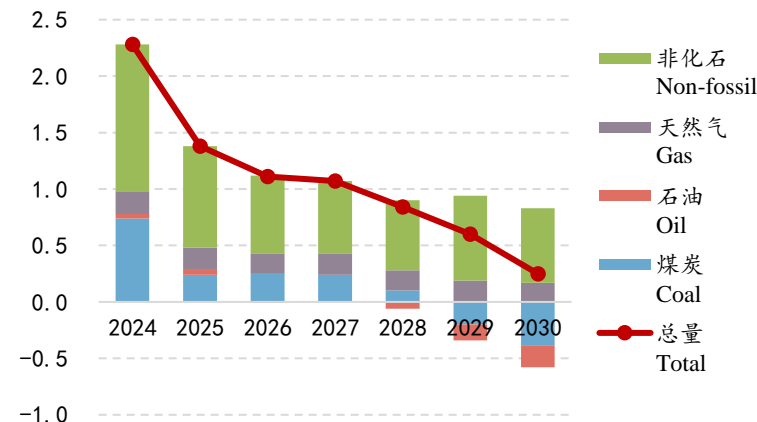
China advances clean energy transition and will meet its carbon peak commitment on time

- **能源结构清洁化发展**，呈现“煤降、油气稳、新能源升”特征。“十五五”时期，非化石能源贡献能源需求增量的80%以上，年均增长6.8%。2030年非化石能源占比达26%。能源相关的碳排放将在2030年前达峰，如期兑现碳达峰承诺。

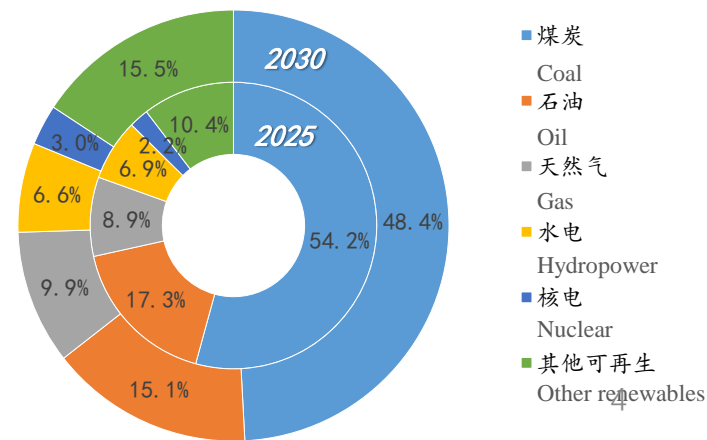
The energy structure is transitioning toward cleaner sources, characterized by declining coal, stable oil and gas, and rising new energy. From 2026 to 2030, non-fossil energy sources will account for over 80% of the incremental energy demand, growing at an average annual rate of 6.8%, and reaching 26% of the total by 2030. Energy-related carbon emissions are expected to peak by 2030, ensuring the carbon peak commitment is met on schedule.

- **油气仍保持主体能源地位**。2030年前油气需求占比维持在25%以上。Oil and gas will remain the dominant energy sources, maintaining a share of over 25% of total energy demand before 2030.

能源需求变化 (亿吨标油)
Change in energy demand (billion tons of standard oil)



一次能源结构 China's primary energy mix





中国的石油消费即将达峰，原料属性不断强化

China's oil consumption is about to peak, with oil's role as a raw material strengthened

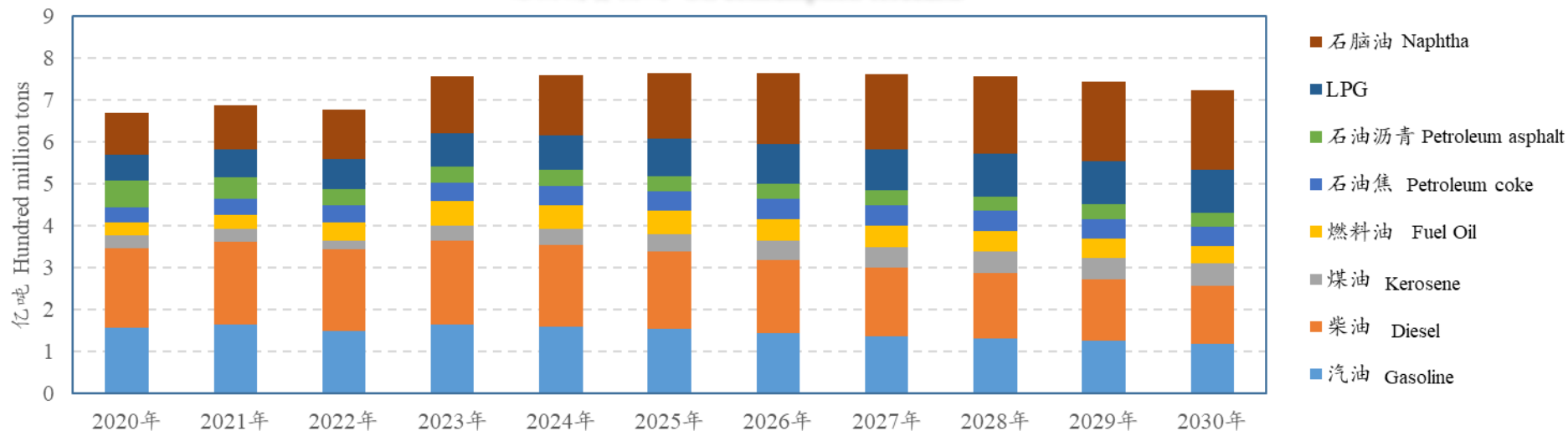
■ 传统石油产业功能定位转换，逐步实现清洁低碳发展。

The traditional oil industry is transitioning its functional role, gradually moving toward clean and low-carbon development.

石油作为交通燃料已达峰，定位逐步转向“交通用能保障+原料用能核心”。需求将于2025年左右达到7.7亿吨峰值，2030年降至7.3亿吨。届时交通用油所占比重将由当前的46%降至40%以下，化工原料占比由当前的20%升至27%。

Oil has peaked as a transportation fuel and is gradually transitioning to a dual role of "ensuring transportation energy supply + serving as a core raw material for energy." Demand will peak around 2025 at 770 million tons, dropping to 730 million by 2030. Transportation's share will fall below 40% (from 46%), while petrochemical feedstock will rise to 27% (from 20%).

石油消费预测 Oil consumption forecasts



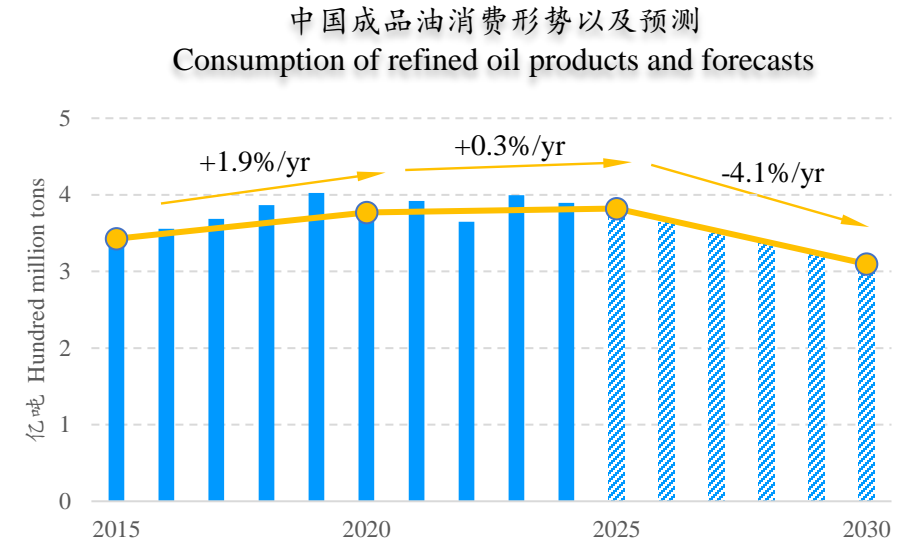


中国的石油消费即将达峰，原料属性不断强化

China's oil consumption is about to peak, with oil's role as a raw material strengthened

- **替代能源超预期发展。** 预计到2030年，新能源汽车、LNG重卡保有量占比将由目前不到10%分别增至30%、15%以上，对汽柴油的替代量将达亿吨规模。

Alternative energy is advancing rapidly. By 2020, new energy vehicles and LNG trucks are expected to reach over 30% and 15% adoption, displacing hundreds of millions of tons of gasoline and diesel.



- **成品油消费进入下降阶段。** 预计到2030年成品油消费降至3.1亿吨，较2024年下降20.5%。汽油、柴油需求降幅达25%，分别降至1.17亿吨、1.39亿吨；仅煤油需求有增长，较2024年增30%以上。“十五五”期间成品油消费由“十四五”的年均增0.3%转为年均降4.1%。

Refined oil consumption will decline to 310 million tons by 2030, down 20.5% from 2024.

Gasoline and diesel demand will drop by 25%, while jet fuel demand will grow over 30%.

During 2025-2030, refined oil consumption will shift from 0.3% annual growth to a 4.1% annual decline.



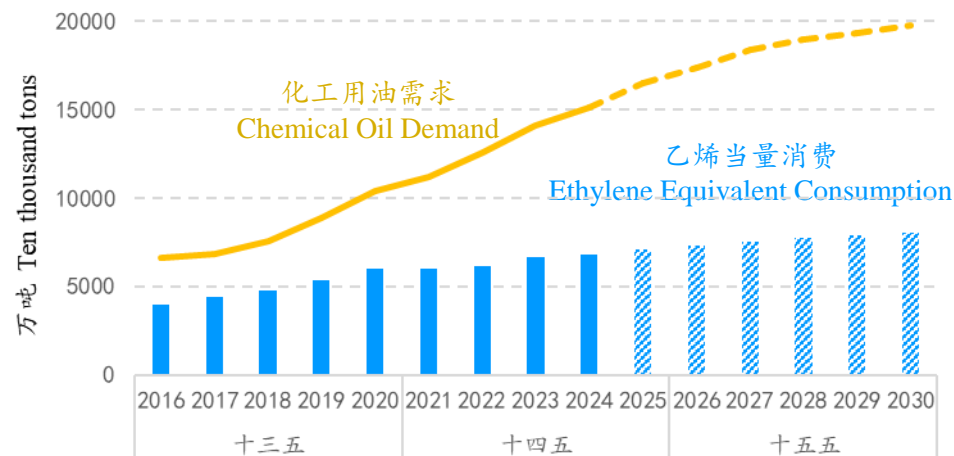
中国的石油消费即将达峰，原料属性不断强化

China's oil consumption is about to peak, with oil's role as a raw material strengthened

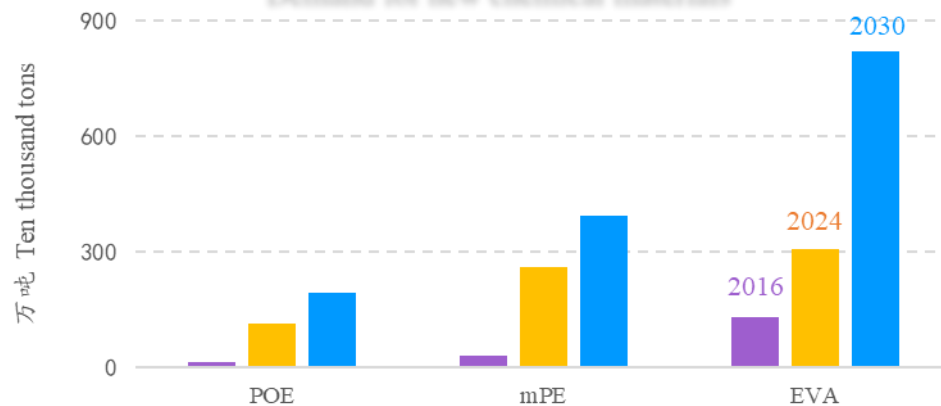
■ **石化产品需求稳定增长带动化工用油需求增长。**在下游产品需求的支撑下，预计2030年乙烯当量消费量达8055万吨，“十五五”年均需求增速2.4%；化工用油需求仍有较大增长空间，预计2030年化工用油需求达1.98亿吨，“十五五”年均增速3.3%。
Petrochemical demand will drive chemical oil use, with ethylene consumption reaching 80.55 million tons by 2030 (2.4% annual growth) and chemical oil demand hitting 198 million tons (3.3% annual growth).

■ **化工新材料将在新能源、高端装备、电子信息、医疗健康等领域发挥更大的支撑作用。**预计“十五五”时期POE、EVA、mPE（茂金属聚乙烯）将产品需求年均增速将保持10%左右。
Chemical new materials will support sectors like new energy and healthcare, with POE, EVA, and mPE demand growing around 10% annually during the 15th Five-Year Plan.

中国乙烯当量消费及化工用油需求
China's Ethylene Equivalent Consumption and Chemical Oil Demand



化工新材料需求预测
Demand for new chemical materials





技术进步将引领石油产业可持续发展

Technological advancements will drive the sustainable development of the petroleum industry

- 传统石油产业通过原料端推进低碳化、多元化；在生产中推进集约化、智能化；在产品侧推进高端化、精细化，逐步实现清洁低碳发展。

The traditional oil industry is advancing low-carbon and diversified practices in raw material sourcing, promoting intensification and intelligence in production, and enhancing high-end and refined product development, gradually achieving clean and low-carbon growth.

原料绿色化 Green Raw Materials

生物制造技术；废旧化工材料回收利用技术；
碳资源高效利用技术；电子化学品

Bio-manufacturing technology;
Recycling technology for waste chemical materials;
Efficient utilization technology for carbon resources;
Electronic chemicals



生产过程智能化 Intelligent Production Processes

流程再造技术；电气化技术；清洁能源替代技术；
过程强化技术；智能化技术

Process reengineering technology;
Electrification technology;
Clean energy substitution technology;
Process intensification technology;
Intelligent technology



产品高端化 High-End Products

高端聚烯烃；特种合成橡胶；特种工程材料；
高端膜材料；高性能纤维；未来材料

High-end polyolefins; Special synthetic rubber;
Special engineering materials;
High-end membrane materials;
High-performance fibers; Future materials





中国天然气供需总体宽松，行业快速发展进入关键“窗口期”

Natural gas supply-demand in China is easing, and will usher in a critical period of rapid development

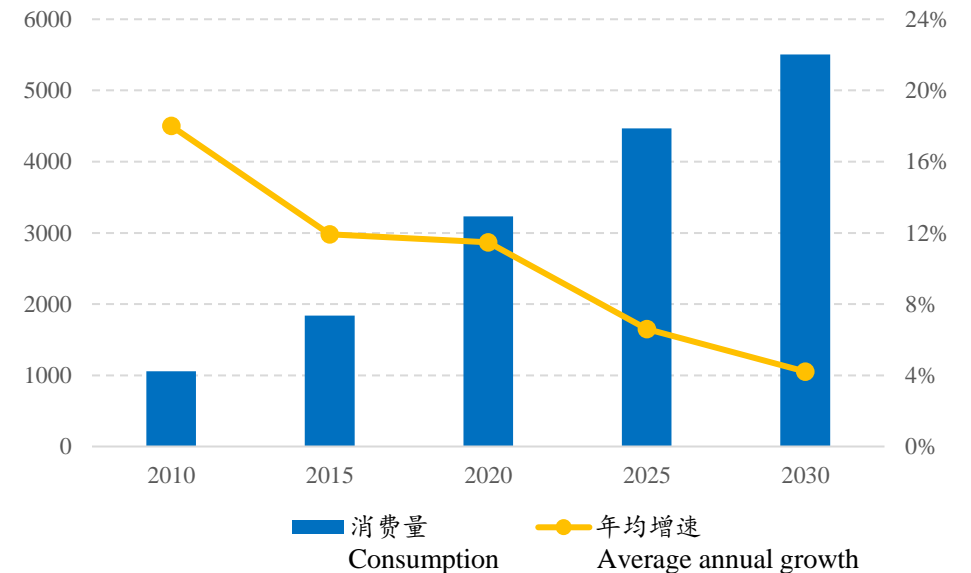
■ “十五五”期间将是中国天然气快速发展的关键“窗口期”

- ✓ 依托清洁、低碳、灵活、高效等优势，发展潜力大；面临新能源、煤炭清洁利用等替代能源的竞争。
- ✓ “十五五”期间需求量年均增加207亿立方米，2030年达到约5520亿立方米，年均增速4.2%，较“十四五”期间放缓2.4个百分点

■ 2026-2030: Key growth "window" for China's natural gas

- ✓ Significant potential due to clean, low-carbon, flexible, and efficient advantages;
- ✓ Facing competition from energy alternatives such as new energies and the clean utilization of coal.
- ✓ Annual demand increase: 20.7 billion cubic meters, 4.2%, down 2.4 percentage points from 2021-2025
- ✓ To reach ~552 billion cubic meters by 2030, peaking at ~620 billion cubic meters around 2040

天然气消费量 (亿立方米)
Natural Gas Consumption (100 million cubic meters)





中国天然气供需总体宽松，行业快速发展进入关键“窗口期”

Natural gas supply-demand in China is easing, and will usher in a critical period of rapid development

■ 天然气在多领域继续发挥重要作用，有效助力“碳达峰”

Natural gas continues to play an important role in a number of areas, effectively contributing to “Peak Carbon”

| 应用领域 Fields of application | 变化情况 Changes | 2025~2030 增加量→2030 消费量 (亿立方米) 2025~2030 Increase → 2030 Consumption (100 million cubic meters) |
|-----------------------------------|--|---|
| 总体 Total | 需求量年均增速4.2%，较“十四五”期间放缓2.4个百分点 Annual demand growth slows to 4.2%, 2.4 pp lower than 2021-2025. | +1058 → 5520 (4.2%/year) |
| 工业用气 Industrial | 增量最大。“气代煤”仍有较大增长空间；新兴产业带来新动力 Maximum Growth. "Coal-to-Gas" transition offers significant growth potential; emerging industries drive demand. | +400 → 2200 (4.1%/year) |
| 发电用气 Power generation | 增速最快。决定天然气利用规模的关键因素；气电迎来高峰；中东部和西南地区；新能源大基地配套气电快速增长 Fastest Growth. Key to gas scale; gas power projects peak, especially in new energy bases and key regions. | +353 → 1050 (7.8%/year) |
| 城市燃气 City gas | 稳步增长 Steady Growth | +175 → 1860 (3.5%/year) |
| 化肥化工用气 Chemical and fertilizer | 总体持稳。受利用政策影响，未来增长规模有限。 Stable. Limited growth due to policy constraints. | +10 → 410 (0.5%/year) |



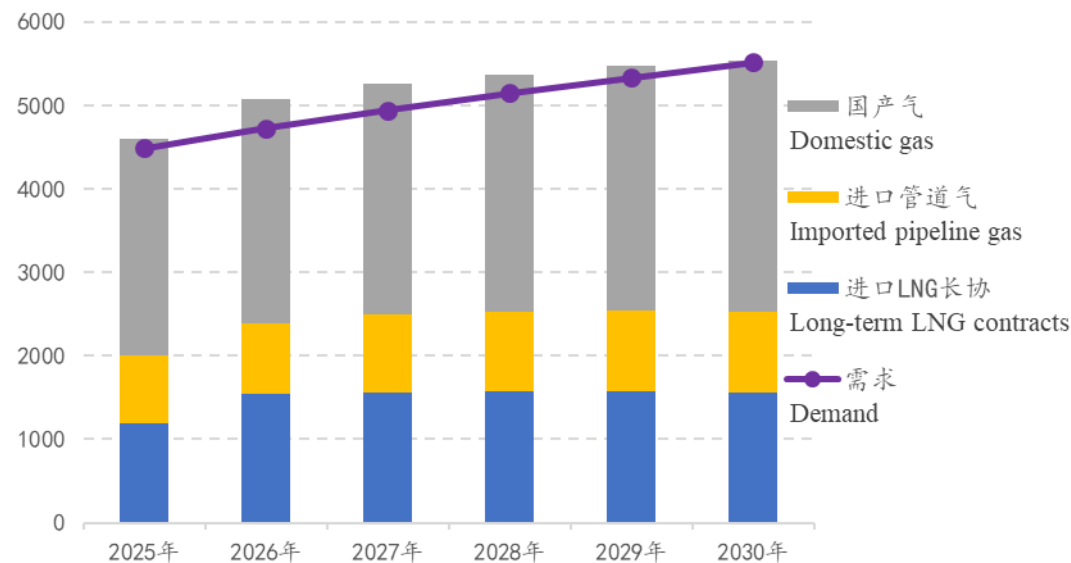
中国天然气供需总体宽松，行业快速发展进入关键“窗口期”

Natural gas supply-demand in China is easing, and will usher in a critical period of rapid development

■ **全国供需相对宽松。** 综合已签进口长协合同情况，预计2030年相对落实的进口气资源量2534亿立方米，超出实际进口需求，“十五五”期间年均供应过剩量超205亿立方米。

Supply-Demand Balance: Relatively loose, with contracted import resources reaching 253.4 billion cubic meters by 2030, exceeding demand. Annual supply surplus during 2026-2030 will average over 20.5 billion cubic meters.

中国天然气供需平衡情况（亿立方米）
Natural Gas Supply and Demand Balance (100 million cubic meters)



| | | |
|--|---|--|
| 国产气稳定增长 Domestic Production: Steady Growth | 年均增速 2.9%，2030年达 3000亿立方米 2.9% annual growth, 300 billion cubic meters by 2030 | 煤岩气等技术突破将提升国内产量 Breakthroughs in coalbed methane could further expand domestic supply |
| 进口气较快增长 Imports: Rapid Growth | 年均增速 4.7%，2030年达 2520亿立方米 4.7% annual growth, 252 billion cubic meters by 2030 | LNG接收站建设进入投产高峰期 New LNG terminal projects drive growth |



石油天然气行业全力推动绿色低碳转型

Oil and gas industry is fully committed to advancing green and low-carbon transformation

- **上游：增储上产、发展新能源，保障能源供给。**

既着力布局当前的清洁替代，大力推动矿区内新能源与油气融合开发，又着眼于未来战略接替，积极布局沙戈荒大基地。

Upstream: Focus on increasing reserves and production, developing new energy sources, and ensuring energy supply. Prioritize current clean energy alternatives, vigorously promote integrated development of new energy and oil and gas within mining areas, and strategically plan for future energy transitions by actively developing large-scale bases in desert and wasteland regions.

- **中游：清洁生产、减油增化、发展新材料。**

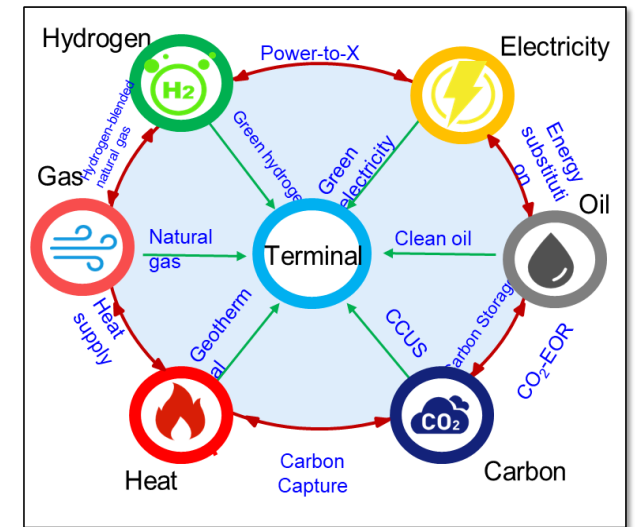
既着力抓好绿电、绿氢替代完成节能降碳任务，又着眼未来化工新产品的战略布局。

Midstream: Emphasize clean production, reduce oil refining, increase chemical production, and develop new materials. Achieve energy-saving and carbon reduction goals by replacing traditional energy with green electricity and hydrogen, while strategically planning for future chemical product innovations.

- **下游：布局电氢终端，推动终端清洁转型。**

抓住新能源车快速增长的机遇，利用品牌渠道优势，快速布局清洁能源综合服务站。

Downstream: Deploy electric and hydrogen end-use infrastructure to drive the clean transformation of energy consumption. Seize the opportunity presented by the rapid growth of new energy vehicles, leverage brand and channel advantages, and quickly establish integrated service stations for clean energy.





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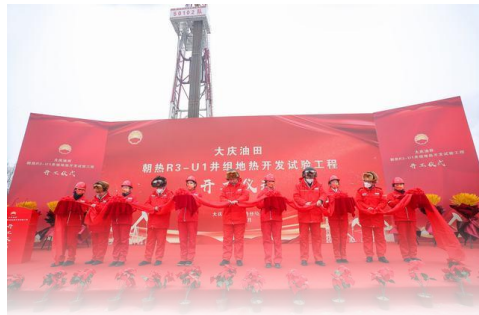
1. 勘探开发

Exploration & Development

形成油气行业绿色转型新模式——

“油田→地热田、油田→绿电田、油田→绿氢田、油田→储碳田”的转变。

Form new model for green transformation of oil and gas industry——Oil field to Geothermal field, Oil field to Green power field, Oil field to Green hydrogen field, and Oil field to Carbon storage field.



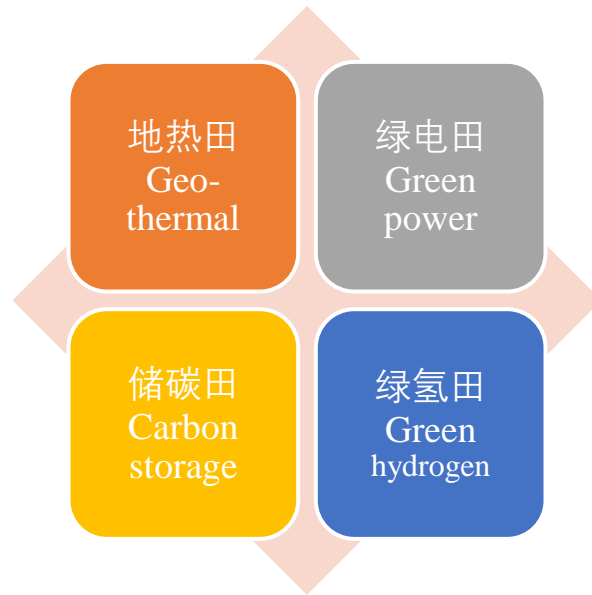
大庆油田：中深层U型井地热项目

Daqing Oilfield: Medium-Deep U-shaped Well Geothermal Project



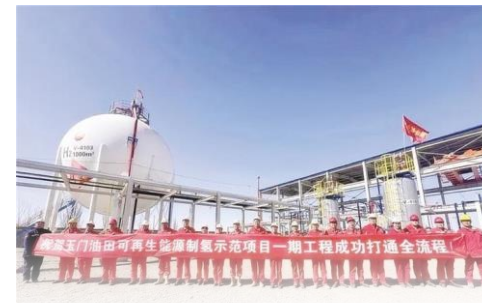
长庆油田：3个百万吨级CCUS示范工程

Changqing Oilfield: 3 million-ton CCUS demonstration projects



塔里木油田：50万千瓦光伏发电

Tarim Oilfield: 50 MW photovoltaic power generation



玉门油田：可再生能源制氢示范项目

Yumen Oilfield: Renewable energy to hydrogen demonstration project



石油天然气行业全力推动绿色低碳转型

Oil and gas industry is fully committed to advancing green and low-carbon transformation

2. 炼油化工 Refining & Chemicals

以技术创新驱动炼化降碳，通过制氢用氢和CO₂回收等实现资源高效循环。

Drive refining decarbonization through technological innovation, achieving efficient resource recycling via hydrogen utilization and CO₂ recovery.



独山子石化：塔里木乙烷制乙烯项目
国家乙烷裂解制乙烯示范工程，乙烯收率与综合能耗均达世界先进水平

Dushanzi Petrochemical: Tarim Ethane-to-Ethylene Project

A national demonstration project for ethane cracking to ethylene. Ethylene yield and comprehensive energy consumption reach world-leading levels.



华北石化：副产氢提纯项目
利用重整装置富余氢气，产出99.999%以上高纯氢，服务北京冬奥会近千辆氢燃料车

Huabei Petrochemical: By-product Hydrogen Purification Project

Using surplus hydrogen from reforming units to produce high-purity hydrogen above 99.999%, serving nearly 1,000 hydrogen fuel cell vehicles at the Beijing Winter Olympics.



长庆石化：炼化智能工厂项目
打造中国首个5G全智能炼厂，节能减排成效显著

Changqing Petrochemical: Smart Refinery Project

Establishing China's first fully 5G-integrated smart refinery, with remarkable achievements in energy conservation and emission reduction.



吉林石化：二氧化碳回收装置
以化肥厂合成氨二氧化碳尾气为原料生产液体二氧化碳，作工业利用

Jilin Petrochemical: Carbon Dioxide Recovery Unit

Producing liquid carbon dioxide for industrial use by utilizing CO₂ tail gas from the synthetic ammonia process in fertilizer plants.



石油天然气行业全力推动绿色低碳转型

Oil and gas industry is fully committed to advancing green and low-carbon transformation

3.销售终端 Sales Terminal

发展“油气氢电非”综合服务，建设加气、加氢、光伏发电、充换电及综合能源补给站，形成多元化补能服务体系。

Develop integrated services for "oil, gas, hydrogen, electricity, and non-fuel products," and build energy stations providing gas, hydrogen, photovoltaic power, charging, and comprehensive energy services, creating a diversified energy replenishment service system.



河北崇礼北油氢合建站——中国石油首个新形象标准综合能源站

Hebei Chongli North Oil & Hydrogen Refueling Station – CNPC's First New Image Standard Comprehensive Energy Station



北京金龙综合能源服务站——中国石油首座“油气氢电非”综合能源服务站

Beijing Jinlong Comprehensive Energy Service Station – CNPC's First "Oil, Gas, Hydrogen, Electric, and Non-fuel Services" Integrated Energy Station



四川宜宾机场路综合能源站——“油、气、重卡换电”综合能源站

Sichuan Yibin Airport Road Comprehensive Energy Service Station – "Oil, Gas, Heavy-duty Truck Battery Swap" Integrated Energy Station



谢谢!

Thanks!

