



洁净煤转化：优化能源结构的重要支撑

Clean Coal Conversion : Important Support of Energy Structural Optimization

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主要内容 Outline



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Coal's Long-term Fundamental Position in the Energy Mix
- II. 洁净转化是优化煤炭地位的重要途径
Clean Conversion: Important Way to Optimize Coal's Position
- III. 神华煤基清洁能源的可持续发展战略
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I. 煤炭长期保持能源结构中的基础地位

Coal's Long-term Fundamental Position in the Energy Mix



能源需求仍将稳定增长

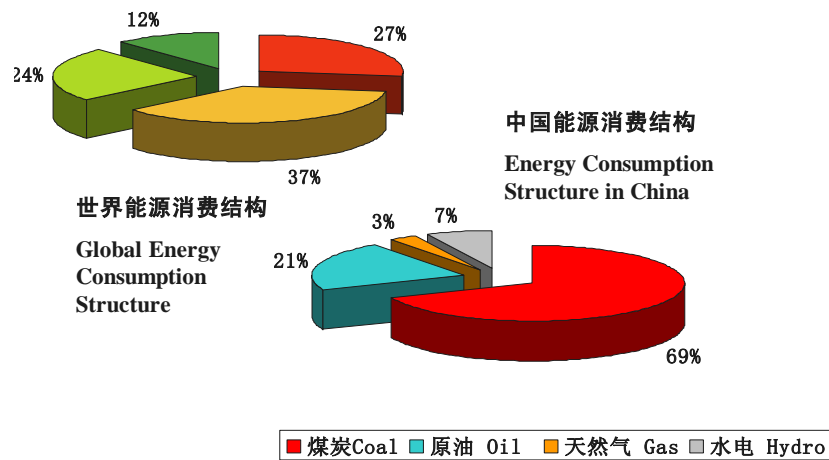
Energy Demand Expected to maintain steady growth

进入新世纪后，世界一次能源需求年均增速放缓，2030年前预计年均增长1.5%左右。发展中国家是带动全球能源消费增长的主力。In the new century, annual growth rate of the world's primary energy demand slowed down, expected to increase by 1.5% every year by 2030. Developing countries are the main driving forces for the increase of the global energy consumption.

单位：亿吨标煤 (Unit: 100 mn tons)

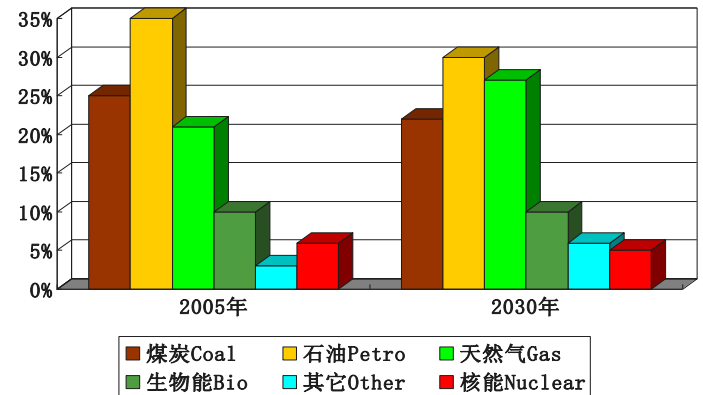
国家/地区 Countries	2007	2030	年均增长率 Annual growth
世界合计 World total	172	240	1.5%
OECD	78.5	83	0.2%
非OECD (Non-OECD)	88.4	150.4	2.3%
美国 USA	33.4	34.2	0.1%
日本 Japan	7.3	7.0	-0.2%
欧盟 EU	25.1	25.4	0.1%
俄罗斯 Russia	9.5	11.6	0.9%
中国 China	28.1	54.7	2.9%
印度 India	8.5	18.4	3.4%

中外能源消费结构比较 Comparison of Energy Consumption Structure in China and the World



神华煤基清洁能源的可持续发展战略 | 《IEA世界能源展望》暨国际煤炭产业研讨会

全球化石能源比重降低但仍为主体 Fossil Fuel: Proportion in Global Energy Mix Lowered But Still Dominant



神华煤基清洁能源的可持续发展战略 | 《IEA世界能源展望》暨国际煤炭产业研讨会

II. 洁净转化是优化煤炭地位的重要途径

Clean Conversion: Important Way to Optimize Coal's Position

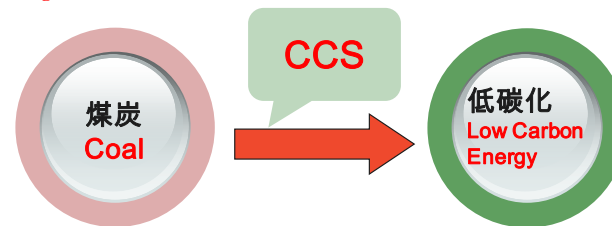


结合CCS以实现煤的清洁低碳转化

CCS Technology to Materialize Clean Coal Conversion

在煤转化为低碳能源的同时，会排放出大量的CO₂，只有对排放出的CO₂进行了处置，这种转化才真正有意义。二氧化碳捕捉与封存是当今世界前沿科技，将对缓解全球变暖的趋势发挥重要作用。

When coal is converted into low-carbon energy form, huge amount of CO₂ will be emitted; therefore such conversion is meaningful only when the CO₂ emission is well disposed of. CO₂ capture and sequestration is at the cutting edge of modern science & technology, which will play a significant role in slowing down the trend of global warming.



煤清洁低碳转化的技术发展方向

Clean and Low Carbon Coal Conversion Technologies: Future Trends



CCS技术应用 CCS Application

CO₂集中处理，
减少温室气体排放。

CO₂ integrated disposal to
reduce greenhouse gas emission



脱硫技术应用 Desulfurization

变污染为资源，
降低环境污染。

Change pollutants into
resource and reduce
pollution



气化
Gasification



清洁燃料 (Clean fuel) 化工原料 (Chemical feedstock)

神华煤基清洁能源的可持续发展战略

《IEA世界能源展望》暨国际煤炭产业研讨会

洁净转化以解决影响煤炭基础地位的关键问题

Clean Conversion: Key to Solve Issues Undermining Coal's Fundamental Importance



以保障能源安全供应为主，协调解决资源短缺、利用效率低和环境污染严重三大问题：

Efforts will be made to guarantee energy supply security and address three major problems: resources shortage, low efficiency of resource utilization and serious environmental pollution:

- ▶ 节能提效、减少污染——清洁燃烧及高效发电；
Save energy, improve efficiency and reduce pollution—clean combustion and efficient power generation
- ▶ 替代燃料油、弥补石油短缺——发展低碳能源；
Substitute fuel oil to offset oil shortage—develop low carbon energy
- ▶ 跟踪世界未来技术发展——多联产和CO₂零排放。
Follow trends in global technological development—poly-generation and zero emission of CO₂

神华煤基清洁能源的可持续发展战略

《IEA世界能源展望》暨国际煤炭产业研讨会



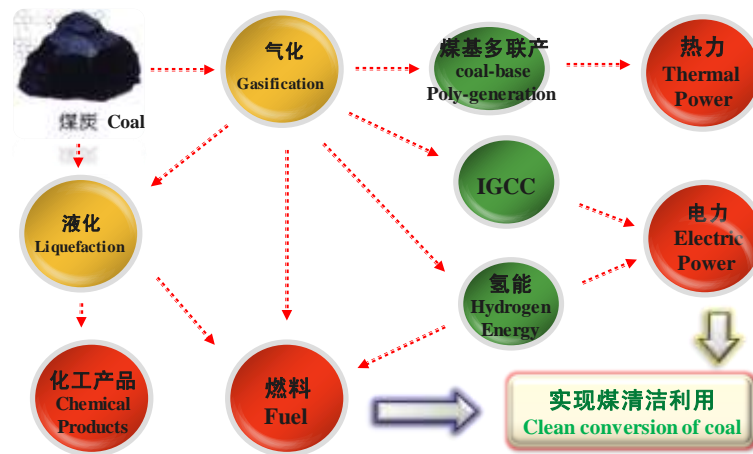
III. 神华煤基清洁能源的可持续发展战略

Sustainable Development Strategy of Coal-based Clean Energy in Shenhua



神华煤清洁低碳转化的技术选择

Technological Preference of Shenhua Clean and Low Carbon Coal Conversion



神华煤基清洁能源的可持续发展战略

《IEA世界能源展望》暨国际煤炭产业研讨会

神华创新发展煤基清洁低碳转化工程

Innovative Development of Shenhua Coal-based Clean and Low Carbon Energy Projects



煤制油 Coal-to-liquids



世界首套100万吨/年直接液化工业化装置
The world's first mega-ton/a direct coal liquefaction industrial project

碳捕捉与封存 CCS



中国首个10万吨/年CCS示范工程
First 100,000-ton/a CCS demonstration project in China

煤制烯烃 MTO



年产60万吨MTO和50万吨MTP示范项目
600,000-ton/a capacity MTO and 500,000-ton capacity MTP demonstration projects

煤制天然气 SNG



年产17.3亿Nm³的煤制合成天然气项目
the SNG project with planned annual output of 1.73 bn Nm³

神华煤基清洁能源的可持续发展战略

《IEA世界能源展望》暨国际煤炭产业研讨会

神华碳捕获及封存示范工程实现煤的清洁转化

Shenhua CCS Demon Project to Materialize Clean Coal Conversion



- 建设年处理10万吨二氧化碳的CCS示范工程，2010年12月30日，中国首套CCS示范项目的液化与净化装置打通全流程，并一次开车成功，生产出纯度为99.2%适应地下封存的CO₂液体。



A 100KTA CCS Demonstration Plant was built. On Dec 30th 2010, the liquefaction and purification units of the first CCS pilot plant in China passed stream test and were successfully started up at first try producing CO₂ liquid with a purity as 99.2% suitable for underground storage.

- 2011年1月2日，神华10万吨/年CCS示范工程成功将超临界状态液体二氧化碳注入到2243.6米深的山西组地层，打通全部生产流程。



Shenhua 100KTA CCS pilot plant successfully injected supercritical CO₂ into Shanxi formation with a depth as 2,243.6m on Jan 2nd, 2011, thereby passing the stream test.

神华煤基清洁能源的可持续发展战略

《IEA世界能源展望》暨国际煤炭产业研讨会

神华加强清洁低碳能源研究与应用

Shenhua Low Carbon Energy Research & Application



依托低碳所，结合煤直接液化国家工程实验室和国家能源煤炭清洁转换利用技术实验（研发）中心，构建低碳研发体系，加强煤洁净转化为核心的低碳能源研究

Strengthen low carbon energy research relying on NICE, National Engineering Lab of Direct Coal Liquefaction and National Testing (R&D) Center for Clean Coal Conversion & Application Technology

- 构建低碳清洁研发机构，研发应用低碳清洁关键技术
Build clean-and-low-carbon R&D institutions, develop key clean-and-low-carbon technology
- 引进了11位国际能源领域顶尖科学家
Introduction of 11 world top scientists in the energy field
- 招聘了24名科研骨干
Recruitment of 24 key researchers
- 围绕“褐煤分级炼制技术”、“新一代煤制天然气技术”等具有革命性的技术进行攻关
Revolutionary technology such as
 - ✓ Graded refining of lignite
 - ✓ A new generation of SNG technology
- 争取将低碳所建成低碳清洁能源领域“贝尔实验室”
Building NICE into “Bell Labs” in clean-and-low-carbon field



神华煤基清洁能源的可持续发展战略

《IEA世界能源展望》暨国际煤炭产业研讨会

神华煤清洁转化产业的发展规划

Development Plans of Shenhua Clean Coal Conversion



到2015年: By 2015

◇ 实现油品产量300万吨

Oil products: 3m tons

◇ 化学品产量500万吨

Chemical products: 5m tons

◇ 天然气产量18亿标准立方米

Natural gas: 1.8b standard cubic meters

到2020年: By 2020

◇ 油品产量1100万吨

Oil products: 11m tons

◇ 化学品产量1000万吨

Chemical products: 10m tons

◇ 天然气产量183亿标准立方米

Natural gas: 18.3b standard cubic meters

神华煤基清洁能源的可持续发展战略

《IEA世界能源展望》暨国际煤炭产业研讨会

IV. 结束语

Conclusions



- 在太阳升起和落下的每一天里，神华集团公司为中国的经济发展和 社会进步提供近100万吨标准煤的高发热量绿色煤炭、清洁的电力和煤制油化工能源产品。
- **Every day, Shenhua Group provides nearly 1m tons standard coal equivalent of high calorific value green coal, clean power and coal liquefaction and chemical products, contributing enormously to the economic and social development in China.**
- 我们希望携手国际能源署及清洁能源产业各方力量，积极倡导全球领先的清洁低碳理念，致力于创新驱动，加大煤洁净低碳转化技术的研发与应用，为人类社会提供优质、清洁、低碳的能源产品与低碳服务，以共同优化煤炭在国际能源结构中的地位，实现煤炭能源的可持续健康发展。
- **We hope to join hands with the IEA and the global clean energy sector to promote world leading clean carbon concept and innovation, step up research and deployment of clean and low-carbon conversion technologies, providing quality, clean and low-carbon energy products and services to the world. Together, let's work to optimize coal's position in the international energy mix and support sustainable and sound development of the coal sector.**

Thank You !