

# A secure, affordable and low carbon energy plan for China and UK

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# Content

- Key problems of fossil fuel for China
- Key problems of fossil fuel for UK
- Solutions to the fossil fuel issues

# Key problems for China

- Meet the fast increase in the energy demand
- Energy imbalance in the different regions
- Public acceptance
- Environmental problems
  - CO<sub>2</sub>- under pressure, SO<sub>2</sub>, dust - restricted,  
NO<sub>x</sub>, heavy metals - unrestricted

# Key problems for the UK

- Ensure energy security for the future
- Reduce CO<sub>2</sub> emissions
- Need the public to help combat climate change
- Limit cost: achieve goals without crippling the economy

# Meet the demand – China, UK

## Short term ~ 5 years

- Build new and efficient supercritical power stations to increase electricity capacity
- Close the high consumption, low efficiency plants
- Save energy
- Clean Coal technology, diversify use of coal
- Ensure diversity in fuel type and generation method

## Mid term ~ 5 - 20 years

- Co operate with international companies to access new technology
- New technology in power plant: IGCC

## Long term ~ 20+ years

- Renewable energy (solar, wind, wave), bio-fuel(locally), nuclear

# Imbalance in the different regions - China

## Short term ~ 5 years

- Develop infrastructure
  - Supply lines
    - Pipelines\trains to improve west-east connection
    - Ensure good foreign relations
  - Distribution
    - Forward planning – detailed investigation into the future of each province's development and energy requirements
    - Optimization, power station positioning, coal liquefaction  
Gas pipe lines

## Mid term ~ 5 – 20 years

- Relocation of industry

## Long term ~ 20+ years

- Exploitation of renewable resources in the east - wind, solar, biomass

# Public acceptance-China and UK

- Educate the public on climate change and the energy dilemma:
  - Schools and universities
  - Continuous reminder through the media
- Establish building regulations
- Motivate companies to improve efficiency and lower waste by influencing the price of utilities
- Governmental encouragement for the use of low carbon/energy efficient products – possible subsidies
- Government policy to promote public transportation: bus, bike, etc.

## General policy

- Commissioning of regulatory third party to monitor governmental activities
- Promote cooperation between countries and institutions

# Environmental considerations - Solutions for China and UK

## Short term ~ 5 years

- Implementation of flue gas filtration systems to reduce  $\text{NO}_x$
- Improve Efficiency of power generation and end-use
- Develop technologies in  $\text{CO}_2$  capture and Storage (CCS)
  - Improve and develop  $\text{CO}_2$  capture technologies to reduce high cost  
Post-combustion capture in the conventional power plants  
New power plant with pre combustion  $\text{CO}_2$  capture or oxyfuel combustion
  - Geological survey of the  $\text{CO}_2$  storage locations

## Mid term ~ 5 – 20 years

- Fuel Switching to Low Carbon Alternatives – natural gas, biomass co-firing
- Removal of  $\text{SO}_x$ ,  $\text{NO}_x$  and  $\text{CO}_2$
- CCS demonstrations

## Long term ~ 20+ years

- Nuclear and renewable energy
- Enhance the natural ‘sinks’ for  $\text{CO}_2$ , e.g. forests, soil and the ocean, which absorb  $\text{CO}_2$  from the atmosphere.



# 中国和英国的化石能源问题和及其解决方案

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# 目录

- 中英两国化石能源面临的问题对比
- 主要的解决方案

# 能源主要问题

	中国	英国
能源需求	持续和快速增长	缓慢增长， 保证未来的能源安全
能源供给	煤为支柱，石油进口50%， 资源和能源使用分布不均，	煤、石油、天然气 依赖进口
环境问题	CO <sub>2</sub> , SO <sub>x</sub> , NO <sub>x</sub>	CO <sub>2</sub>
公众	缺乏了解	需要行动

# 能源需求-中国和英国

## 短期 ~5年

- 建立新的高效率电厂，例如采用超临界发电技术，增加装机容量
- 关掉高污染、低效率的工厂
- 提高全民节能意识
- 采用清洁煤生产技术（例如煤的气化、液化），提高能源利用效率
- 因地制宜，采用多种产电方法

## 中期~ 5 - 20 年

与国际企业的合作，共享新技术  
新技术使用：IGCC

## 长期 ~ 20年以上

可再生能源发展, 风能、太阳能、潮汐能、生物能

# 能源供给-中国和英国

## 短期 ~5年

基础设施的建设（中国）

能源输送畅通

- 管道/铁路建设增强西部能源的东输
- 与能源进口国保持良好的关系
- 分布
- 规划未来：详细调查每个省的未来的能源需求和供给情况
- 能源利用最优化：电站的位置，能源的相互转化

## 中期~ 5 - 20 年

重工业的迁移由东部迁往西部

## 长期 ~ 20年以上

在东部地区发展可再生能源 - 风能，太阳能，生物质

# 公众态度-中国和英国

- 公众教育- 气候变化和能源的两难境地：
  - 学校教育和家庭教育
  - 媒体的持续宣传
  - 节能减排规则的建立：住房，常用电器
  - 提高水电费等，提倡节约，降低浪费
  - 政府倡导
  - 低碳高效新产品的开发和使用
  - 公共交通

## 其他 政策

- 成立非盈利性的团体监督政府的行为，宣传节源和减排政策
- 促进国家间和团体间的交流与合作

# 环境问题-中国和英国

## 短期 ~5年

- 限制排放量  $\text{NO}_x$
- 提高能源利用效率：电厂，家用
- 发展 $\text{CO}_2$ 捕集和储存（CCS）技术
- 发展新技术降低 $\text{CO}_2$ 捕集成本：
  - 燃烧后捕集用于已有的电厂
  - 燃烧前和然烧中用于新的电厂
  - 新的捕集技术：化学链燃烧等
- 调查可能的 $\text{CO}_2$ 储存场所：存储能力及其安全性

## 中期~ 5 - 20 年

多用低碳能源：天然气，煤层气，生物质  
开发 $\text{SO}_x$ ,  $\text{NO}_x$ 和 $\text{CO}_2$ 一体化脱除技术  
CCS的大量示范性装置

## 长期 ~ 20年以上

植树造林，吸收更多  $\text{CO}_2$   
核能和可再生能源：太阳能，风能，水能

Thanks!