

- 能源、环境、经济是紧密联系的问题。在中国煤炭占能源消费总量的65-70%。近年，原油和天然气的使用比例增加的原因是私家车的激增和一部分城市能源消耗的扩大。中国的原油需要在不断增加，依靠进口的部分在增加。大庆油田可以稳定地生产4000万到5000万吨。新的油田埋藏量又小，所以从90年代初开始中国成了原油的纯进口国。现在每年消费的原油中有三分之一依赖进口。预计到2010年将有80%依赖进口。
- 中国是以相对比较少的能源消耗取得了如今GDP的增长。但是今后仍以较小的能源弹性值保持发展已经变得很困难，需要引进先进的节约能源型的技术。从能源在各产业中的分布情况中，我们看到交通和运输比率的增加格外引人注目。估计今后这个比率的增加还会继续。
- 从以上的统计数据只是局限在商业用能源上，并未包括农村地区的数据。没有相关农村地区的数据的统计。预计将来如果大量的人口流动到城市的话，那么该商业用数据的基础数值也将大幅增加。
- 只看商业用能源，我们会发现东部地区在整个能源消费的比例从1990年的46%上升到2002年的49%。西部地区保持同样的比例，中部地区的比例略有下降。也就是说，能源状况显示了和经济发展状况相同的分布。东部和西部经济发展差距扩大的同时，能源消耗量的差距也在拉开。
- 把南部地区和北部地区相比较的话，北部地区的比率从1990年的67%减少到61%。作为原因有两个假说。第一：在南部地区随着经济的发展能源消耗量也在扩大。比如在广东省和浙江省，今年很多家庭开始使用暖气。第二，可能是受持续了将近20年的地球温暖化，既“暖冬”的影响，冬季在北方地区取暖用的煤炭消费量在减少。
- 人均能源消费量整体上和该地区的能源消耗量分布相同。工业领域的能源使用中大部分是电力。火力发电的主要原料是煤炭，天然气和石油所占比例非常小。水力发电的发电能力实现了飞跃式的增加，但是由于受降水量的影响，实际的发电量比例比较小。
- 在经济分布上，最近10多年，东部地区和西部地区的经济差距越来越大。1990年东部地区占GDP的51%，2002年增加到59%。其中，三个百分点是西部地区比例的下降、还有五个百分点是中部地区的下降。西部地区有西部大开发，东部地区有先富政策，东北地区有老工业地带改造。但现状是：只是分布着大量农业生产据点的中部没有明确的发展战略。
- 对中国的能源问题造成影响的主要原因有：人口增加、宏观经济的总量、工业化和城市化的过程、能源效率的改善、能源结构问题。预计中国人口到2030年达到将近16亿。我们无法对可再生的能源和核能报太大期待。所以估计煤炭依然会占50%左右的比例。
- 如果中国大力发展制造业的话，那么今后长时间的减少能源消耗将变得很难。随着城市化，城市人口的人均能源消耗量将大于农村人口、住房的维持、照明、暖气、冷气等等都将大量需要能源。交通的发达也扩大了城市的能源需求量。
- 在技术进步方面，可再生能源和核能源都需要进一步提高稳定性和可信赖性、需要进一步降低成本。此外还有资金问题。能源效率方面，中国的发电厂的发电效率是30%左右，发达国家平均水平在40%以上。最终使用者今后也需要推进技术改善和进步。

- 现在中国面临的挑战有6个：(1)持续增加的能源需求、(2)能源不足、(3)能源的安全保障、(4)交通体系的制约（比起人的运输来中国的铁路更主要的是在运输煤炭）、(5)低下的能源使用效率（特别是中小企业低下）、(6)严重的污染问题。这些不仅是中国所面对的问题同时也是亚洲所面对的问题。
- 地球整体的污染方面，《京都议定书》批准之后中国的责任分担会成为问题。现在中国必须进行避免能源消耗量的扩大、阻止已经发生的污染进一步发生这些有关经济的、从过去的经验看是接近不可能的事情。即使是困难，也必须从“污染的发展”转型到“清洁的发展”。
- 最后，我想提出我个人的建议。(1)将 COE 概念扩展在东北亚地区形成 COE 网，从全球化的视点思考解决经济问题和环境问题的重要对策。(2)通过确立诸如 COE 网之类的经常性的制度，来共有信息和知识。(3)大学的研究人员需要进一步关心民间领域。(4)边实践边学习很重要。(5)应该通过这些方法来逐渐形成具有实质性的合作姿态。具体言之，以2008年的北京奥运会为契机，推进中国的“绿色奥运”，进行城市交通和大气状况的改善。这些与城市土地使用相关，并与生态系统的管理相联系。沙尘暴问题和水资源、草原问题大量存在。最后还有有关社会经济评价方法的研究。这个问题需要“革命性的评价方法”。比如必须确立对西部大开发这一巨型项目的评价方法。今后企业代表、NGO 代表也应该一起参加一起进行讨论。我想那样的话，中国学研究会将更具社会性意义。

(榎根勇 执笔，高娜 译)

Challenges in Building-up a Sustainable Energy in China: between Economy and the Environment

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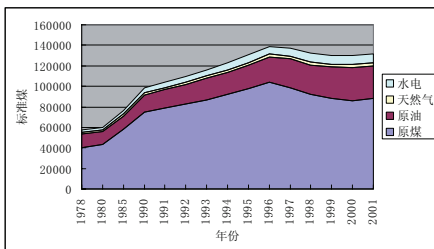


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1. Overview: history and current status of energy in China
2. Driving forces of China's energy
3. Major challenges
4. Relevant response measures: Sino-Japan environmental cooperation
5. Conclusions

Overview: use of Energy in China

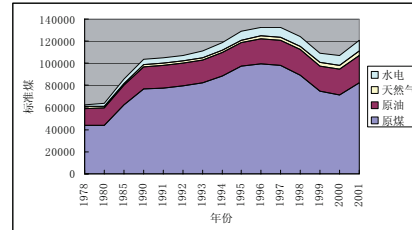
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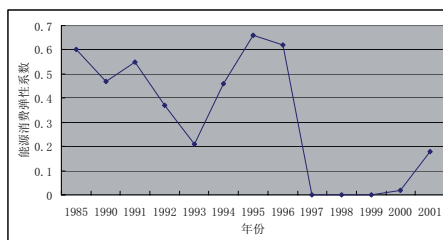
Overview: production of Energy in China

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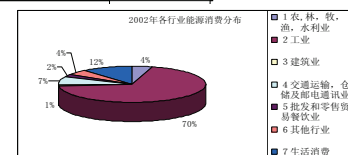
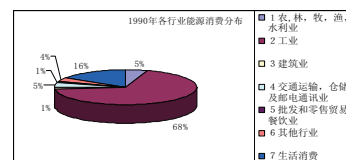
Overview: Elasticity of Energy to Economic Growth in China

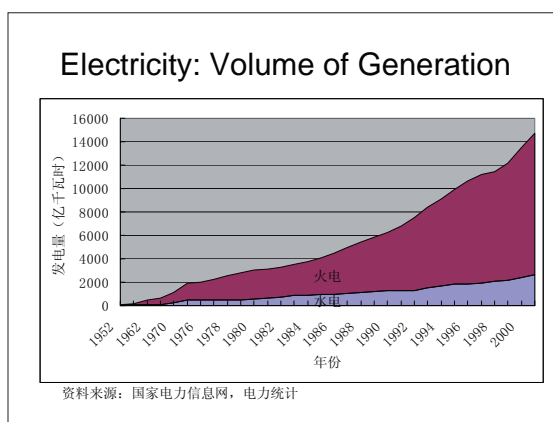
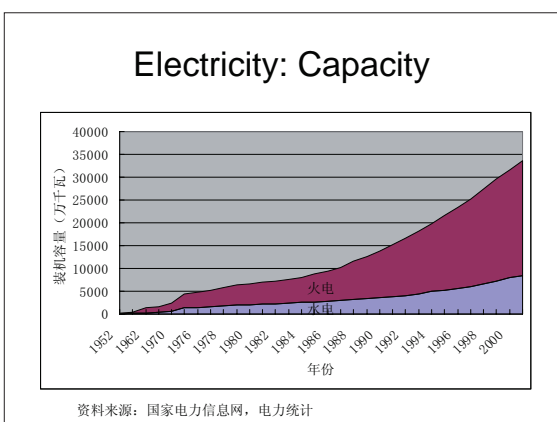
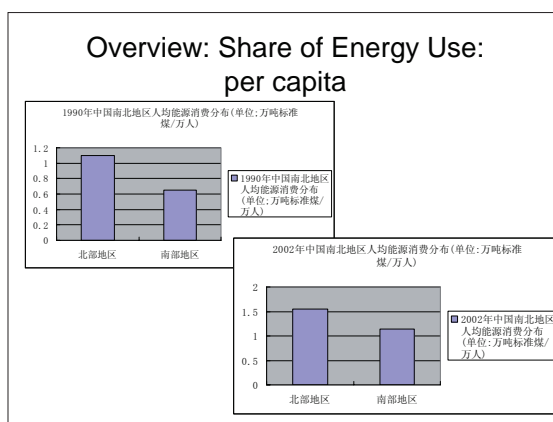
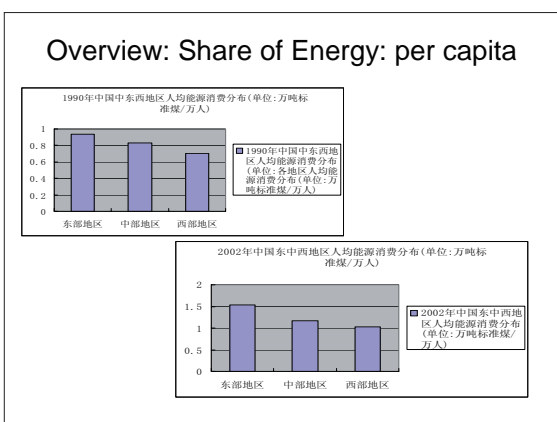
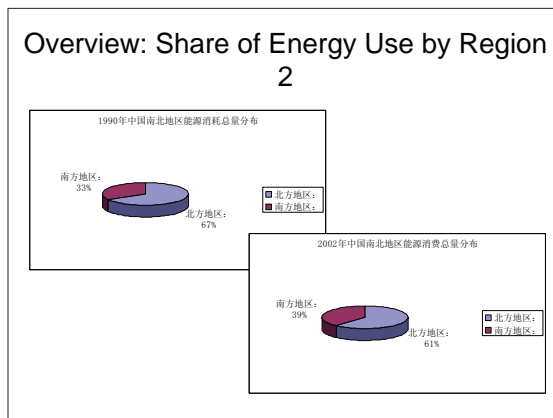
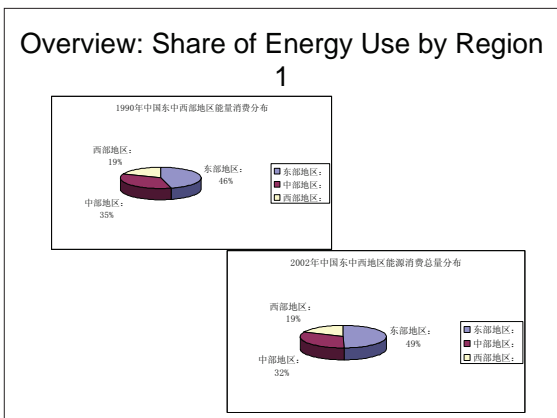


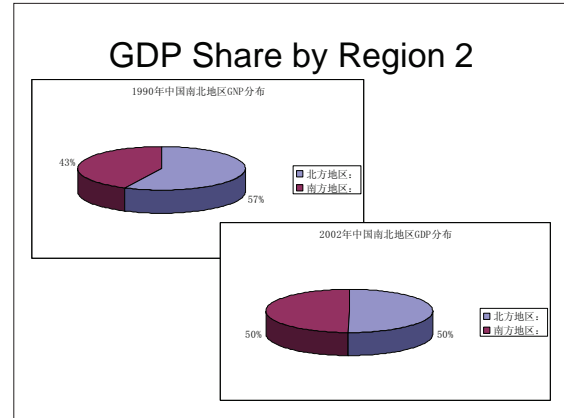
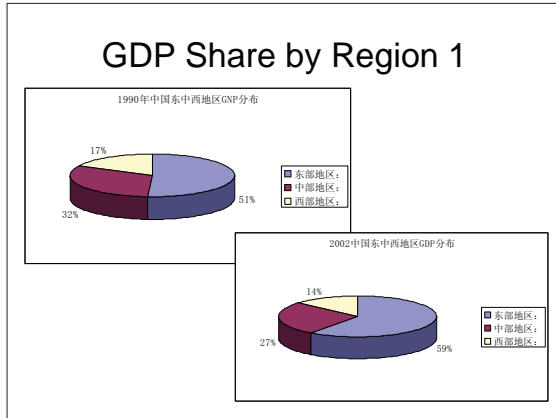
注: 97-99年数据缺失

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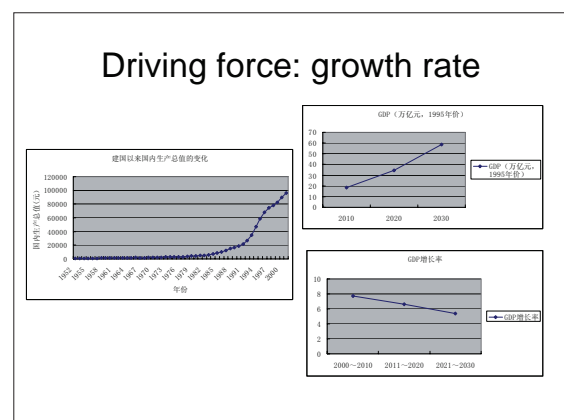
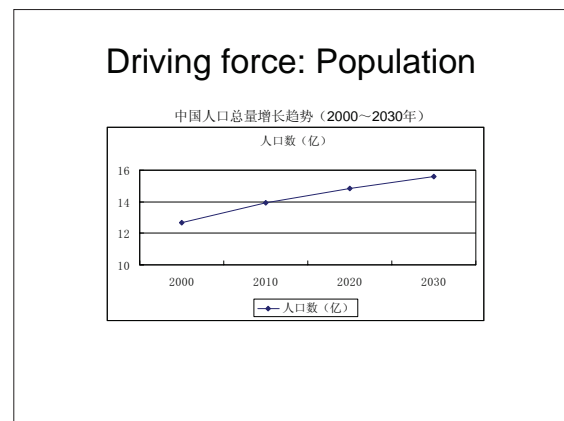
Overview: Share of Energy Use by sectors







- ### Driving Forces of Energy Change in China
- Population
 - Growth rate of economy
 - Industrialization (energy demand side)
 - Urbanization (energy demand side)
 - Change of energy share (supply side - technology)
 - Improvement of energy efficiency (D & S side - technology)

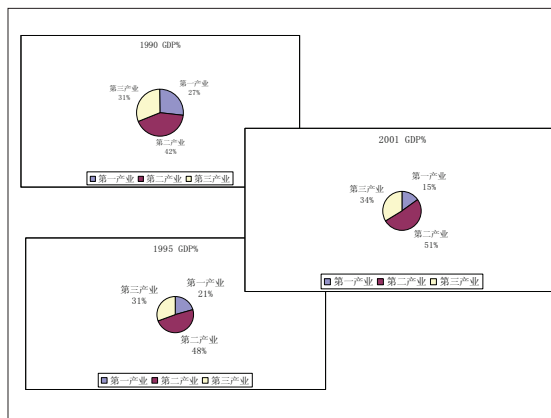


Driving force: change of sector share

Manufacture/industrial sectors will continue to account for a dominant share of the overall GDP.

Is China becoming a worldwide manufacturing center with high energy intensity?

(steel, aluminum, cement, chemical products, car, machinery, etc)



Driving force: urbanization

- Population shift from rural to urban areas with higher average energy use;
- Construction of infrastructure: railway, highway, airport, port, pipeline for gas and tap water and wastewater, electricity transmission system, telecommunication, commercial facilities, and so on;
- More housing
- More heating & air-conditioning and lighting
- More transportation

Driving force: technology change 1

Share change of different energy sources

- Coal: keeping dominant, gradual share decrease;
- More hydropower;
- Nuclear power and renewable: more, but not nationally significant; local implication
- Biomass: good in rural areas
- Other new energy: Hydrogen, fuel cell, etc

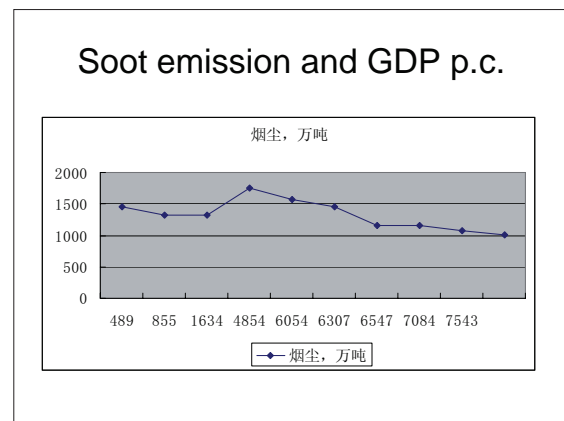
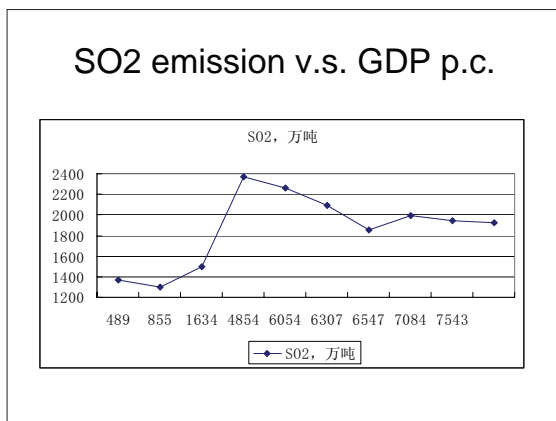
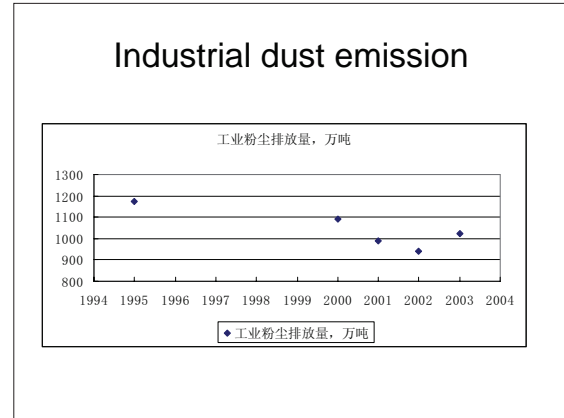
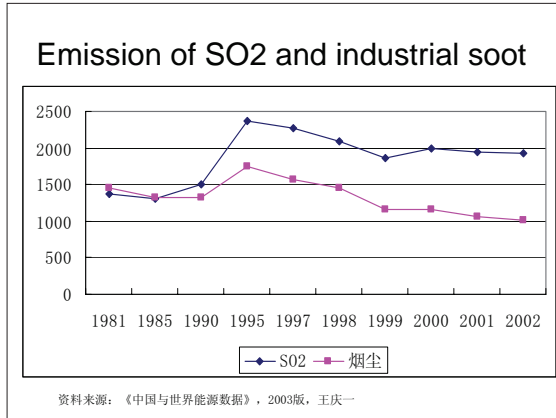
Driving force: technology change 2

Efficiency improvement: prioritized fields

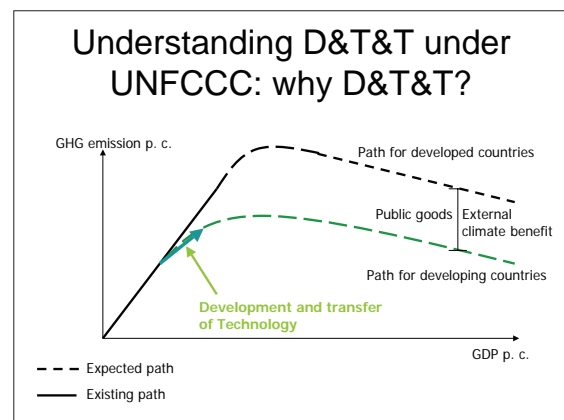
- Energy production sectors: coal mining, oil & gas fields, petroleum chemistry, power sector;
- End-users: energy-intensive sectors (metallurgy, chemical industry, construction materials, transportation, housing, machinery, etc.)

Major challenges

- Rapid increase of demand over supply: wide energy stress
- Energy security: heavier and heavier reliance on oil and gas import (1/3 of use from import in 2003, 2/3 in 2010)
- Transportation system: a constraint
- Low efficiency accompanied with out-of-date technologies
- High pollution: urban air quality, increase in GHG emission
- Global concerns: international energy security and global warming



- ### Global Warming
- UNFCCC and Kyoto Protocol
 - Overlapping global concerns with local concerns
 - Way-out: cooperation in low-carbon technology transfer



Relevant response measures: Sino-Japan Cooperation

Existing Sino-Japan Cooperation

- Research and education
- Personnel exchange
- FDI and trade related to environmental technologies and services
- Policy dialogues: regular communication between environmental ministers
- Approaches: COE, Sino-Japan Friendship Centre for Environmental Protection
- Trend? Given ODA declines and finally disappears

International Perspective on Sino-Japan Environmental Cooperation 1

- Common environmental concerns
 - Global: security of water, food, and energy; global warming; biodiversity; ozone layer; desertification; trans-boundary hazards, POPs;
 - Regional: sand storms in northeastern Asia; acid deposition, and so on.
- Common economic concerns
 - Trade: WTO and environment norms as non-tariff barriers;
 - FDI and pollution transfer
 - New environmental market: technology transfer and new investment areas

International Perspective on Sino-Japan Environmental Cooperation 2

Conclusions: needs for cooperation

- No single party can address the challenges of public bads;
- Share the public goods derived from efforts to combat environmental degradation;
- More effective and efficient;
- Need for imagination on creating new approaches and mechanism meeting new challenges: interaction between developed and developing countries.
- Capacity development: a vehicle for international cooperation

Feasibility of regional environmental management in East and South East Asia 1

- Basis
 - Short geographical distance
 - Close economic and trade link
 - Common environmental and resources concerns: oil, carbon, acid deposition, desertification/sand-storm
 - Similar cultural value judgment: concern welfare of future generation and collective interests

Feasibility of regional environmental management in East and South East Asia 2

Closer links and higher level of cooperation among China, Japan, and Korea in economic and environmental terms with more common concerns

Regional environmental management: elements

- Regular communication/consultation mechanism at different level
- Multilateral and bilateral international conventions or protocols as legal basis
- Prioritize environmental issues and establish goals and plans in the region
- Development and transfer of environmentally sound technologies
- Constant financial and technological assistance in research, education, and institutional development
- Policy coordination

Significance of regional environmental management

- Contribution to efforts on global change
- Widen current economic cooperation
- Curb regional environmental issues more effectively (desertification, acid deposition)
- Knowledge and technology transfer
- Towards to common market (less and less differences in environmental standards)

Suggestion 1

- Development of network of COE;
- Establish a mechanism to disseminate information and knowledge via COE network;
- More attention to cooperation and communication in civil society: NGOs, univ., media, etc;
- Learning by doing with some real exercises in forms of projects and activities

Suggestion 2

Focuses related China-Japan cooperation:

- 2008 Olympic Game and urban development (infrastructure, managing eco-city);
- Urban traffic management and air quality improvement
- Eco-system management
- Socioeconomic assessment methodologies
- Stakeholder participation

**Thank you for your attention
and comments are welcomed!**

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