



International Technology Collaboration

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IEA-ENEL Workshop
***Sectoral Approaches for Greenhouse Gas
Mitigation in the Power Sector***

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Annex I Expert Group
on the UNFCCC

Relevant AIXG Work

- **The Annex I Expert Group on the UNFCCC**
- **Work on technology and climate change:**
 - ◆ **Innovation, development & diffusion (2003)**
 - ◆ **International collaboration: an initial paper, 5 case studies, a synthesis report (2004-2006)**
 - **Concentrating solar power technologies**
 - **Agriculture: R&D on high-yielding crop varieties**
 - **Appliance energy efficiency**
 - **Clean coal technologies**
 - **Wind power integration into electricity systems**
- **Work on future architectures**
 - **Sectoral approaches, CDM**
 - **Integrating different approaches**

Case study: Clean Coal Technologies

- **Importance of coal**
- **Clean technologies include end-of-pipe devices (up to CO₂ Capture & Storage) and greater conversion efficiencies**
- **International collaboration: various IEA implementing agreements, policy forums and professional associations**
- **A focus on China (by far largest market)**

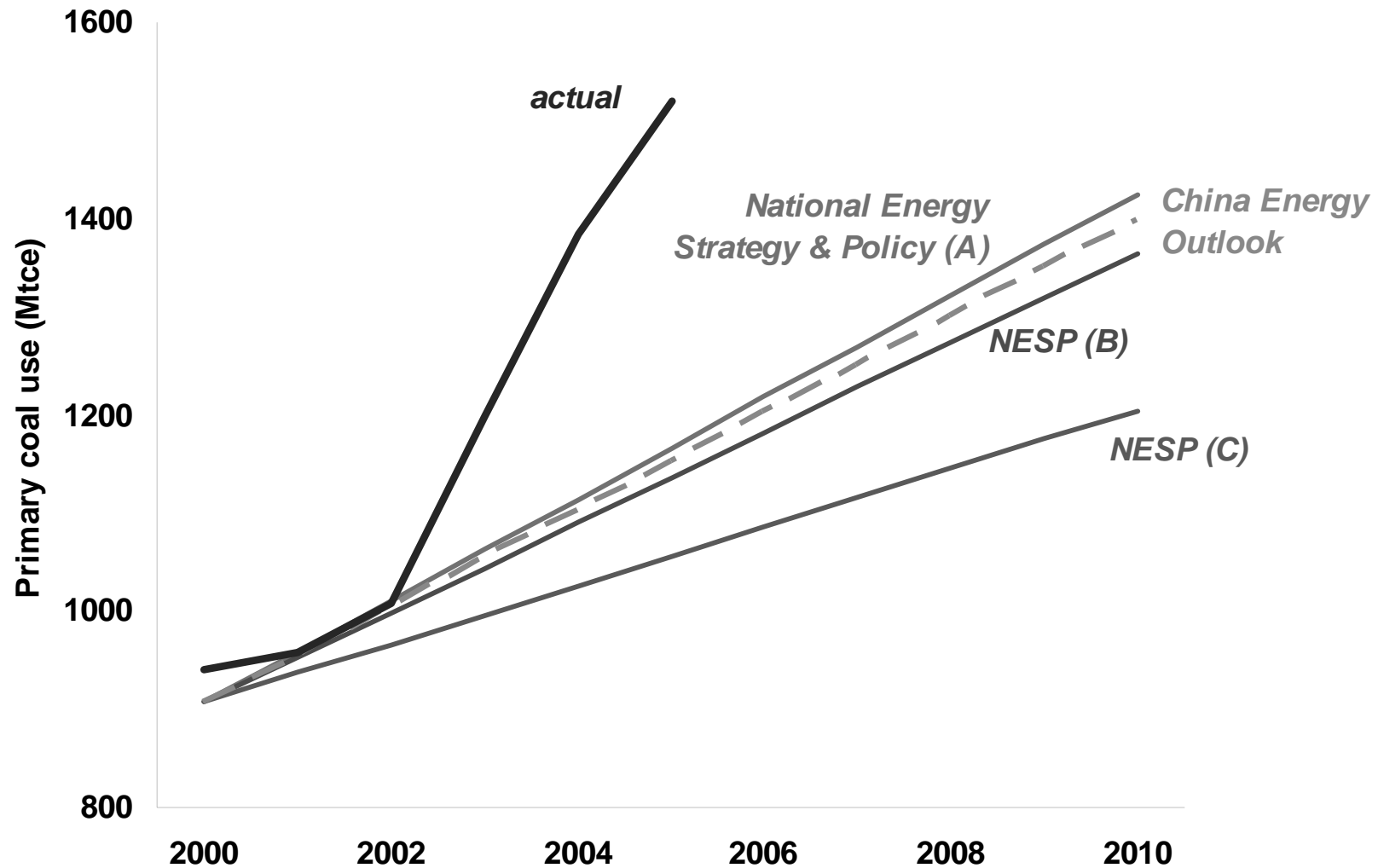
Collaborating with China

- **Importance of coal from both energy and environment perspectives**
 - ◆ **China wants clean coal technologies**
- **Technology transfer with Chinese eyes**
- **Numerous bilateral collaborations**
- **Development banks**
- **The GEF and its industrial boilers project**

Coal in China

- **Large reserves, mines and transport issues**
- **Coal combustion: 75% China's electricity**
- **Total power capacity: 360 GW in 2002, to 1187 GW in 2030 (776 GW coal plants)**
- **Efforts to build larger, more efficient plants, outpaced by demand growth**
- **Power plants consume half of China's coal**
- **Coal: 80% of CO₂ emissions from China, first source of air pollution (SO_x, PM...)**

Coal use in 2005 was far higher than expected



Technology transfers

- **Large and super-large enterprises**
- **Imports of clean coal technologies do not entail technology transfer**
- **Foreign direct investment preferred**
- **Patent acquisition effective but risky**
 - ◆ **Weak IPR protection**
- **Multinationals' strategy viewed by Chinese analysts:**
 - ◆ **« Export equipment only; transfer only outdated technology; make hard transfer conditions »**

Bilateral programmes

- **Australia: blended coal combustion**
- **Germany: mature technologies**
- **Japan: numerous demonstration projects, all possible technologies**
- **Netherlands: own technologies**
- **UK: focus on China's needs**
- **The US: IGCC & advanced combustion**
- **Mixed results**

The GEF project

- **Industrial boilers (industry & district heating): 40% of coal consumption**
- **Average efficiency 60% vs 80% in IC**
- **Full technology transfer: patent and equipment acquisition for 3 large boilermakers**
- **637 Mt CO2 to be avoided over the lifetime of the investments**
- **Total cost 100 M\$ - 35 M\$ for the GEF**

Main lessons learned

- **Lesson 1 : Strong demand growth may slow supply-side progress**
- **Lesson 2: Technology transfer is more than equipment transfer**
- **Lesson 3: IPR protection matters for transferees as well**

Selected lessons from the five case studies (1)

- **International collaboration very useful at R&D level:**
 - ◆ **Information/cost sharing**
 - ◆ **Collaboration needs & builds capacities**
 - ◆ **Need to link international R&D to national & local innovation systems**
 - ◆ **Need to accomodate a great number of stakeholder viewpoints**

Selected lessons from the five case studies (2)

- **Domestic level key for dissemination but international collaboration helps:**
 - ◆ **Keep momentum**
 - ◆ **Harness private sector's potential**
 - ◆ **Expand markets/Share « learning investments »**
 - ◆ **Harmonise standards**
 - ◆ **Build policy implementation capacity**
- **Transfer is more than equipment transfer**
 - ◆ **May not work with ready-made technologies**
 - ◆ **May not work with not-yet-ready technologies**
 - ◆ **Importance of intellectual property rights (?)**
 - ◆ **Transfer know-how to address barriers**

A key question for future negotiations

- **Can we integrate technology approaches and cap and trade approaches into a future regime?**

What is 'integration'?

- **Broader concept than linking emissions trading systems based on emission caps**
- **May take place when agreements are negotiated**
 - ◆ **To help the process take preferences into account, expand efforts and participation**
- **...and/or when policies are undertaken**
 - ◆ **To enhance synergies between approaches, even if adopted independently**
- **Integration requires comparisons**

Reasons for integration

- **Climate change as a public good**
- **Competitiveness**
- **Fairness**
- **Static cost-effectiveness**
- **Dynamic cost-effectiveness**
- **Technology transfer**

Conclusions

- **Comparing e.g. a technology approach with a cap-and-trade approach difficult**
 - ◆ **Except for comparing narrowly defined efforts (e.g., standards), no reliable metric to determine whether countries are making similar commitments – an essential element of fairness**
- **Political decisions may still request this**
- **Comparing efforts to help others easier than comparing results in helping others**