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Climate Change: What can market based instruments deliver?

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Background

International climate policy

- **Rio 1992: agreement on the UN Framework Convention on Climate Change (UNFCCC)**
  - **Objective: "*stabilisation of GHG concentrations in the atmosphere at a level that would prevent dangerous interference with the climate system*"**
  - **OECD Members and countries with economies in transition (Annex I Parties) recognise their responsibility, take the lead and aim to return their emissions to 1990 levels by 2000**
  - **Non-Annex I (developing countries) are "off the hook". Acknowledges most vulnerable countries and countries that could suffer from policies to reduce GHG emissions (read: OPEC)**
- **Berlin 1995: Rio commitment is inadequate – and unlikely to be met – Berlin Mandate**

Kyoto Negotiations (COP3) Opening negotiation positions

- **US: emission goals should be legally-binding, over a multi-year period, and be tradeable; objective: 0% by 2010**
- **EU: policies and measures Objective: -15% by 2010 Opposes unlimited trading**
- **Norway, Australia: favour *differentiated objectives***

In parallel: Analytical work brought to various fora

- Annex I Expert Group on the UNFCCC (OECD/IEA analysis to support climate negotiators)
- US mobilizes research (MIT, US DoE labs, EPRI) to quantify gains from 'where and when flexibility' (i.e. emissions trading)
- New negotiation group emerges at UNFCCC: the Umbrella Group, in favour of full flexibility
  - US, Japan, Canada, Australia, New Zealand, Norway, Iceland, Russia and the Ukraine

Kyoto Protocol

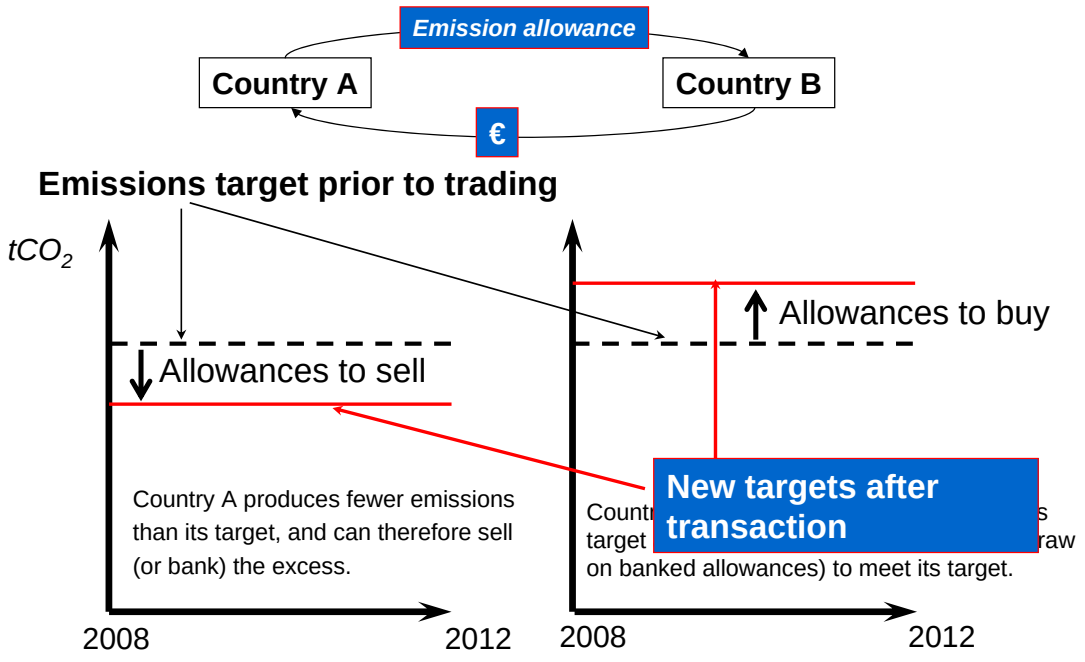
- Differentiated commitments
  - overall objective leads to a 5% reduction from 1990 levels by 2008-2012
- 6 gases, sources and sinks, five-year period
- Three (+1) "flexibility m
  - Emissi buy and sell quotas)
  - ject-based mechanisms
    - Joint implementation (among industrialised countries)
    - Clean development mechanisms (with developing countries)
  - "Bubble": share burden *before ratification*
- Policies & measures: non-binding list only
- Negotiations on next period: start in 2005

Entry into force: 16 February 2005

Flexible Mechanisms: the rationale

- Different pollution sources will have different marginal abatement costs (MACs)
- To achieve a given pollution target at least cost, the MACs of all sources must be equal. →different sources will reduce pollution by different amounts
- Market based instruments allow MACs to be equalised for all polluting sources, allowing a particular environmental target to be achieved more cheaply than with traditional instruments

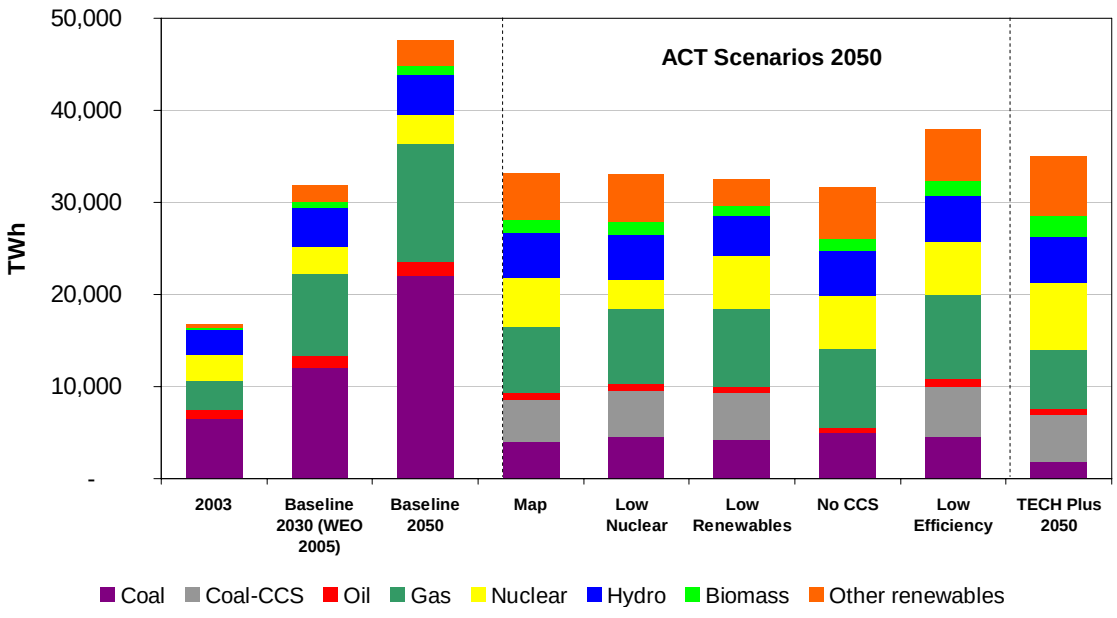
Illustration: emissions trading



Why do we need a carbon price signal?

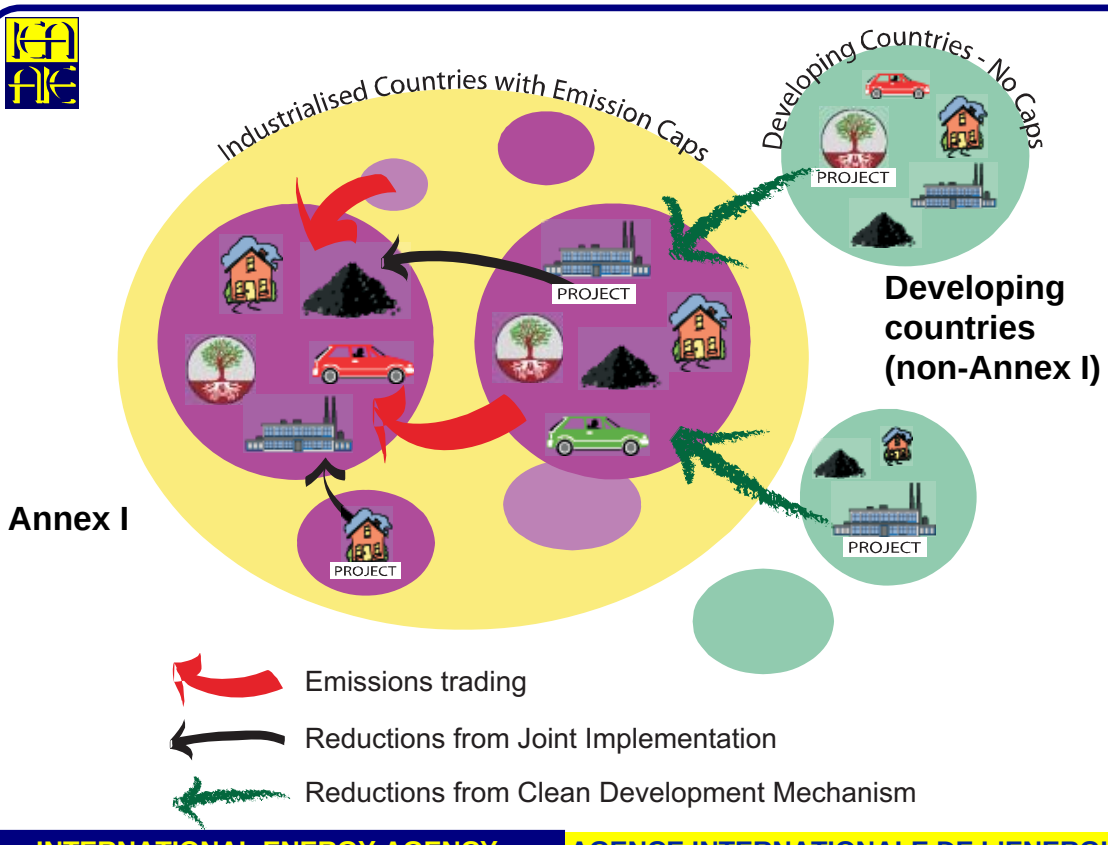
- Basic point: internalise the social cost of CO_2 – and optimise choices on that basis
- Consumers of CO_2-intensive products must adjust demand accordingly
- Illustration: should steel makers continue producing blast-furnace slag, which can reduce CO_2 emissions in cement production?
  - Only relative prices, including CO_2 cost, can answer this question
  - Engineering the solution to such and other choices is unlikely to deliver 'least-cost'

Power Generation: *"Can you guess the 2050 mix?"*



Source: IEA, 2006, Energy Technology Perspectives

The carbon market: does it deliver?



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The carbon market: where are we today?

Multiple markets at multiple levels, each with their own drivers and prices:

- **International compliance**
  - **IET, CDM, JI**
- **National and regional markets**
  - **UK, EU ETS, Norway, Switzerland; RGGI, Western Climate Initiative, California, numerous proposals; New South Wales trading system, Australia…; NZ; Canada; South Korea; Japan**
- **Voluntary**
  - **Retail, or consumer-driven**

…and already some linkages

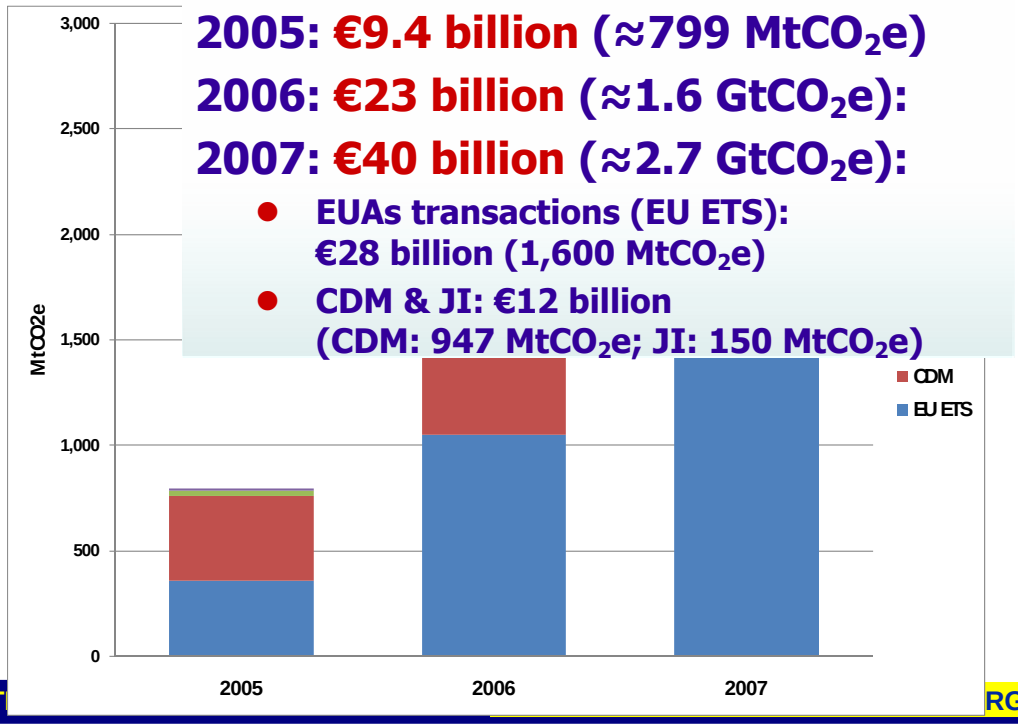
Are market based instruments delivering?

2005: €9.4 billion (≈799 $MtCO_2e$)

2006: €23 billion (≈1.6 $GtCO_2e$):

2007: €40 billion (≈2.7 $GtCO_2e$):

- **EUAs transactions (EU ETS): €28 billion (1,600 $MtCO_2e$)**
- **CDM & JI: €12 billion (CDM: 947 $MtCO_2e$; JI: 150 $MtCO_2e$)**



The role of the EU ETS

- Represents the single largest market for GHG emissions allowances
  - True multi-national scheme (25/27 MSs)
  - Link to Norway, Iceland, Liechtenstein
- Covers around 11,500 fixed sources, about 45% of the EU25 total CO_2 emissions (2.2 Gt)
- A "Linking Directive" governs the relationships between the EU ETS and the Kyoto Protocol
  - EU ETS stimulates overall carbon market
- EU ETS stimulates design of other schemes
- Phase 2 tightens overall cap (-6% wrt 2005)
- Proposed Amendments would further strengthen scheme

Is the EU ETS delivering emission reductions?

Some background issues

- Emissions will never exactly equal the cap
  - Especially with intra-period banking/borrowing
- A constraining cap will always result in long and short positions among installations
- Reasons for being "long/short":
  - "The" reason that motivates trading: differences in the marginal cost of abatement
  - Uncertainty (of economic activity, weather or any other factor affecting emissions)
  - Deliberate over- or under-allocation

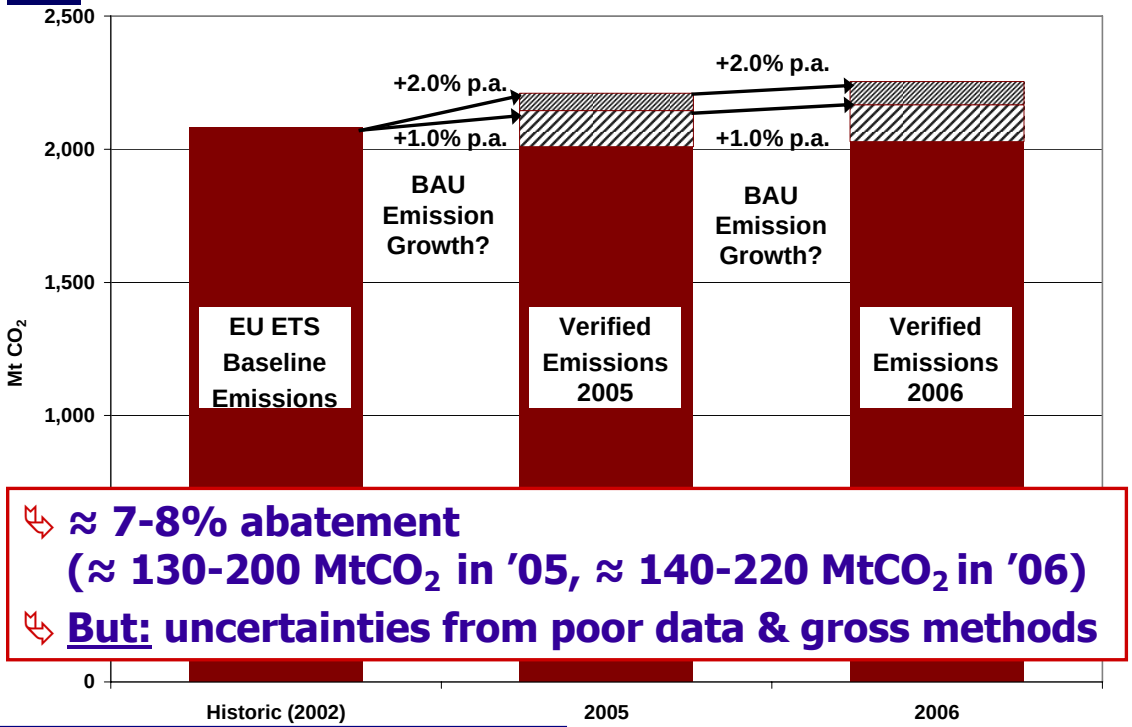
Over-allocation?

- At least 72% of allowances in 14 MSs without evident over-allocation
- Presumed over-allocation:
  - In 9 MSs with 28% of allowances of which 6% are surplus
  - In industrial sectors with 42% of allowances of which 5.6% are surplus
- Maximum over-allocation ≈ 125 MEUAs

↳ But not necessary complete indicator of overall length of EU ETS: some length is due to abatement

Source: Ellerman & Buchner, 2008

Abatement?



↳ ≈ 7-8% abatement
(≈ 130-200 $MtCO_2$ in '05, ≈ 140-220 $MtCO_2$ in '06)

↳ <u>But:</u> uncertainties from poor data & gross methods

 Source: Ellerman & Buchner, 2008

Some conclusions on impacts of EU ETS

- The basic case for abatement
  - A significant positive price is being incurred
  - Rising real output
  - Emissions are lower than historical levels (even after allowing for plausible bias)
- Serious work on estimating abatement has yet to be done (baseline bias)
- A high level estimate would suggest around a maximum of <170 Mt
  →probably 85 Mt or about 4%
- Plus: stimulates other trading systems

Source: Ellerman & Buchner, 2008

Potential for linkage

- Linking various trading schemes is technically feasible and would be economically efficient, but…
  - Different price levels could make it politically difficult
  - Realisation of benefits depends to some extent on differences in design details of involved schemes
- EU: "Strengthening the EU ETS"
  - Link to compatible mandatory schemes
- Almost all US state, regional & proposed Federal initiatives include potential for some level of linkage
- Similarly the NZ and Australia schemes
- International Carbon Action Partnership (iCAP): working towards a global carbon market

Issues ahead

- No major reductions without incurring a CO_2 cost – minimising this cost through flexibility mechanisms is a legitimate priority
  - Role substantially increased over last years
  - New wave of trading schemes may have implications for international mitigation architecture beyond 2012
- Emissions trading is an essential tool, but:
  - Current market signals do not look far enough into the future
  - Emissions trading alone not likely to trigger sufficient R&D

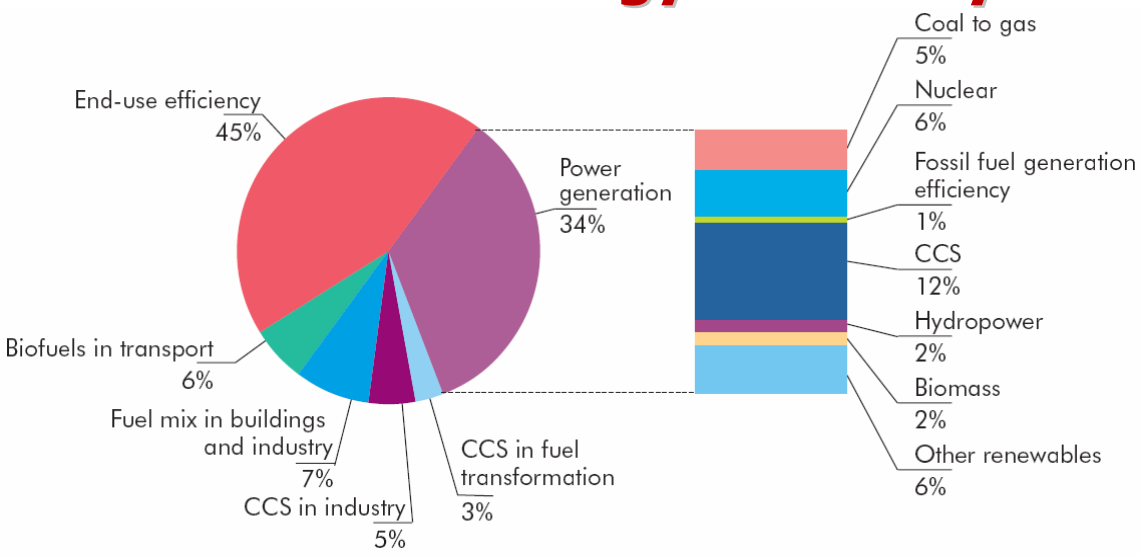
➔Other policies are needed to complement a carbon price

The need for complementary policy instruments

Issues on effectiveness of market based instruments

- **Preconditions:**
  - Data availability
  - Transparency - MRV
  - Flexibility (e.g., access to international offsets)
- **Visibility & robustness (of goal/system)**
  - Certainty/predictability for investment decisions
  - Regulatory stability
- **Does the price signal get transmitted?**
  - E.g., is the carbon price effective?
- **Is the constraint 100% effective?**
  - Ambitious climate policy implies changing relative competitiveness of sectors
  - Is system able to drive real change – not to relocate activities? *(carbon leakage)*

An illustration: The role of energy efficiency



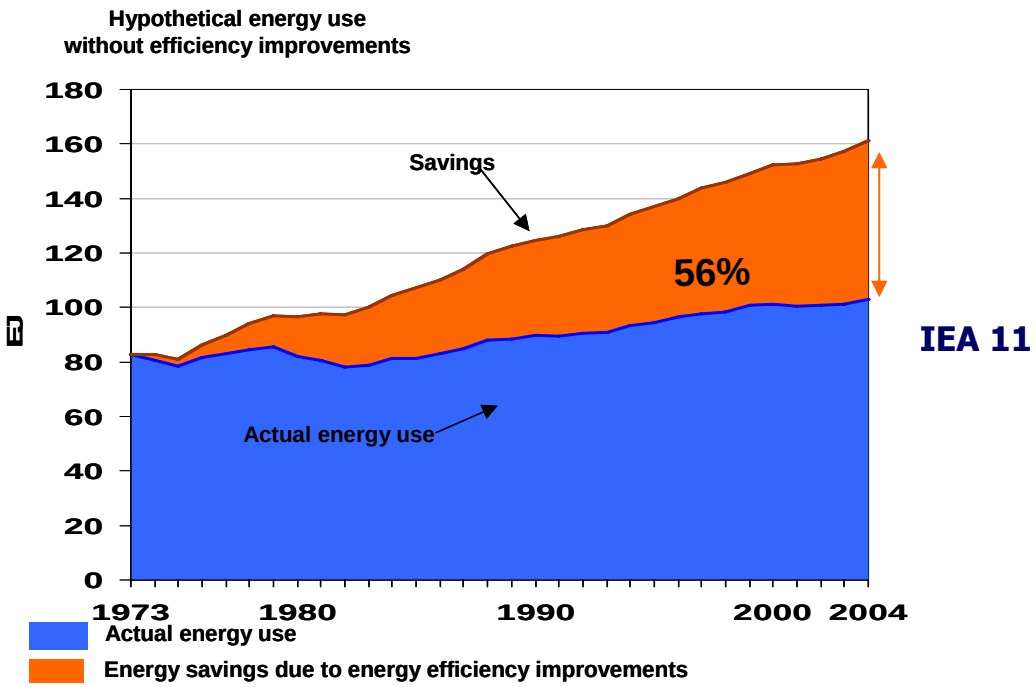
A portfolio approach could bring CO_2 emissions back to today's level by 2050. End-use energy efficiency is an essential piece.

Source: IEA, 2006, Energy Technology Perspectives

Why focus on energy efficiency?

- **Economic development**
  - reduced energy costs
  - improved private sector competitiveness
  - overall financial benefits
- **Energy security**
  - improved access to energy services
  - improved reliability of energy services
- **Environment protection**
  - reduction of emissions that affect humans, infrastructure and ecosystems

Energy Efficiency: The Largest Fuel



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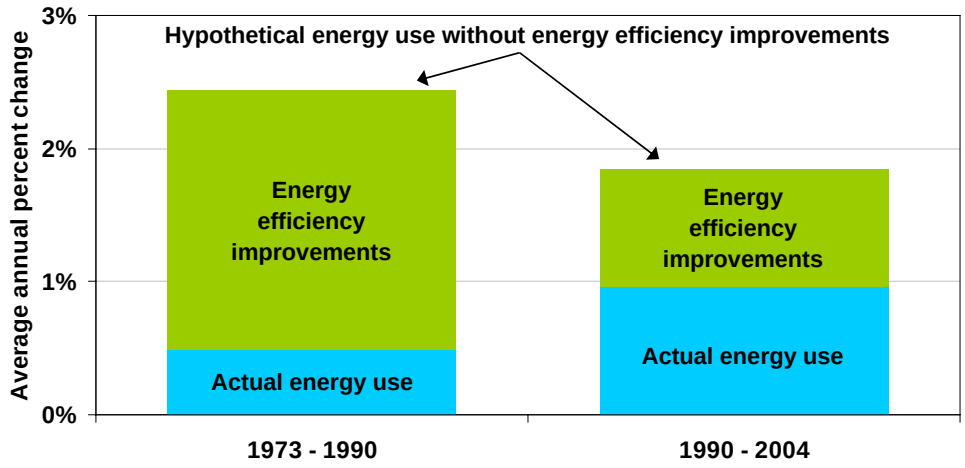
Source: IEA, 2007, Energy Use in the New Millennium

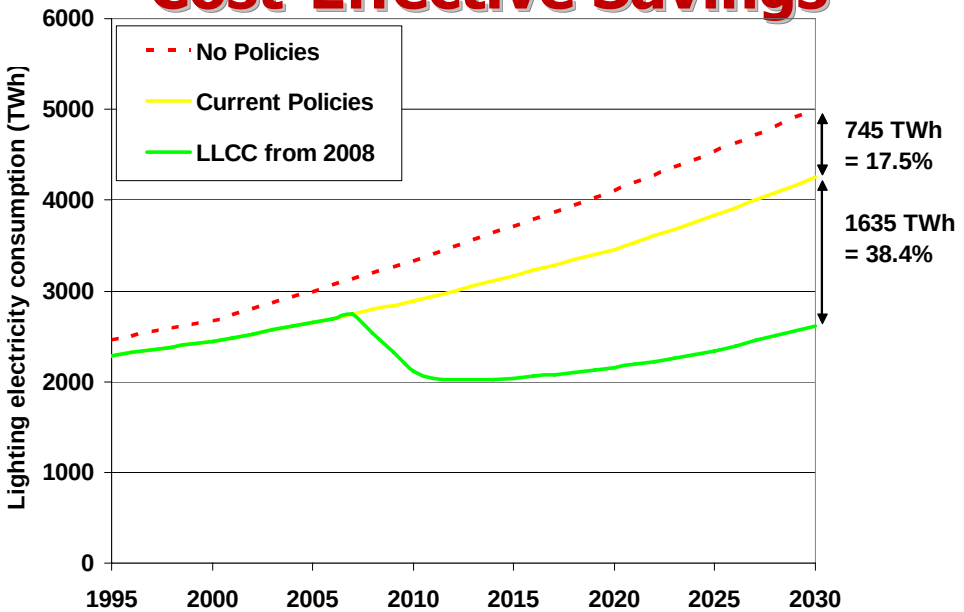
Energy efficiency: More policy is needed



Since 1990, the rate of energy efficiency improvement in IEA countries has been less than 1% per year – much lower than in previous decades.

Source: IEA, 2007, Energy Use in the New Millennium

Lighting, An Example of Cost-Effective Savings



Global cost of lighting could be reduced by US$ 2.6 trillion
16 billion tons of CO2 could be saved

Source: IEA, 2006, Light's Labour's Lost

Barriers to EE

- Best policy practice
- Lack of awareness re cost-effective savings potentials
- Missing or partial information on EE performance and lack of common metrics
- Split incentives: Landlord-Tenant issue
- Access to capital – capital markets not well developed to support the efficiency market
- Inherent nature of the energy market
- Technology barriers
- Capacity building needs

➔ emphasis on upfront, not on life-cycle costs

G8 Process

- Gleneagles Summit
  - Declaration recognises the threat of climate change
  - Mandate (to World Bank and IEA) to identify best policy practice in energy efficiency
  - «G8 plus Five» Dialogue
- Heiligendamm Summit
  - IEA made 12 concrete EE policy recommendations – could save ~ 5.7 billion tons of CO_2 by 2030
  - Topic-driven Dialogue between «G8 plus 5»
    - Promoting and protecting innovation; Enhancing freedom of investment; Defining common responsibilities for development; Sharing knowledge for improving EE and technology cooperation to reduce CO_2

Rationale for complementary instruments

- Carbon price signal must find its way to CO_2-intensive goods and services
- Barriers stand in the way of appropriate response to this signal
  - Many least life-cycle cost practices are not adopted by consumers
  - Similarly, many least life-cycle cost technologies are not adopted by industry
- Need to promote policy measures to enhance efficiency at end-use and in industry

↳ *Make price signal effective!*

But be careful... risk of interactions!

EC Energy & Climate Package:

- Proposal for multiple targets to be achieved by 2020
  - 20% GHG reduction compared to 1990 (30% if satisfactory international agreement)
  - 20% renewable share in final energy consumption
  - 10% biofuels in transport
  - 20% efficiency improvements
- Multiple targets – but also multiple motivations:
  - Environmental benefits
  - Energy security
  - Technology development

Are multiple instruments problematic?

- Yes, but there is more to it than the argument of overlapping instruments for same aim
- Reasons:
  - Renewable energy will continue to play its role in political terms
  - More objectives involved: energy security, job creation, technology development…
  - Consider the contrary : absence of RE target would have created 27 national targets in Europe
- Difficulty: Create the right scene
  - Ensure that the 'other' target is well reflected: if GHG target is ambitious, RE target can help
  - Set the right incentives: e.g., too ambitious RE target takes away incentive for CCS etc
  - Think about instruments that could unite: green certificate schemes?

Potential interactions between tradable green & white certificate schemes and the EU ETS: emissions

- In general, programmes would not affect EU-wide CO_2 emissions from sources covered by the EU ETS
  - Given the fixed ETS cap, additional measures have no immediate reduction benefits
- Yet, changes in the location of ETS allowance purchases/sales due to these other programmes could affect national CO_2 emissions
- Emissions may be lowered if…
  - programmes were so stringent as to reduce CO_2 emissions below the cap
  - governments were to reduce allowances to participating facilities, creating a lower ETS cap that reflects the impact of these programmes
  - white certificate programme reduced emissions from facilities not covered by the EU ETS

Source: Harrison et al., 2005

Potential interactions between tradable green & white certificate schemes and the EU ETS: costs

- Green / white certificate programmes generally lower the need for allowances by electricity generators (though energy/CO_2 savings), implying a lower allowance price.
  - could affect burden of EU ETS costs and electricity price impacts on different producers & consumers
- The impact on the overall cost of meeting the emissions cap by the covered sectors is unclear, depending on whether the abatement options that would have been chosen instead of the RE/EE measures would have had higher or lower costs.
- Overall costs may be lowered if…
  - retail electricity prices did not fully reflect CO_2 costs

Source: Harrison et al., 2005

Interactions between complementary measures: some more thoughts

- Concerns of double-counting:
  - provision of CO_2 credits for green / white certificates could represent double-counting, undermining thus the ETS cap
- Questions of fungibility
  - two-way fungibility may compromise the environmental soundness of energy saving targets
  - one-way fungibility would create two separate markets without real linkage
- The choice and design of instruments to achieve multiple targets is essential
  - must not be same for RE and EE!

Conclusions

- Price signal is needed, and market instruments are essential to transmit it
- In addition, targeted policy interventions are needed to overcome other energy market barriers
- Complementary measures can thus be important in the intermediate to make the price signal effective
  – but they need to be designed carefully

Thank you!

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