

# Policy Developments in Europe – Climate Change

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What's happening in Europe in terms of:

- Policy development
- Policy Process – Impact Assessment
- Prospects
- Can our models ‘improve’ policy package? – more cost effective, more environmentally effective, fairer, more politically acceptable or administratively feasible?
- Note that focus is entirely post 2012, and EU-centric

# Key Features

Trade (and CO<sub>2</sub> prices) technology, mandatory targets (caps), effort sharing

Designed to:

- Create a 'strong' price signal
- Be politically viable by effort sharing
- Improve cost effectiveness
- Support innovation generally, and in Europe in particular
- Impact Assessment (June 05 Guidelines) has come of age

# Key Task

To decide which niche in the current policy framework each model can usefully contribute, using the Dublin survey as indicative of potential

# Tentative Conclusions 1

1. Considerable learning from pilot phase of EU ETS (auctioning, single cap, long period, banking, cost efficient distribution of effort between ETS and Non ETS, linkage, no price cap)
2. Economists matter – many changes come from our play book
3. Centrality of EU ETS price as driver of abatement and especially CCS. CDM access will be limited to hold up price
4. European Market in renewable certificates a major innovation
5. European policy instruments are markets, information, regulatory threat, leadership, harmonisation, international collaboration
6. Little relevant EU budgetary power, except structural funds
7. Member States will have to do most of the budgetary heavy lifting
8. Auction revenues (€30-80 billion) will be key carrot for MS approval.
9. Effort sharing and equity key to securing approval
10. High hopes for technology SET Plan and CCS but instrument portfolio mobilised at European level weak.

# Tentative Conclusions 2

11. Porter Hypothesis is alive – first mover advantage in low carbon technologies
12. Nuclear is back, sort of..
13. 2005 is baseline, horizons are 2020 and 2050
14. **Impact Assessment** has arrived in town – Regulatory Impact Assessment as Antecedent?
15. Very uneven quality, but will improve – organisation, efficiency, technology, burden sharing are preoccupations
16. Careful analysis can elucidate policy thinking, values
17. Important source of **insight and data** for modellers
18. People Matter (Day, Merkel, Blair etc)
19. With overall caps, MS negotiation becomes a zero sum game

# The Key Commission Proposals 1

## ***1. Proposals re Revision of emissions trading Directive***

- Cap tightening –stepwise reduction by 20 per cent over by 2020
- Centralisation ('harmonisation') of – cap fixing, allocation, monitoring verification and enforcement
- Auctioning of allowances (power and..)
- Leakage provisions for the non power sectors – more free allowances and/or 'equivalent effort' required of imports to EU
- Banking (including CERs) over 13 years - 2008-2020
- CERs post 2012 parked pending UN agreement
- Exclude small-scale installations (but equivalent effort?)
- Effort sharing – distribute 10% of auctioned allowances to poorer Member States

# Key Commission Proposals 2

## **2. *Capping non-trading sectors***

Distribution of mandatory cap between the trading and non-trading sectors  
Effort sharing by EU 27

## **3. *Renewables Directive***

Mandatory targets (-20 per cent)  
Effort Sharing by EU 27  
Trading in excess of the mandatory target

## **4. *Promotion of Carbon Capture and Storage (CCS)***

Demonstration as key requirement  
Include emissions 'stored' in EUETS  
Commercialisation by 2020 with CO<sub>2</sub> price of 30-40 per tonne



# But March 2007 the ‘Big Bang’

Brussels European Council March 8/9 – **key Political Decisions**

- An Integrated climate and energy policy
- Absolute reductions in emissions are the backbone of a global carbon market
- Developed countries should continue to take the lead
- Commitment to transform Europe into a highly energy efficient and low greenhouse gas emitting economy
- Firm independent commitment to achieve at least 20% reduction of greenhouse gas emissions by 2020 compared to 1990
- Effort sharing
- Emissions trading as anchor

Council endorses Commission's intention to stimulate the construction and operation by 2015 of up to 12 demonstration plants of sustainable fossil fuel technologies in commercial power generation.

# Impact Assessment - Innovation in the EU Policy Process

Emphasis is on why and how, *not* on whether

3 case studies

- A. Carbon Capture and Storage
- B. Trading and Renewables
- C. Reduce CO<sub>2</sub> emissions from light-duty vehicles in Europe

## A. Carbon Capture and Storage Proposals – Impact Assessment

Use of fossil fuels in power generation –

- 40% of all CO<sub>2</sub> emissions in the EU
- Technologies for capture and storage of CO<sub>2</sub> (CCS) represent a crucial element of the policy portfolio
- Widespread application of CCS in power plants can be commercially feasible in 10-15 years enabling CCS by 2020 or soon after to stand on its own feet in an *Emissions Trading Scheme driven system* (Italics added)

# International parallel policies

Develop and accelerate ongoing European collaboration with China – through the Near Zero Emission Coal project – NZEC

Commission laid the groundwork in 2007 for CCS collaboration with India and South Africa.

The European Investment Bank (EIB) signed a China Climate Change Framework Loan

Agreement reached in June 2007 of signatory parties OSPAR convention enabling CCS to be considered under the Convention.

- large storage capacities under the North Sea seabed can be opened up.

# Costs and Benefits

- **Costs**
- R&D about € 1 billion between now and 2020.
- Equipping a new power plant (300MW) - additional up front capital allocation of €300-500 million *or* ongoing additional revenues of €45-125 million over the life of the project
- 12 Demonstration Projects (12X500) – 6 billion Euro
- European Technology Platform for Zero Emission Fossil Fuel Power Plant (ETP-ZEP) costs of CCS can be brought down by 50 per cent between now and 2020.

# *Future Costs*

- Industry and independent expert opinion:
- The period up to 2020, incremental costs would correspond to €70 per tonne
- But post 2020:
  - With CO<sub>2</sub> prices around €35 per tonne
  - Assuming full recognition of CCS in ETS
  - Power plants using CCS after 2020 will not be at a competitive disadvantage vis-à-vis standard power plants.

# Benefits

- ***EU***
- power sector emission reductions 160 million tonnes in 2030, and 800-850 million tonnes in 2050
- ***Global***
- CS can contribute between 20 and 28% of the achievable global CO<sub>2</sub> emission reductions (IEA)
- May provide solutions for energy intensive industries
- Maintaining the EU's global lead will generate new commercial opportunities for European businesses in countries such as China and India.
- Avoid 'lock in carbon intensive technologies into as much as 70 GW of capacity installed in the coming 10-15 years'.

# Overcoming obstacles

## **An EU Structure to Stimulate the Demonstration of CCS in Power Plants**

Overcome the scale and cost challenge

CCS technologies already used in industry

Need to be adapted for use in large-scale power plants and improved through advanced R&D

*European Industrial Initiative on CO<sub>2</sub> capture, transport and storage starting in 2008.*

Large-scale demonstration,

Increasing public awareness and acceptance.



# Regulatory Threat and Funding 1

*The longer the power industry takes to start embracing the CCS technology, the more policy makers will be obliged to look at the option of compulsory application of CS technology as the only way forward.*

## Funding

### **Commission (see 'Budget' earlier)**

Overcoming State Aid constraints

'declaration of compatibility' of the limited number of cases can be granted

'Commission can under current budgetary circumstances provide only a minimum part of the support necessary to ensure that sustainable power generation from fossil fuels is brought to the market'.

Only €15-20 million on annualised basis under FP6 (Research)

# Budget 2

## ***Business***

Commission will support a project network via the European Community Steering Group on Strategic Energy Technologies in cooperation with stakeholders.

Projects entering network will share information on progress and experience, and gain visibility and market identity via a European logo.

The dedication of substantial resources by companies is a precondition for the stimulation of sustainable fossil fuel technologies.

## ***Member States***

Up to each Member State to decide how it will support CCS demonstration in addition to R&D, addressing the higher up front and operational costs, and how it will be financed – subsidies funded by auction revenues, feed in tariffs obligations etc.

Early movers - Norway, UK, Netherlands, with Poland, Germany and Spain in preparation

# Impact Assessment of Options

*Takes the need for widespread CCS deployment in the EU from 2020 as established.*

Impact assessment focuses on:

- Options for achieving coordinated and timely demonstration of CCS technologies in Europe
- Construction of demonstration plants
- Sustaining financial support
- Wider deployment and associated infrastructure
- related initiatives abroad.

Key challenges – coordination of demonstration projects, improved public awareness, and interaction with international projects.

# Options

0 0 - no policy change - the 'do nothing' alternative.

Too slow, no tech lead, radical shift from coal to the detriment of EU energy mix

1 1. – EU coordination and strong MS action

EU provides framework and removes constraints. MS and firms provide the funds.

2 2. Joint Undertaking as Community scheme

Capitalised costs estimated at €6-16 billion, with EU contribution of €5 billion, Reaching agreement on this could be lengthy. Funds not available 'under current EU financial arrangements.'

## **Preferred option**

1 - Combining of EU coordination role and harmonisation of national funding schemes, and stimulation of strong MS and other commitments.

# Issues for Modeling

Test assumptions – on:

**Costs** (R&D, 12 Demonstration projects)

Timing (‘proven by 2020?, public acceptance)

Environmental Effectiveness – 90% reduction? Leakage?

Commercial viability at €35 per tonne

## **Benefits**

Decarbonisation of coal-fired electricity

Technology leadership

## **Regulatory threat**

Implementation of regulation ‘requiring’ CCS

# Relevant TSS Models (Dublin Survey)

IVM – *DEMETER*

UNiHH – *EU-FASOM*

FEEM – *WHICH*

ECN – *MARKAL?*

# B. Impact Assessment of 20 20 Package

Commission Staff Working Document Brussels 23 January 2008  
Impact Assessment

[http://ec.europa.eu/energy/climate\\_actions/doc/com\\_2008\\_030\\_en.pdf](http://ec.europa.eu/energy/climate_actions/doc/com_2008_030_en.pdf)

## ***Emissions Trading (40% of GHG emissions)***

Directive of the European Parliament and Council amending Directive 2003/87/EC so as to improve and extend the EU greenhouse gas emission allowance trading system. COM(2008) 16

## ***Non Emissions Trading (60% of GHG emissions)***

Decision of the European Parliament and of the Council

On the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020. COM(2008) 17 ('effort sharing')

## ***Renewables 23***

Directive of the European parliament and Council on the promotion of use of renewable energy sources. COM(2008) 19

# Agreed targets

20 per cent reduction by 2020 compared with 1990

Mandatory target of 20% renewable energy including a 10% biofuels target

Mutually reinforcing policy goals designed to dovetail in order to achieve the EU goals in a *politically acceptable* as well as *economically efficient* way.

Impact assessment sets out:

Options explored

Analysis made to underpin the policy choices made in the proposals



# Key principles (6)

1. Cost-effectiveness
2. Flexibility - without, any variations from *ex ante* projections could lead to costs which a less rigid option could avoid.
3. Internal market and fair competition – level playing field
4. Subsidiarity – MS hold key competences to define measures such as ambitious taxation schemes, traffic management, modal shift, public transport, urban and transport planning.
5. Fairness – take account of different circumstances
6. Competitiveness and innovation – need to protect competitiveness taken into account in context of clear commitment to leadership on climate change, improve energy security and *accelerate innovation to create a competitive edge in clean energy and industrial technologies.*

## Issues for TSS Modeling – Social Coherence

Reference scenario focuses on minimum cost (cost-effectiveness) outcome, and then tradeoffs efficiency (accepts higher costs) to accommodate distribution to lower income MS.

View of TranSustScan modellers on this as an approach?

LIFEA – W8D/IMPEC

SMASH - *IMACLIM*

# Methodology and Models

*Economic modelling tools* not used for determining targets, but for assessing the effects of different allocation methodologies and policy design choices.

## PRIMES

Partial equilibrium - all sectors and fuel types, detailed at Member State level

Use for assessment in changes in energy system (investment costs, change in fuel mix and consumption)

## GAINS

Allows assessment of reducing non CO<sub>2</sub> GHG and the resulting impact on air pollution emissions

## GEM-E3

General equilibrium all sectors but less detail on different mitigation technologies

Used to assess macro economic impacts (GDP, private consumption and employment) at Member State level of reducing emissions in energy sector

## PACE

Similar to GEM-E3 with more detail on electricity generation technologies

## POLES

Global partial equilibrium energy model used to assess impacts of a future international agreement on the EU energy system.

# Some Key Parameters

*GHG reduction effort*

**EU ETS** covers 40 per cent of emissions – preferred option a single EU-wide cap.

**Effort sharing** for non-EUETS emissions

*Base Year*

2005 – only year for which reliable verified emission data are available.

*Unit of measurement of energy*

Final energy consumption as the unit of measurement for renewable energy targets.

# Relevant TSS Models (Dublin Survey)

**Meeting GHG Emissions Targets: 7 Models can contribute**

IFW – *DART*

UniHH – *EU-FASOM*

SMASH – *IMACLIM*

LIFEA – *W8D/IMPEC*

ECN – *MARKAL*

ZEW – *PACE*

FEEM - *WITCH*

# Relevant TSS Models (Dublin Survey) 2

## Renewables Targets

UniHH – *EU-FASOM*

SMASH – *IMACLIM*

ECN – *MARKAL*

FEEM - *WITCH*

# Assessing the options

All options based on simultaneous achievement of 20% renewables target and the 20% reduction of greenhouse gas emissions.

Take into account:

- Gradual technical efficiency improvements
- Normal capital stock turn over, US\$61 per barrel of oil (but with sensitivity analysis of \$100 oil)
- Energy efficiency policies in place at end 2006.

Assumes that marginal costs across all MS and all sectors are equalised, both for GHG reductions within EUETS and those not covered.

*Reference (core cost efficient) Option - cost effective at EU level*

But Other Options show modification to:

Reach a fair distribution of effort between MS without incurring a significant Increase in the overall economic cost.

Assess impact of access to credits from CDM etc.

Carbon leakage and competitiveness of internationally exposed energy intensive industries (access to CDM, international sectoral agreements, free allocation to non power sectors, inclusion of imports of energy intensive goods in the EU ETS.)



## Results of Reference Scenario (reaching 20% GHG reduction and renewable energy share of final consumption)

Category	Impact
Distribution of effort	EUETS (60%) Non Trading (40%)
EU ETS reduction	21% compared to 2005
Non ETS reduction	10%
Direct Economic Costs (oil \$61/barrel)	€1 billion (0.58% GDP in 2020)
Direct Economic Costs (oil \$100/barrel)	€9 billion
Direct costs with access to DM	€71 billion in 2020
Reduction in oil and gas imports	€1 billion in 2020
Reduction in air pollution costs	€10 billion in 2020
Renewable Energy incentive costs	€45 per MWh
CO <sub>2</sub> price per tonne	€39
Electricity Price increase	10-15% in comparison with today

## **Renewable Energy** (Renewable Energy Roadmap)

- Distribute burden on basis of half effort made through flat rate increase in share of renewable energy, and the other half weighted by GDP.
- Targets will be more difficult to achieve for MS with lower resource potential and higher target.

# Renewables Trading and Costs

Create a regime enabling the transfer of Guarantees of Origin (GOs) and to leave discretion to MS in terms of the level and pace of their transferability – a partial market opening that allows MS to take advantage of cheaper resources and achieve their targets in more cost effective manner. (Costs in Ireland and EU in 2020 are 0.45% of GDP).

# Biofuels and Transactions Costs

10 per cent target for transport subject to:

- Production being sustainable (minimum level of GHG saving of 35%)
- Ban on conversion of areas with high carbon stock or a high biodiversity value; in EU
- Extension of cross compliance criteria to cover all feedstock used)
- Second generation biofuels becoming commercially available and
- Fuel Quality Directive being amended

## *Benefits of Biofuels*

Savings of 7 million tonnes of CO<sub>2</sub> at *significant additional costs*, but result in significant reductions in oil imports generate extra employment.

# Relevant TSS Models (Dublin Survey)

Biofuels

UniHH – *EU-FASOM*

SMASH - *IMACLIM*

# Project based reductions (CDM)

## *Costs of unlimited access*

20 per cent GHG reduction target with *unlimited access* to such credits

carbon prices as low as €4 per tonne with consequences of:

- No significant change in energy system
- Oil and gas savings would not materialise
- Technological innovation not spurred
- 20 per cent RES target more difficult to achieve
- Less EU leadership on climate change
- Smaller impetus to develop and deploy advanced energy and low carbon technologies.

# CDM in EU ETS

NAPs in second period (2008-12) allow more than 13% of JI and CDM credits to be 'imported' into EUETS.

If as is proposed, banking is allowed from second to third phase, and is spread out over the period, this will represent 5% of the total cap, or a quarter of the entire reduction effort by 2020 within the EU ETS.

With 30 per cent target, it could be achieved readily with access to CDM but 'substantial financial resources would have to be made available to acquire additional credits generated through CDM'

# Total and Marginal Costs of Options

Scenarios	Direct Costs % of GDP	Change in Direct Costs	Costs of Energy and Non CO2 and CDM bill €	Change costs of energy and non CO2 and CDM	Reduction in oil and gas imports Bill €
Scenario 3 Redist of non ETS with with CDM	0.45		70		41
		+0.13		+21	
Scenario 1 Cost Effic ref	0.58		91		49
		+0.03		+4	
Scenario 2 Red of non ETS no CDM	0.61		95		47
		+0.06		+8	
Scenario 4 Red of non ETS and Renewables no RES Trade	0.66		103		46



# Improved Energy Security

## Makes EU:

Considerably less dependent on imports of oil and gas

Provides a more positive trade balance

Reduces exposure of EU economy to  
rising and volatile energy prices

inflation

geopolitical risks

and risks related to inadequate supply chains that are not matching global  
demand growth.

# Electricity prices

- Unit costs rise for households between 19-26%, but with consumption falling by about 10 per cent. But may be less as some argue that carbon prices of €20 are already factored into electricity prices
- Overall, households facing an average increase of €150 per year in 2020, which will fall if oil prices continue to rise.

# Fairness etc

In non-trading, most cost effective opportunities in non CO<sub>2</sub>  
Transport low (-7% compared with 2005)

**Fairness** – GDP per capita varies by factor of 10

Options

For non-EUETS target, poorer countries get higher allocations (up to +20%) and rich less (up to -20%) from 2005 base. Would increase costs from 0.58% of GDP to 0.61%

Also redistribute disproportionately revenue from auctioning

## **Auctioning**

If all allowances at €40 per tonne, revenues of €75 billion in 2020 (0.5% of GDP)

Assuming recycling, GDP will increase by 37.5% by 2020 instead of the projected 38%.

Free allocation has the same effect

# Europe as California? Car Transport and Innovation

1

- Voluntary Agreement (average of 140 grams per kilometre by 2008/09) failed
- The proposal - average target of 130g per kilometre, but
- Specific target being weight based.
- *Pooling provisions* may allow *de facto* informal trading between companies to meet the targets.

## Some Industry Reaction

- Germany's BMW - plans were "naive" and would distort the market in favour of makers of smaller cars
- France's Peugeot-Citroën - the proposals were "anti-ecological, anti-social, anti-economical and anti-competitive in relation to non-European Union carmakers."

# Europe as California? Car Transport and Innovation

## 2

**NGO Transport and Environment (T&E)** criticising the proposals for:

- Weakening a 120g CO<sub>2</sub>/km goal already set back in 1995
- Failing to set additional targets for 2020 and 2025, thereby disincentivising carmakers from longer term investments in fuel efficiency....
- Commission's weight-based approach, saying it was "hugely favourable for makers of heavy cars such as SUVs" and eliminates "80% of the incentive for car makers to reduce weight" – the main means of reducing CO<sub>2</sub> emissions

# President Barosso

"This proposal demonstrates that the European Union is committed to being a world leader in cutting CO<sub>2</sub> emissions and the development of a low carbon economy. At the same time, we *are committed to promote the competitiveness of our industry and its global technological leadership.*"

# Relevant TSS Models (Dublin Survey)

SMASH - *IMACLIM*

Impact Assessment of CO<sub>2</sub> reduction measures

To be addressed by Simon McDonnell