

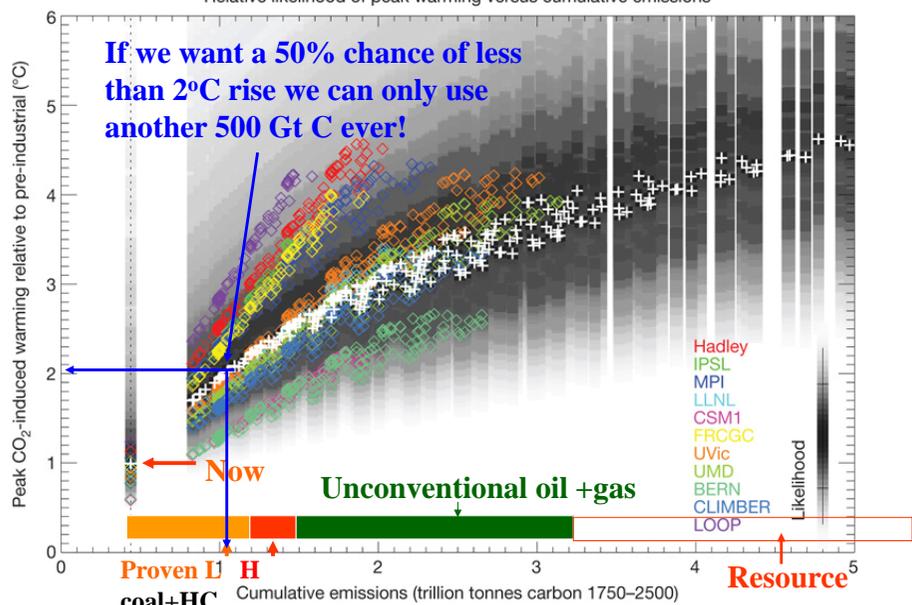
CERRE Regulation Dossier Energy & electricity

David Newbery
 Kick-off meeting for EC 2014-18
 Brussels
 22nd January 2014
<http://www.eprg.group.cam.ac.uk>

- Guiding principles for EU intervention
 - to correct EU-wide market failures
 - R&D is a public or club good
 - internalising inter-Member State spill-overs
 - => DG COMP's role
 - otherwise respect subsidiarity
- Policy: goals fine, delivery terrible
 - => improve interventions!
- Remaining questions - and brief answers

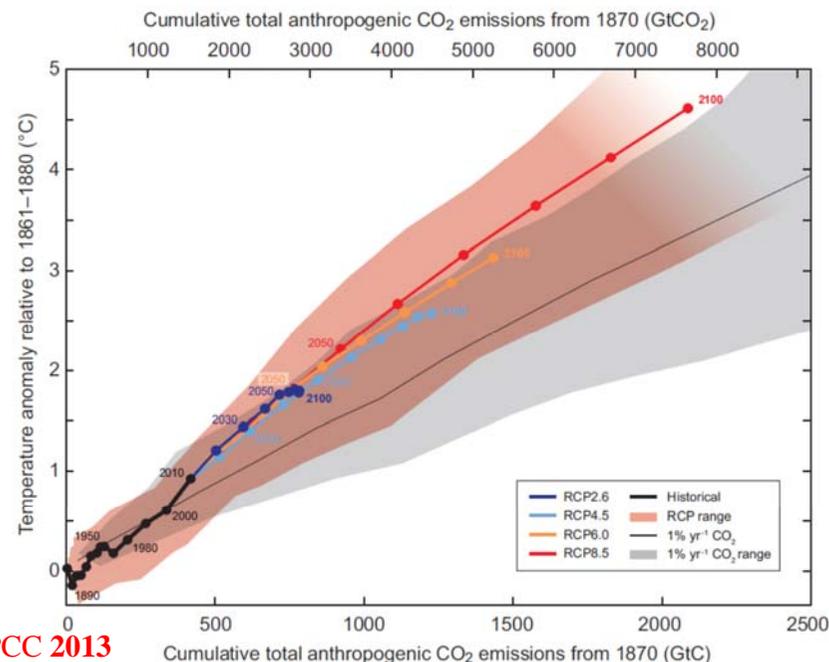
Peak CO₂-warming vs cumulative emissions 1750–2500

Relative likelihood of peak warming versus cumulative emissions



MR Allen et al. *Nature* 458, 1163-1166 (2009) doi:10.1038/nature08019

nature



Correcting EU-wide market failures

- **ETS to price CO₂**
 - to support mature low-C options
 - fixes quantity not price => poor guide for low-C
- **20-20-20 Renewables Directive:**
 - demand pull for not-yet-commercial renewables
 - justified by learning spillovers and burden sharing
- **EU Strategic Energy Technologies (SET) Plan to double 2007 R&D spend**
 - R&D to support less mature low-C options

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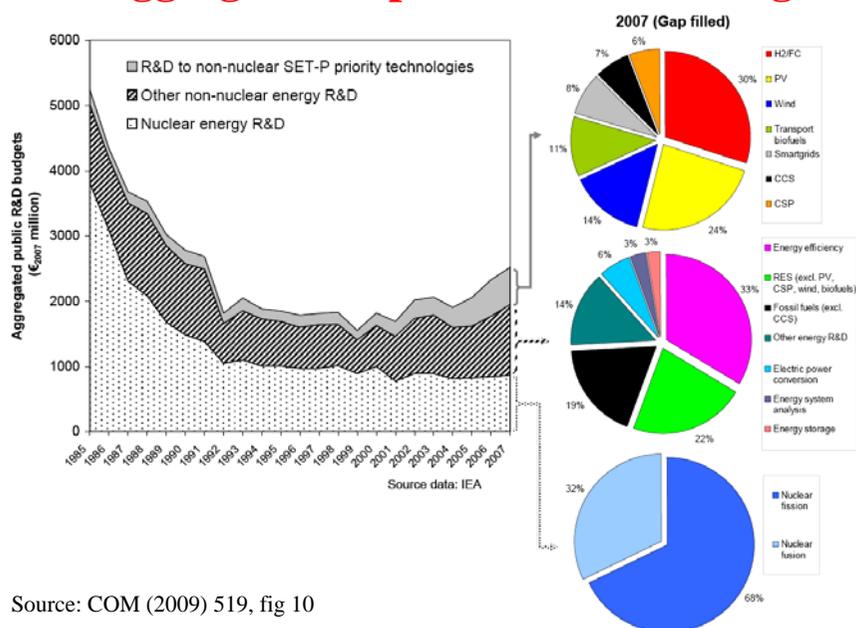
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Policies are poorly designed

- **ETS** fixes quantity not price
 - Renewables Directive undermines EUA price
 - Does not reduce CO₂ emissions at all
 - Great Recession further undermines EUA price
 - No bankable future carbon price to guide investment
- **Renewables Directive** sets country RES targets
 - Different supports by technology and country
 - not well-designed to deliver best learning benefits
- **SET plan** - driven by industry lobbies?
 - as it lacks funding and allocation criteria

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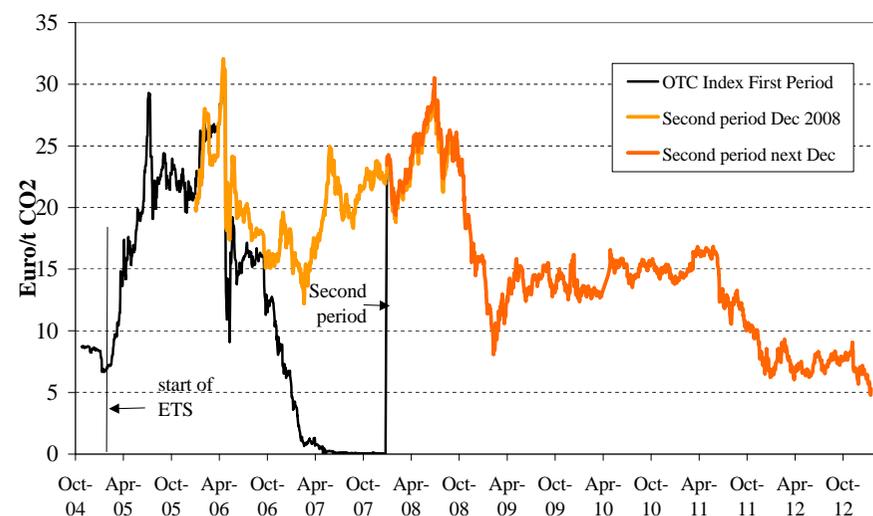
Aggregate EU public R&D funding



Source: COM (2009) 519, fig 10

Carbon prices have crashed

EUA price October 2004-March 2013



Source: EEX

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- Current ETS sets quota of total EU emissions
- 20-20-20 Renewables Directive increases RES
 - increased RES does not reduce CO₂
 - => reduces carbon price
 - => prejudices low-C solutions (nuclear, efficiency,..)
- Risks undermining support for RES

Plan A: fix carbon price instead of quota

Plan B: each country sets carbon price floor

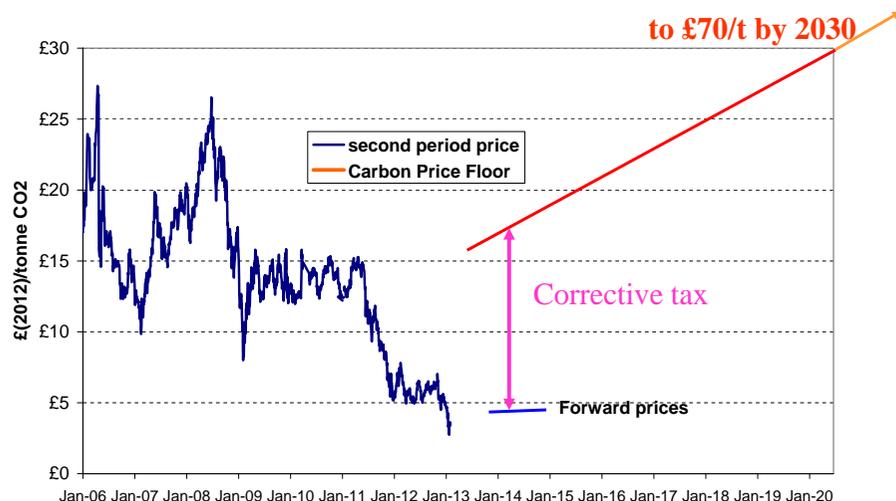
Plan C: set carbon intensity

- Each country imposes a Carbon tax
 - tax bads not goods as part of fiscal adjustment
 - rebated by EUA price for covered sector
 - can start low: €20/t CO₂ and escalate at 5% p.a. above RPI = €34/t by 2020
- Tax can finance research and renewables

Message: setting a carbon tax is better than trading carbon permits

UK's Carbon Price Floor - in Budget of 3/11

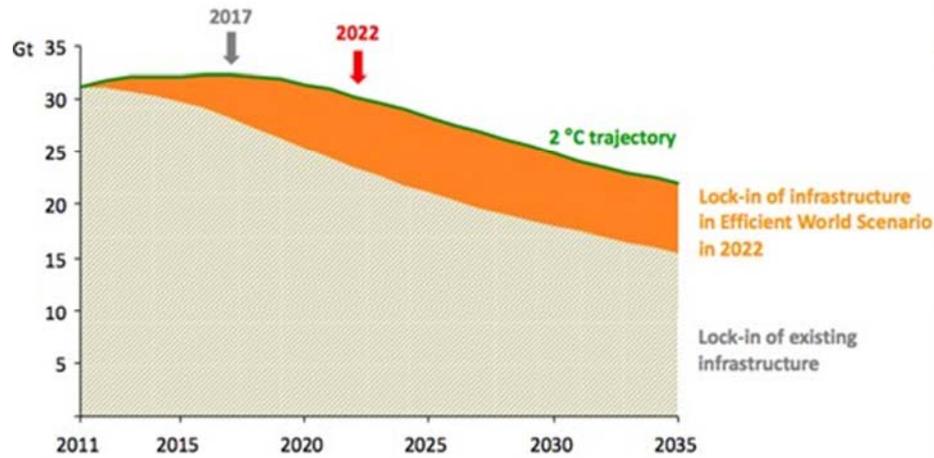
EUA price second period and CPF £(2012)/tonne



- Electricity is simplest to decarbonise
 - investments are highly durable
 - ETS future C price neither adequate nor durable
- => needs **credible durable investible** proposition
 - long-term contracts supported by carbon price floor (UK EMR approach) **and/or**
 - emissions standard for new plant: tonnes/MW/yr **plus** sector-wide emissions target set 20 yrs ahead

French nuclear programme demonstrates

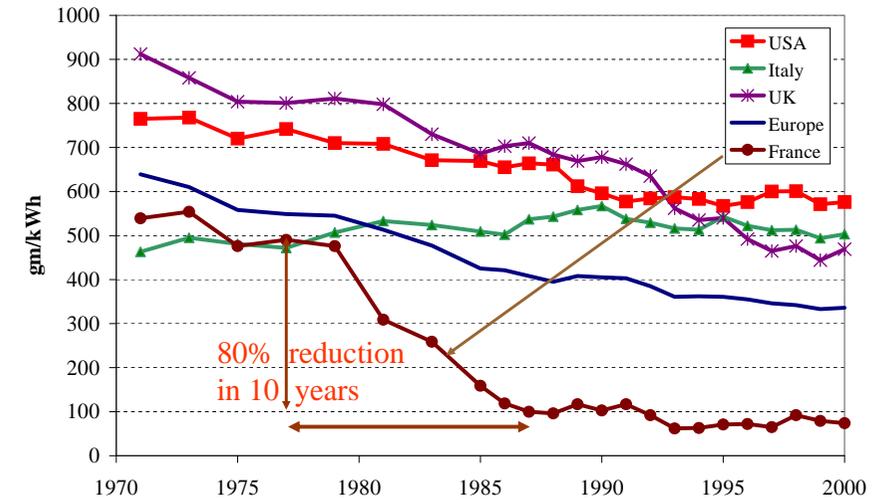
We are already locked in to high carbon emissions from past fuel choices



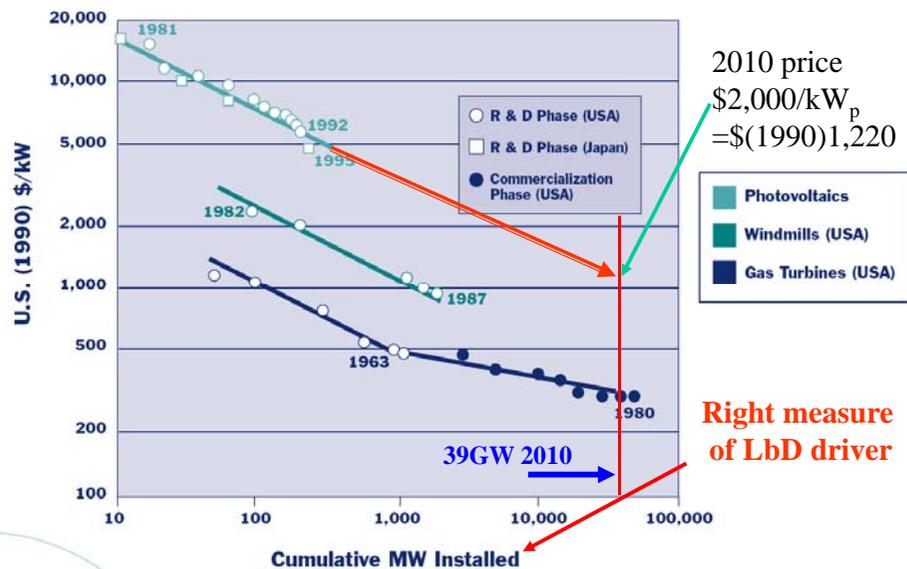
Source: IEA <http://www.carbonbrief.org/blog/2012/11/favourite-graphs-from-iea>

Rapid decarbonisation of electricity is possible - with nuclear power

CO2 emissions per kWh 1971-2000



Learning justifies Renewables Directive



Source: N. Nakicenovic, A. Grübler, and A. McDonald, eds., *Global Energy Perspectives* (CUP, 1998).

SET road map

- 2007 SET R&D non-nuclear ~ €2.4bn (Nuclear €0.94)
 - 70:30 private:public; 80:20 MS:EC
- SET-plan to 2020 total €70 bn or double current rate
 - Grid: €2bn; fuel cells + H₂: €5bn; Wind: €6bn;
 - nuclear fission €7bn; bio-energy €9bn;
 - smart cities €11 bn; CCS €13 bn; Solar: €16bn;

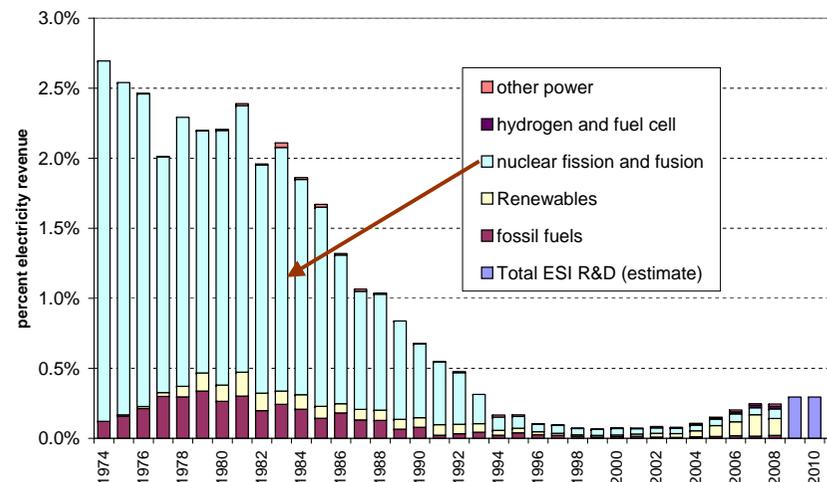
Concern that the allocation is based on lobbies not careful evaluation of potential

- Liberalizing causes R&D to collapse
- **Renewables Directive** has massively increased renewables support
 - Perhaps too much deployment, not enough R&D?
- **SET-Plan** is critical but funding doubtful
 - Innovation seen as an EU industrial policy => impose duties on imported Chinese PV!

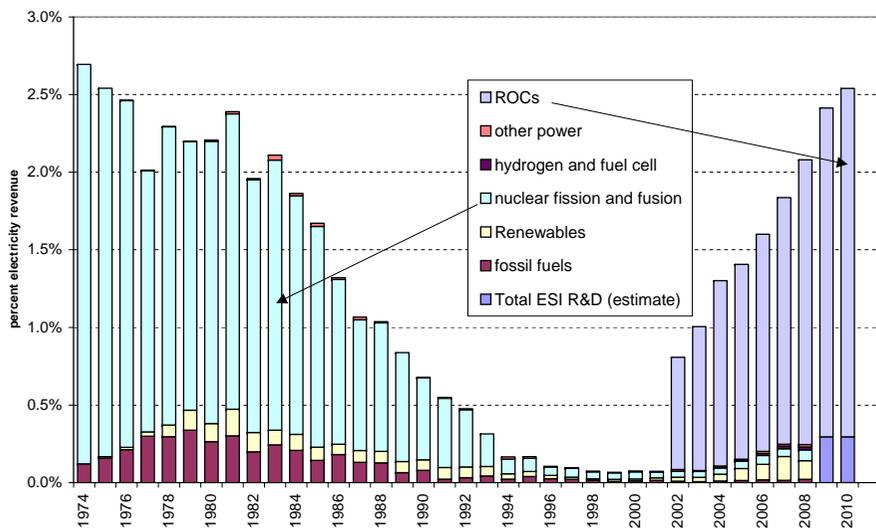
What is the solution?

R&D collapses with liberalization

UK Electricity R&D intensity



UK Electricity R&D intensity



A better EU low-C RDD&D policy?

- **Targets** are an effective method of devolving support
- Why not set the target in cash terms as a share of GDP?
 - Possibly reflecting the cost of the RES targets
- Member states meet their targets by:
 - commissioning R&D and demos by competitive tender
 - supporting RES-E, credited with **benchmarked value**

1. Decide which technologies are promising
 - for R&D, demonstration and deployment
 - => develop a social cost-benefit method to value innovation
2. Determine initial total EU budget allocation
 - e.g. as in a better form of the SET-Plan road map
3. Determine how/when to stop/reallocate budget
 - e.g. if the revealed rate of cost reduction too slow
4. Allocate budget to Member States (MSs)
5. MS decide what to support and how, report results
6. Expenditure valued at benchmarked rates

- Example: solar PV, for each MW_p installed, credit = **Least EU installed cost** / less NPV of electricity generated in **best EU location** valued at cost of CCGT output displaced
- Where budget for technology is limited, MSs tender for right to undertake: winner is least credited unit cost
- Where learning independent of location (e.g. depends on volume installed) can choose **non-EU locations**
 - e.g. Africa

- DG COMP to address **cross-border exercise of market power** - e.g. DK's suit against SE exporting congestion
 - State aid Guidelines to prevent market distortions
 - to be updated for energy 2014
 - intervention justified by **irreparable market failures**
 - Test of intervention: "is the aid measure proportional, namely could the same change in behaviour be obtained with less aid?"
- => Strong implications for RES support

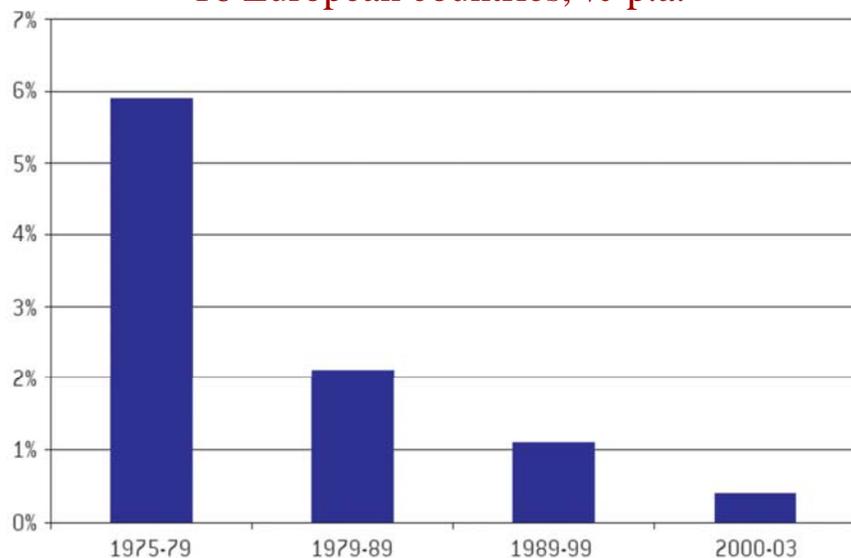
- Reducing carbon, creating learning and knowledge are all **PUBLIC GOODS**
- => finance out of public funds, **not levies** on electricity
- current policies exempt some industries in some countries from such levies
 - legally discriminatory, violates State aids, DG COMP cross
- => Solution = ALL industry should be exempt from distortionary taxes => fall on final consumers (VAT)

Make Energy policy consistent with good public finance

- Future of retail markets and smart meters
 - no case for EU-mandated domestic electricity liberalisation, nor smart meters
 - doubtful benefits, potentially high metering costs
 - some case for agreeing meter standards
- Is vertical integration a problem?
 - Yes between transmission and production
 - not obviously between production and retailing
 - provided there is a liquid and competitive wholesale market, ideally a (voluntary) pool

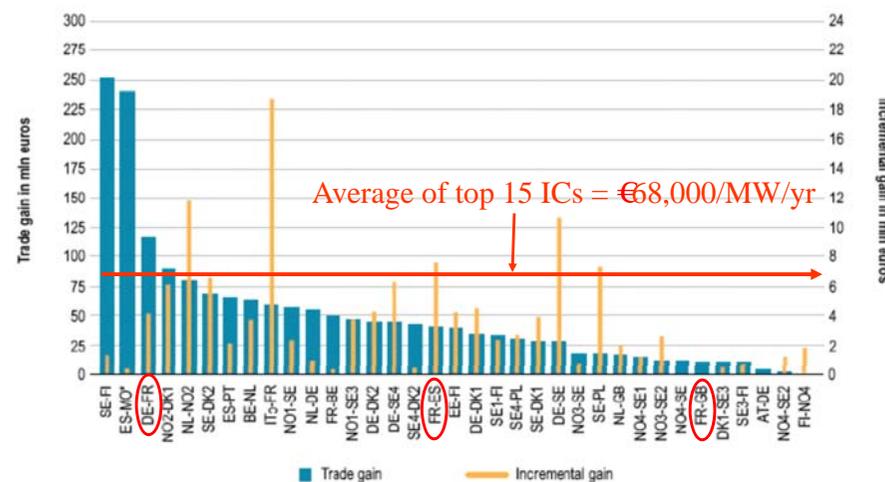
- Capacity markets
 - issue is efficient cross-border market coupling
 - may need upgrade of Euphemia auction platform
- Transmission investment
 - key is beneficiary pays, plus compensation to local authorities, based on sound SCBA
- Energy efficiency
 - leave MSs to choose how to reduce CO₂

Increase in 220-400kV transmission 16 European countries, % p.a.



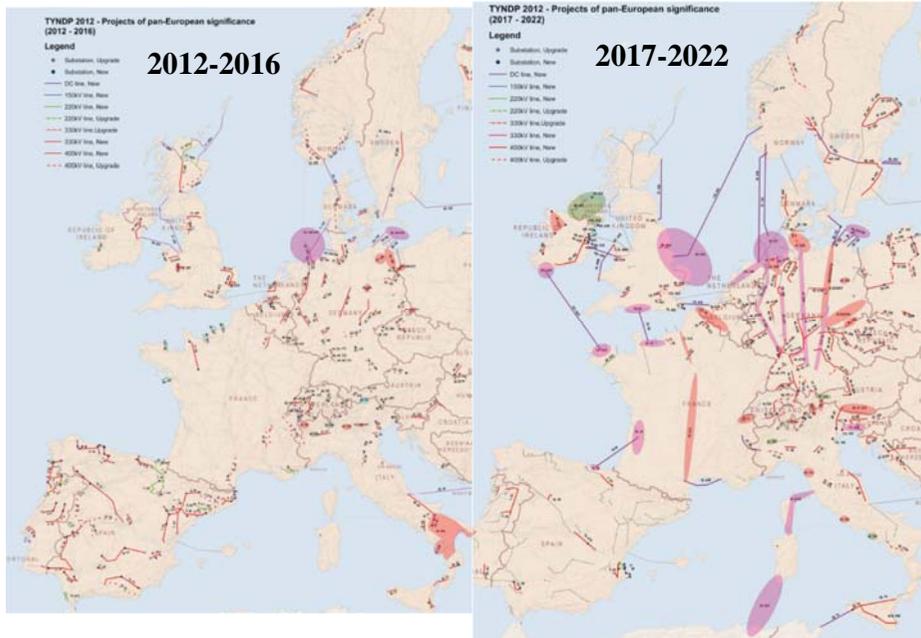
Source: Zachman (2010) from IEA (2005)

Gross welfare benefits from cross-border trade and incremental gain per 100 MW – 2011 (€m/yr)



Source: PCR project, including APX-Endex, Epex Spot, Nordpool, GME, OMIE (2012)

ENTSO-E Ten-Year Development Plan 2012



ENTSO-E Ten-Year Development Plan 2012

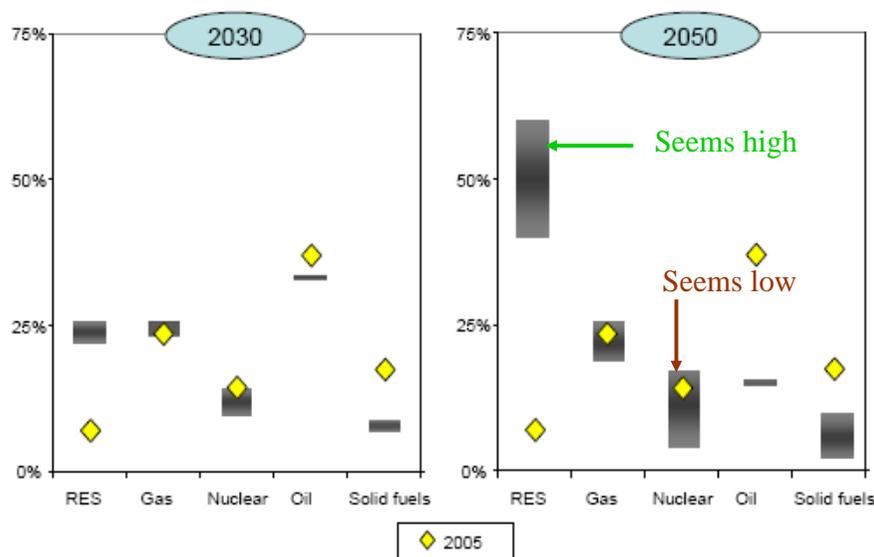
52,300 km total, in +/-3,000 km of sub-sea routes, plus 10,000 km of offshore grid key-assets and +/-7,000 km of inland routes to bring peripheral power to load centers.



Figure 1.4:
Projects of pan-European significance – volumes

51 of the 495 investments items contained in the TYNDP 2010 have been commissioned to date (12 have been partly commissioned, 25 are expected to be commissioned in 2012³⁰)

Graph 1: EU Decarbonisation scenarios - 2030 and 2050 range of fuel shares in primary energy consumption compared with 2005 outcome (in %)



- Need clear reason for EU action
 - correcting EU-wide market failures
 - Near-market renewables needs extra support
- => well-targeted solutions to market failures
 - poor record reflects difficulty of 27 MS agreeing
- need better cross-border solutions
 - market coupling took 10 years, transmission needs better incentives to avoid local opposition
 - but energy-only market with zonal pricing imperfect

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Kick-off meeting for EC 2014-18

Brussels

22nd January 2014

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ETS	Emissions Trading System
EMR	Electricity Market Reform
EUA	EU Allowance for 1 tonne CO ₂
IC	Interconnector
LbD	Learning by doing
MS	Member State
RDD&D	Research, development, demonstration and deployment
RES	Renewable Electricity Supply
SCBA	Social Cost benefit Analysis
SET	Strategic Energy Technologies