Business and Policy Challenges In European Electricity Industry

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The Norwegian Business School

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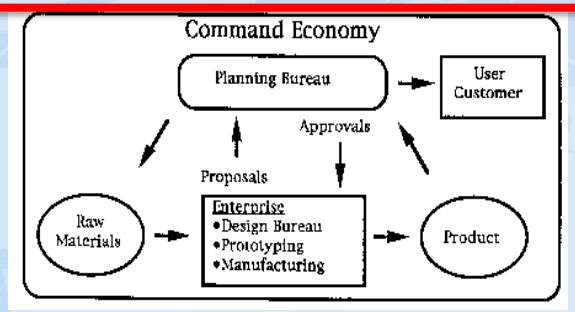
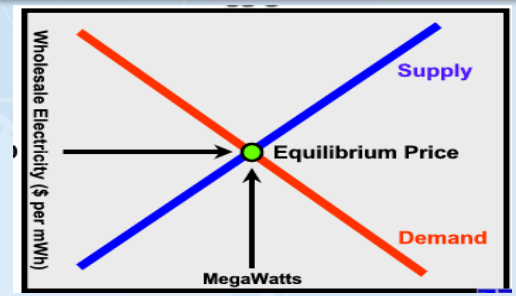
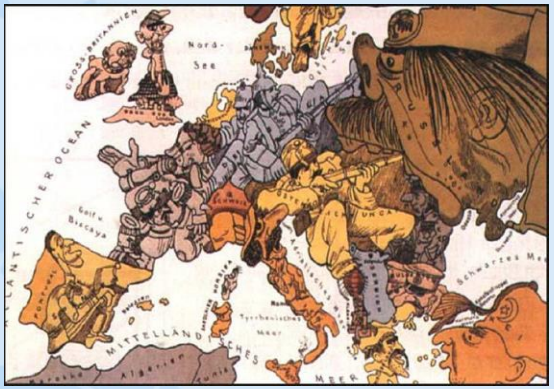
Electricity Industry Under Pressure From Crises and Transitions



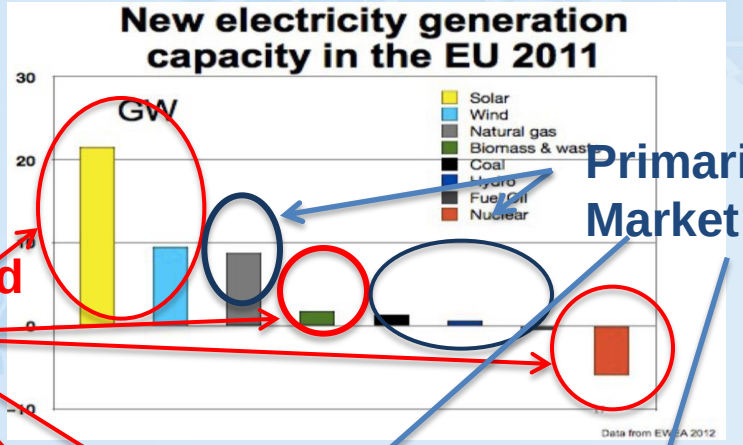




Western/ European Economic Crisis

BUSINESS CHALLENGES

Mixes of Market and Politics



Politicised

Primarily Market driven

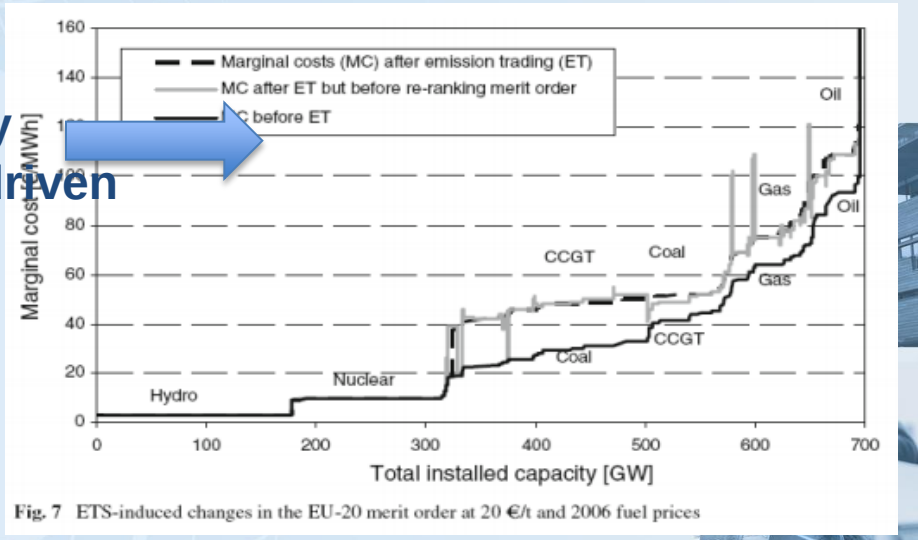
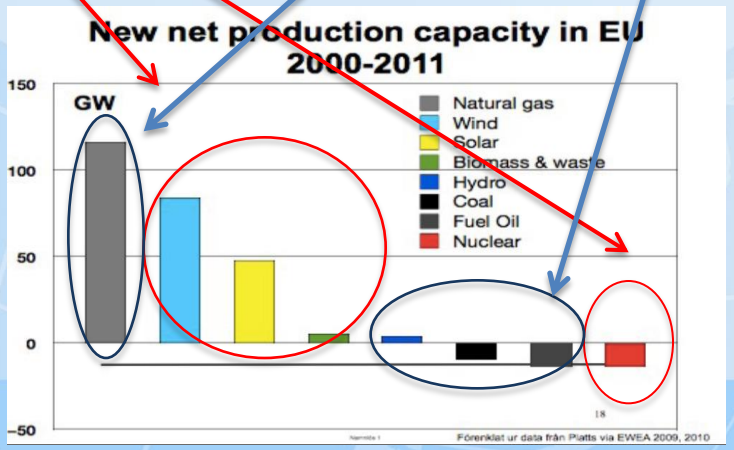


Fig. 7 ETS-induced changes in the EU-20 merit order at 20 €/t and 2006 fuel prices



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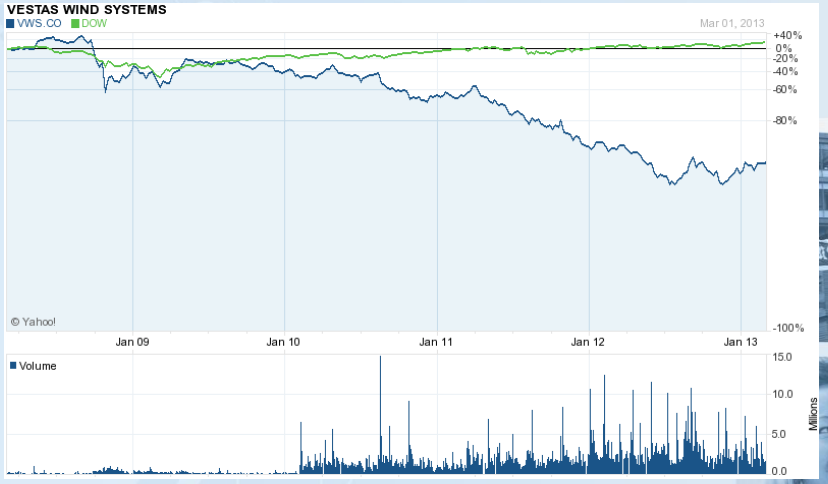
Both Conventional and Renewable Investors are in Trouble

Conventionals

Greens



TOP 10 GLOBAL PV CELL MANUFACTURERS 2006, 2010 (RANK ORDER BY CAPACITY)

+46% per year

2006

Company	Country	Capacity (MW)
1. Sharp	Japan	500
2. Q-Cells	Germany	420
3. Suntech	China	270
4. Motech	Taiwan	240
5. Solarworld	Germany	200
6. China Sunergy	China	180
7. Kyocera	Japan	180
8. Isofoton	Spain	130
9. Schott	Germany	121
10. Sanyo Electric	Japan	115

2010

Company	Country	Capacity (MW)
1. JA Solar	China	1,900
2. Suntech	China	1,620
3. First Solar (TF)	US	1,502
4. Yingli	China	1,100
5. Trina Solar	China	1,000
6. Q-Cells	Germany	1,000
7. Canadian Solar	China	800
8. Motech	Taiwan	600
9. Ginlech	Taiwan	600
10. JinkoSolar	China	600

Europe US China Other Asia

Note: 'Capacity' counted as either crystalline silicon cell or thin film module.
TF is thin film

Source: Bloomberg New Energy Finance, company announcements

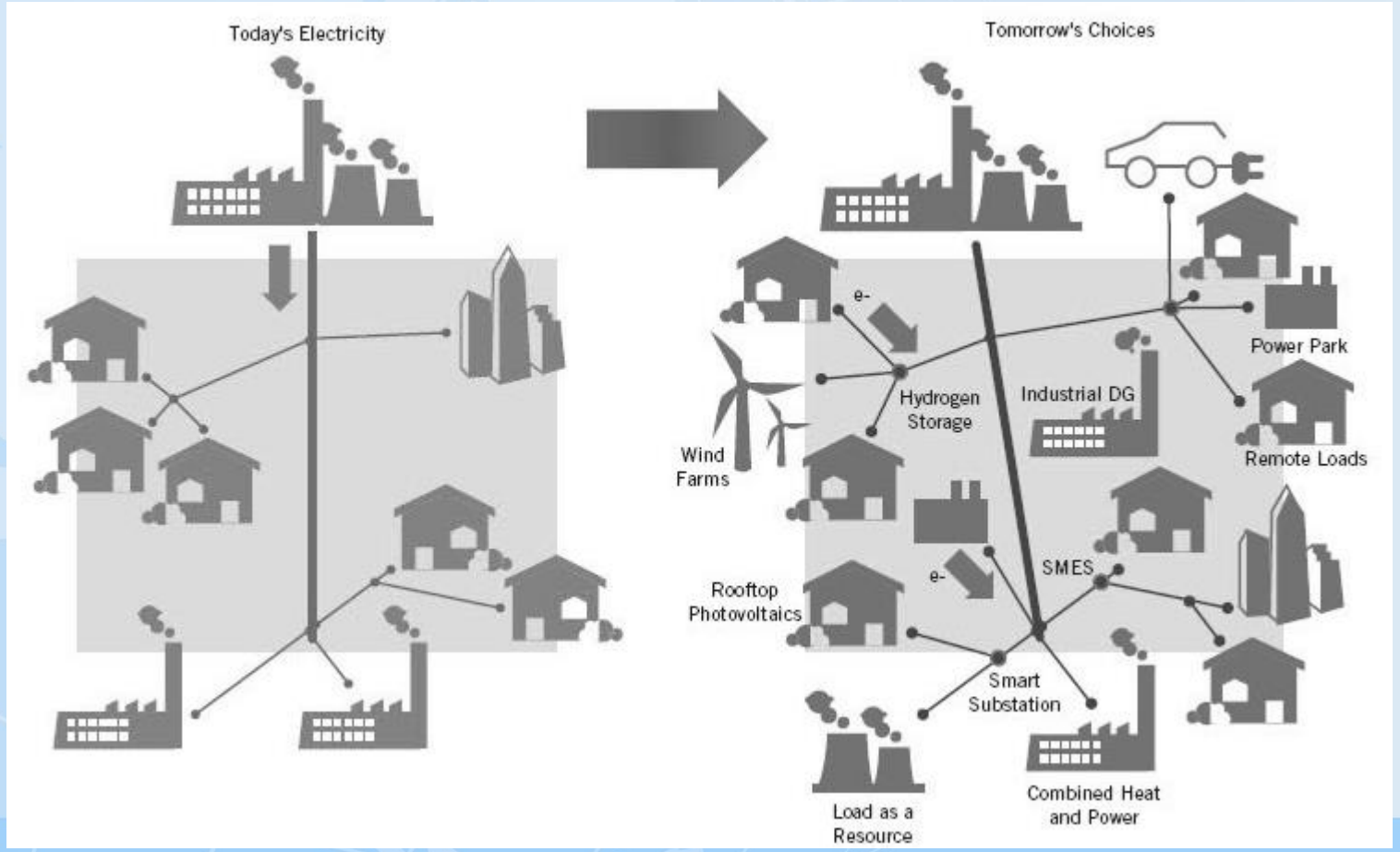
From Kåberger 2012

Wind Turbine Manufactures

Vestas, Denamark (12.7 marked Share 2011)

- Sinovel, China (9)
- GoldWind, China (8,7)
- Gamesa, Spain (8)
- Enercon, Germany (7.8)
- GE Energy, US (7.7)
- Suzlon, India (7.6)
- GuoDian, China (7.4)
- Siemens, Germany (6.3)
- MingYang, China (3.6)

Smart Grids, crossover between el and IT

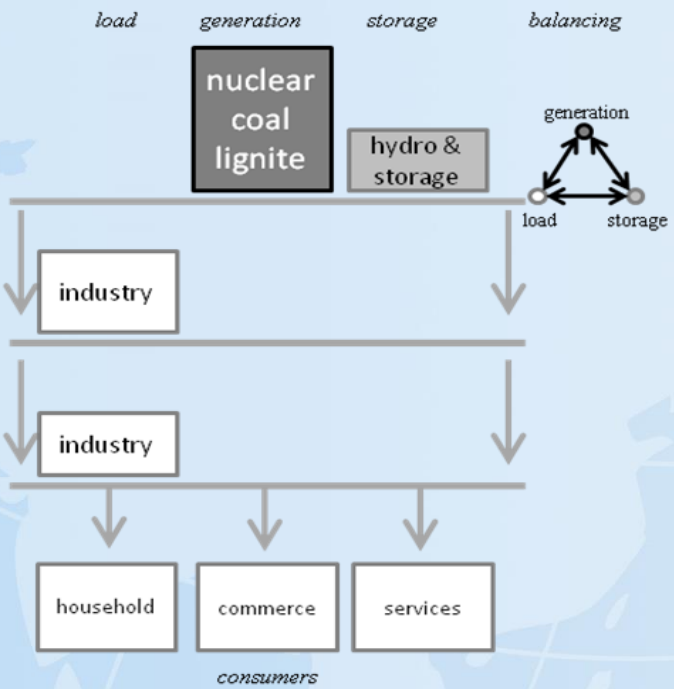


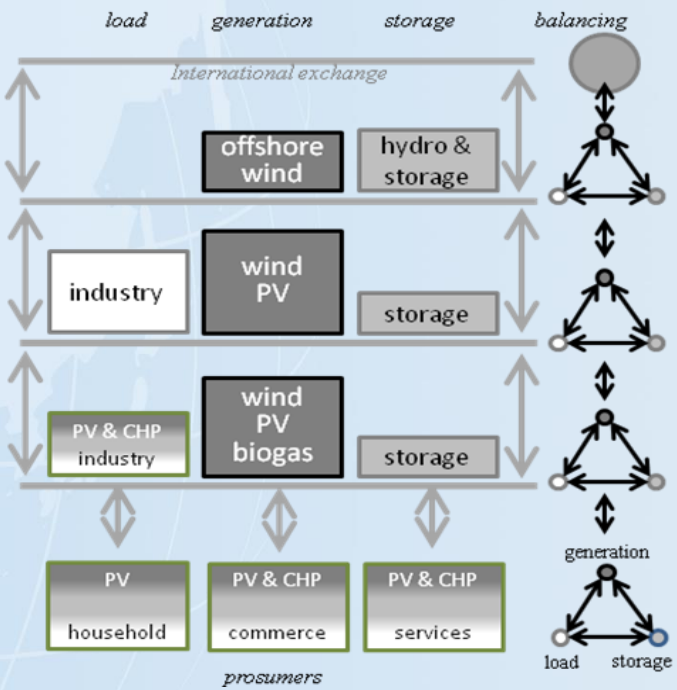
Prosumer Systems

Top-down supply system
(central control)

→

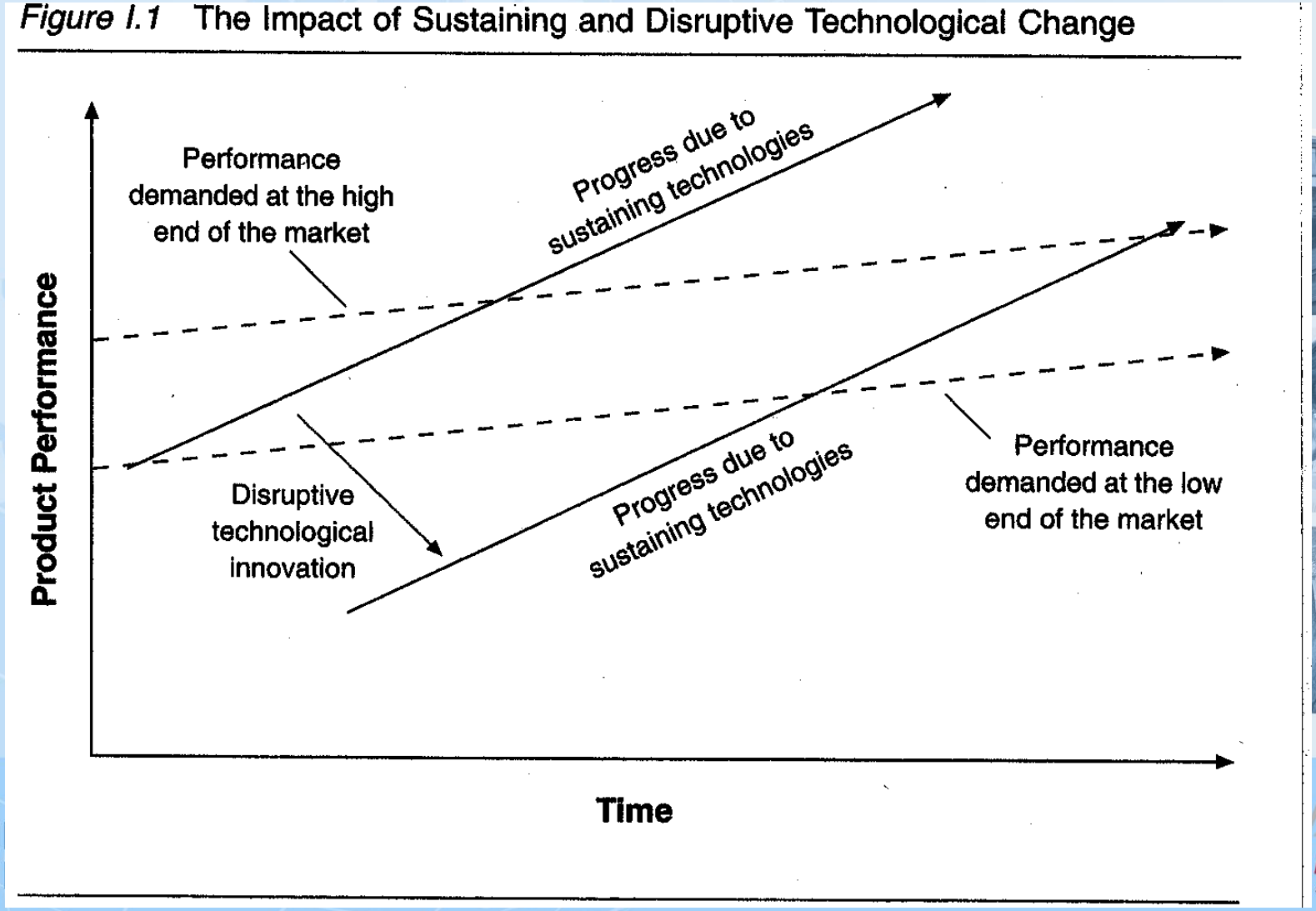
Multi-level exchange system
(subsidiarity, shared responsibility)





Sustaining (ST) versus disruptive technologies (DT)

Figure I.1 The Impact of Sustaining and Disruptive Technological Change

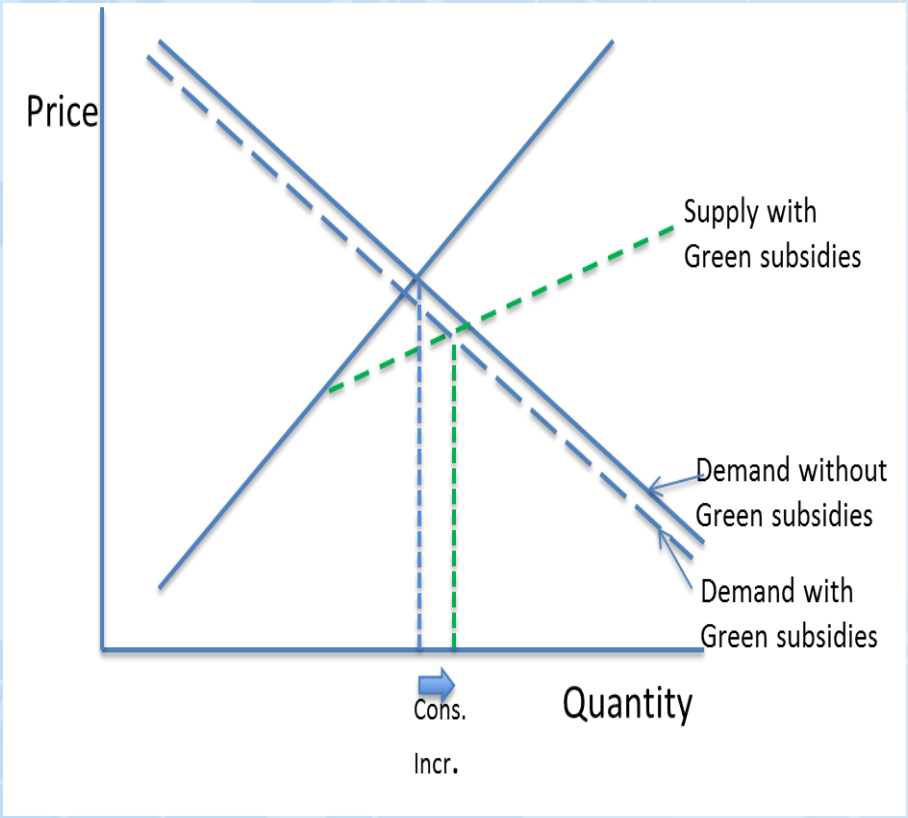


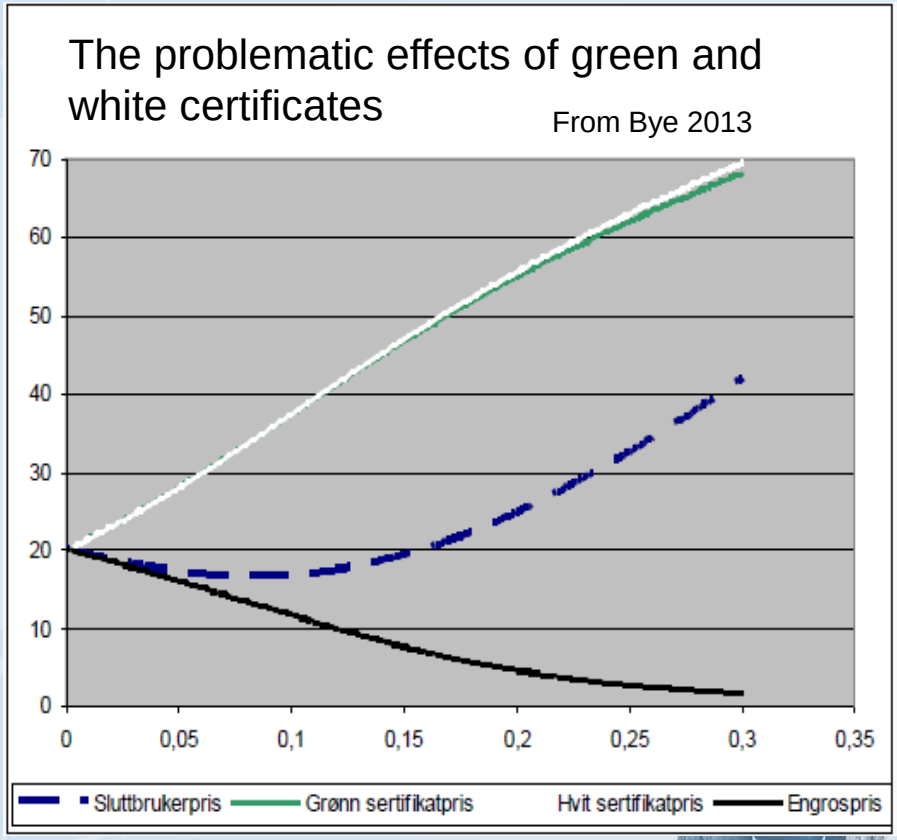
Develop robust strategies

- Be good at political as well as commercial strategising
- Be prepared for «normal» global production logic
- Take part in the new end-user dynamic – with appropriate organisational design!
  - Parallell to media - paper and digital – need to be in both

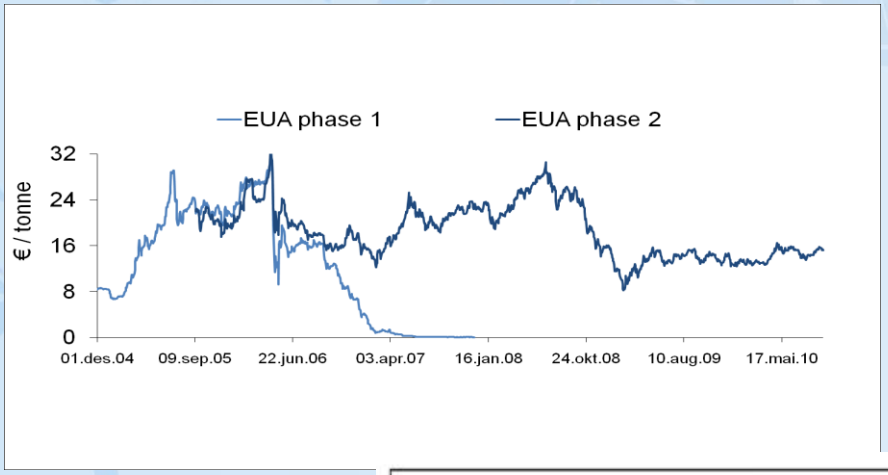
POLICY CHALLENGES

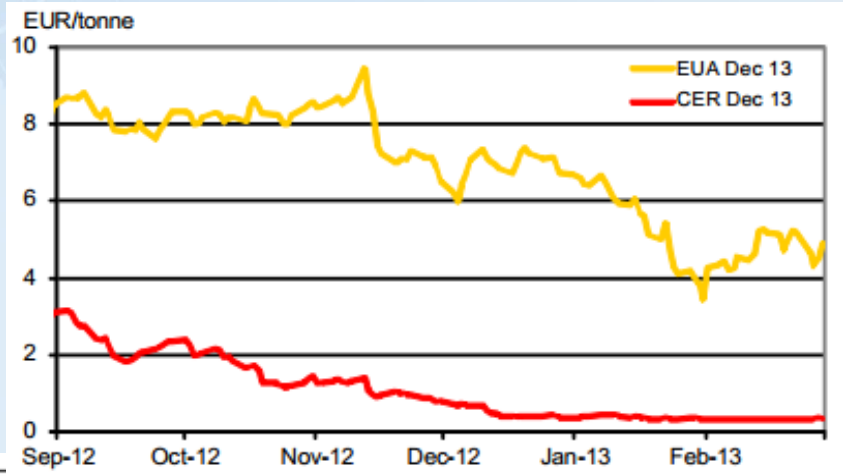
A Plea for Greening by Carbon Pricing

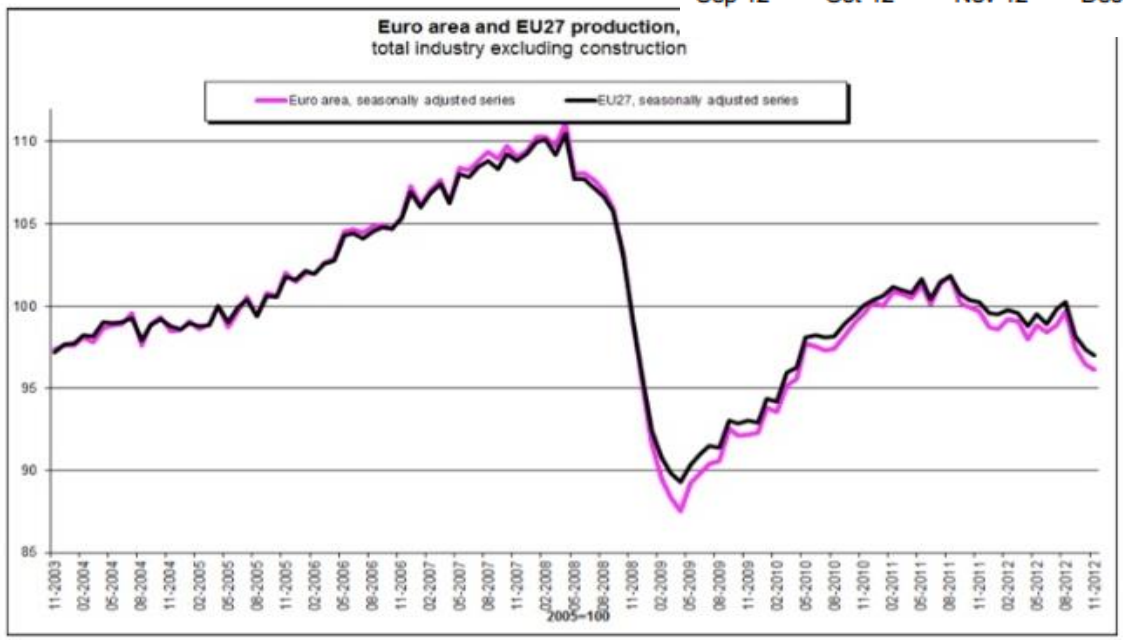




Can Carbon Pricing Realistically Drive Greening?







Source:Eurostat

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Economics and Politics

El-price

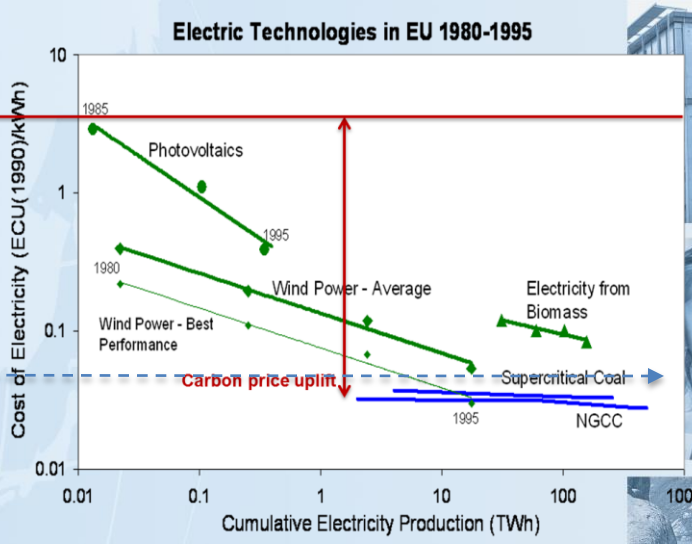
Price necessary to drive technology

Price acceptable to majority

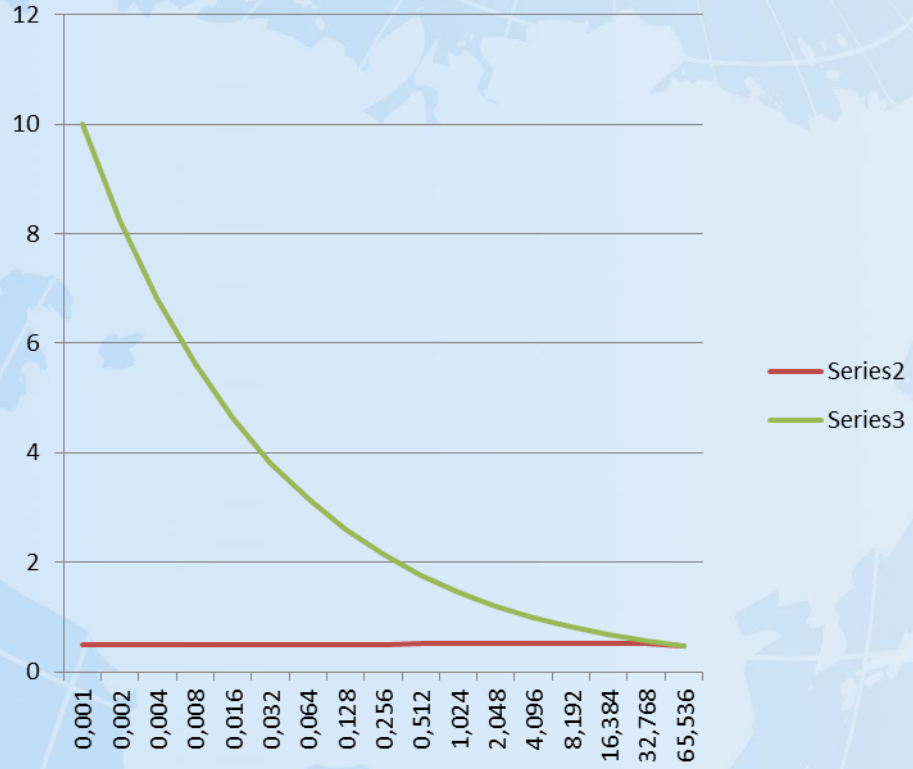
5%

50%

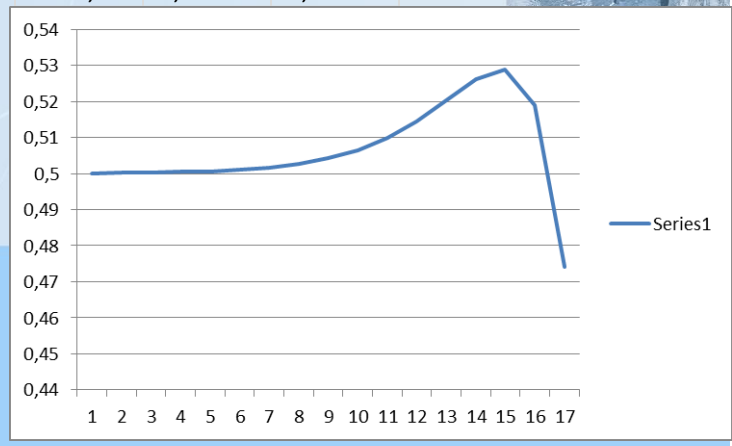
Electoral Acceptance



The learning effect



0,001	0,500095	10
0,002	0,500155	8,25
0,004	0,500252	6,80625
0,008	0,500409	5,615156
0,016	0,500661	4,632504
0,032	0,501063	3,821816
0,064	0,501698	3,152998
0,128	0,50269	2,601223
0,256	0,504214	2,146009
0,512	0,506505	1,770458
1,024	0,509837	1,460628
2,048	0,514439	1,205018
4,096	0,52024	0,99414
8,192	0,526228	0,820165
16,384	0,52894	0,676636
32,768	0,519079	0,558225
65,536	0,474137	0,460536



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Dumping Effects of Renewables

Dumping effect of renewables volume

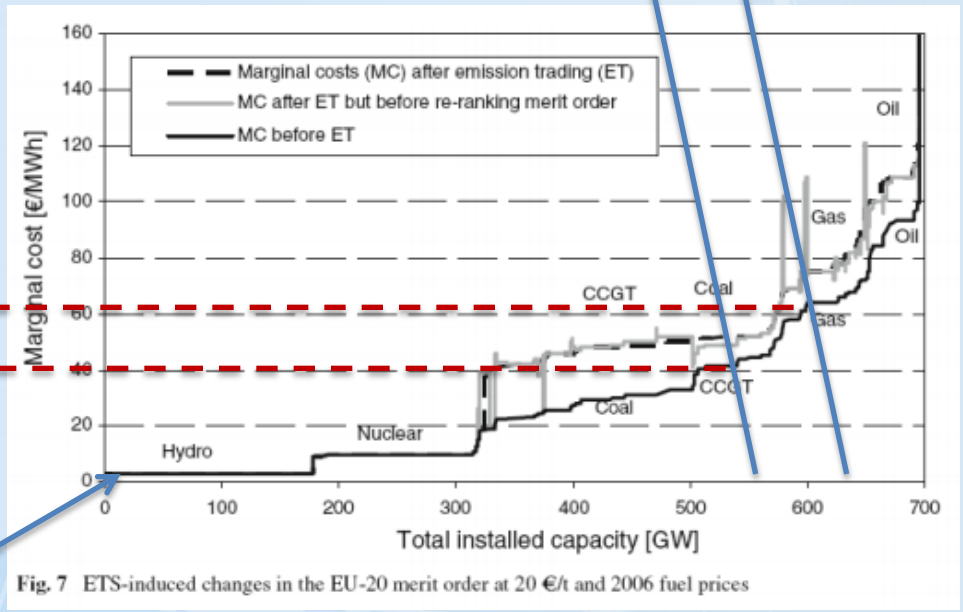


Fig. 7 ETS-induced changes in the EU-20 merit order at 20 €/t and 2006 fuel prices

Dumping effect of renewables

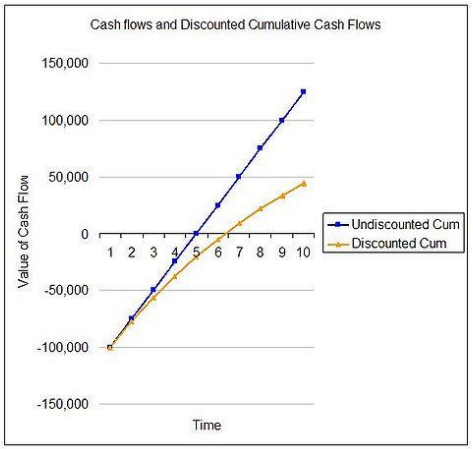
Input renewables
With very low operating costs

Static Efficiency: IEA Example

- Least cost solutions
- Rapid discounting of future

= basically business as usual

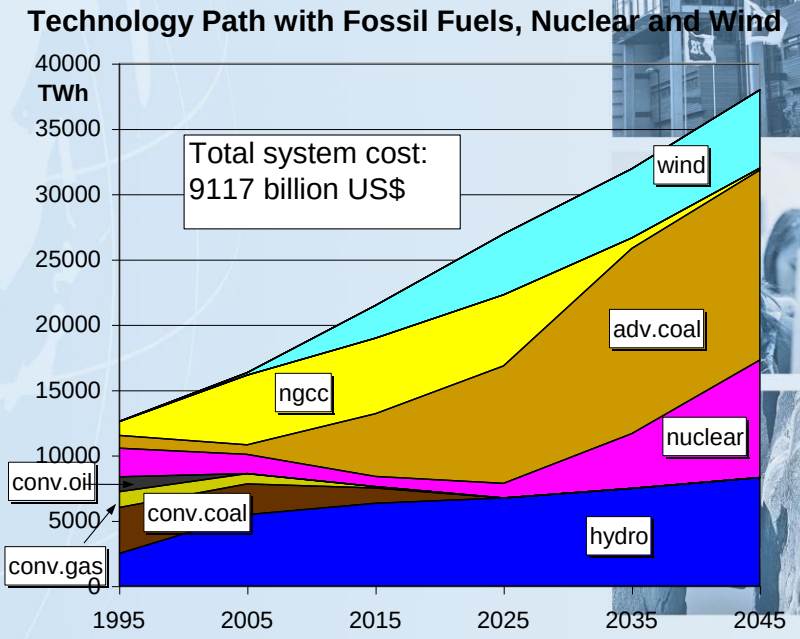
Year	Cashflow	Present Value
T=0	$\frac{-100,000}{(1+0.10)^0}$	-$100,000
T=1	$\frac{30,000-5,000}{(1+0.10)^1}$	$22,727
T=2	$\frac{30,000-5,000}{(1+0.10)^2}$	$20,661
T=3	$\frac{30,000-5,000}{(1+0.10)^3}$	$18,783
T=4	$\frac{30,000-5,000}{(1+0.10)^4}$	$17,075
T=5	$\frac{30,000-5,000}{(1+0.10)^5}$	$15,523
T=6	$\frac{30,000-5,000}{(1+0.10)^6}$	$14,112



Environment factored in as extra costs: "Burden sharing"

- **Energy projections based on least cost solutions going forward**

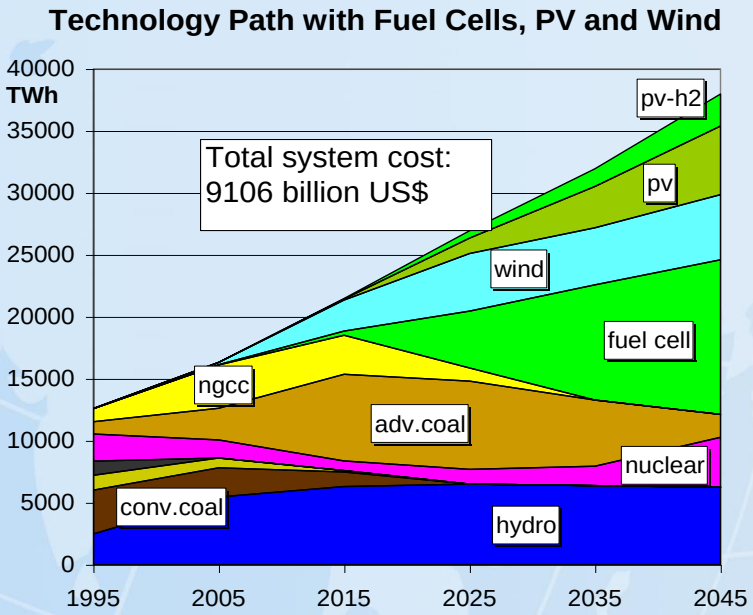
Scenario made by IEA 1997

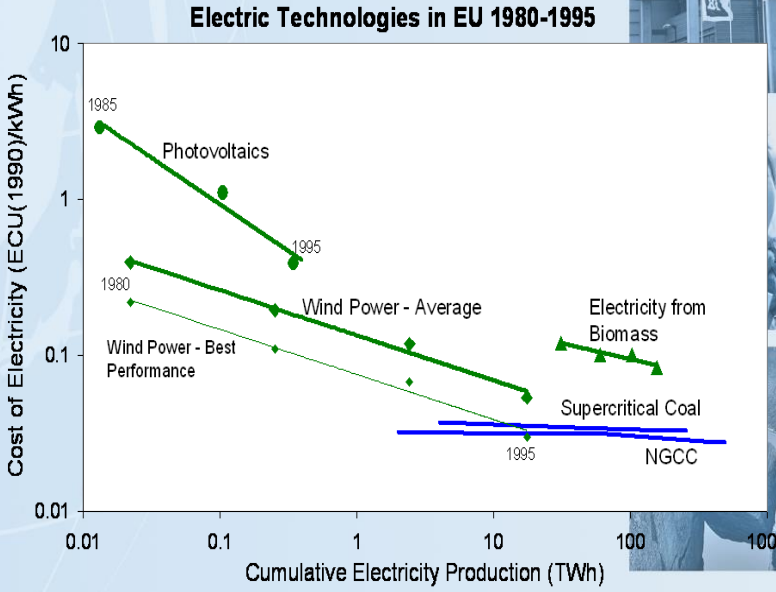


Dynamic Efficiency IEA Example

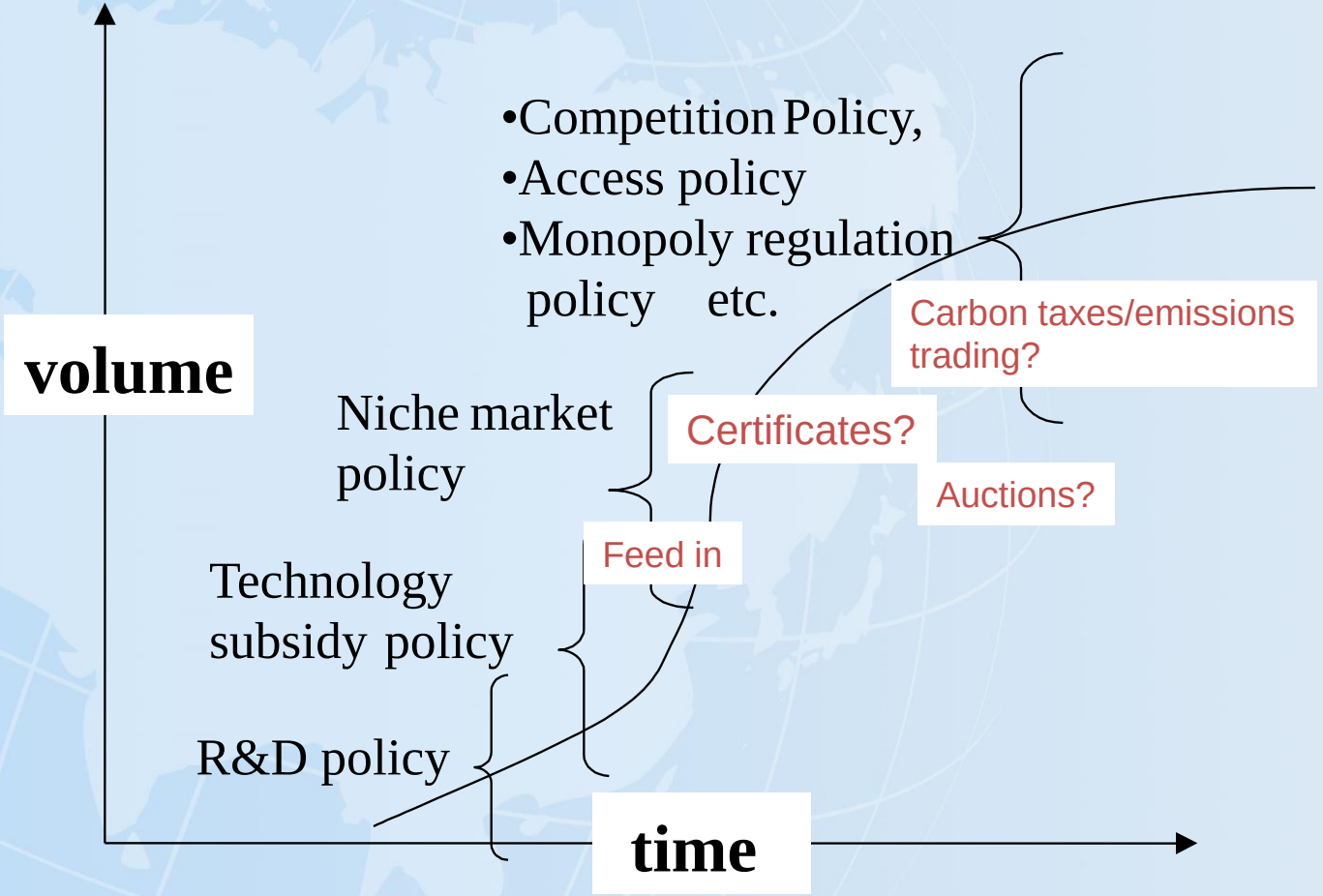
- Energy projections based on learning curves going forward
- Scenario made by IEA 1997

- **Learning curves for energy technologies**





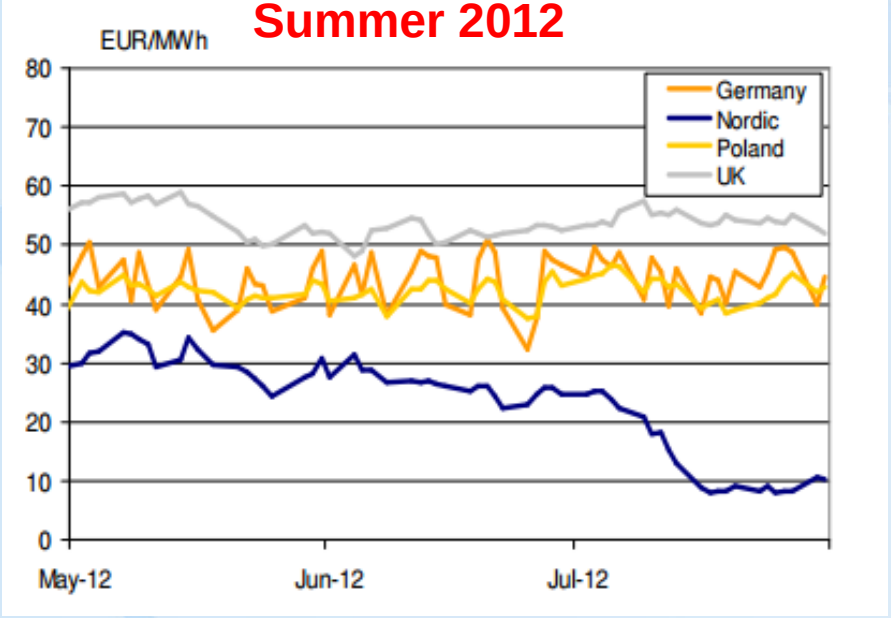
Policy as a Transition Tool

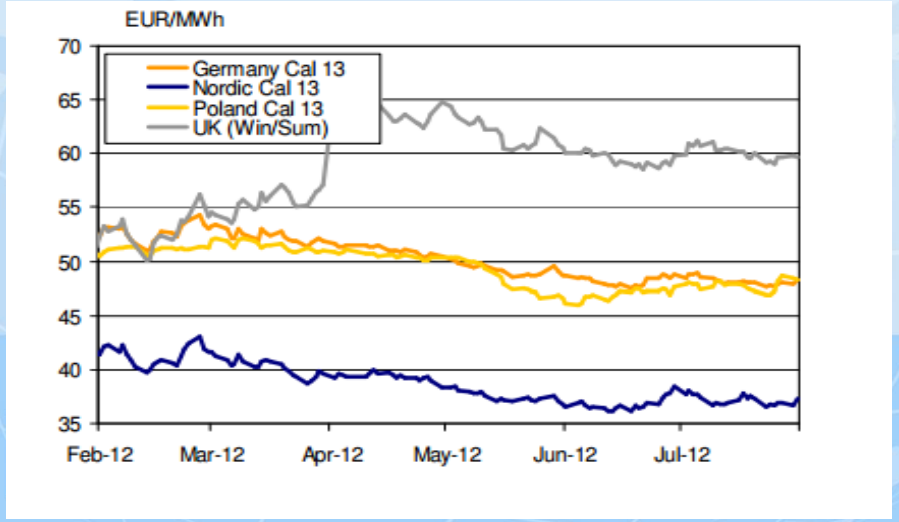


EURO CHALLENGES

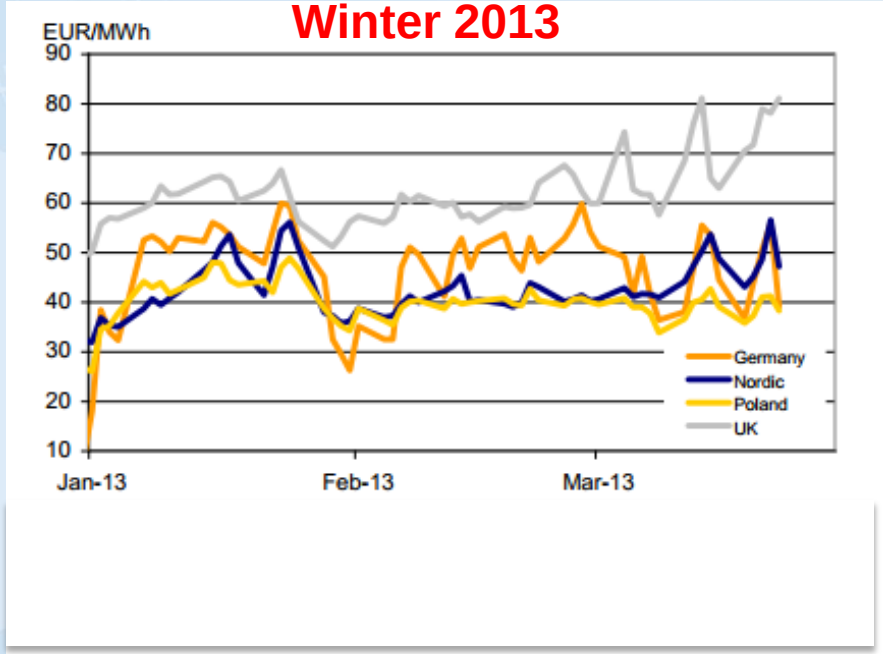
Regional or North European Markets?

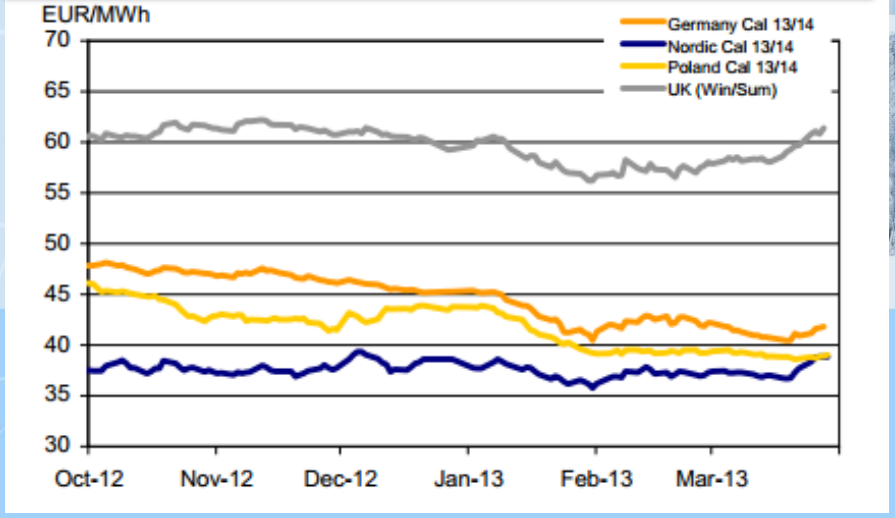
Summer 2012



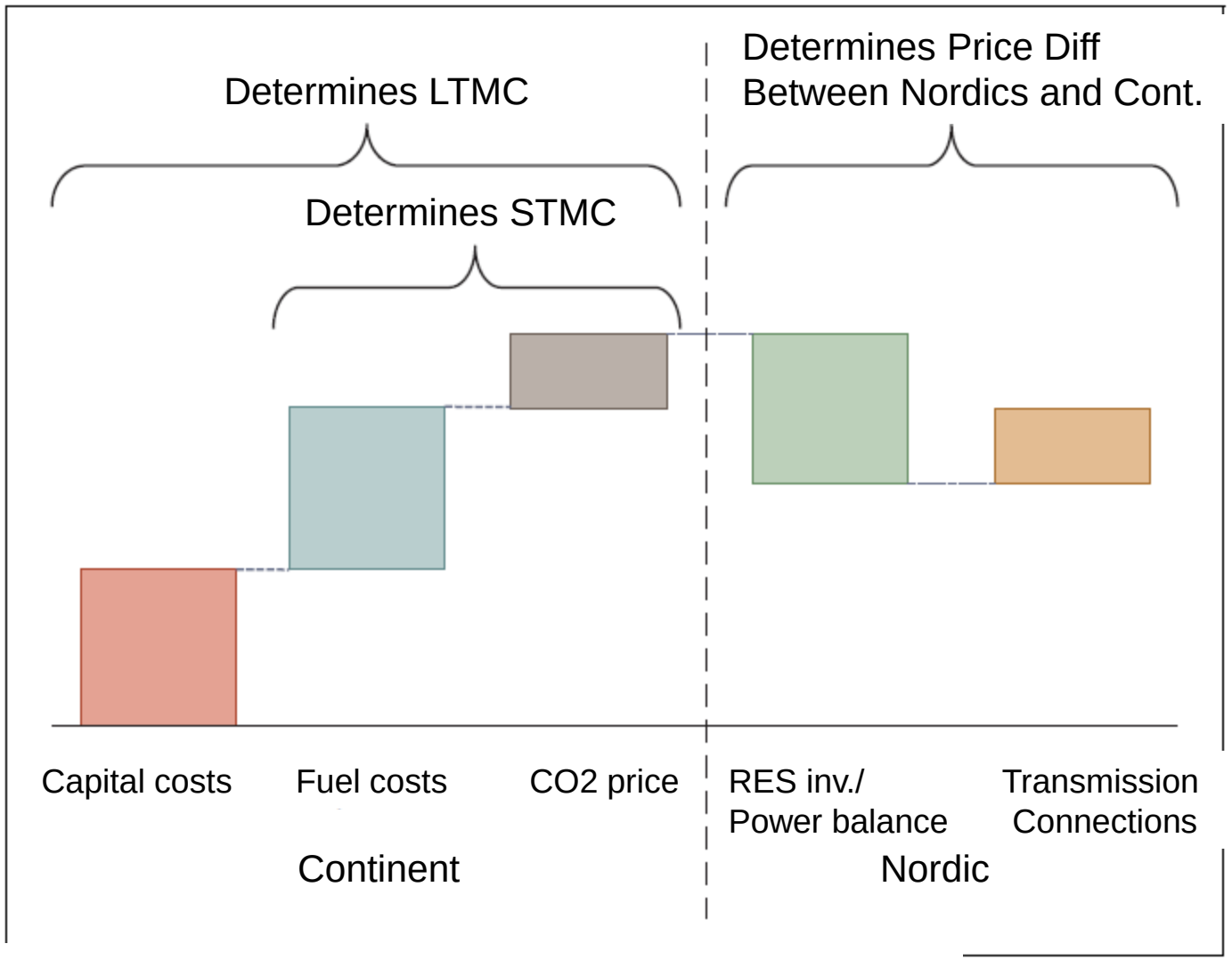


Winter 2013



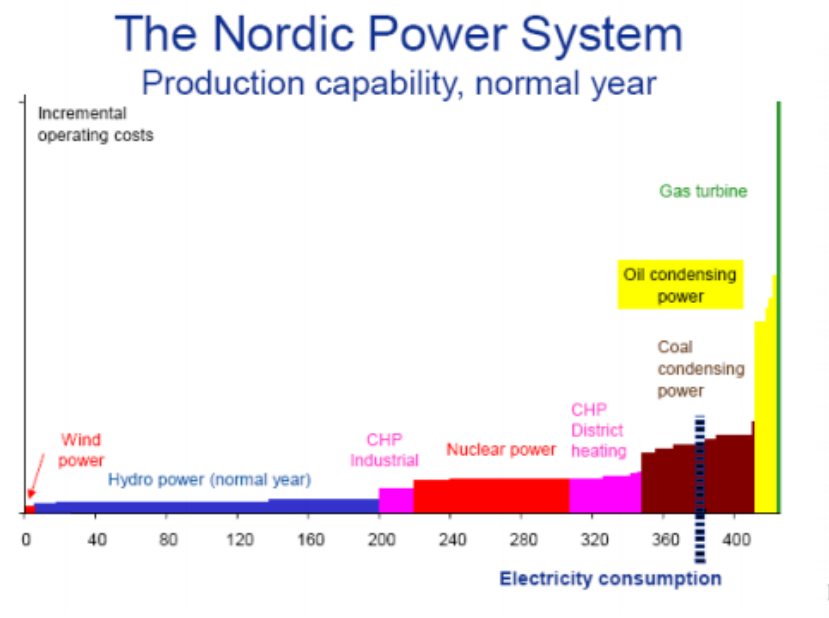


Factors determining prices



Factors determining el-prices, from NOU 2012: 9

When can we add up the merit order curve?



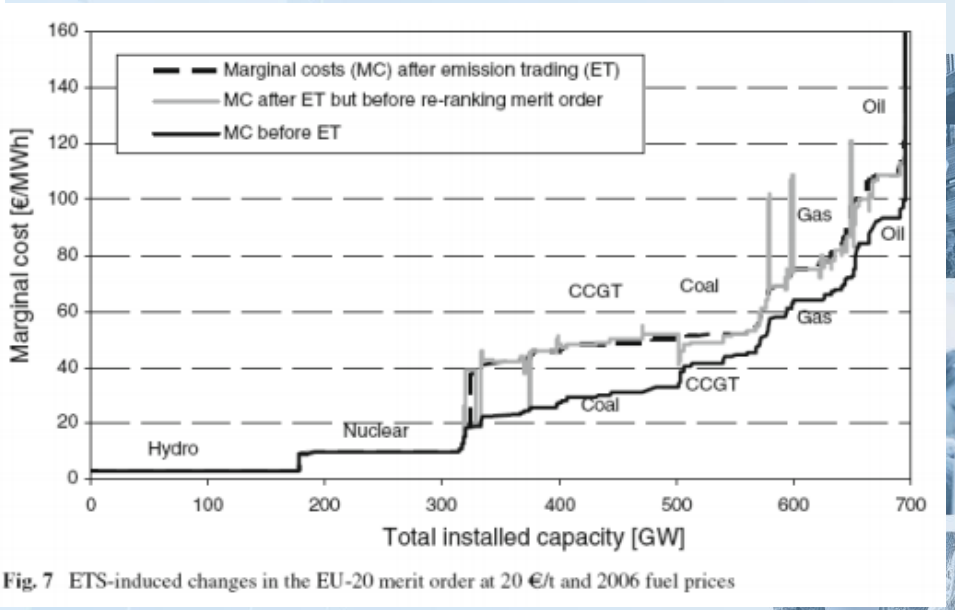
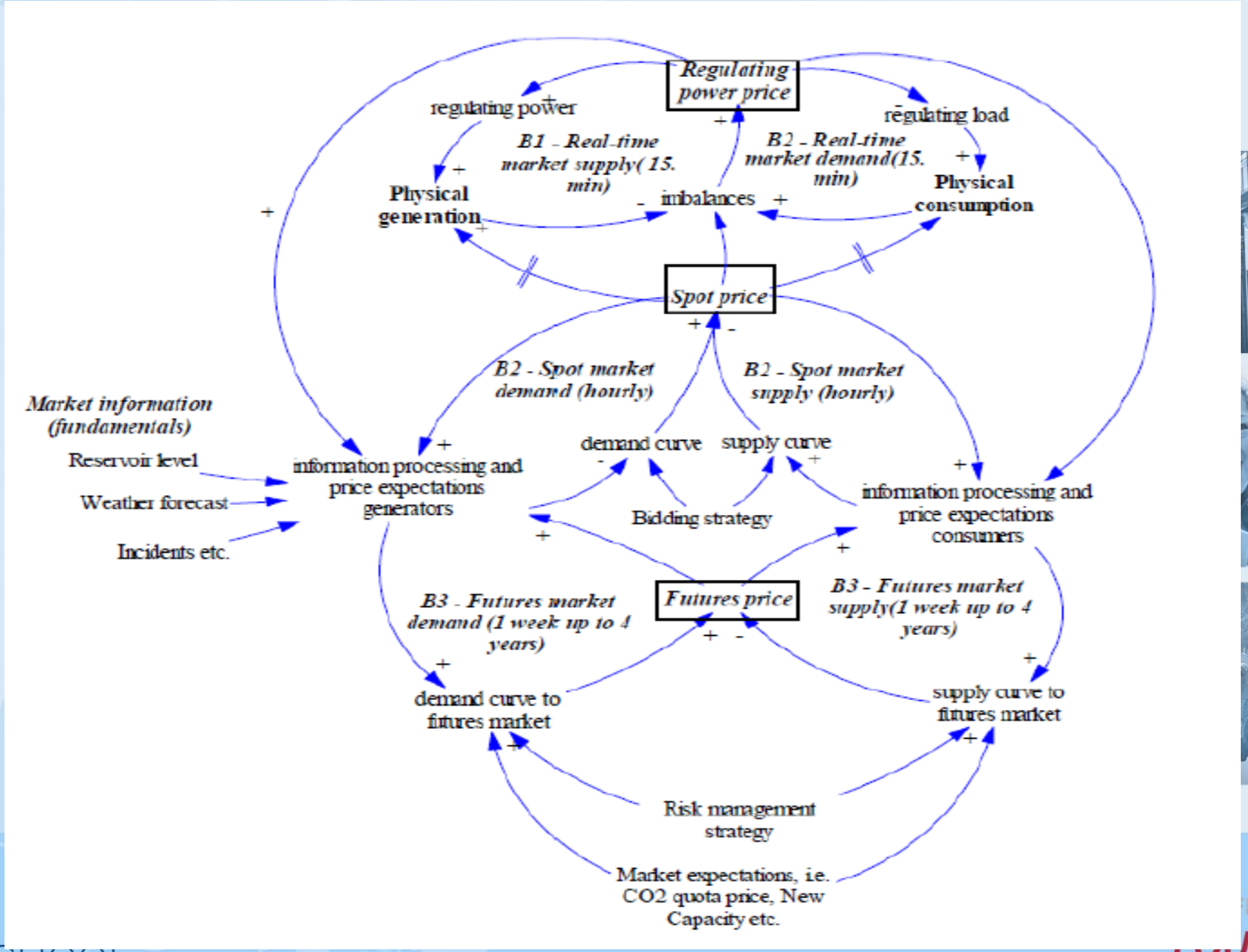


Fig. 7 ETS-induced changes in the EU-20 merit order at 20 €/t and 2006 fuel prices

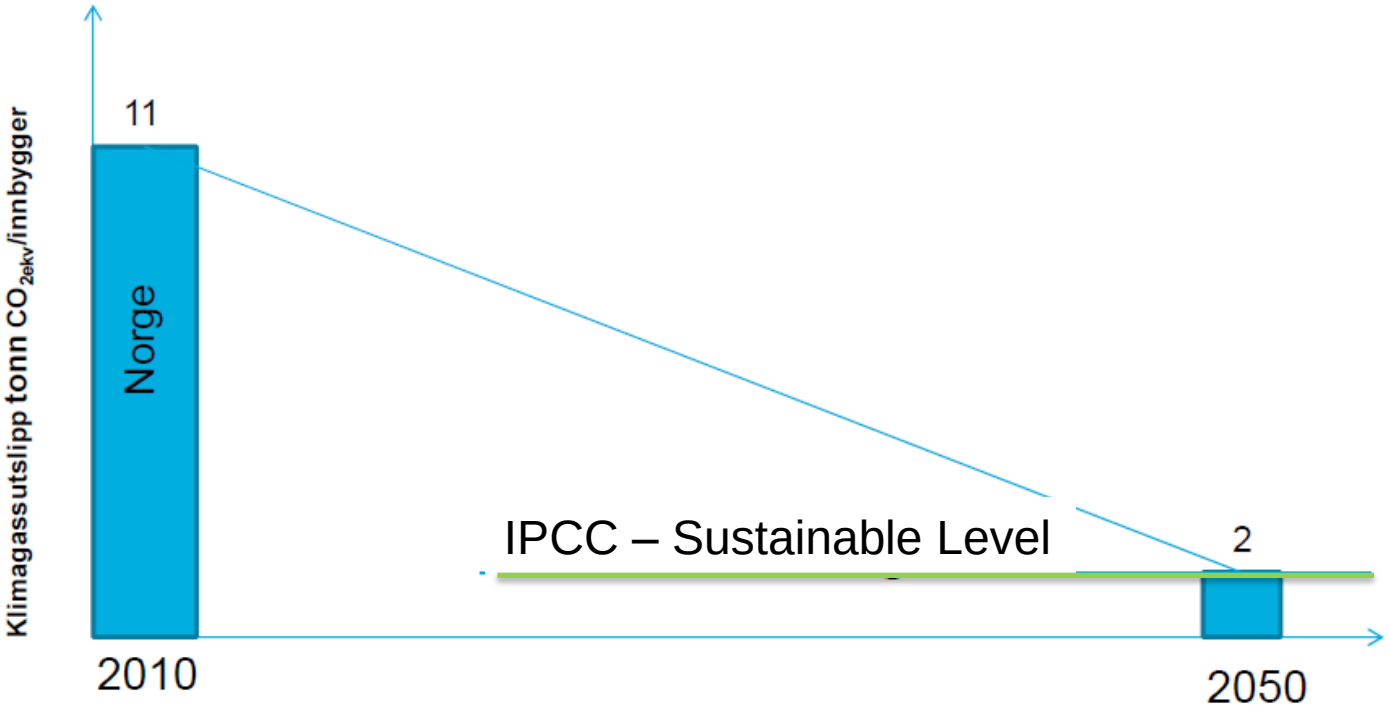
http://ec.europa.eu/competition/sectors/energy/impact_assessment_annexes_12_13.pdf

Grid Connections Nordics-Continental Europe

Causal loop diagram illustration of the various feedback processes in the Nord Pool market, including real-time, spot and futures market (Source: Klaus-Ole Vogstad)



A Tall Order for Petro-Norway



EnergiNorge