

ENVIRONMENTAL DIMENSION OF THE EEP III.

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Environmental dimension of EEP

- Climate change – EU aim to develop a low-carbon economy
- Measures primarily to reduce GHG emissions
 - EU ETS – covers 40% of EU emissions
 - individual targets of MS for the non-EU ETS sectors (housing, agriculture, transport, waste) – cover 60% of EU emissions
 - CCS
- Measures to transform the energy sectors
 - RES
 - Energy Efficiency
 - Research and development, new technologies

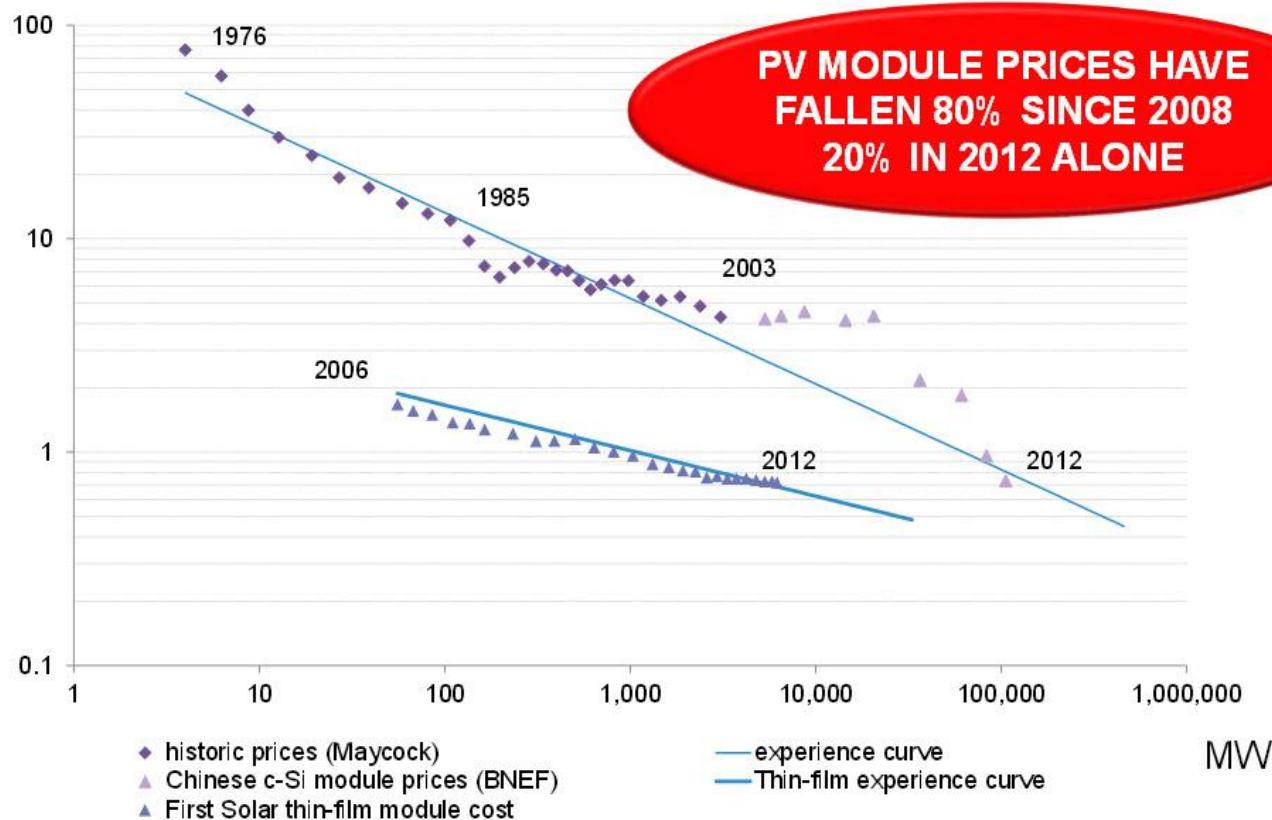
Deployment of RES

- Why should RES be part of an any energy mix?
- Why should RES be supported (subsidized)?

Deployment of RES

- Why should RES be supported (subsidized)?
 - Experience curve
 - LCOE

PV EXPERIENCE CURVE, 1976-2012
2012 \$/W



Note: Prices inflation indexed to US PPI.

Source: Paul Maycock, Bloomberg New Energy Finance

Deployment of RES

- 1) Inception phase – creates a climate allowing investment in early projects
- 2) Take off phase - managing support policy costs
- 3) Consolidation phase – to integrate RES in the system (RES can no longer be considered in isolation due to their impacts across the whole electricity system that needs to accommodate them).

Inception phase

- ❑ 1997 – indicative target of 12 % RES in gross domestic consumption of the EU by 2010
- ❑ 2001 – Directive 2001/77/ES – indicative targets for individual states to 2010
- ❑ 2009 – Directive 2009/28/ES – aim 20 % by 2020, 10 % in transport sector (Energy and climate package). With indicative targets for 2013.

- ❑ = to save 600 – 900 million tons of CO₂/y, 200-300 million tons of oil/y, lowering of import dependency, industry....

Inception phase

Member State	Share of renewables in 2005	Share required by 2020
Austria	23.3%	34%
Belgium	2.2%	13%
Bulgaria	9.4%	16%
Cyprus	2.9%	13%
Czech Republic	6.1%	13%
Denmark	17%	30%
Estonia	18%	25%
Finland	28.5%	38%
France	10.3%	23%
Germany	5.8%	18%
Greece	6.9%	18%
Hungary	4.3%	13%
Ireland	3.1%	16%
Italy	5.2%	17%
Latvia	32.6%	40%
Lithuania	15%	23%
Luxembourg	0.9%	11%
Malta	0%	10%
The Netherlands	2.4%	14%
Poland	7.2%	15%
Portugal	20.5%	31%
Romania	17.8%	24%
Slovak Republic	6.7%	14%
Slovenia	16%	25%
Spain	8.7%	20%
Sweden	39.8%	49%
United Kingdom	1.3%	15%

Source: thinkcarbon.wordpress.com

Take off phase: subsidies

Feed in tariff

- 21 EU states, provides a fixed rate of subsidy for fixed period. Cover all a producer's costs and profit, essentially replace the market.
- Instrument of choice for big RES players (Germany, Spain). Basic rule is that government sets the price, market (investor response) sets the quantity, but many recent amendments to control costs.
 - = Very successful in triggering large deployment of RES, but at a high cost.
 - Could be more cost-effective – greater security around income to investors, therefore reducing financial costs.

Take off phase: subsidies

Feed in tariff

- They could be tailored (and therefore support) different technologies.
- But:
 - ▣ difficulty of setting the right price – too high and money is wasted, too low and no deployment. Once the price is set, it is hard to make radical changes without breaking contracts
 - ▣ they insulate the RES producer from the market (a limited compatibility with internal energy market)
- Grid priority - the grid must take RES electricity first.

Take off phase

- „A solar RES case“ – Spain, Italy, Czech Republic
- Generous FiT tariffs in place, volumes of deployment not controlled or capped and support mechanisms not sufficiently responsive to rapidly falling costs.
- PV developers earn high rates of return on their capital – overheated markets and rapid rises in support costs.
- Policy makers react by dramatically reducing tariffs and introducing retrospective measures to recouple some of the costs – detrimental impact on investor confidence in the government.
- Also impact on the other RES in given country.

Czech Republic

Installed capacity of PV

Source: ERÚ

Year	Installed capacity (in MWe)
2006	0,2
2007	3,4
2008	39,5
2009	464,6
2010	1959,1
2011	1971
2012	2086

Estimated costs in Czech Republic – 1,76 bn. euro in 2013.

Take off phase: subsidies

Quota obligations

- Power plant operators receive certificates for their green energy to sell to the actors (distributors) obliged to fulfil the quota obligations.
- Selling the certificate provides an additional income on top of the market price of electricity.
- Quota obligations with tradeable certificates. Here government sets the quantity, the market the price.
- Compatibility with market principles, competitive price determination.

Take off phase: subsidies

- High risk premiums – increase policy costs.
- Technology neutral way – only the most cost-effective technologies supported (windfall profits for the lower cost technologies).

= Quota systems with tradable certificates tend to be cheaper, but favour mature technologies like onshore wind and biomass.

Take off phase

Feed-in-premium (green bonuses)

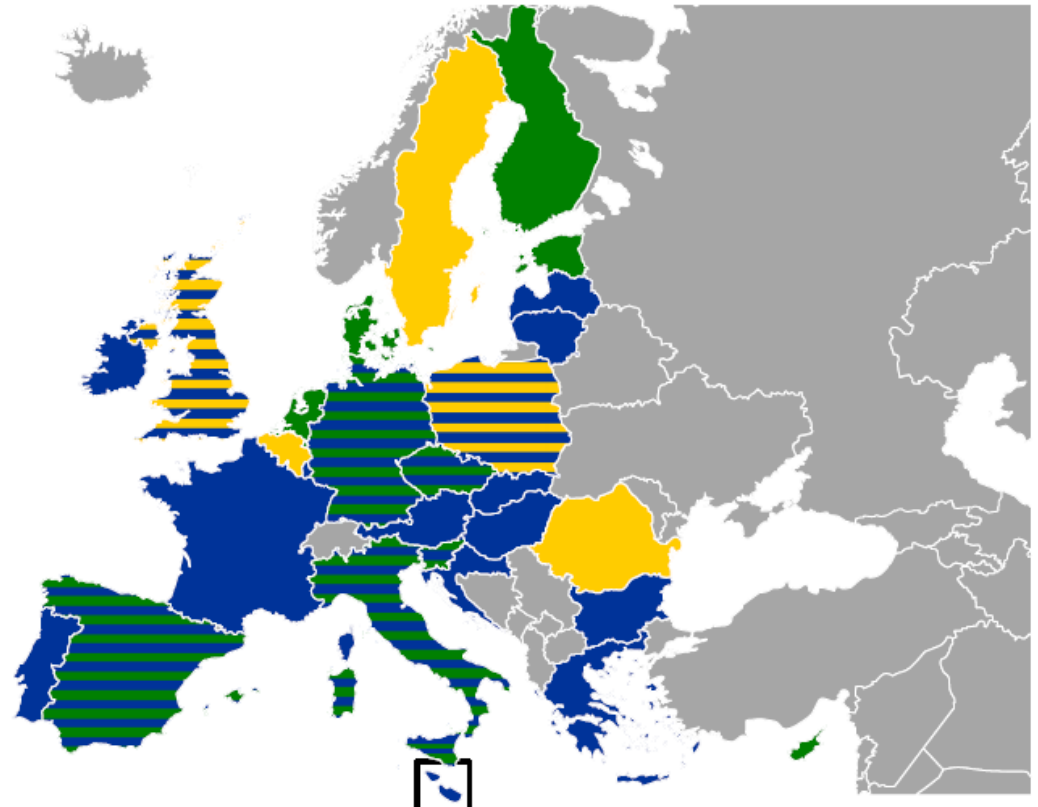
- Plant operators have to sell the electricity at the market
- To receive a fixed payment for each unit of electricity generated independent of the market price of electricity
- More market oriented, higher risk for producer (compensated by the level of the premium)
- Used sporadically, as a second option to supplement FiTs

Subsidy schemes

Renewable support schemes in the European Union, 2013

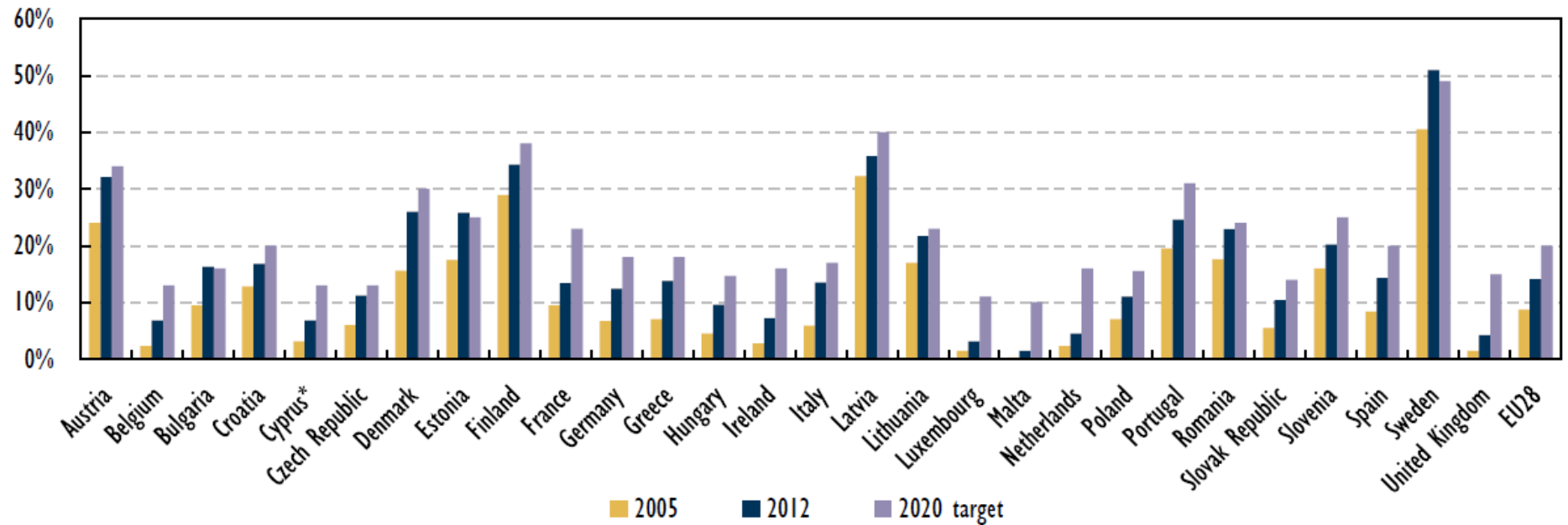


- Feed-in tariff
- Premium
- Quota



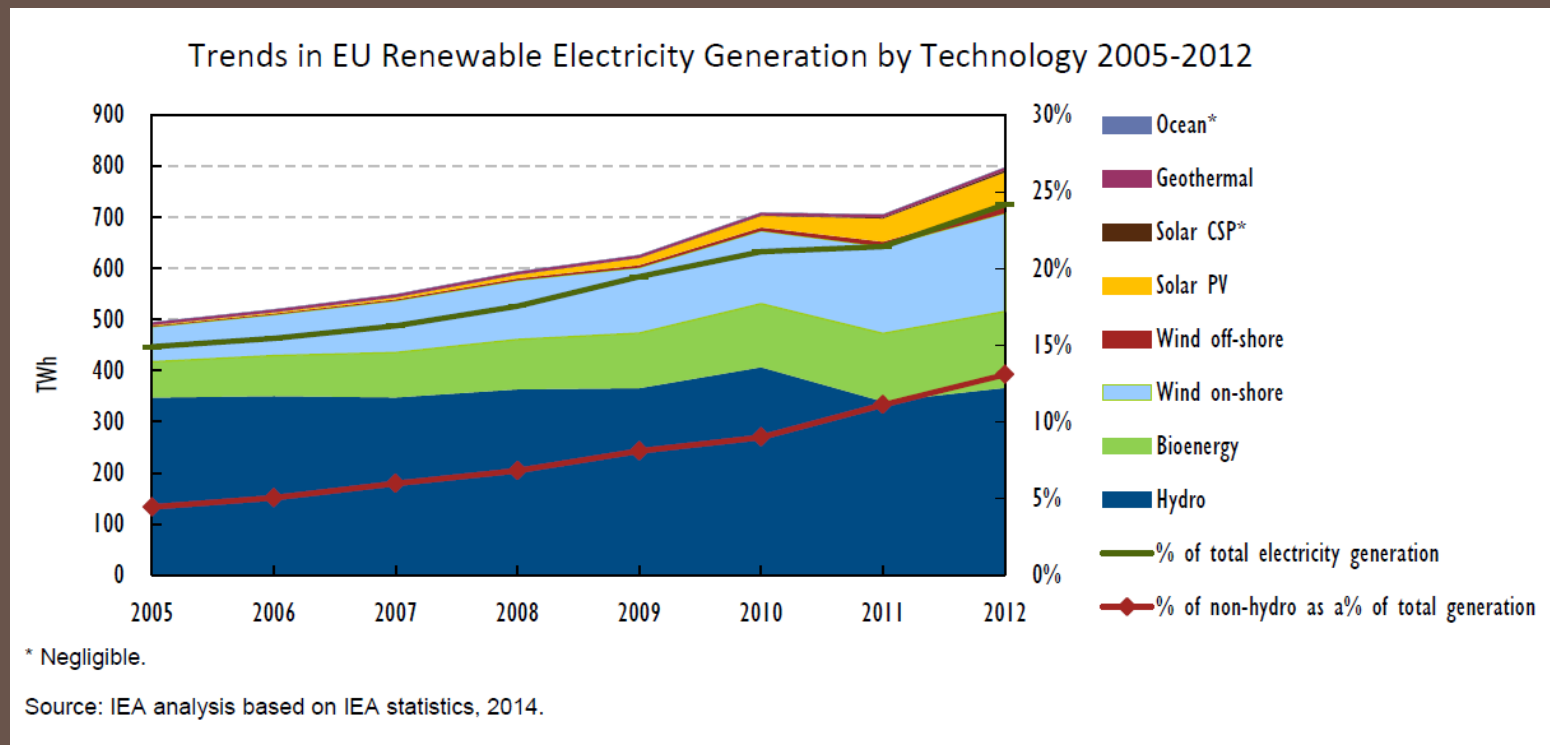
Source: EU submission, 2013.

Percentage of Renewables in Final Energy Consumption in 2005 and 2012 and 2020 Target



RES in EU's electricity generation

- Growth from 14,9% to 26,1% between 2005 and 2013. Due to the increase in non-hydro RES (4,4% - 14,5%).
- 17 MS producing more than 20% electricity from RES, 6 MS more than 50%.

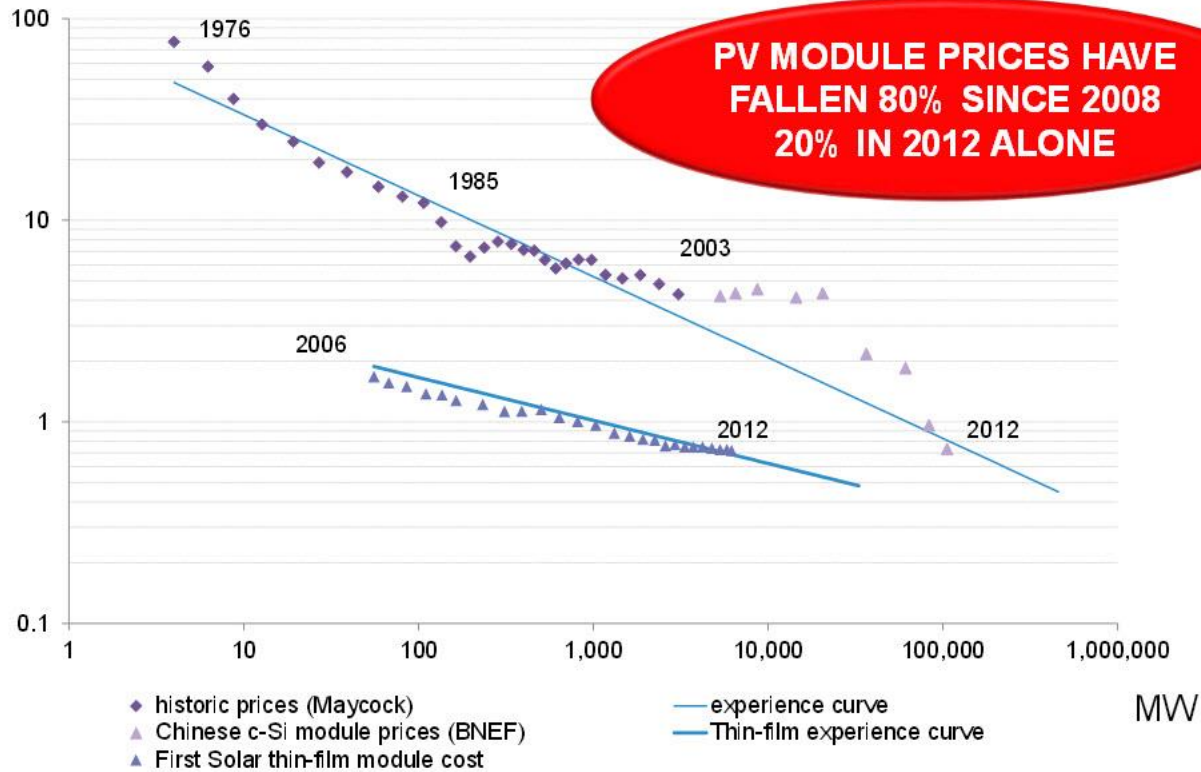


Results so far...

- Final consumption: electricity 26,1%, heat 15,6%, transport 5,2%. (*eurostat*). Overall final consumption 14,1% in 2012. (from 8,7% in 2005).
 - ▣ Overall investments in RES around 40 bn. euro annually.
 - ▣ Employment in RES related sectors – 1,5 million in 2010.
 - ▣ Reduction of costs of key PV and wind technology.
- 2050 roadmap to a low-carbon economy envisage a strong growth in RES: 55% - 97% in 2050.
- 2030 targets: common EU target of 27%, not individual targets.

Results so far...

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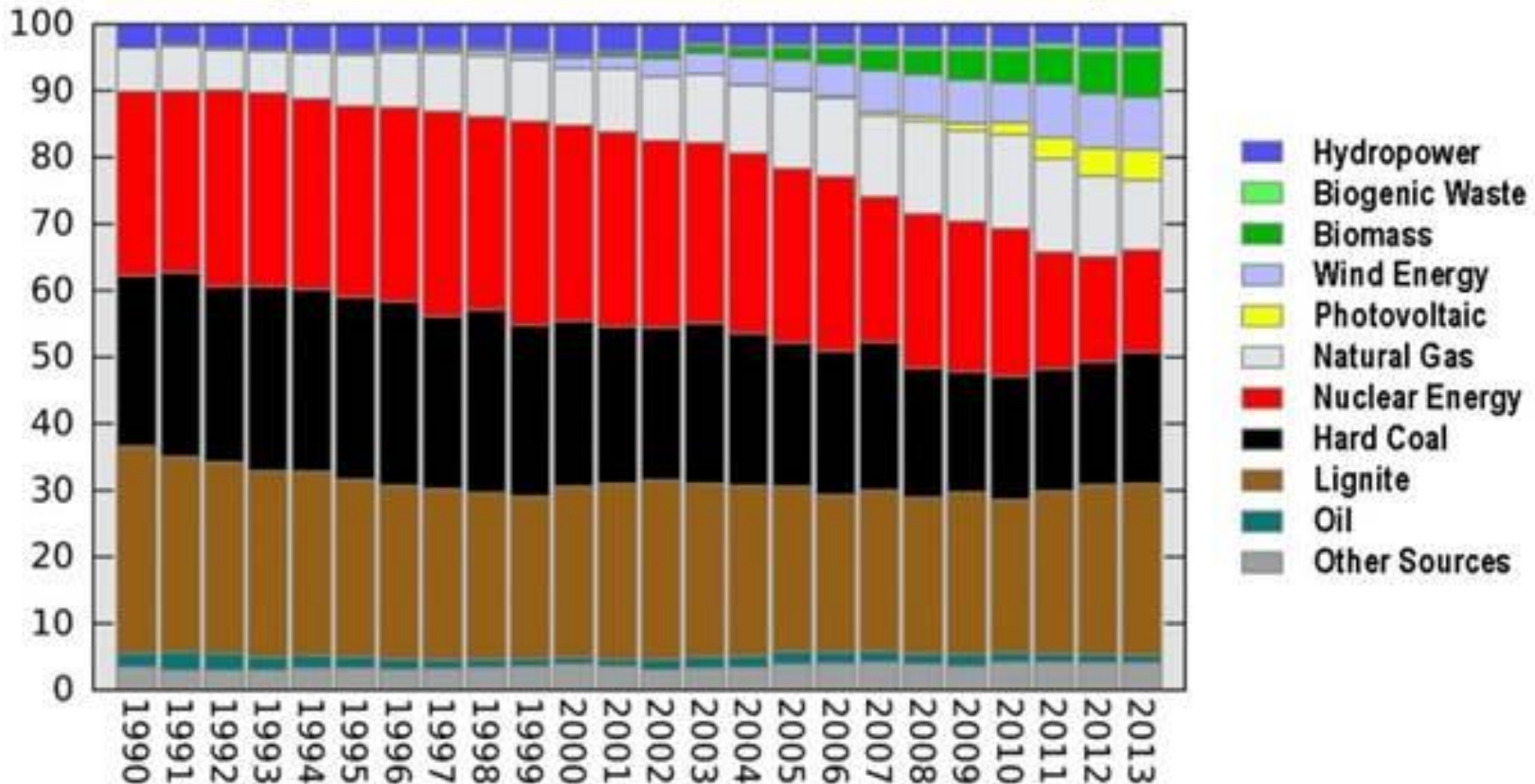
Consolidation phase – example of Germany

- Die Energiewende – to limit the fossil fuels in favour of RES, later on the phase out of nuclear energy added.

	2011	2020	2030	2040	2050
Greenhouse Gas Emissions					
GHG (against 1990)	-26.4 %	-40%	-55%	-70%	-80 to -95%
Efficiency					
primary energy use (against 2008)	-6%	-20%	-	-	-50%
electricity demand (against 2008)	-2.1%	-10%	-	-	-25%
heat in residential sector	n.a.	-20%	-	-	-
energy use in transport sector (against 2005)	-0.5%	-10%	-	-	-40%
Renewable Energy					
share in electricity consumption	20.3%	≥ 35%	≥ 50%	≥ 65%	≥ 80%
share in final energy use	12.1%	18%	30%	45%	60%

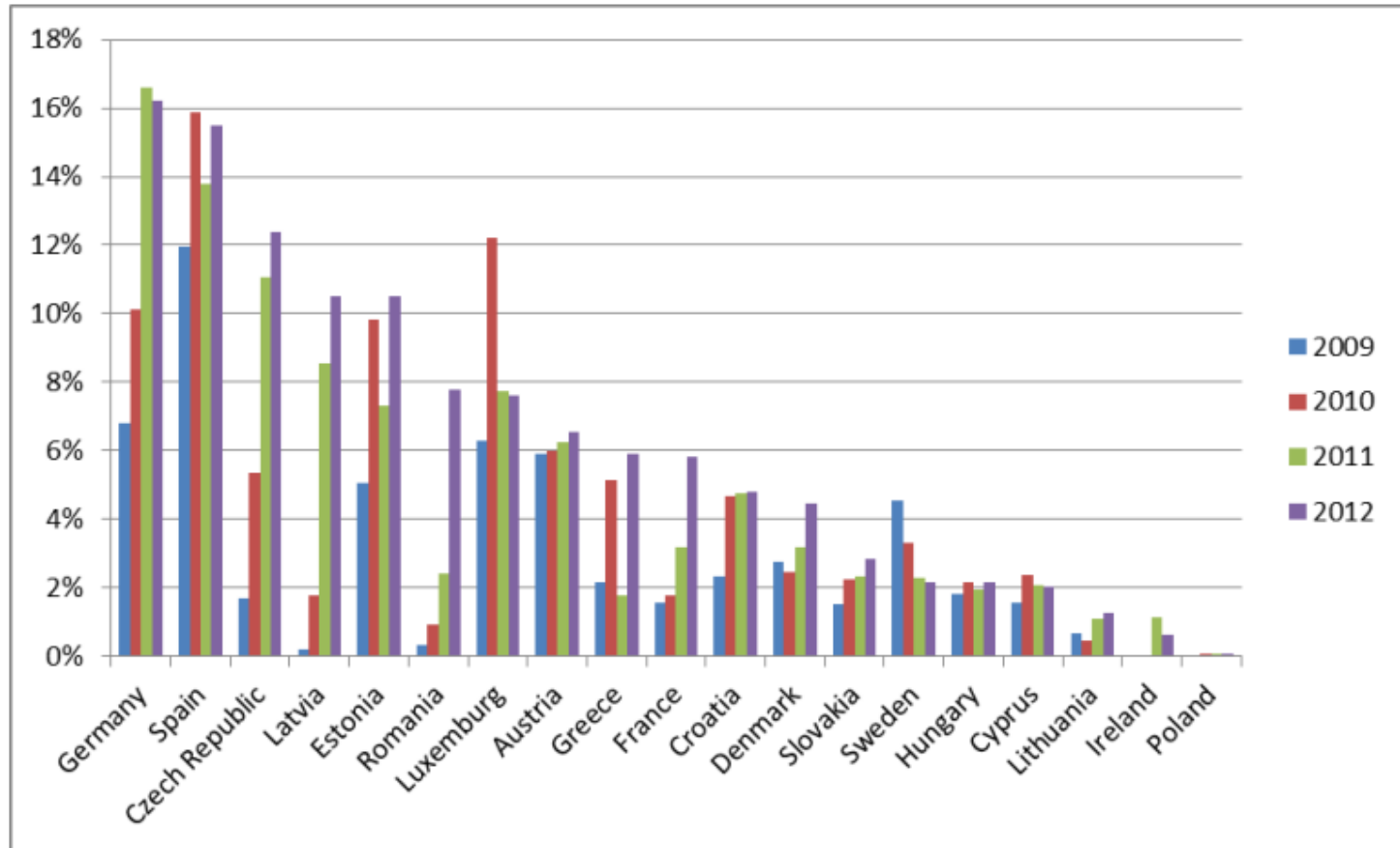
Consolidation phase – example of Germany

Percentage of Net Electricity Generation by Source in Germany



1st problem – cost of subsidies

Evolution of the share of RES-E levies in the electricity price for households in selected EU countries (2009-2012)

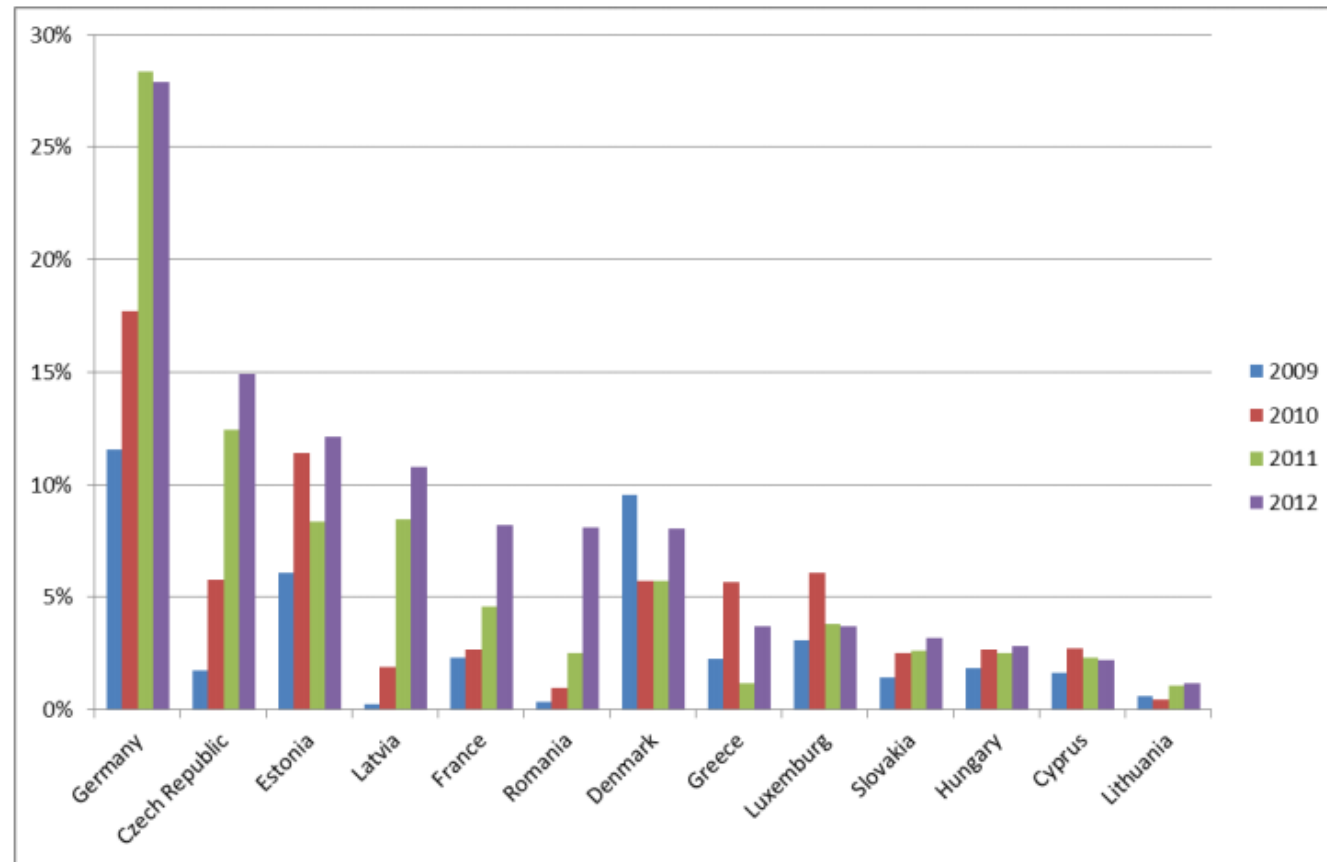


Note: Only states with data for all the years in the period 2009-2012 included. Calculated as % of price for consumers with annual consumption between 2500 and 5000 kWh (Eurostat consumption band DC), excluding VAT.

Source: Commission services calculations based on Eurostat and Member State data

1st problem – cost of subsidies

Evolution of the share of RES-E levies in the electricity price for industrial consumers in selected EU countries (2009-2012)



Note: Only states with data for all the years in the period 2009-2012 included. Calculated as % of price for consumers with annual consumption between 500 and 2000 MWh (Eurostat consumption band IC), excluding VAT and other recoverable taxes.

Source: Commission services calculations based on Eurostat and Member State data

1st problem – cost of subsidies

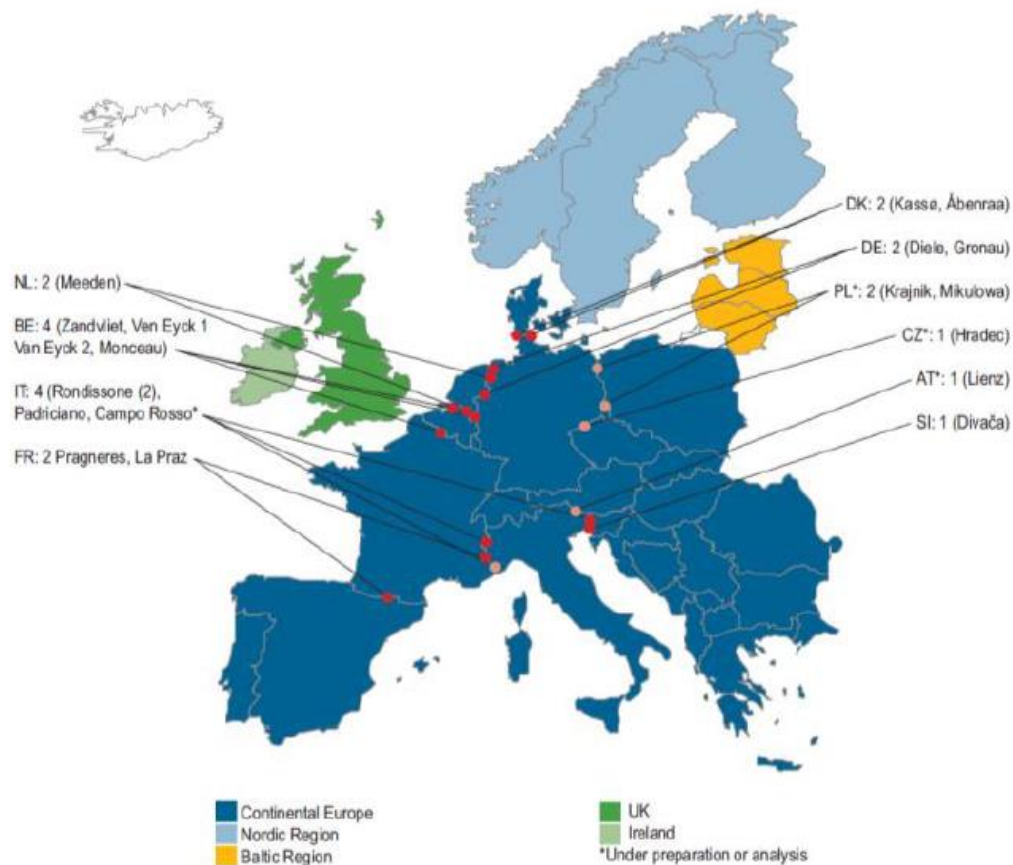
- Sigmar Gabriel, federal minister for economic affairs and energy: *“we have reached the limit of what we can ask of our economy”*.
- In 2013 German consumers paid €21,8 bn in RES subsidies.
- FiT for new installations are to be reduced: from 17 to 12 cents/kWh (for onshore wind power to maximally 9 cents/kWh).
- Practice of excluding large corporations from burden sharing is to be restricted to operations exposed to foreign competition.
- **But** – first installations (in favourable nature conditions and receptive business environment) in Europe and USA competitive without subsidies.

2nd problem – grid expansion

- To redistribute the renewable energy from the wind and solar farms in/at the Nord Sea, about 2600km (4600km) of grid expansion need to be realized.
- In the beginning of 2014 – 322km completed – protests from regions ensuing landscape degradation with no local economic benefits.
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2nd problem – grid expansion

Phase-shifting transformers installed and planned in the European Union at a selection of borders (as of June 2012)



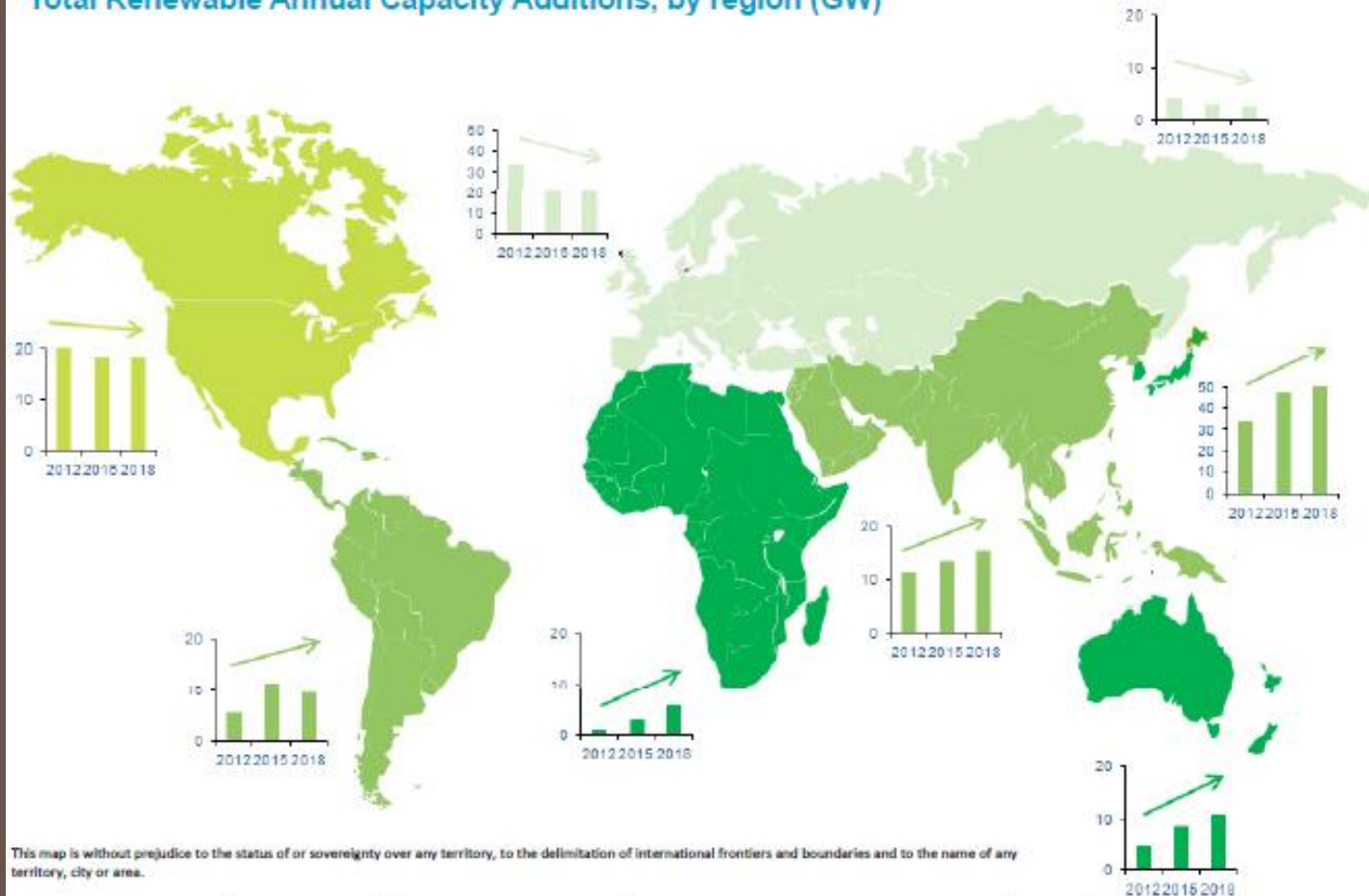
Source: ACER/CEER (2012).

3rd problem – unreliability of RES

- Common interconnected internal market
- Back-up capacities of conventional sources
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Renewable power spreading out everywhere

Total Renewable Annual Capacity Additions, by region (GW)



■ Emerging markets more than compensate for slowing growth and volatility in markets such as Europe and the US