Energy Union: Compatibility of adopted measures and instruments

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Energy Union

- **Energy Union: affordable (competitive), secure, sustainable energy for every European**
  - **Solidarity clause** (Lessen energy dependency within Europe, and reduce security of supply problems)
  - **Energy flows, as if it were a Fifth freedom** (free flow of energy involving energy unbundling, independence of regulators, redesigning electricity markets, removing environmentally harmful subsidies).
  - **Energy efficiency first** (promote competition)
  - **Transition to a low-carbon society that is built to last** (transition to non-fossil energy, promoting EU technological leadership)

Economic principles

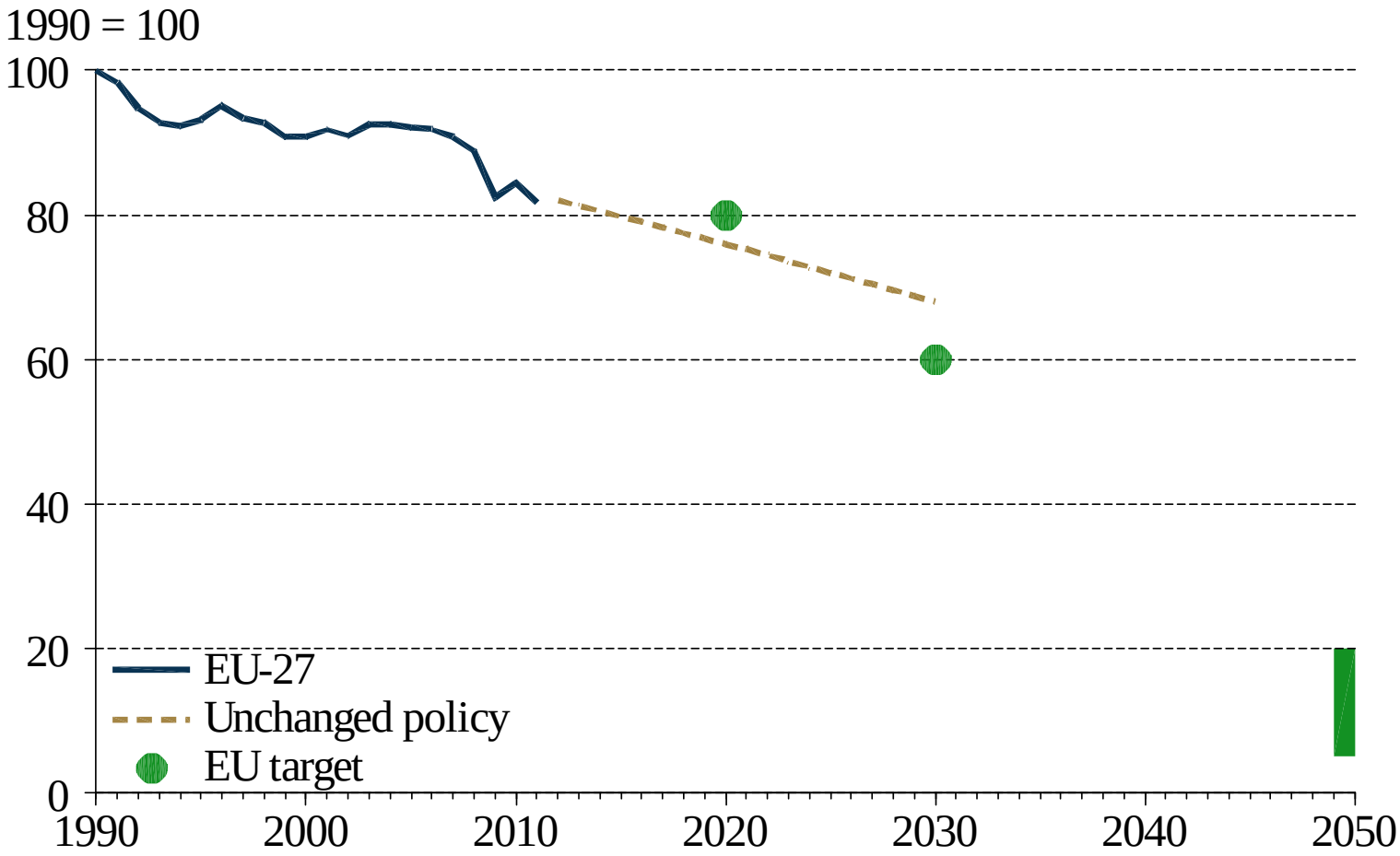
- Organize economic activity so as to meet individual needs without wasting resources (achieve targets at least cost to society)
  - Organize markets in a competitive way (reap gains from comparative advantages and from trade)
  - Regulate for market failures
    - Negative external effects (e.g. climate change due to green house gas emission)
    - Public goods (e.g. new clean energy technologies)
    - Natural monopolies (e.g. transmission and distribution of electricity)

EU target and instruments for promoting competition and security of supply

- Increase competition (promote affordability)
  - Enlarging and redesigning markets (e.g. unbundling), so as to promote competition and dilute market power exertion
  - Integrating the EU energy systems (“the electricity interconnection target” of 10% by 2020, not for natural gas)
  - Monitoring of energy prices
  - Reduction of subsidies to mature energy technologies
- Increase security of supply
  - Two senses: reduce probability of “energy supply chocks” to the economy and reduce the risk of «black» and «brown» outs.
  - Reduce dependency on single energy supplier by spreading the energy mix in energy consumption
  - Purchase energy from friendly neighbors by way of interconnecting energy infrastructure

EU climate and energy targets

- **Targets for 2020**
  - a 20% cut in greenhouse gas emissions (GHG) compared with 1990 levels
  - at least a 20% share of renewable energy consumption
  - at least 20% energy savings compared with the business-as-usual scenario
- **Targets for 2030**
  - a 40% cut in GHG emissions compared with 1990 levels
  - at least a 27% share of renewable energy consumption
  - at least 27% energy savings compared with the business-as-usual scenario
- **Target for 2050**
  - Low carbon society with (a 80% - 95% cut in GHG emissions compared with 1990 levels)


1990 = 100
100
80
60
40
20
0
1990
2000
2010
2020
2030
2040
2050
EU-27
Unchanged policy
EU target

EU and national instruments

- GHG emissions
  - EU ETS (emission permits) sectors of industries. Common for the whole of EU + EEA.
  - Non EU ETS sectors national targets for the rest of GHG. Typically regulated by (Pigouvian) taxes. (Norway to be included)
- Share of renewables
  - National targets set by EU for 2020. Regulated by subsidies (Feed in tariffs and Green certificates)
  - After 2020 member states decide their own targets
- Energy efficiency/ savings
  - Member states decide their own targets. Regulated by taxes, white certificates and command and control.

EU ETS and carbon pricing

- The rationale is to regulate a negative external effect on a global public good (i.e. a stable climate).
- From the point of view of economics the system is functioning well (there are many buyers, many sellers and there is a positive price)
- However, price has been very low in recent years, partly due to the economic downturn, use of Non EU credits and a sizable increase of renewable energy capacity
- A low price is not in itself a sign of a non functioning market, only of a large supply relative to demand
- EU ETS permits for future use are piling up through the banking mechanism . This may cause a threat to the stability of the market

EU ETS prices

Changes to the EU ETS towards 2030

- In order to strengthen and stabilize the EU ETS several measures are taken
  - Back-loading
  - Emission cap tightening (from 1,74% to 2.2% reduction of permits.)
  - A proposed stability reserve
  - Innovation fund and modernization fund (to promote competition and new renewable energy capacity)

Renewable energy support and carbon pricing

- The basic task:
  - Put a price on greenhouse gas (GHG) emissions using proper instruments such as (Pigouvian) taxes, permit systems and command and control mechanisms.
- This will induce:
  - Relatively more renewable energy (due to substitution)
  - More energy saving (due to more expensive energy)
  - More R&D on new technologies of renewable energy and efficiency augmenting technologies (due to induced technological change)

A basic question on subsidies on renewable energy

With correctly used instruments for internalizing the negative external effects from GHG emission are there any valid economic arguments for subsidizing development of renewables?

- Inventions and innovations are public goods (non excludability implies that efforts of inventing new renewables are not sufficient if left to the private agents, in spite of patent systems). This calls for general subsidies on research.
- Learning by doing has spill-over effects (non excludability implies that efforts of developing renewables are not sufficient if left to the private agents). This calls for subsidies for a period until all spill over-effects from learning by doing have been realized.

A basic question on subsidies on renewable energy (cont.)

- But these arguments may be valid for any technology development (e.g. IT research), not only renewables.
- The question is whether the social return from subsidization is larger for energy research than for other research and therefore should be subsidized to a larger extent than for other kinds of research.
- Preliminary results using Danish data show that this is not the case (rather the opposite). Similar results are obtained for Germany (Expertenkommission Forschung und Innovation – EFI, 2014)
- Hence, at the outset there are no arguments for supporting private R&D for renewables more than other private R&D, nor are there any arguments for supporting the generation of renewable energy (apart from the learning by doing argument) provided that there is a correct price on the externalities of fossil energy.

Other arguments for supporting renewable energy

- Not always possible or practical to tax GHG-emission (border trade and leakage from fuel taxation or practical difficulties of taxing GHG-emission in the agricultural sector). This may warrant additional governmental support for private R&D (see Jaffe, 2005). Several studies show, however, that support of research on renewables is not particularly effective without a CO2 tax (see e.g. Schneider and Goulder (1997), Popp (2006),Fischer and Newell (2008).
- Lack of security of supply of energy may be considered a negative externality i.e. governmental support that can lessen the dependency on fossil energy from problematic and uncertain sources may be warranted.

Other arguments for supporting renewable energy

- **“Stimulating the renewable energy sector will create new jobs to the benefit of society**”: Not necessarily so. Labor will be taken from other sectors of the economy where it may have a better use.
- **“Technological innovation in a country will benefit the country in terms of production and trade”.** Not necessarily so as there is no guarantee that the country developing the new technology, also will build up an industry and trade (e.g. solar panels and Germany).
- **“Stimulating the renewable energy sector will give the country a first mover advantage in trade of renewables**”: Not necessarily so if many countries plan to do this. (All countries can not have a first mover advantage, cf EU)
- **”Picking the winner strategies”:** Promoting a specific technology may be costly to society i.e. the market should decide, not politicians.
- With **global spill-over effects** it may be beneficial for a country to **free-ride** on other countries R&D. This is an argument for international coordination of research and international cost sharing.

Arguments for subsidies for energy savings/ increased energy efficiency

- Why is not increasing prices of energy sufficient for stimulating a reduction of energy consumption and a more efficient use of energy?
  - Invention of technologies that increase energy efficiency is a public good and calls for general subsidies
  - Spill-over effects from learning by doing in using new efficiency increasing technologies is a public good and calls for time limited subsidies.
  - Lack of information on gains of insulation etc. is often mentioned as a cause of slow energy saving. To the extent this is the case society's resources should be spent to increase information.

Why targets on energy saving?

- Energy is a production factor just like other production factors (labour, capital services, raw materials and intermediaries). In this respect it is not quite obvious why one should reduce the use of this particular factor.
- From the point of view of society, energy generation should take place at the lowest possible cost to society (e.g. from deregulating the electricity market)
- This is a rationale for more efficient energy markets (just as more efficient labour markets, capital markets, financial markets are good for society). This will result in lower energy prices and consequently not lead to energy saving.
- Environmental problems as well as problems of security of supply relating to energy use should be taken care of by internalizing these effects in the costs of using the various energy sources and not by requiring a general reduction of energy use.

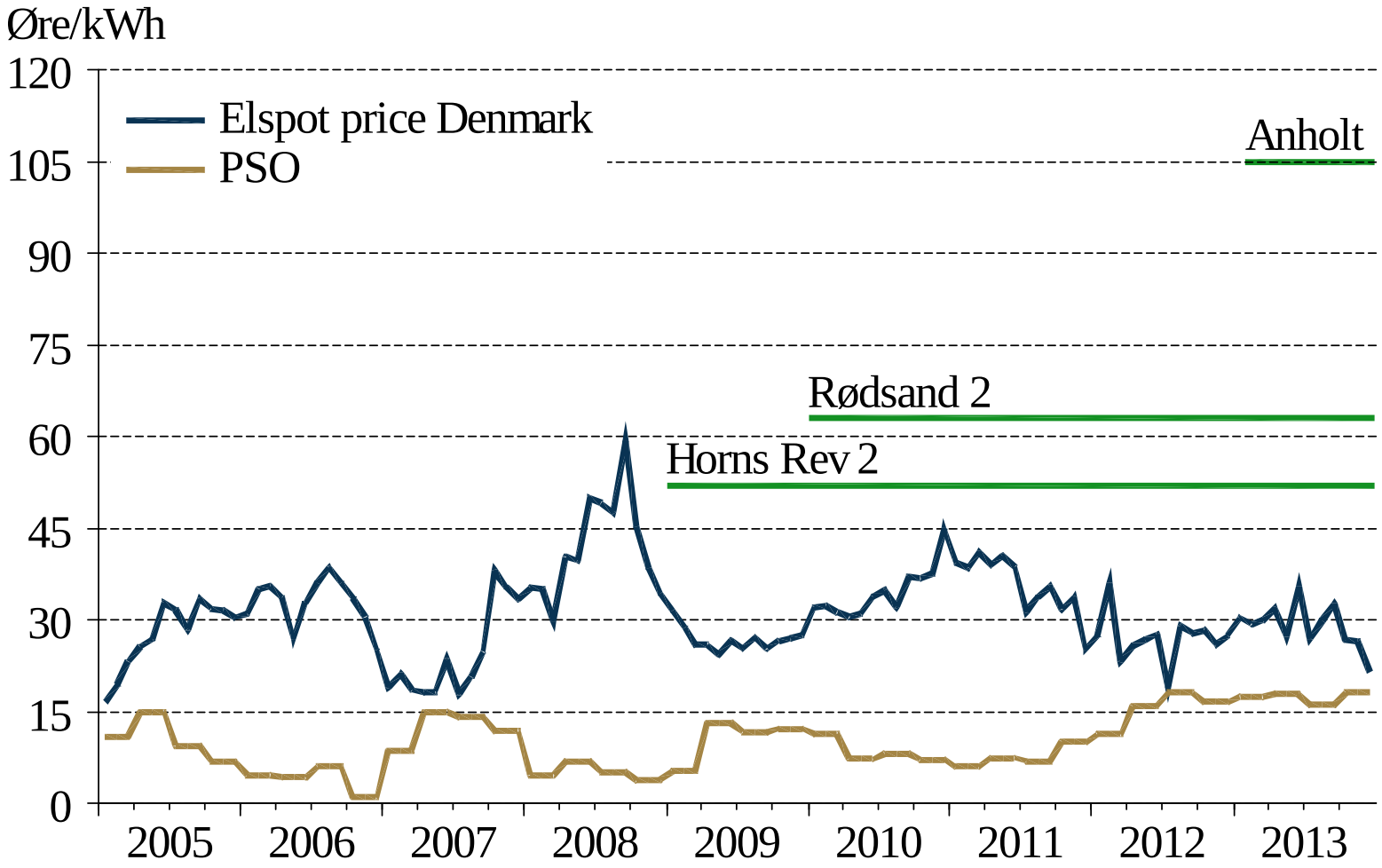
Example of national policies: Denmark

- Denmark's EU targets
  - Non-EU-ETS sector: Reduce emission of GHG by 20 pct. as compared with 2005
  - Share of renewables*:* Attain 30 pct. by 2020
  - Energy efficiency/ saving*:* Reduce energy consumption by 4 pct. as compared with 2006
- Denmark's additional national targets
  - Reduce GHG emissions **in Denmark** by 40 pct. by 2020
  - Wind power should cover at least 50 pct. of total electricity consumption in Denmark by 2020
  - Phase out coal from electricity and heat generation by 2030
  - 100 pct. renewables in electricity and heat generation by 2035
  - Denmark should be «fossil free» by 2050

Evaluation of Danish policies

- Denmark has an ambitious policy with regards to the share of renewables, and seeks to overachieve the targets set by EU (construction of new offshore wind power plants such as Horns Rev 3, and Kriegers Flak)
- Two problems:
  - Increasing wind power capacity have little effect on EU GHG emissions (other countries will purchase the permits at a slightly lower price)
  - Financing the investments by way of PSO tariffs leads to higher electricity prices for Danish consumers (households and firms) thus preventing purchase of heat pumps and electric cars.

Guaranteed prices and development of Elspot price and PSO tariff in Denmark



Example of national policies: Norway

- 30 pct. reduction of GHG by 2020 as compared with emissions in 1990 (in part taken abroad in terms of emission credits)
- «Carbon neutrality» by 2050 (2030 if global ambitious agreement). To a large extent taken abroad in terms of credits)
- Increase the share of renewable energy to 67.5 pct. in 2020 (mostly by the green certificates mechanism). In 2005 the share was 58 pct.
- 10 pct. share of renewables in transportation by 2020
- Phase out use of oil for heating purposes by 2020
- Electrification of the Utsira High (instead of using natural gas for power generation)

Examples of national policies: Norway

- Electrification of Utsirahøyden
  - Costly project (30 – 60 Euro per ton CO2)
  - Problem: No reduction of GHG emission in EU.
  - However, contrary to Denmark, Norway also purchases emissions permits abroad for partial fulfillment of obligations

Some conclusions

- From the point of view of economics, the EU Energy Union seems to be based on sound economic principles
- The proposed reform of the EU ETS is timely and good
- It is also an improvement that centrally decided targets of renewable energy is abandoned for the period towards 2030
- Focus should be directed towards energy efficiency rather than general energy saving as such
- Economic arguments for subsidies of research on new technologies of energy generation and energy efficiency
- National policies not always in line the intentions of the EU policies.
- National policies should focus on reducing emissions in the non EU ETS sectors