

Climate and energy policy in EU: A critical view

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Contents

- Targets and framework for energy and climate policies in EU
- A critical view on targets and instruments
- The non-quota sectors
- Conclusions

*Targets and framework for climate
and energy policies in EU*

Main focus of energy and climate policies in the EU and the MSs

- Reduction of CO₂-emissions (20% by 2020 as compared with 1990)
- Increase of the share of renewable energy (20% by 2020)
- Reduction of energy use (20% by 2020)

The framework for climate and energy policies in EU

CO₂

Quota sectors:

Common EU cap on CO₂ emissions. i.e. **no country specific targets**. Single **market for quotas** (tradable emission permits) called **EU-ETS**.

Non-quota sectors:

Country specific reduction targets (percentages) **determined by EU** centrally (e.g. Denmark – 20%, Bulgaria + 20%). So far, **instruments** to be **determined by the single member states (MSs)**

The framework for climate and energy policies in EU: The EU ETS

- Cover more than 10000 energy intensive sectors within the energy and industrial sectors (e.g electricity generation)
- Covers about 50% of all CO₂ and 40% of all greenhouse gas emissions in EU
- A common cap on CO₂ emissions within the quota sector is set for EU as a whole for the period until December 2012. Thereafter the system is going to be extended until 2020 in order to achieve a 21 % reduction of CO₂ emission within EU ETS by 2020 as compared with, 2005.
- Quotas are allocated to MSs according to so called National Allocation Plans for each MS
- Quotas can be traded within and across countries
- Until 2013 quotas are allocated free of charge. From then on, more than 60% is going to be auctioned off.

The framework for climate and energy policies in EU: the non-quota sectors

CO2 emission targets (2020) for some countries
(percentages relative to 2005)

Denmark:	- 20
GB:	- 16
Germany:	- 14
Sweden:	- 17
Italy:	- 13
Bulgaria	+ 20
EU	- 10

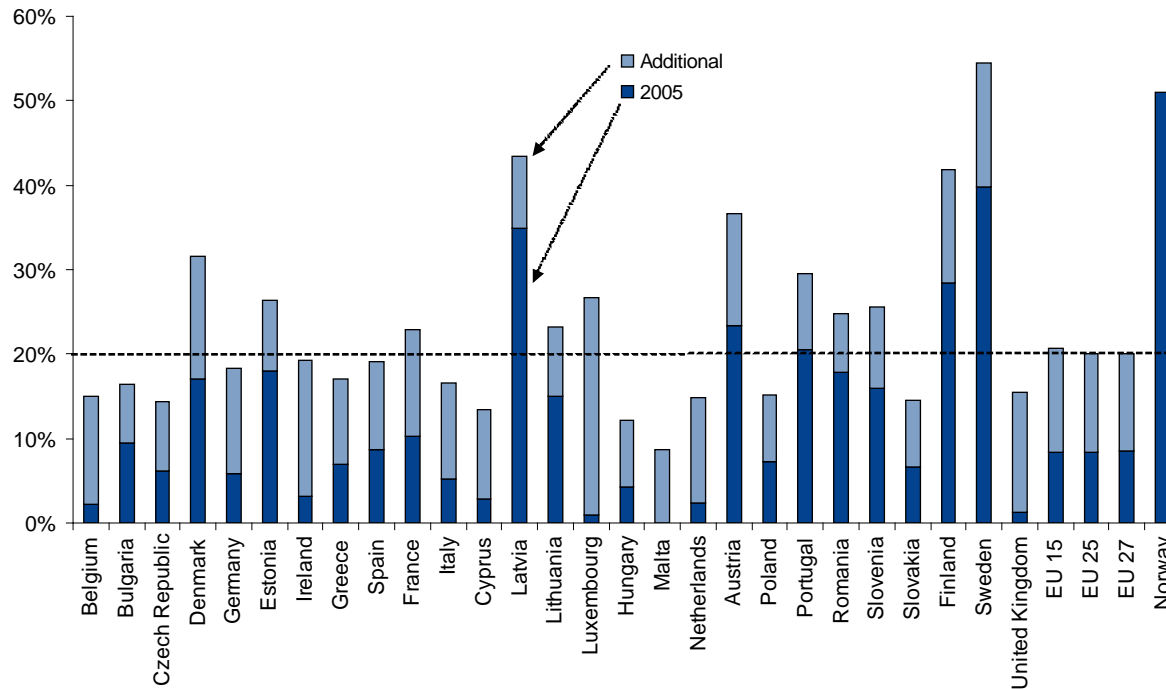
The framework for climate and energy policies in EU

Renewable energy

Country specific targets on share of renewables out of total energy use **determined by EU** centrally. (e.g. Denmark + around 15 percentage points, Bulgaria + around 7 percentage points as compared with 2005).

So far, **instruments** to be **determined by the MSs**
(Feed-in tariffs, Green certificates, subsidies ...)

Shares of renewable energy in Europe (Dansk Energi, 2008)



The framework for climate and energy policies in EU

Reduction of energy use

No EU determined targets for individual MSs.
Basically, **each country on its own** with respect to **targets and instruments**

*A critical view on targets and
instruments*

Why targets on CO₂ emission reductions?

We all know the answer to this

Why targets on shares of renewables in EU?

- **Reduction of CO2 emission ?**

But: this is already taken care of by the CO2 quota system and the CO2 taxes

- **Increase of security of supply?**

– But: This problem primarily relates to oil and gas deliveries from unstable political regimes. This problem could be solved by specific excise taxes or by shifting to more stable suppliers.

A general requirement of shares of renewables is not a very precise measure to attain this target. As for EU, the security of supply between MSs is presumably very high.

Why targets on shares of renewables in EU? (cont.)

- **Ensure R&D on new renewable technologies that otherwise would have been under-financed?**
But: this could be achieved by direct support to research on renewables. A general requirement of shares of renewables is not a very precise measure.
- **”First mover advantage” in producing and exporting new technologies and capital equipment of renewable energy?**
But: all countries within EU can not have a “first mover advantage” (generally, not a good idea to try to pick a winner). Anyway, a general requirement of shares of renewables is not a very precise measure to attain this target.

Why targets on energy savings?

- 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.
- 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.
- Otherwise, energy generation should take place at the lowest possible cost to society (e.g. deregulating the electricity market)
- This is a rationale for more efficient energy markets (just as more efficient labour markets, capital markets and financial markets are good for society) rather than energy reductions in general.
- But, what kind of market failure is it that calls for regulatory measures in addition to the efficiency drive stemming from the energy price itself?

Instruments for CO₂ reduction: quotas and taxes: different, but closely related instruments

- A CO₂-quota system fixes the total quantity of CO₂ emission and lets the market decide on the price of CO₂ emission.
- A CO₂-tax fixes the price of CO₂- emission and lets the market decide on the quantity of CO₂ emissions.
- In many MSs CO₂-emission is regulated both by the EU ETS system and CO₂-taxes
- Otherwise, CO₂-taxes are normally applied in the non-quota sectors

Instruments for renewable energy: Inefficient requirements in EU

- The requirements set for each single country do not guarantee an equalization of marginal costs of generating renewable energy between countries.
- A need for systems that can equalize the marginal costs of generating renewable energy between countries and thus realize gains of trade (i.e. necessary to separate who is paying from who is doing)



Instruments for renewable energy: A quota system for renewable energy

- A quota system for renewables does not seem as "clear cut" as the CO₂-quota system.
 - In Sweden and UK the quota systems (green certificates) are markets for "percentages".
 - There are many renewable technologies with different marginal costs. If a diversification is required there is a need for different quota prices.
- There may be compatibility problems with the CO₂ quota system.
- The EU proposal: A combination of feed-in tariffs and quotas (using "guarantees of origin")
 - Unclear which effects these will have

The Basic ideas of a TGC-system

- The TGC system is a market based subsidy system for renewables in electricity provision (i.e. “green electricity”)
- Sellers of TGCs are the producers of green electricity
- For each MWh they load into the network they get a TGC to be sold on the TGC-market
- Buyers are the consumers/retailing companies that are required to hold at least a certain percentage (e.g. 20%) of TGCs corresponding to total consumption/ end-use deliveries
- Hence, for each MWh green electricity the producers get the wholesale price plus the certificate price
- In the Swedish TGC system only new small hydropower plants qualify for TGCs (in addition to e.g. wind- and biomass power plants)

Some theoretical results

- An increase of the price of CO₂ emission permits, leads to less green capacity. This is due to the fact that an increase of the price of the CO₂ emission permit leads to an increase of the marginal cost of providing power and a higher price of electricity. Demand and supply will therefore be reduced in a proportion corresponding to the percentage requirement i.e. also the supply of green electricity.
- An increase of the percentage requirement may lead to less green capacity. This result is a technical result that needs elaboration. (Basically it depends on the second order derivatives of the cost functions and the price elasticity of electricity).
- The TGC price may be very volatile if green generation is predominantly based on wind power
- The percentage requirement is not a very precise policy measure, in particular if trade in TGCs is allowed.
- Green producers may have strong market power



Instruments: Energy efficiency

- Energy taxes is a very precise instrument for achieving increased energy efficiency
- Still some EU countries and other countries apply so called “white certificates”
 - Design problems
 - High administrative costs
- Administrative measures such as building codes on insulation may work better and be more to the point.

Number of targets and instruments

- Accepting there are three (meaningful) targets (which is difficult to do) one simple view would be that we need three different instruments to attain the targets. (Think of a system of independent linear equations that should be determined.)
- But if the important target is to reduce the emission of CO₂ only, then applying three instruments to attain all three targets may imply inefficiency with excessive costs of attaining the target ("too many constraints")
- Hence, harsher CO₂-policy alone increases the costs of fossil energy and implies efficient
 - Increase of the share of renewables
 - Reduction of energy consumption
- Recognize, however, that in the face of uncertainty, it may well be optimal to combine instruments even if there is only one target (e.g. a quota system with a price ceiling and a price floor.) (Cf. Roberts and Spence, 1976).

Understanding the implications of EU ETS: The effects of increasing the share of renewable electricity and decreasing electricity consumption on EU CO2 emissions

- Emission of CO2 within the quota-sector is fixed for years to come and determined by the number of quotas issued
- Hence, no reduction of CO2 emission in EU if a MS:
 - increases the generation of electricity by renewables (i.e. more wind power, more biomass utilization)
 - reduces the consumption of electricity
- The effect of this will be to make quotas cheaper but the number of quotas will be the same
- The only way to reduce CO2 emissions further within the EU ETS would be to:
 - reduce the total number of quotas by issuing less quotas (a decision to be taken by EU centrally)
 - purchase CO2 quotas for destruction without being used to cover CO2 emissions (a decision to be taken by individuals or groups of individuals)

The non-quota sectors

The "non-quota sectors"

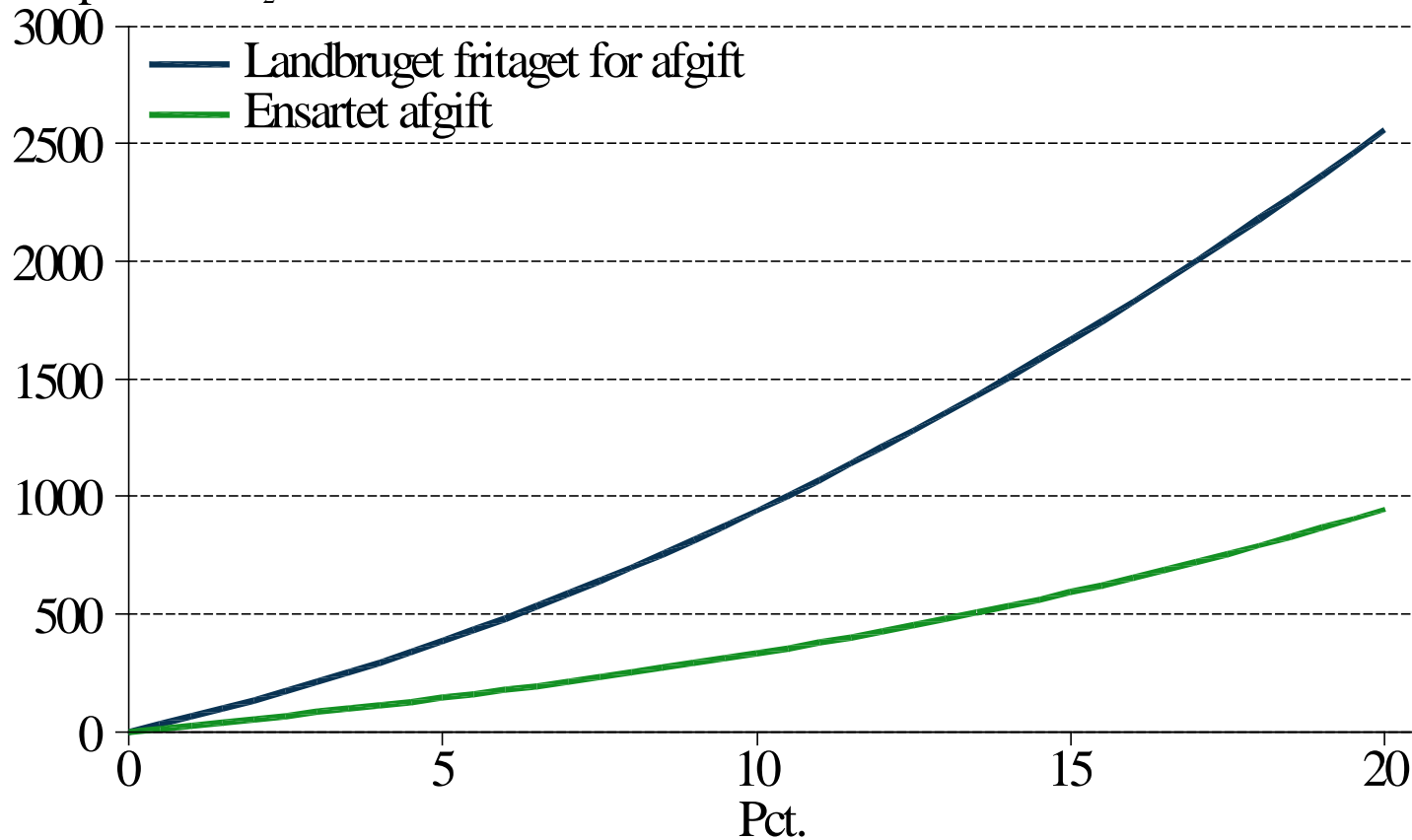
- A policy conclusion following from the above analysis is that the MSs should focus on the non-quota sectors
- The most important sectors outside of the quota sectors are: transportation, agriculture and buildings (heating except for central heating and heating by electricity)
- Each MS has been given a target for the reduction of CO₂ emissions in the non-quota sectors e.g. to be attained by a CO₂ tax.
- The targets vary from harsh reductions to generous increases (Denmark -20% , Bulgaria +20%) (see Table)
- Targets are set according to potential for further reductions and according to GNP.

Efficiency and compatibility in achieving the the EU emission targets for the non-quota sectors

- A principle for attaining the EU target in an efficient way is to have a common marginal cost for CO₂ reductions across all sectors and all countries.
- This can not be achieved in the combined quota and non-quota sectors; e.g. for a country like Denmark a CO₂ tax would have to be far above the expected quota price in order to attain the necessary reductions in the non-quota sector. Thus indicating an inefficient allocation of society's resources
- The question then is: How can this be improved upon?

Costs of CO₂ reductions in the Danish non-quota sectors

Kr. pr. ton CO₂-ækvivalent



How can the systems be improved ?

- Allow companies in the non-quota sectors to fulfill their requirements by purchasing quotas in the EU ETS.
- Try to get (“CO2 expensive ”) sectors in the non-quota sector to be included in the EU ETS (electric cars instead of fossil fuel cars, heat pumps instead of oil heating)
- Improve energy efficiency (if this is a problem)
- Replace fossil fuels by biofuels and renewable energy (harsh CO2 taxes)
- Trade emission reductions in the non-quota sectors between countries i.e. a MS that has a low cost of over-fulfilling its requirement in the non-quota sector (marginal cost below the quota price) can sell their excess to a MS that has a high cost of achieving its target in the non-quota sector (marginal cost above the quota price). This will give rise to gains of trade for all involved parties and lead to lower total costs of achieving the targets.

Conclusions

EU-regulation of CO₂-emissions

- The reduction targets in the non-quota sectors in the different countries determined by distributional consideration
 - High income EU-countries have to reduce more (Denmark in particular)
 - Not the same CO₂-reduction cost in non-quota sectors in different countries
- Hence, CO₂-reduction in EU could be obtained with lower overall costs

Recommendations to changes in EU-regulation of CO₂ emissions

- **First best:**

It should be possible for countries to buy CO₂-quotas, as a way to reach national targets in non-ETS sector

- Ensuring uniform reduction costs between ETS and non-ETS sectors and between countries
- Minimizes overall costs of CO₂-reduction in EU

- **Second best alternative:**

Improve the possibility for trade between EU countries of CO₂ reductions in the non-ETS sectors

- Ensures uniform reduction costs between non-ETS sectors in EU
- Not uniform reduction cost between ETS and non-ETS sector