



House of
**Energy Markets
& Finance**

Coal Exit - Ecologically and Economically Efficient?

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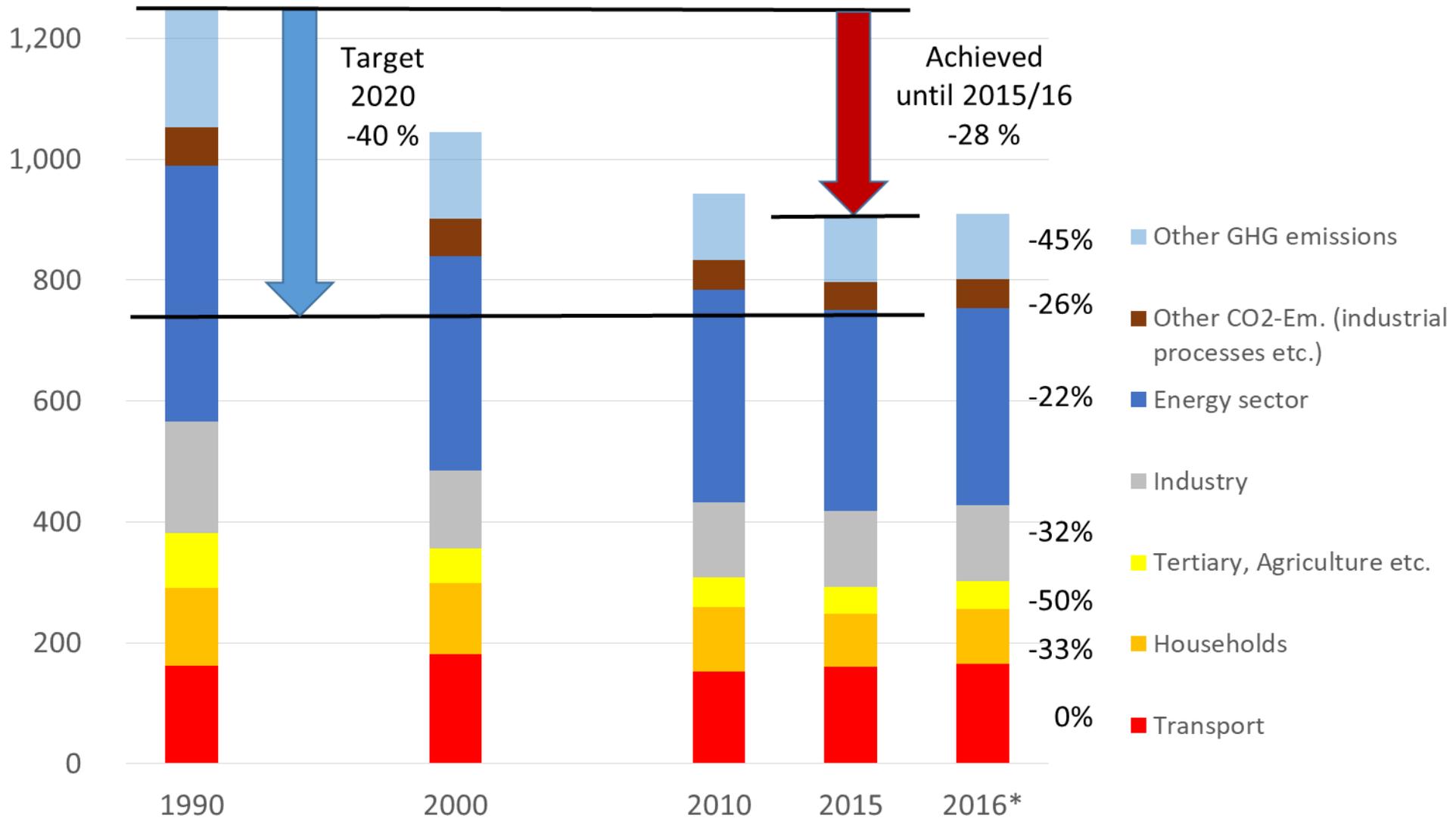
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Offen im Denken

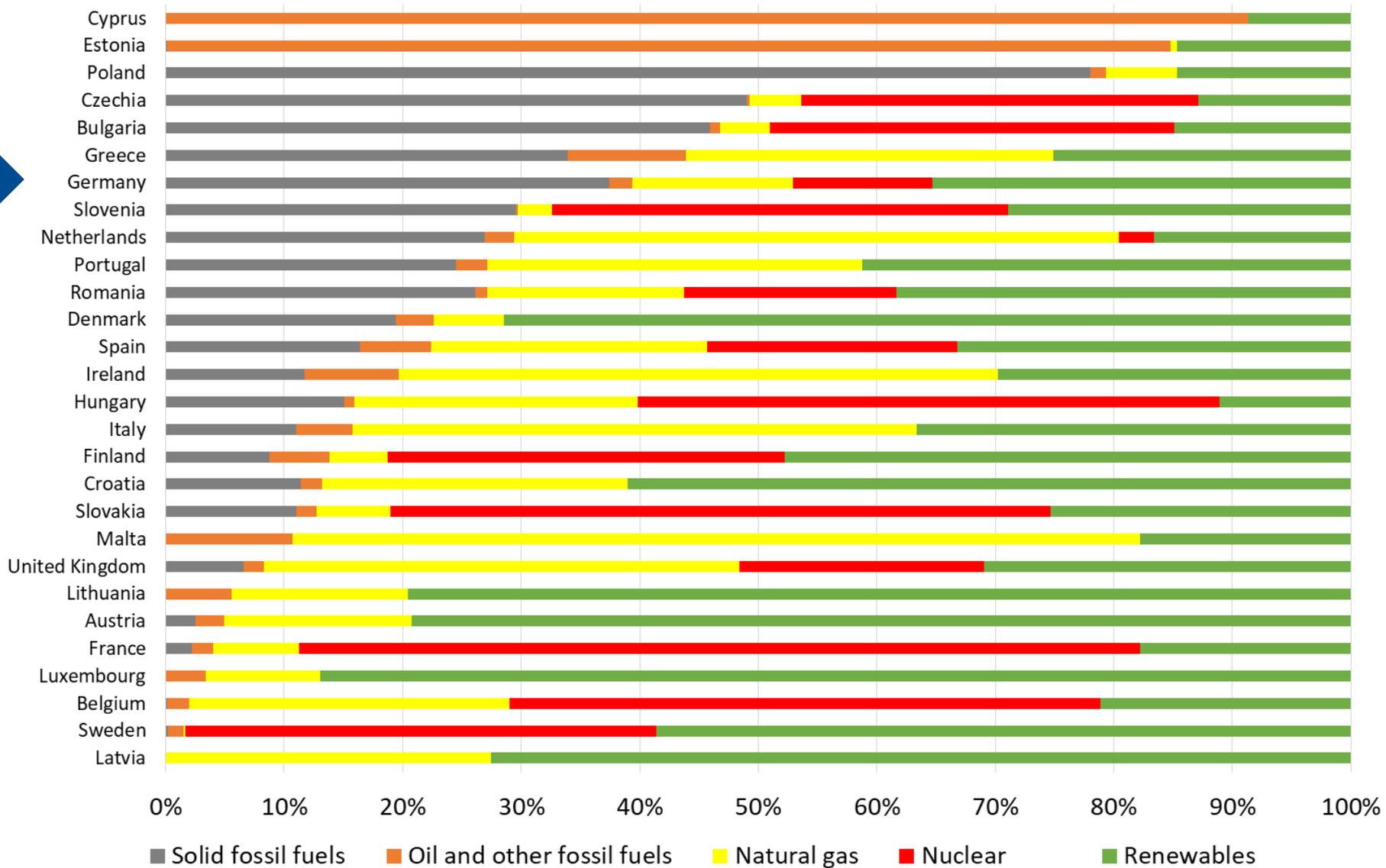
- Already in 1994 an Enquete-Commission of the German Bundestag stated the objective to reduce Greenhouse Gas emissions in economically strong industrial countries by 40 % until 2020 and by 80 % until 2050 compared to 1990 levels.
 - Germany has missed its ambitious 2005 target (-25 % for West Germany) and is almost certain to miss its 2020 target
 - 2017: about -28 %
 - The EU is likely to achieve its -20 % target for 2020
 - But obviously less ambitious
 - Even if the specific effects of German reunification are taken into consideration
- Something has to happen!?

... some success...



... but ...

- Where is Germany?
- Electricity generation mix in the EU



Key recommendations of the coal commission:

- **End coal-fired generation in Germany by 2038**
 - By end of **2017**, operating capacities of **42.6 GW** (19.9 GW lignite, 22.7 GW hard coal)
 - Decommissioning of **12.5 GW until 2022** (5.0 GW lignite, 7.5 GW hard coal)
 - including 1.8 GW lignite capacity already foreseen to be put into so-called security reserve and 3.2 GW hard-coal capacity with shut-down planned by operators
 - Decommissioning of further **13.1 GW until 2030** (5.9 GW lignite, 7.2 GW hard coal)
- **Provide structural aids to the concerned regions – total 40 b€**
- **Provide compensations**
 - **to power plant operators for early shut-down of power plants and open-pit mines**
 - **to electricity consumers for increases in wholesale market prices**
- **A compromise!**
- **Is the glass half full or half empty?**

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Well, it depends...

- How is the coal phase out implemented?
- What is the reference case (the “counterfactual”)?
 - Rules of the European Emission Trading System (ETS)
 - Rules of the Political Game, aka “Political Dynamics”

- Amount of **allowances** (and hence c.p. emissions) **fixed** many years **in advance**
 - Current political decisions cover period **until 2030** (phase 4 of the ETS: 2021 – 2030)
 - **Revised EU ETS directive** entered into force in April **2018** (Directive 2018/410)
 - Annual **reduction rate of -2.2 %** from 2021 onwards (currently -1.74 %)
 - Emissions in the sectors covered by the ETS to be reduced by 43 % compared to 2005 levels

- Prima facie: A German **coal phase-out** makes **no difference** in EU CO₂ emissions

- But:
 - **Market Stability Reserve (MSR)**
 - **Possible Cancellation of Allowances**

- Discussed since several years in view of the persistent surplus of allowances in the ETS
 - Beginning of phase 3 (2013): surplus of about 2 billion allowances
- First answer: “Backloading” - postponement of auctions of 990 million allowances in the period 2014 – 2016
 - Implemented through amendment to the EU ETS auctioning regulation in February 2014
 - Release of these allowances foreseen in 2019 – 2020
- Revised answer: MSR – use of a reserve to stabilize CO₂ certificate prices
 - Backloaded allowances are transferred to reserve
 - Reserve limited to the auction volume of the previous year from 2023 onwards
 - Effective elimination of allowance surplus (up to a certain degree)
 - Emission allowances made available through Coal Exit may effectively be cancelled (if reserve is above limit)
 - Rules for reserve management are tricky – some unintended effects may occur

- Possibility foreseen in Article 12(4) of the Revised ETS directive

“In the **event of closure** of electricity generation capacity in their territory **due to additional national measures, Member States may cancel allowances** from the total quantity of allowances to be auctioned by them referred to in Article 10(2) up to an amount corresponding to the average verified emissions of the installation concerned over a period of five years preceding the closure.”
- In principle straightforward way to effectively reduce actual CO₂ emissions
 - Measure recommended by the “coal commission” (p. 65 of the final report)

But:

- If allowances are scarce (lower bound of MSR reached) and German coal-based generation is replaced by coal-based generation elsewhere, allowances from the MSR may be released
 - Effectively no emissions reduction
- Allowances could also be cancelled (or auctioned and repurchased by government) without Coal Exit
 - Emission reduction consequence of cancellation of certificates and not of Coal Exit

- ... are in general non-linear
- and thus hard to predict

German Coal Exit sends a signal

- clear or blurred?
- certainly more than symbolic

German policy makers...

- ... are getting serious about reducing Greenhouse Gas emissions
- ... foresee long transition period for Coal Exit
- ... throw a lot of money at potential losers of Coal Phase Out
- ... undermine further the role of the ETS as a cornerstone of Europe's climate policy
- ... encourage other governments to undertake also additional measures for GHG reduction

➤ Time will tell...

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- Difficult to assess as even direct costs of coal exit are currently not yet known

Cost components indicated by the commission:

- Structural aids for the regions with lignite mining:
 - 2 bn € per year over 20 years
- Compensation of electricity price increases for (household and industrial) consumers:
 - 2 bn € per year (~4 €/MWh) for how long?
 - + continued compensation for CO₂ price increase for energy intensive industry
- Compensation for power plant operators: to be negotiated
 - For lignite: indicative compensation for so-called security reserve: 0.6 bn € per GW → ~ 5 bn € until 2030
 - For hard coal: suggestion to select closures through auctions
- Support payments for workers
 - Not quantified

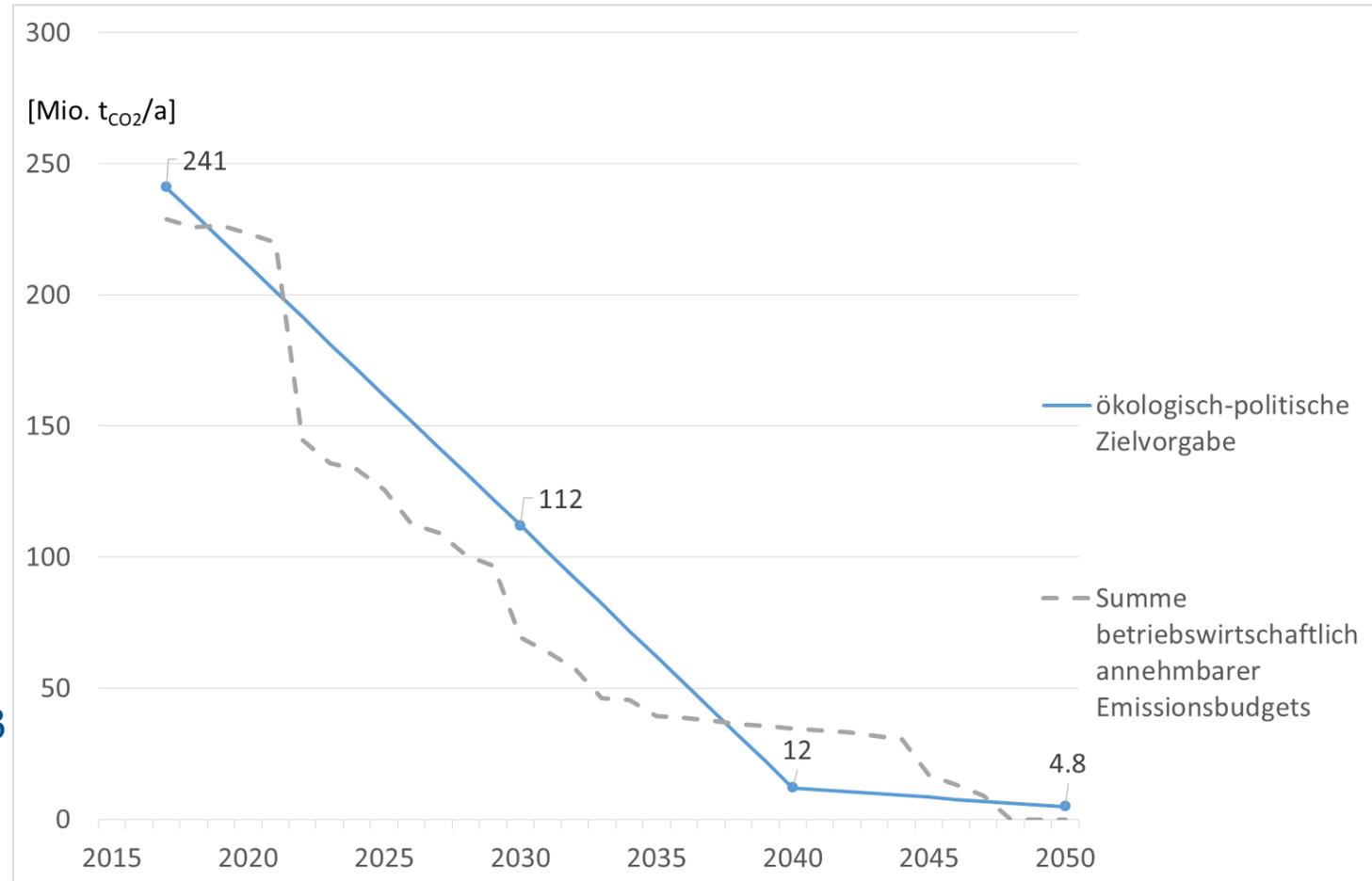
1. Business-as-usual without new policy measures
 - CO₂ reduction targets would not be reached
 - Old hard cold plants would nevertheless mostly be decommissioned until 2030
 - Low current profitability
 - Close to end of economic lifetime
 - Lignite plants would probably resist longer to economic pressure – unless CO₂ prices rise above ~60 €/t
 - Lower cost for government, less support for concerned regions and workers
 - Ongoing political and market uncertainty on future of coal-fired generation
2. Pure CO₂ allowance cancellation policy
 - National CO₂ reduction targets would not necessarily be reached
 - (Limited) increase in CO₂ allowance prices
 - Coal phase out somewhat accelerated but recently built units (2011 – 2015) probably operating beyond 2040
 - Lower cost for government, less support for concerned regions and workers
 - Less support for increased levels of ambition in climate policy?

- (published in et – Energiewirtschaftliche Tagesfragen 9/2018)

Based on six principles:

1. Limitation of the total remaining CO₂ emissions from coal use in the electricity sector („*ecologically and politically preset emission budget*“)
2. Computation of a (energy) economically plausible emission budget for each power plant based on vintage and further plant characteristics („*economically acceptable emission budget*“)
3. In case of surpassment of the ecologically and politically preset emission budget by the sum of the individual power plant emission budgets: proportional cut in the plant emission budgets to reach the preset emission budget.
4. Compensation of plant owners for devaluation of their investments as a consequence of the cuts in emission budgets
5. Possibility to allow plant owners to transfer CO₂ emission budgets on other plants
6. Compensation of the other stakeholders (workers, municipalities/regions) for economic backdrop

- Parametrization of emission budgets:
 - Until 2021: attributed to all power plants
 - Until 2029: up to a lifetime of 40 years
 - From 2030: up to a lifetime of 32 years
- Inclusion of a progressive reduction of annual full load hours
- The ecological-political target is fulfilled in most years
 - Except for years up to 2021 and after 2038
 - Data not directly comparable to coal commission yet scenario quite similar
- Estimated necessary compensation payment around 0.7 bn € for plant operators



- The solution found is a compromise
- To find a compromise in such a situation is per se good
- Whether it is a good compromise, depends on the details to be defined/negotiated by the government
- The coal compromise is another government intervention into market structures
 - But reaching environmental objectives is not possible without government intervention
- The glass is half full –
- but the government has to be careful not to empty it further during the implementation phase

Th

Thank you

