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**Energy Markets
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The German Energiewende – Winding paths on a long journey following a distant star?

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Offen im Denken

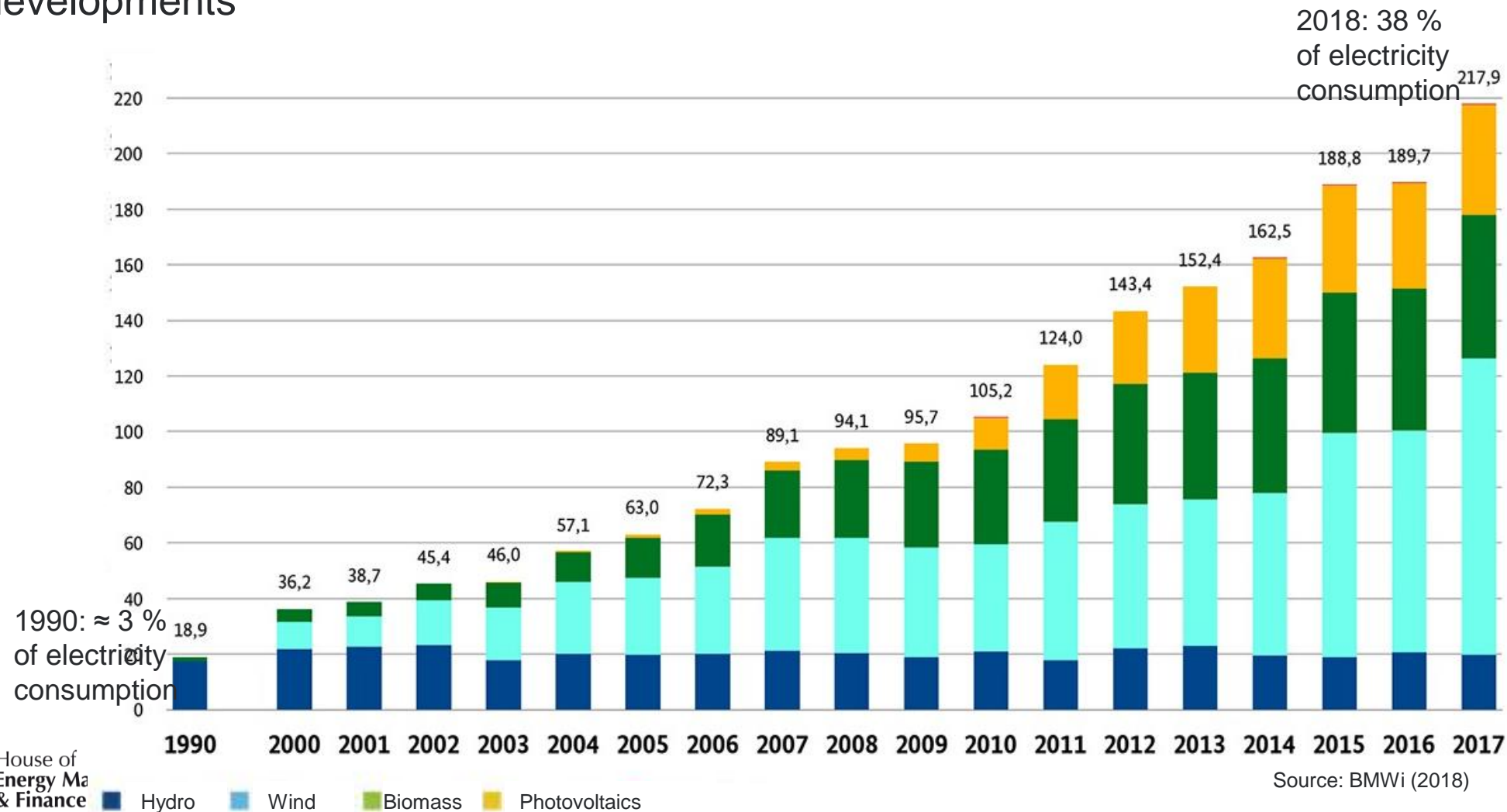
The “Energiewende” (“energy turnaround”) started way back

Key developments

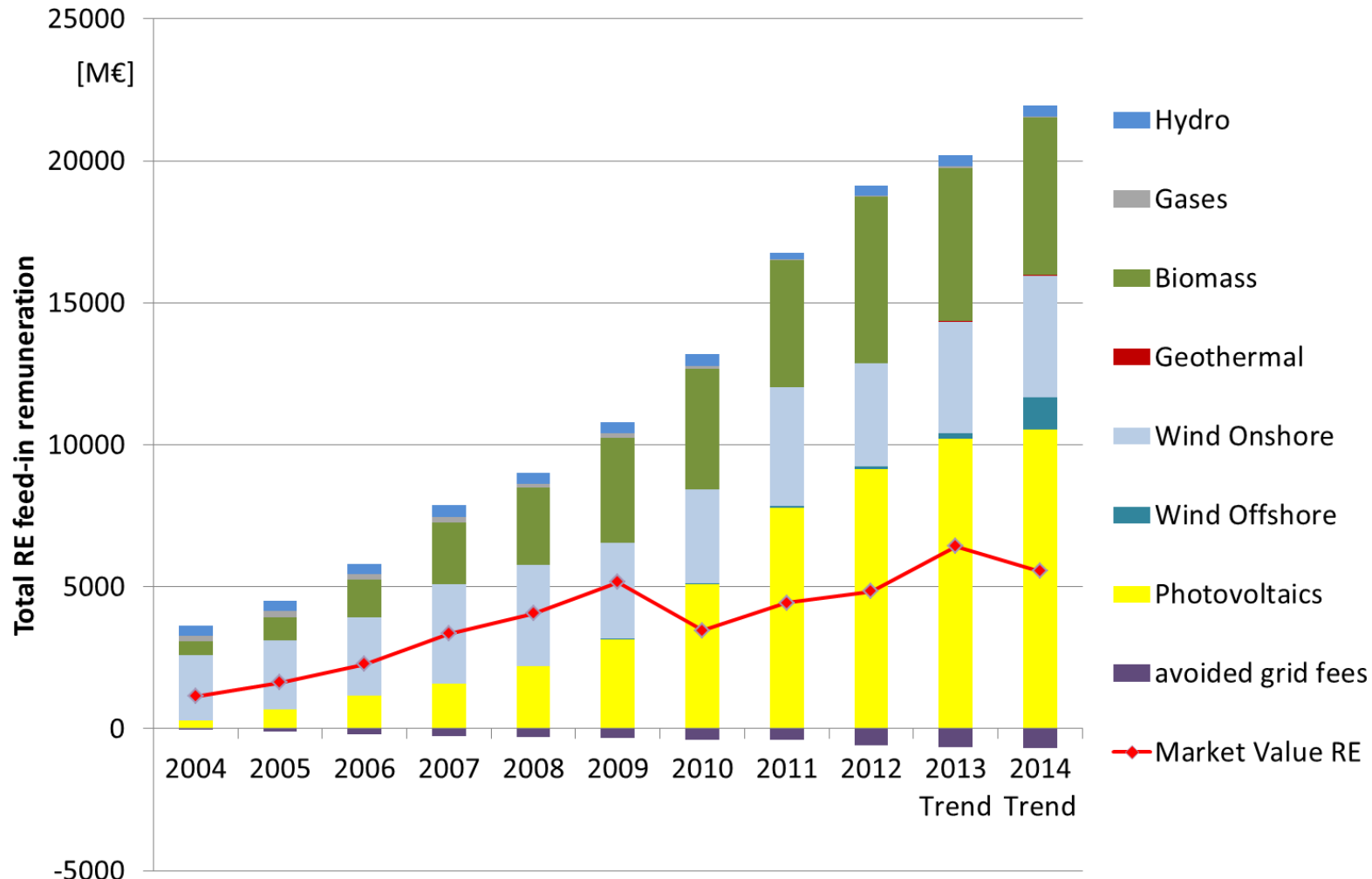
- **“Energiewende – Growth and wealth without oil and nuclear”**: title of a **1980** book by the “Öko-Institut” – a non-governmental environmental think tank
- **Since 1990**: Government support for electricity production from Renewable Energies using **Feed-in Tariffs** (introduced by a conservative-liberal government)
- **Energy concept 2010**: Overarching concept by the then conservative-liberal government for energy supply and climate change mitigation
Key objective: **GHG emission reduction** by at least 85 % until 2050,
80 % + renewables in electricity generation by 2050,
prolongation of nuclear plant life time until at most 2036
- **Energiewende 2011**: after the Fukushima catastrophe, the government **accelerated** the **phase out of nuclear** – end of operation now in 2022
- **2014**: Share of **renewables** in power generation **exceeds 25 %** for the first time
- **2018**: Share of **renewables** in power generation **reaches 38 %** (US: 17 %, China 27 %)

Feed-in tariffs have been effective

- Key developments



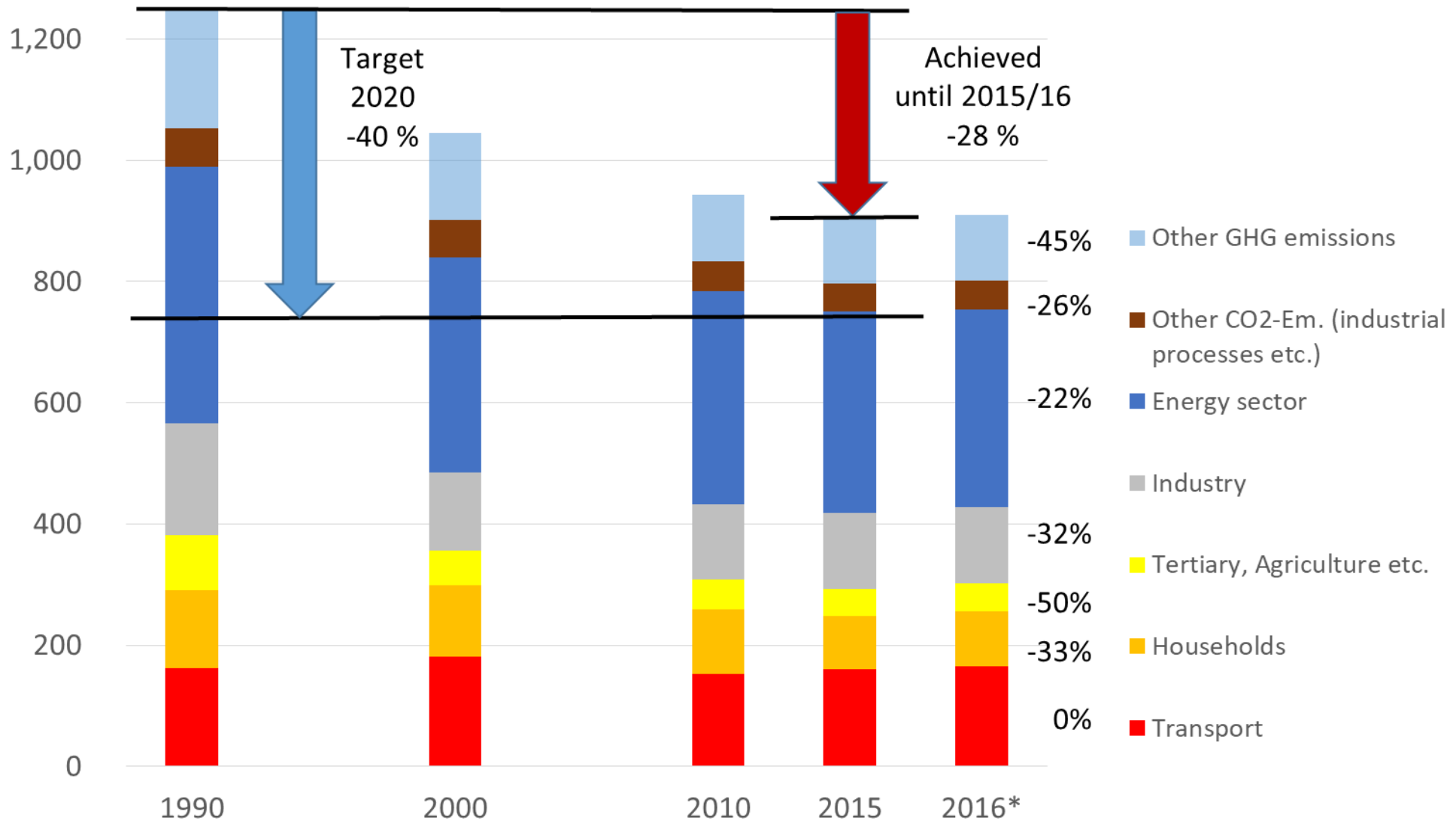
... but expensive



➤ Austria also has renewable infeed tariffs, yet has always limited the financial support volume per year

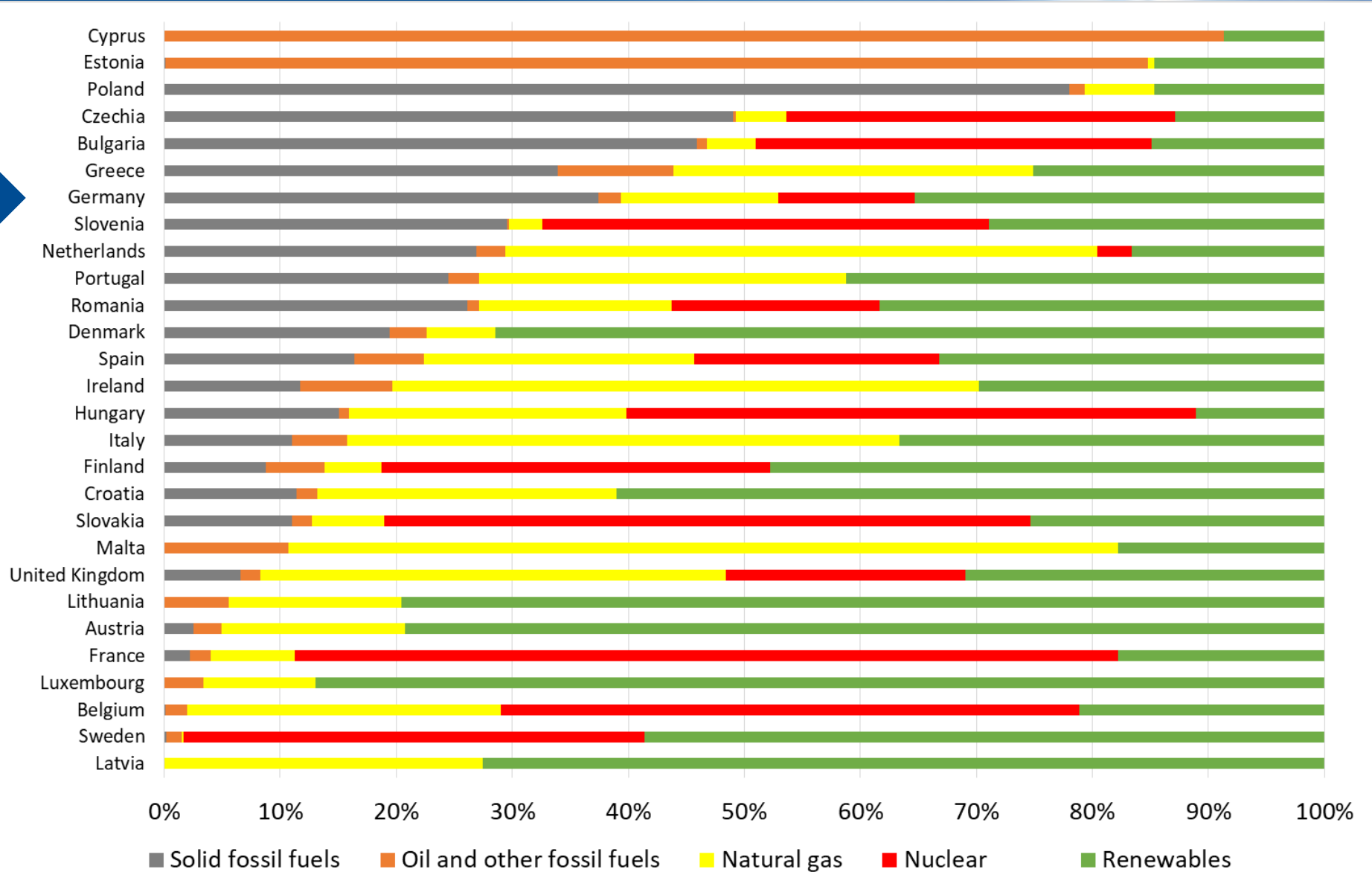
- Already in 1994 an Enquete-Commission of the German Bundestag stated the objective to reduce Greenhouse Gas emissions in economically strong industrial countries by 40 % until 2020 and by 80 % until 2050 compared to 1990 levels.
- Germany has missed its ambitious 2005 target (-25 % for West Germany) and is almost certain to miss its 2020 target (-40 %)
 - 2017: about -28 %
 - 2018: about -31 %
- 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
- Ordered by decreasing share of solid and liquid fossil fuels



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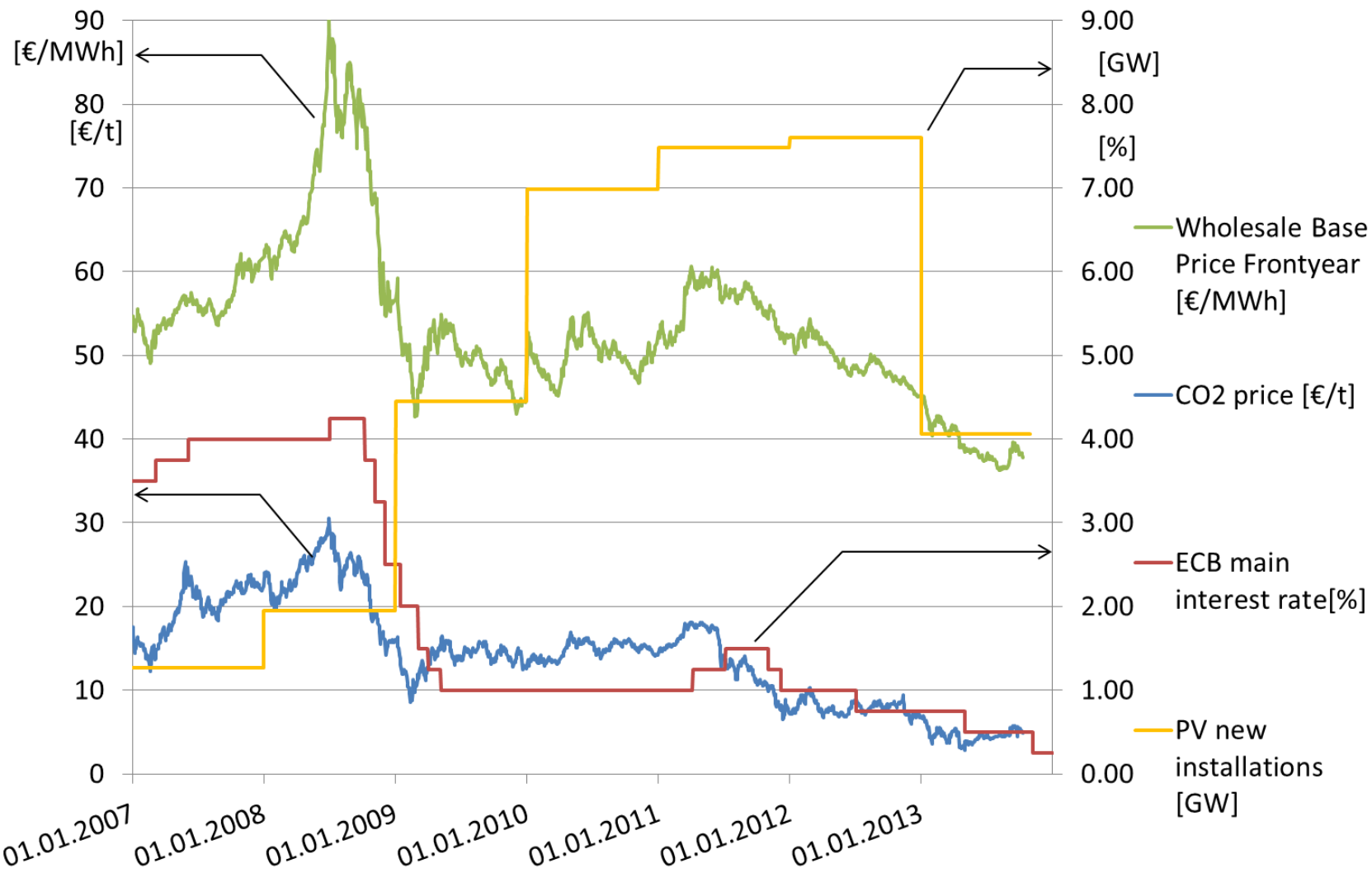
Consequences of the 2008 financial crisis:

- Economic recession (German GDP went down by -5.4 % in 2009)
 - Demand for electricity declined → CO₂ certificate prices also dropped
 - Costs for raw materials and PV systems collapsed
 - Costs for home solar investments shrank

- (extremely) low interest rates
 - Opportunity cost for capital invested in PV sank

- Huge investment into PV systems
- Huge increase in renewable subsidies
- Built-in in the fixed feed-in tariff without quantity limitations

The perfect storm for the German policy mix



- Support payments went strongly up
 - Guaranteed payments for the next 20 years
- It took about three years to fix the construction error
 - A target corridor for PV expansion was defined,
 - decreases in PV support levels linked to PV build-up relative to target corridor
- Build-up rate sank continuously from 2013 onwards
- Global cost for PV had gone drastically down
 - PV roof-top generation cost 2018 around 13 ct/kWh in Germany
 - PV utility-scale generation cost 2018 below 6 ct/kWh in Germany

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Key recommendations of the coal commission published January 2019:

- **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?**

How much CO₂ emissions are actually avoided by the coal exit?

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**

- ... 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...

- 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

- 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

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- Greta Thunberg says:
„How can you dare?“ – German actions insufficient
- Summary by Deutsche Welle (public broadcasting service for foreign countries – **highlights** by CW)
„Cabinet's agreed measures would **raise motorists' petrol** (gasoline) and **diesel prices** in increments by 2026, in line with the EU's existing regime of carbon emissions certificates.
CO2 emitted in Germany would **cost 10 euros** per ton, **rising to 35 euros per ton by 2025**.
Commuters would see increased **tax rebates**, **cheaper train travel** — through lower sales tax on tickets — and **higher tax on short-haul flights**.
Subsidies for electric vehicles — currently struggling to increase their share in the German car market — will be boosted for cars costing less than €40,000. Vehicle tax costs would also be aligned more closely to cars' emissions.
From 2026 **installation of oil-fired heating in buildings** would be **banned** in favor of more climate-friendly alternatives, coupled with a bid to improve buildings' insulation standards“
- Another „typical German“ compromise

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- **Continuation of current policies**
 - **But clear focus on cost limitation**
- **Reforms of the renewable support schemes (EEG) every few years**
- EEG 2014: clearly defined expansion paths, feed-back mechanisms from observed capacity build-up on support levels (“breathing cap”)
 - Further changes: mandatory participation in the wholesale market except for home solar systems (up to 10 kW), reduction of exceptions for renewables financing levy...
- EEG 2017: Use of **procurement auctions** instead of feed-in tariffs except for small installations (up to 100 kW)
- Further points under discussion
 - **Capacity mechanisms** for conventional power plants
 - **Support** schemes for electricity **storage systems**
 - Incentives for increased **demand response** / regional market places
 - Modified **grid tariffication** rules to eliminate excessive incentives for self-consumption
 - Shift towards **zonal or nodal prices** in the wholesale market

- **“Get the prices right”** – focus on CO2 prices as the key incentive for emission abatement – ideally on an international scale
 - In order to avoid excessive risk for renewable investment: prespecified CO2 price path with upper and lower bounds needed
 - CO2 tax alone will not be sufficient to reach emission reduction objectives since price spreads between coal and gas (and renewables) are strongly fluctuating
 - In order to limit political risk:
 - Devolution of CO2 price fixing and CO2 quantity target reaching to an independent “climate authority” similar to central bank
 - Gradual phase out of separate support mechanisms for renewables
 - In order to avoid inconsistent incentives
 - Cross-border tax adjustments if needed
 - Needed as long as no coherent international framework is established – stabilization of the “Climate club”
- May this work? Yes
- Is this likely to happen? No – as seen of today
- But sometimes tipping points are reached in politics...

- The Energiewende is not progressing irrespective of costs
 - Recent adjustments clearly aim at limiting the costs
- The Energiewende is not a free lunch – it is an investment for a better environment
 - Cost effectiveness has been poor so far, but hopefully will improve in the future
- The Energiewende is pushed by a strong public will to go for renewables
 - Supporting motivations: Reduction of energy imports and general nuclear fears (Germany has no nuclear weapons)
 - Public support decreases when an own financial contribution is asked for
- The policy instruments used for the Energiewende are partly incoherent
 - Given international inconsistencies, incoherencies are however partly inevitable
- The success of the Energiewende will require to tackle also energy efficiency and renewables/electrification in transport and heating

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Thank you

