



POTSDAM INSTITUTE FOR
CLIMATE IMPACT RESEARCH

The German Energiewende and climate change mitigation – the only game in town or only a green dream?

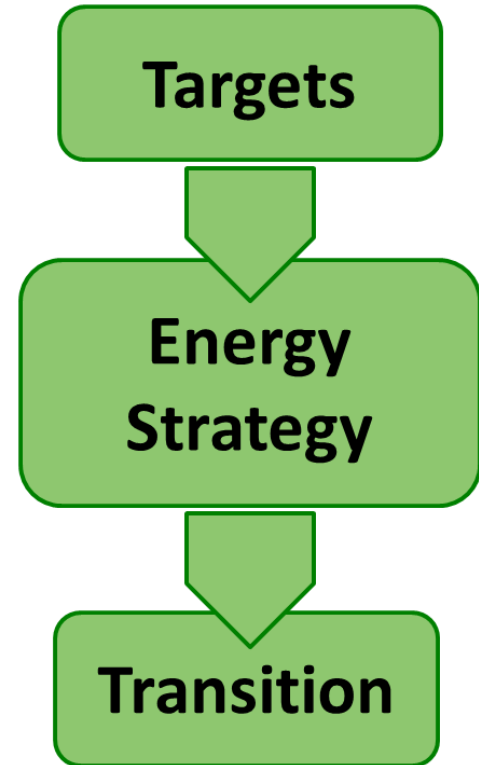
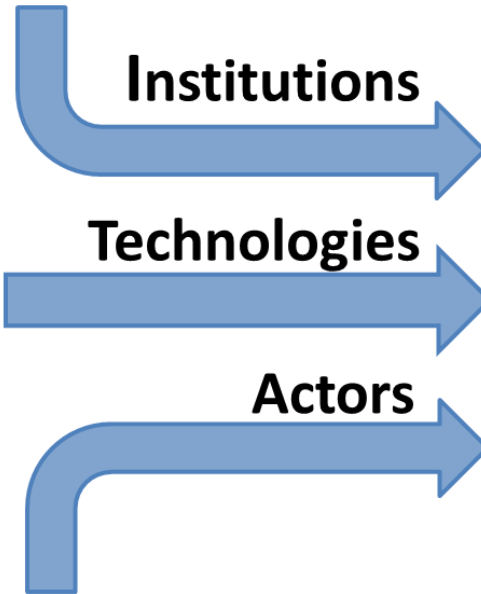
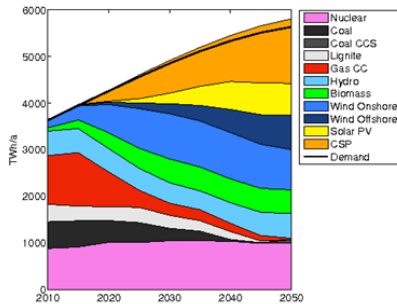
Science & Pretzels Australia

30 April 2014

Dr. Brigitte Knopf (PIK)

Energy Strategies Europe and Germany (ESED) @ PIK

- ETS, EEG, ...
- Market Design RES
- Capacity Mechanisms
- Grid planning / financing
- ...



Outline

- **Status Quo of the Energiewende –**
 - The only game in town?
 - Only a green dream?
- **The future of the Energiewende –**
 - The European perspective
 - Reform options for the EEG / FIT

...THE ONLY GAME IN TOWN

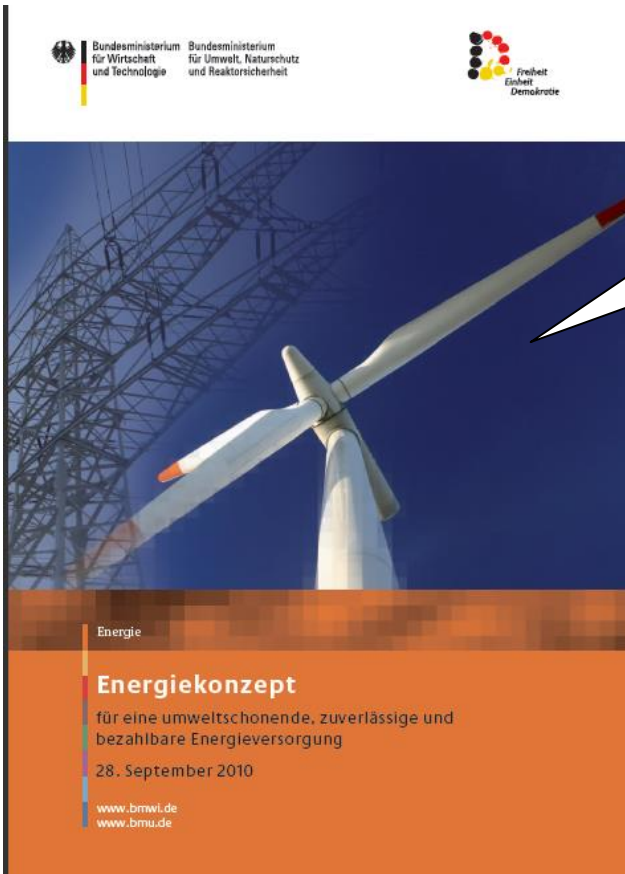


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Energiewende – The basics

„In this Energy Concept, the German government [...] for the first time, mapped a road to the age of renewable energy.“

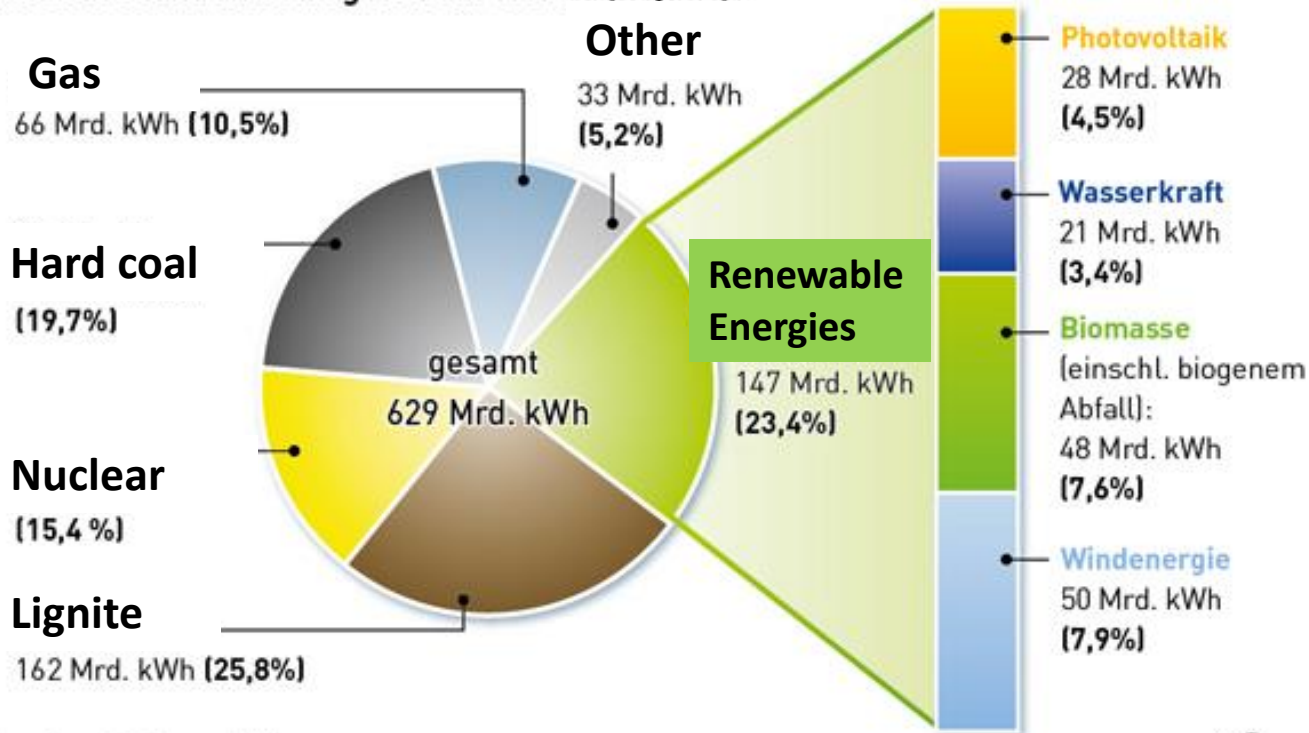
- 2000: first decision on nuclear-phase out
- Energy Concept (2010):
 - Reduction of greenhouse gas emissions by 80-95% by 2050
 - 80% target for share of renewable energy by 2050
 - Targets for energy efficiency
 - Nuclear power as „bridging technology“ (withdrawal of the phase-out)
- In 2011: 2nd decision on the nuclear phase-out („Energiewende“)



Increasing deployment of renewables – A success story

Der Strommix in Deutschland im Jahr 2013

Mit 147 Milliarden Kilowattstunden lieferten Erneuerbare Energien 23,4 Prozent der Bruttostromerzeugung. Ihr Anteil am deutschen Stromverbrauch von 596 Milliarden Kilowattstunden betrug fast ein Viertel (24,7 %).

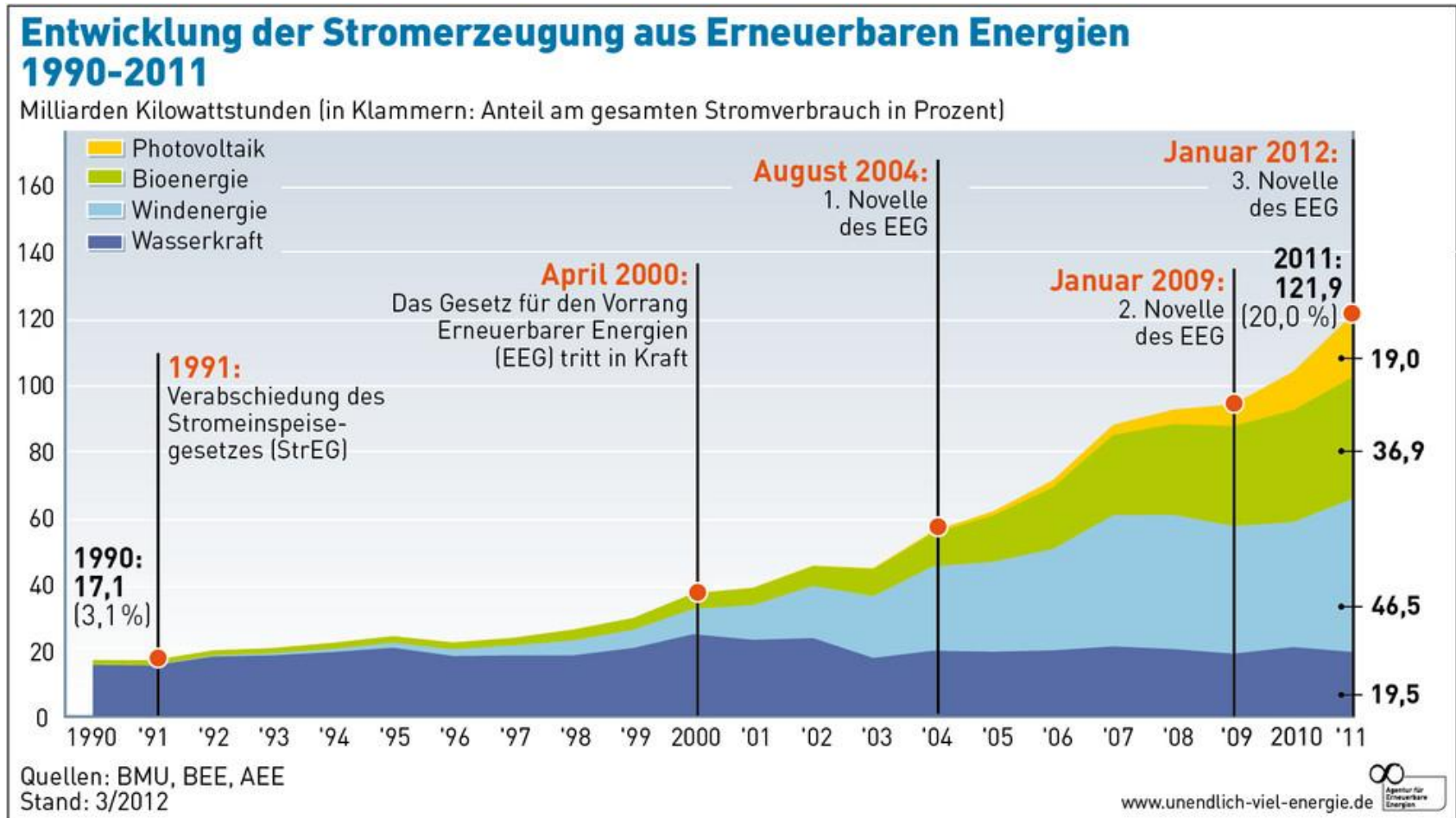


Quelle: AG Energiebilanzen
Stand: 12/2013

www.unendlich-viel-energie.de

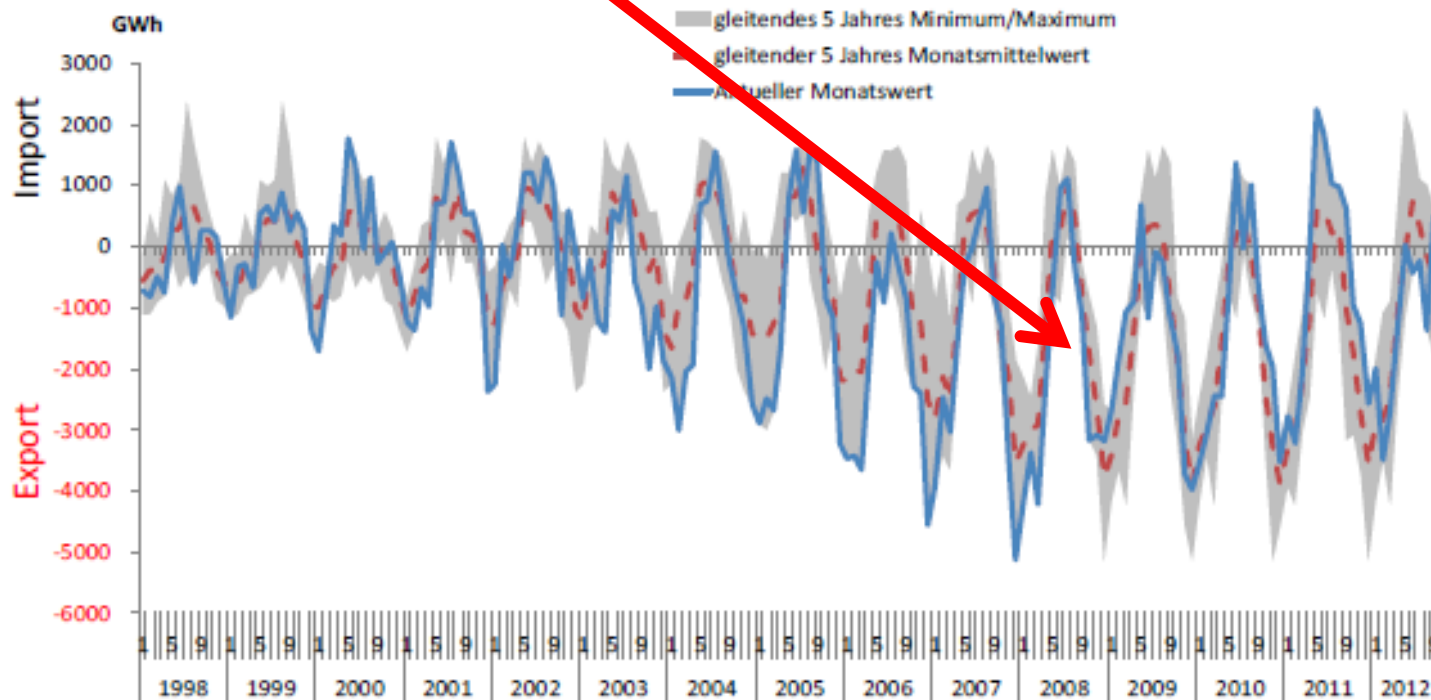


Success based on feed-in tariff scheme for renewables



No black-out despite nuclear phase-out so far – quite the contrary

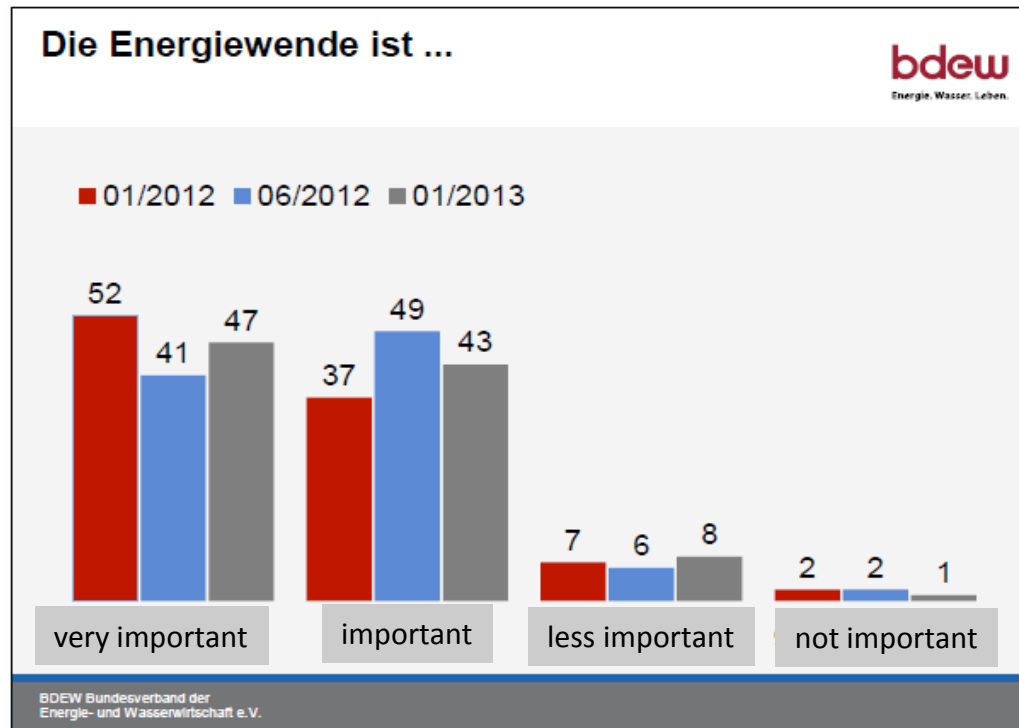
Increasing electricity exports



Quelle: [ENTSOE, 2012] (Eigene Darstellung)

Strong public support of the Energiewende

The Energiewende is ...

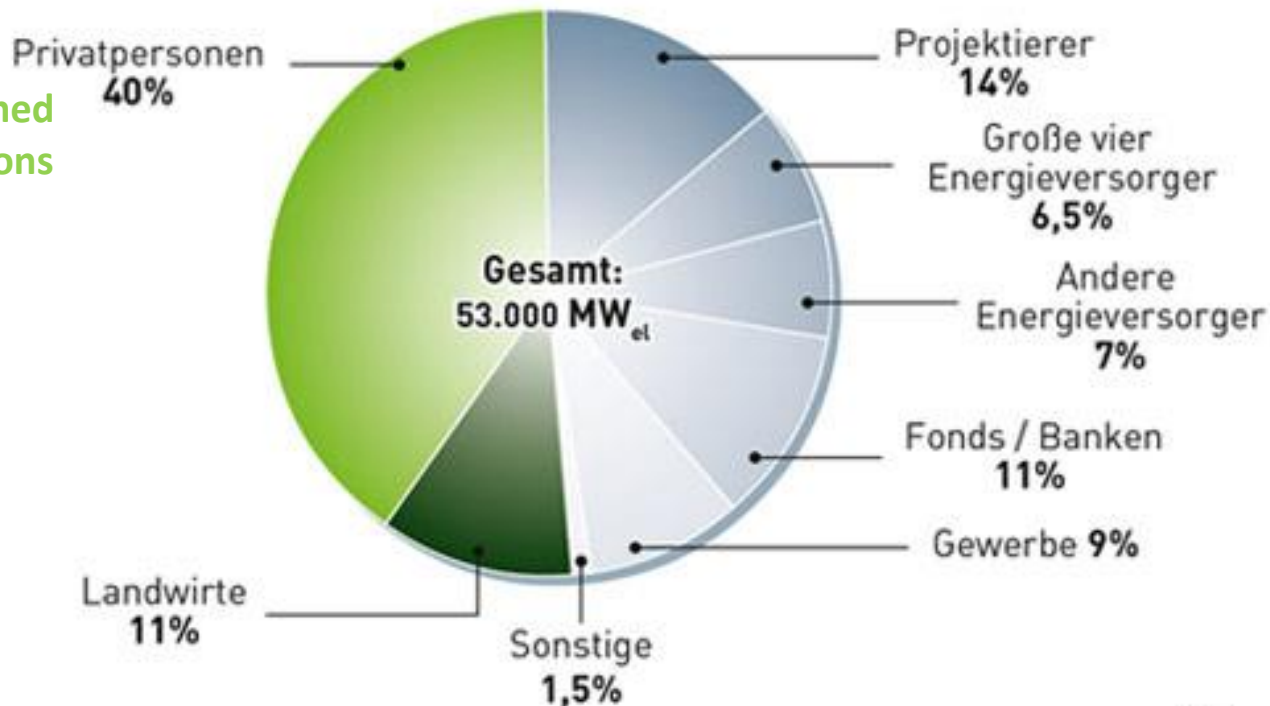


BDEW (2013)

“Breaking the power of the electricity oligopoly”

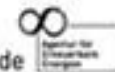
Erneuerbare Energien in Bürgerhand

Verteilung der Eigentümer an der bundesweit installierten Leistung zur Stromerzeugung aus Erneuerbaren-Energien-Anlagen 2010 (53.000 MW).



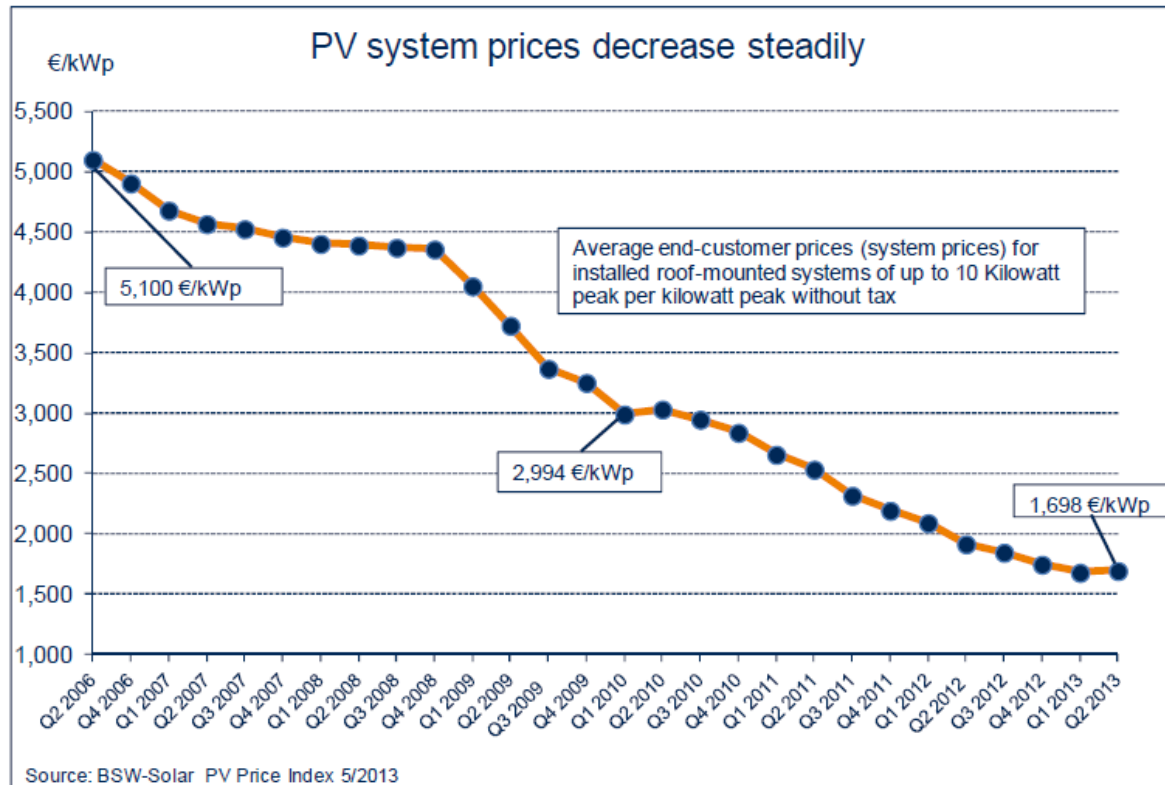
Quelle: trend research; Stand: 10/2011

www.unendlich-viel-energie.de



Cost degradation of solar PV

Average retail price for PV roof-top plant



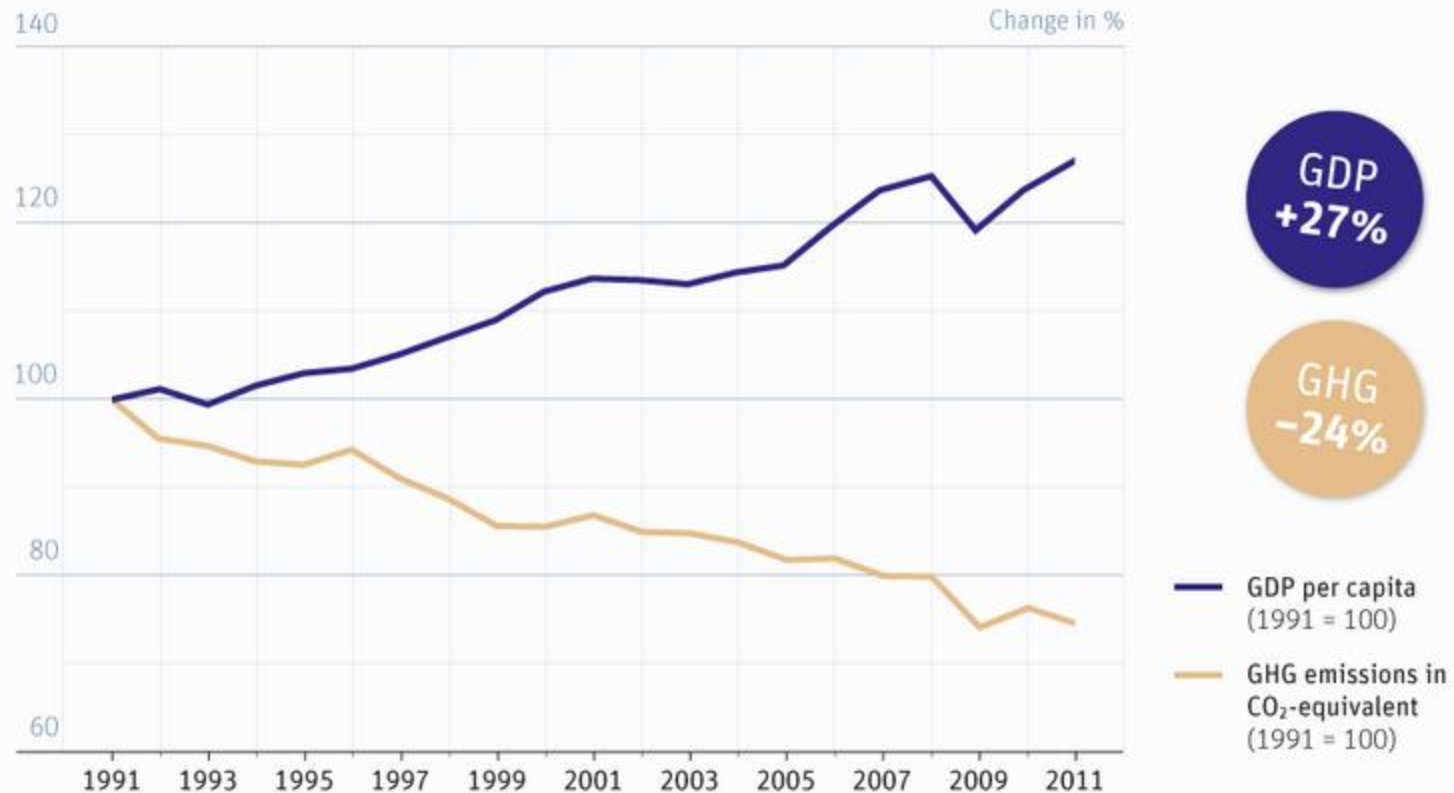
- Germany is providing a global public good by „driving down the learning curve“ of PV

Successful decoupling of growth and emissions

Germany: growing economy, declining emissions

Change of GDP and GHG emissions in Germany, 1991–2011

Source: BMU, BMWi, Destatis



www.energytransition.de

The international perspective

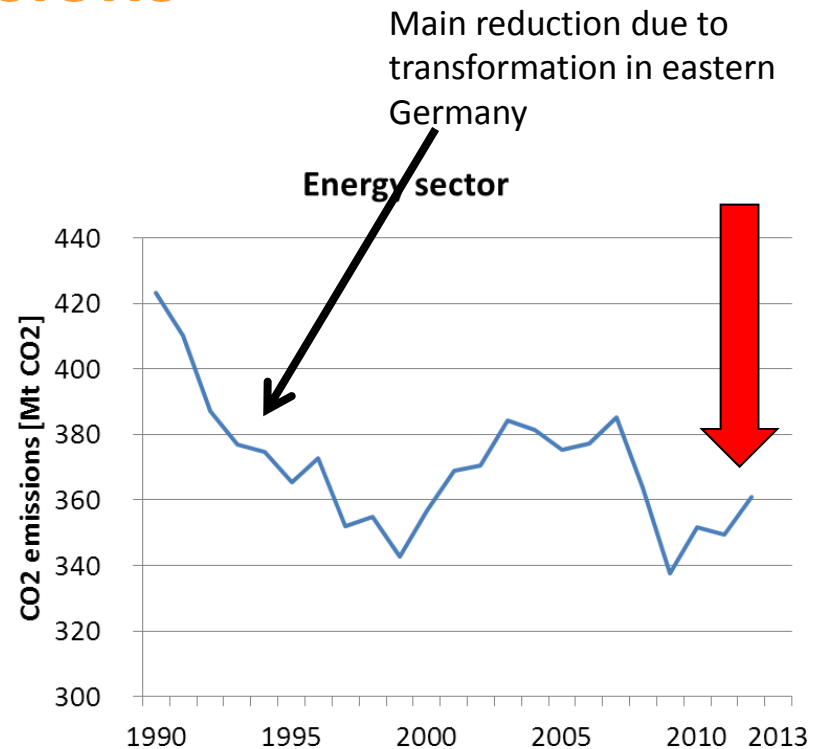
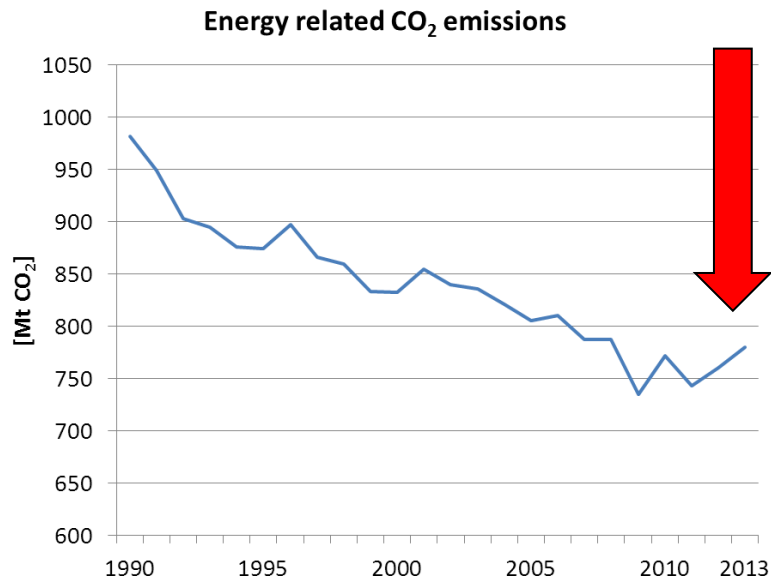
- Climate change mitigation is more urgent than ever, but emissions are increasing, increasing, increasing (see latest IPCC report)
- No binding agreement in Copenhagen 2009; most probable no binding agreement in 2015 in Paris
- National approaches become more important (e.g. trial phase of emissions trading scheme in China; regulation of coal power plants in the US; Energiewende in Germany)
- Local and national action might be the prerequisite for an international agreement and not the other way round:
 - “The Energiewende [...] is a pragmatic alternative to the largely fruitless efforts of international climate-change diplomacy” (nature, April 2013)

...ONLY A GREEN DREAM



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Increasing deployment of renewables – but also increasing emissions

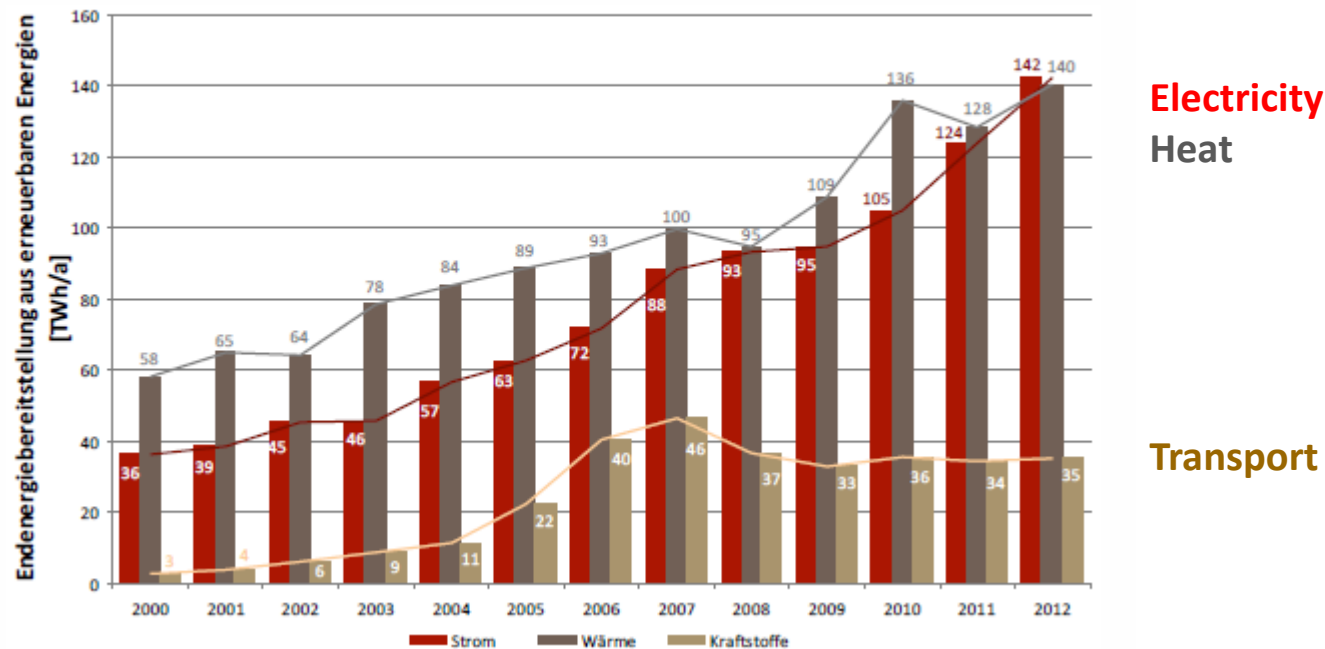


Source: BMWi (2012) and Ziesing (mündlich); eigene Darstellung

- Subsidising renewables is not enough! We need a price for carbon
- National 40% target by 2020 will most probably not be achieved

The Energiewende is only an electricity-Wende

Energy from renewables in different sectors

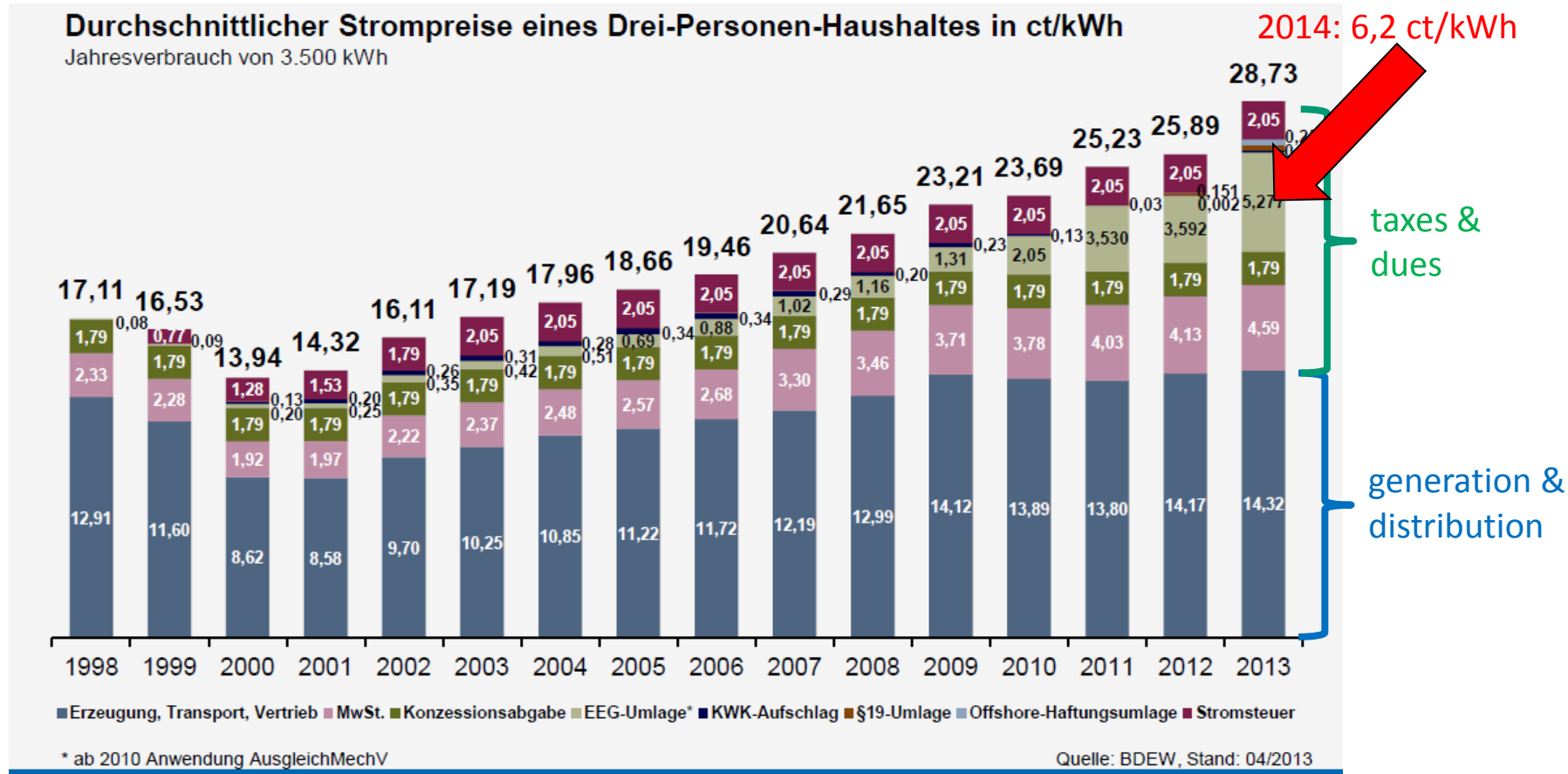


Expertenkommission Monitoring-Bericht 2014

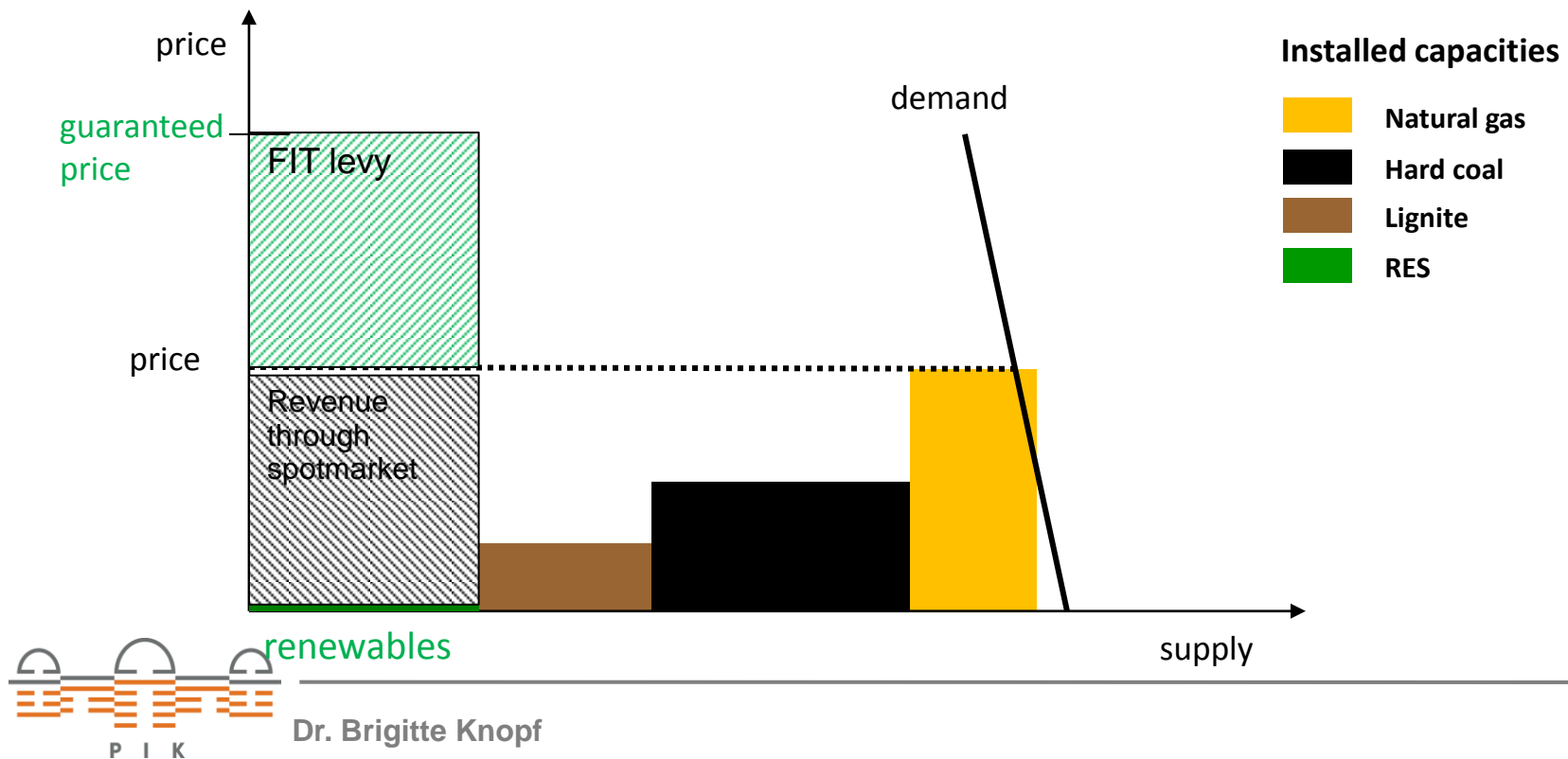
- Not much progress in other sectors (Transport, Heat)

Increasing subsidy costs for renewables

- Feed-in tariff (EEG) has been effective, but also costly

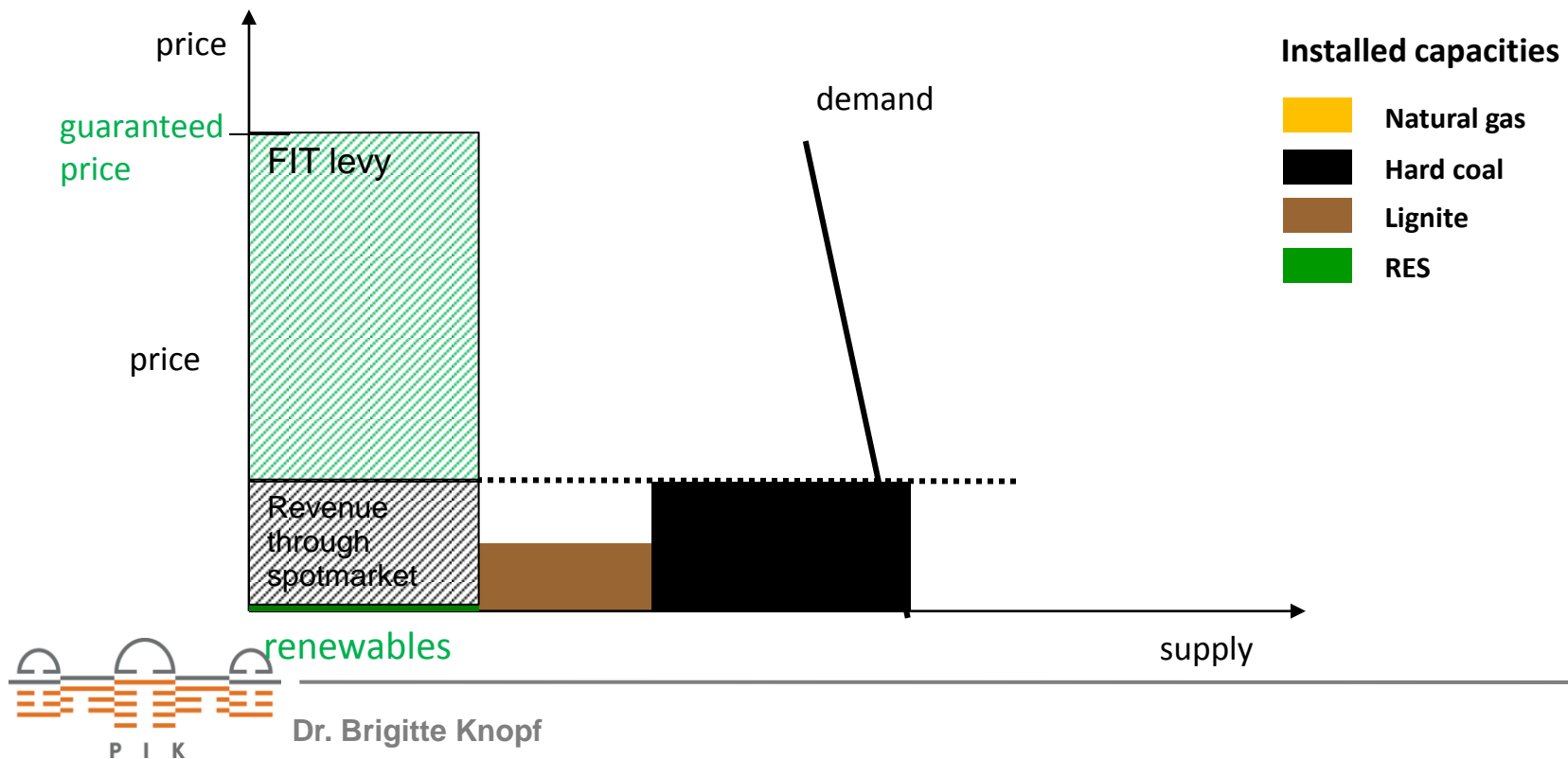


The mechanism of the feed-in tariff (EEG)



The mechanism of the feed-in tariff (EEG)

Increasing FIT levy with decreasing spot market price



Problems of the current EEG

- **Unfair distribution of the burden:**
 - For only 47% of electricity consumed by industry the full FIT levy has to be payed
 - Levy has a regressive effect as each household pays per kWh
 - By contrast, house-owners with PV on their roof profit
- **No coupling to market signals of the supporting scheme; probably not cost-efficient**

Is the focus on renewables enough? Not in the international perspective

New IPCC report of WGIII:

“Many models could not achieve atmospheric concentration levels of about 450 ppm CO₂eq by 2100 if additional mitigation is considerably delayed or under limited availability of key technologies, such as bioenergy, CCS, and their combination (BECCS).”

Interim conclusion

- **Whether the Energiewende is perceived as a success depends on the viewpoint, but 2 main problems have to be solved:**
 - **Increasing emissions despite of increasing deployment of renewables**
 - ➔ **The European perspective**
 - **Increasing subsidy costs of renewables; currently no integration of renewables into the market.**
 - ➔ **Reform options for the EEG**

THE EUROPEAN PERSPECTIVE



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Climate and energy policy in Europe

- EU-wide targets for 2020:
 - 20% GHG reduction
 - 20% share of renewable energy
 - 20% increase in energy efficiency
- How to continue for 2030? Suggestion of new framework by EU Commission in Jan 2014:
 - 40% GHG reduction by 2030
 - EU-wide target for RES (27%, de facto non-binding)
 - no energy efficiency target
- Urgently needed: Reform of the EU ETS due to low price ($\sim 5\text{€}/\text{tCO}_2$)

REFORM OPTIONS FOR THE EEG



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Reform of the Renewable Energies Act (EEG)

Why a Reform?

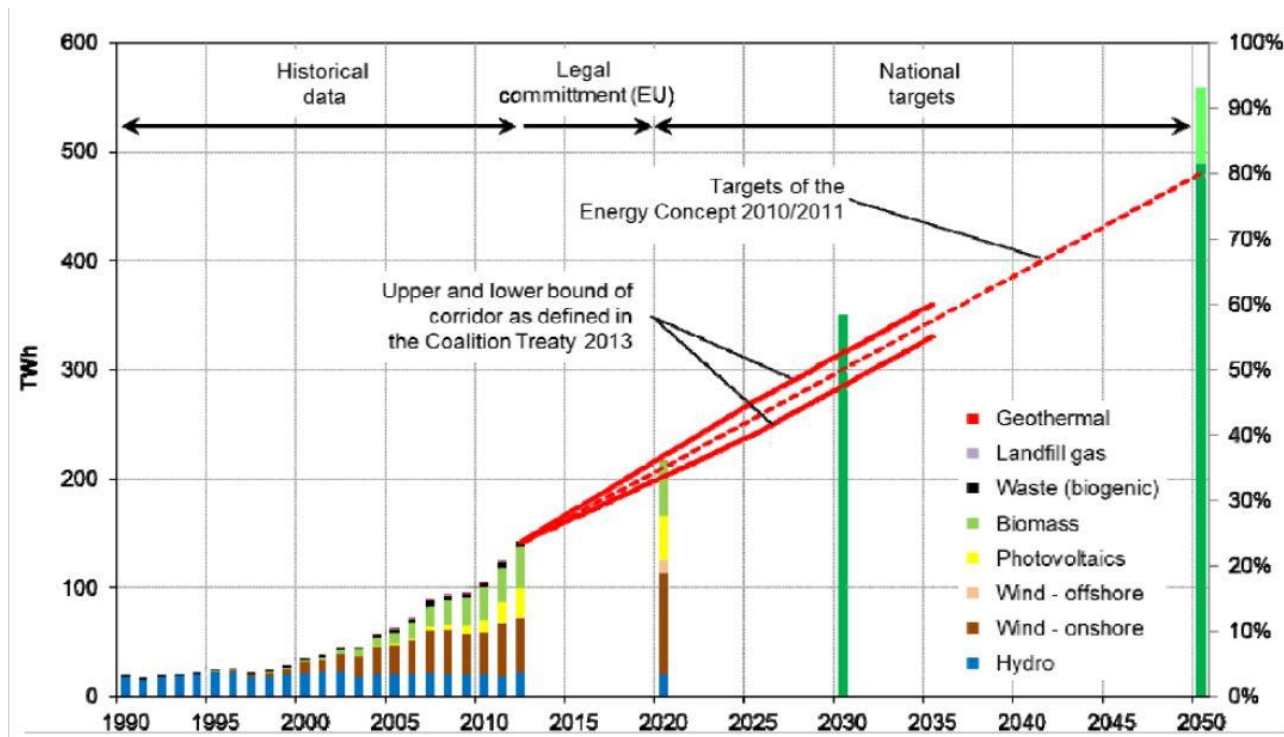
- Strong increase of FIT levy over last years
- De-solidarization between: industry vs. households; rich vs. poor household; privileged vs. non-privileged industry

Main changes proposed by new government:

- 1) **Price regulation** becomes a (hybrid) **quantity regulation**, legal framework for an „deployment corridor“ for each technology
- 2) **Direct marketing** of electricity from renewable
- 3) **Self-consumption**: Ending of exemptions from the payment of FIT levy
- 4) Cutting **industry privilege**

Regulation of Expansion of Renewables

- Corridor for RES deployment
- Flexible cap: Increased reduction of remuneration rates according to installed quantity (technology specific)
- Pilot phase for auctioning capacity from 2017 on



AG Energiebilanzen, Bundesregierung 2011, CDU/CSU/SPD 2013, Darstellung Öko-Institut

Evaluation of the Reform

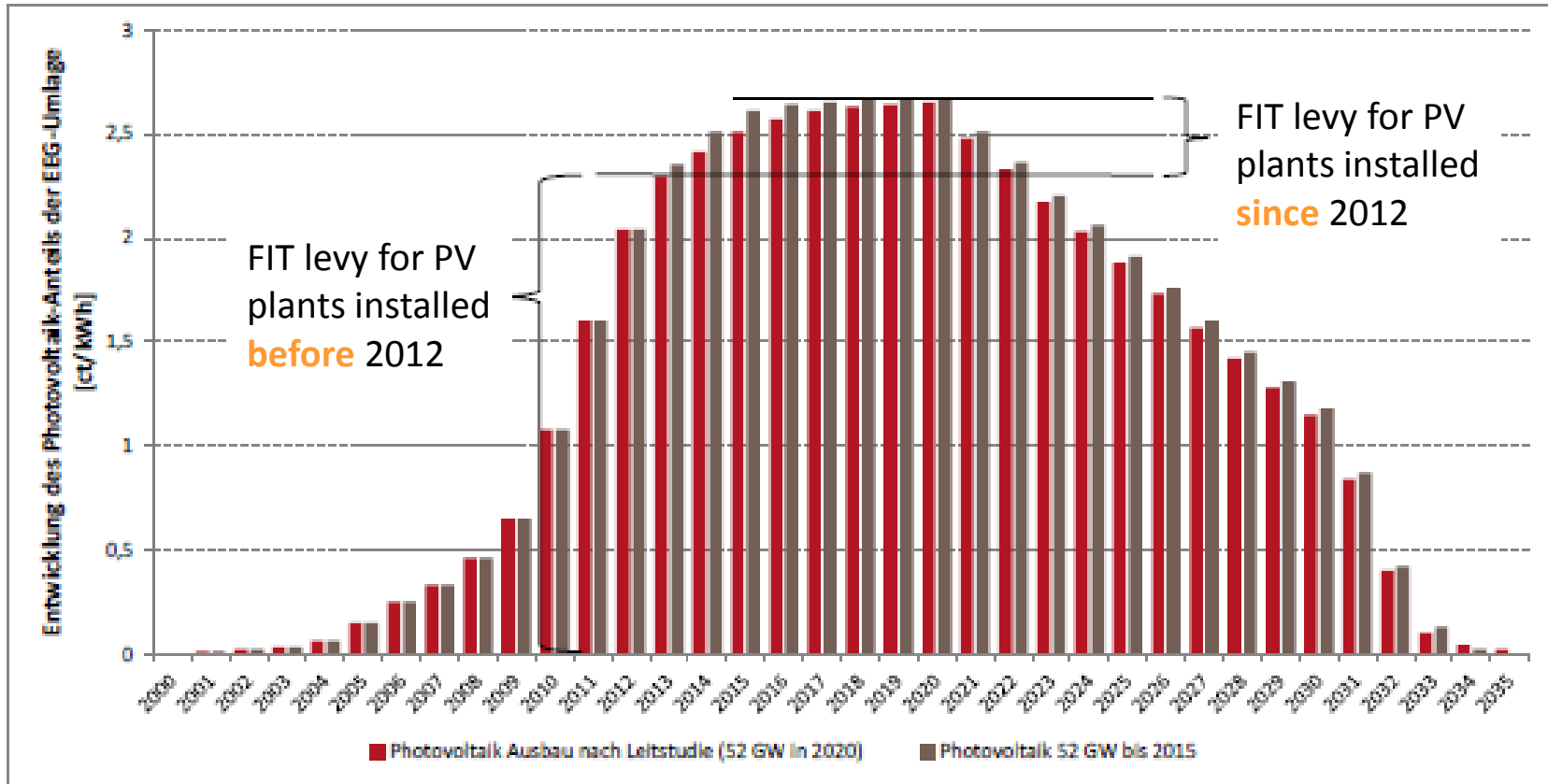
New:

- Deployment corridors; (hybrid) **quantity regulation**
- Increased **direct marketing** of electricity from renewable
- **Self-consumption** will be charged

No changes:

- FIT levy won't decrease as the main share of the burden is historical
- Hardly any cuts for industry privileges

Lock-in in high FIT levy by „old“ solar PV



Conclusion

- **Whether the Energiewende is perceived as a success depends on the viewpoint and on the objectives considered**
- **Crucial next steps have to be taken so that the Energiewende becomes a success also for climate change mitigation**
- **Without putting a price on carbon, subsidies for renewables will not be enough; 100% renewables are not enough for keeping 2°C**
- **For an international agreement we first need successful steps at the national or even local level and then initiate a bottom-up process by fostering international cooperation**
- **Europe is the natural starting point for cooperation**

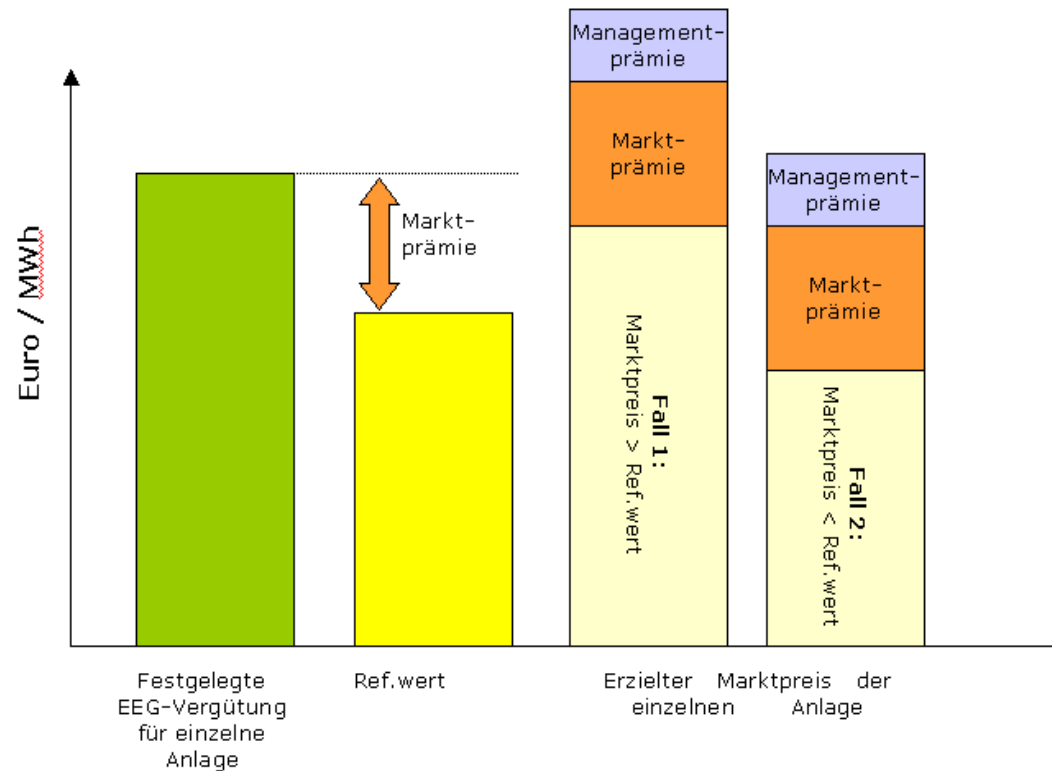
BACKUP



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Reform options for the EEG

- Great Coalition: “gleitende Marktprämie”
- Smooth reform, smallest possible step



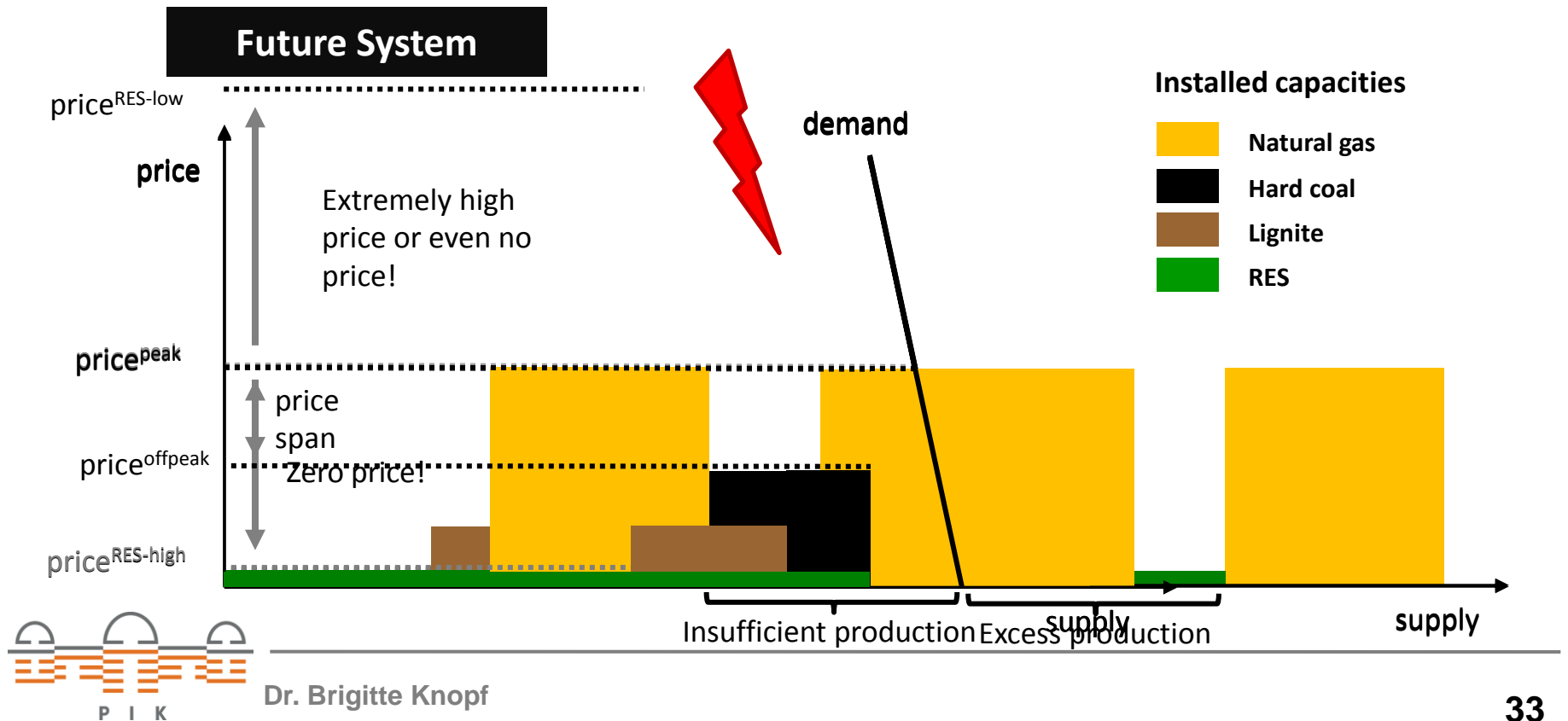
Source: wikipedia

The challenge of integrating renewables (RES)

Regulatory challenge: RES subsidy scheme(s) for inducing transition?

Technical challenge: Grid expansion, storage technologies, ...

Market design challenge: Renewables have marginal costs of (nearly) zero - can they be integrated into the existing energy only market?

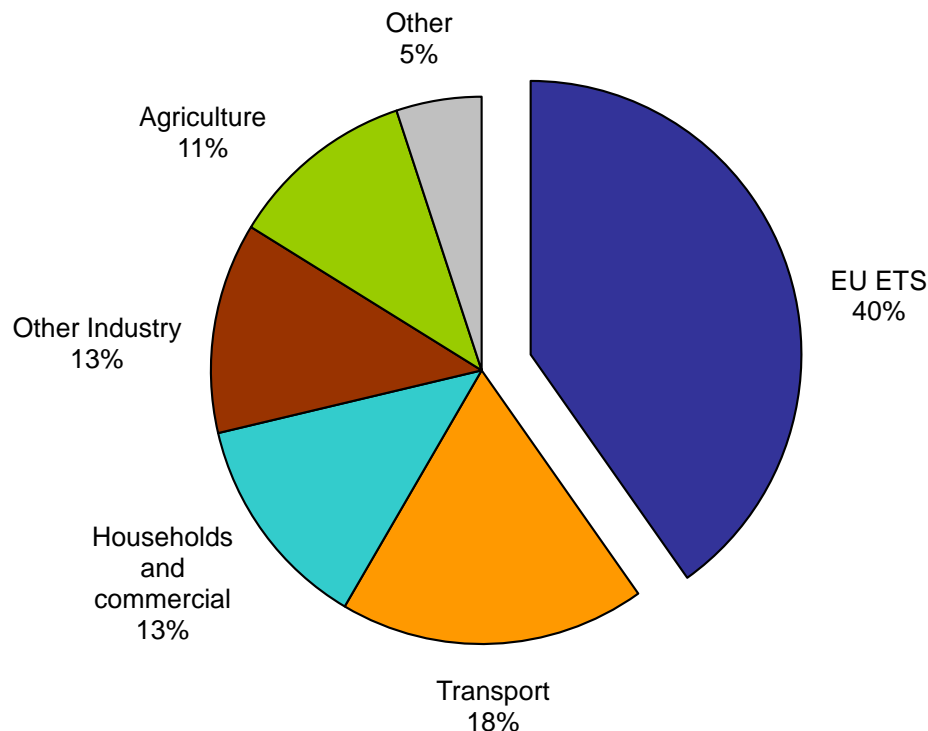


Security of supply and adequacy of power generation capacities

- **Capacity Mechanisms are currently heavily discussed**
 - Is it needed at all? The answer depends crucially on the deployment path of renewables. Bottlenecks are expected in 2016 (shut-down of Grafenrheinfeld) and after 2022
- **Option A: Strategic reserve:**
 - provision of power plants as „backup“ in times of peak load
 - operation of power plants at a fixed price cap
- **Option B: Contracts for security of supply / capacity market:**
 - capacity bonus by means of auctioning for all plants
- **Problem: mixing of security of supply issues with re-financing issues of fossil power plants**

Putting a price on carbon: The European Emission Trading System EU ETS

EU-27 Greenhouse-gas emissions



- 40% of EU emissions are covered by the EU ETS
- If Germany increases emissions, this has to be compensated by reductions in other countries
- This implies that the cap is crucial for emission reduction in Europe

Collapse of EU ETS allowance price

theguardian

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Environment > Emissions trading

EU carbon price crashes to record low

Price of a permit to emit a tonne of carbon fell to €2.81 after an EU vote against a proposal to support the struggling market

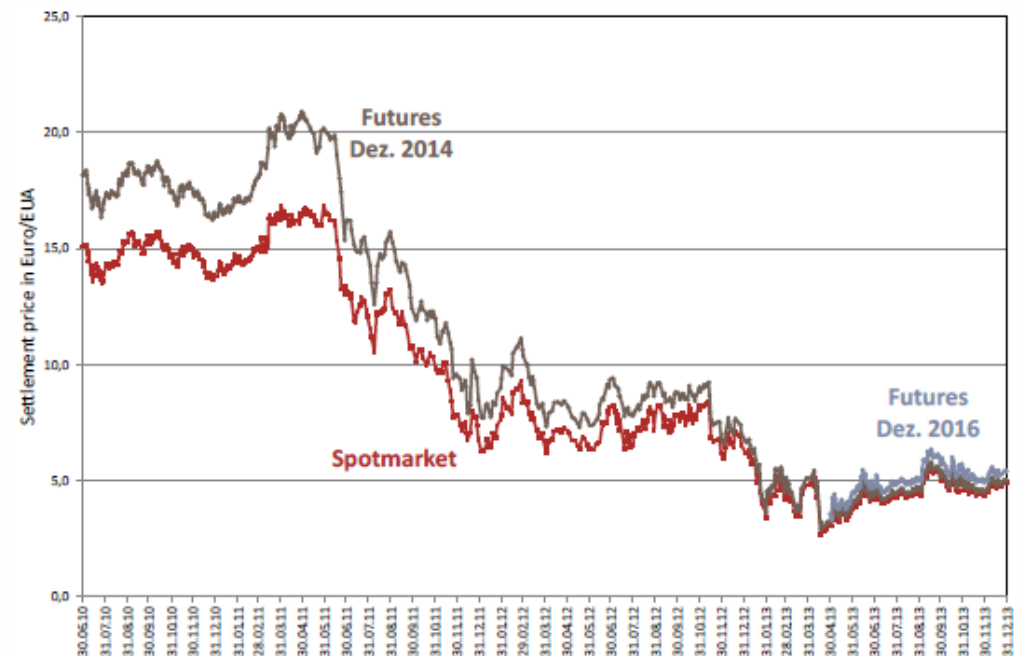
Damian Carrington

theguardian.com, Thursday 24 January 2013 17.17 GMT

Reasons:

- Economic recession
- Overallocation for CDM credits
- Renewables supporting schemes?

Abb. 2-5 CO₂-Zertifikatspreise von 2010 bis 2013 auf dem Spot- und Terminmarkt für Lieferungen im Dezember 2014 und 2016



Quelle: EEX [2014]



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Reform options for the EU ETS

- **Backloading of certificates (only a temporary solution)**
- **Sectoral expansion (e.g. transport sector) or regional expansion (e.g. linking with Australia)**
- **Installation of a Carbon Authority similar to a Central Bank (e.g. Grosjean et al. 2013)**
- **Credible targets for 2030 and stronger reduction in ETS sector**
- **Installation of a price collar (see discussion of floor price in UK)**

Linking of regional emission trading systems

Italics: already operating

