arrhenius INSTITUT FÜR ENERGIE- UND KLIMAPOLITIK
INSTITUTE FOR ENERGY AND CLIMATE POLICY

Integration of renewables into the power markets of Europe: the German perspective

Joint Workshop

IEA Renewable Energy Working Party & Research Council of Norway

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The Institute

Private Think Tank	Independent expertise for policy and decision makers
Areas of expertise	• Liberalised energy markets • Renewable Energies • Regional energy and climate protection concepts • Decentralised energy systems • Carbon and green certificate trading
Legal form	arrhenius consult gmbh (private limited liability)
Office	Hamburg
Founding year	2005

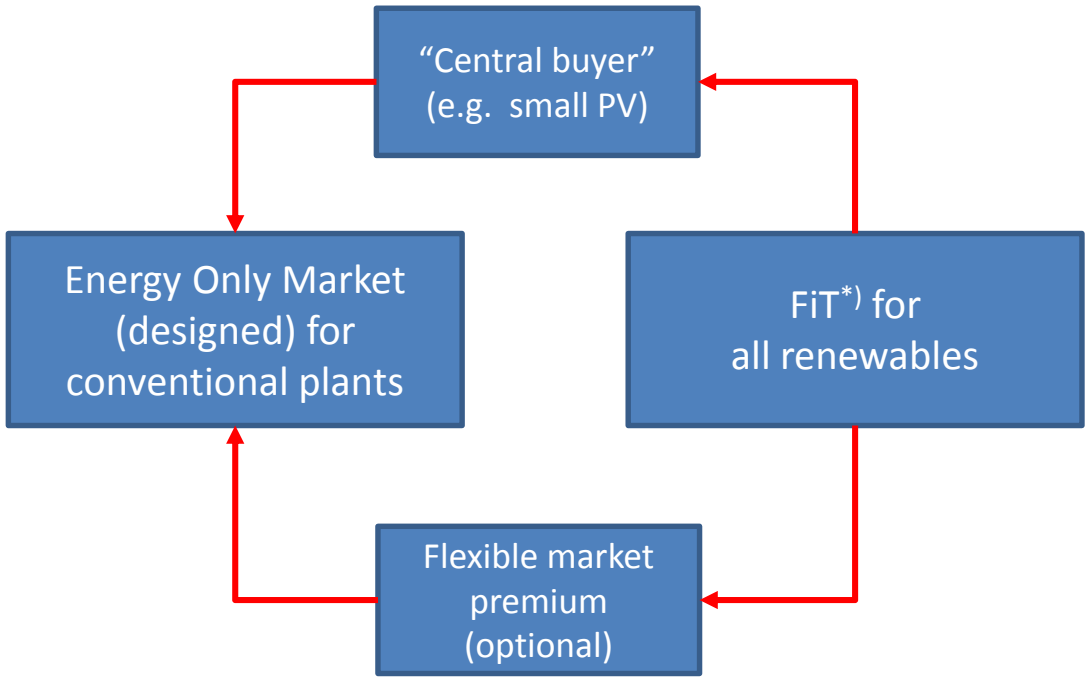
Svante **Arrhenius**

- Swedish physicist and chemist (1859 -1927)
- First (1895) to discover the role of carbon dioxide for climate on earth and to predict anthropogenic climate change

Integration of renewable energies into power markets

Possible view on market integration

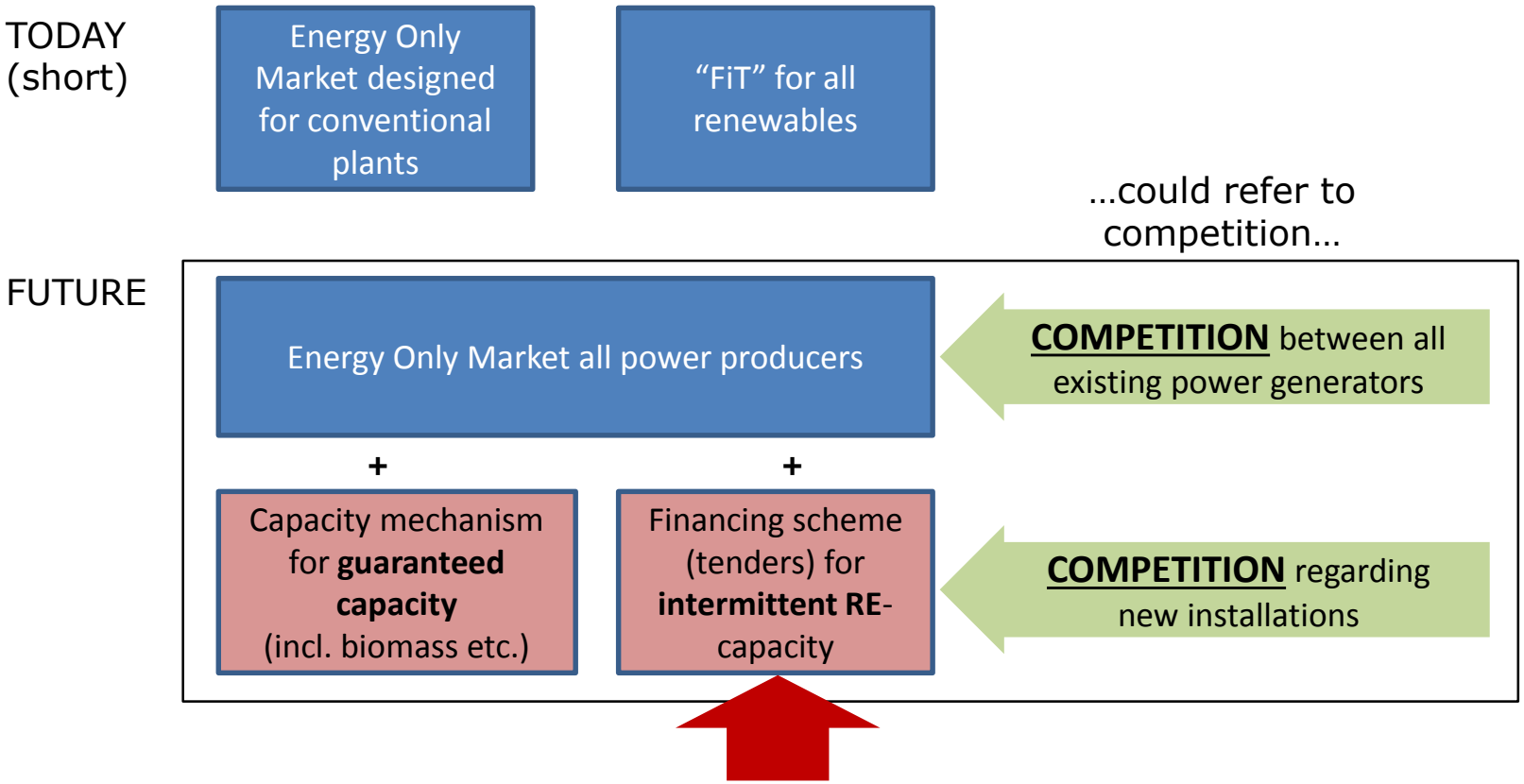
TODAY



*) FiT = Feed-in Tariff (in Germany = EEG)

Integration of RE into power markets

One possible view on what market integration could be…



*) FiT = Feed-in Tariff

Background on EEG in Germany

Background

- EEG (= Erneuerbare-Energien-Gesetz: feed-in tariff scheme):
  - Feed-in tariff based on total average costs over 20 years
  - 80% RE in 2050 as part of the Energiewende
    (other parties: 100% in 2030)
- Increase in RE-mark-up (EEG-Umlage) over the last years
  - especially for private households

2008	2009	2010	2011	2012	2013	2014
1,2 ct/kWh	1,2 ct/kWh	2,05 ct/kWh	3,53 ct/kWh	3,59 ct/kWh	5,28 ct/kWh	6,2 to 6,5 (estimated)

  - Reductions/ exemption for large industrial power consumers
- Support/ acceptance is decreasing

EEG-Reform

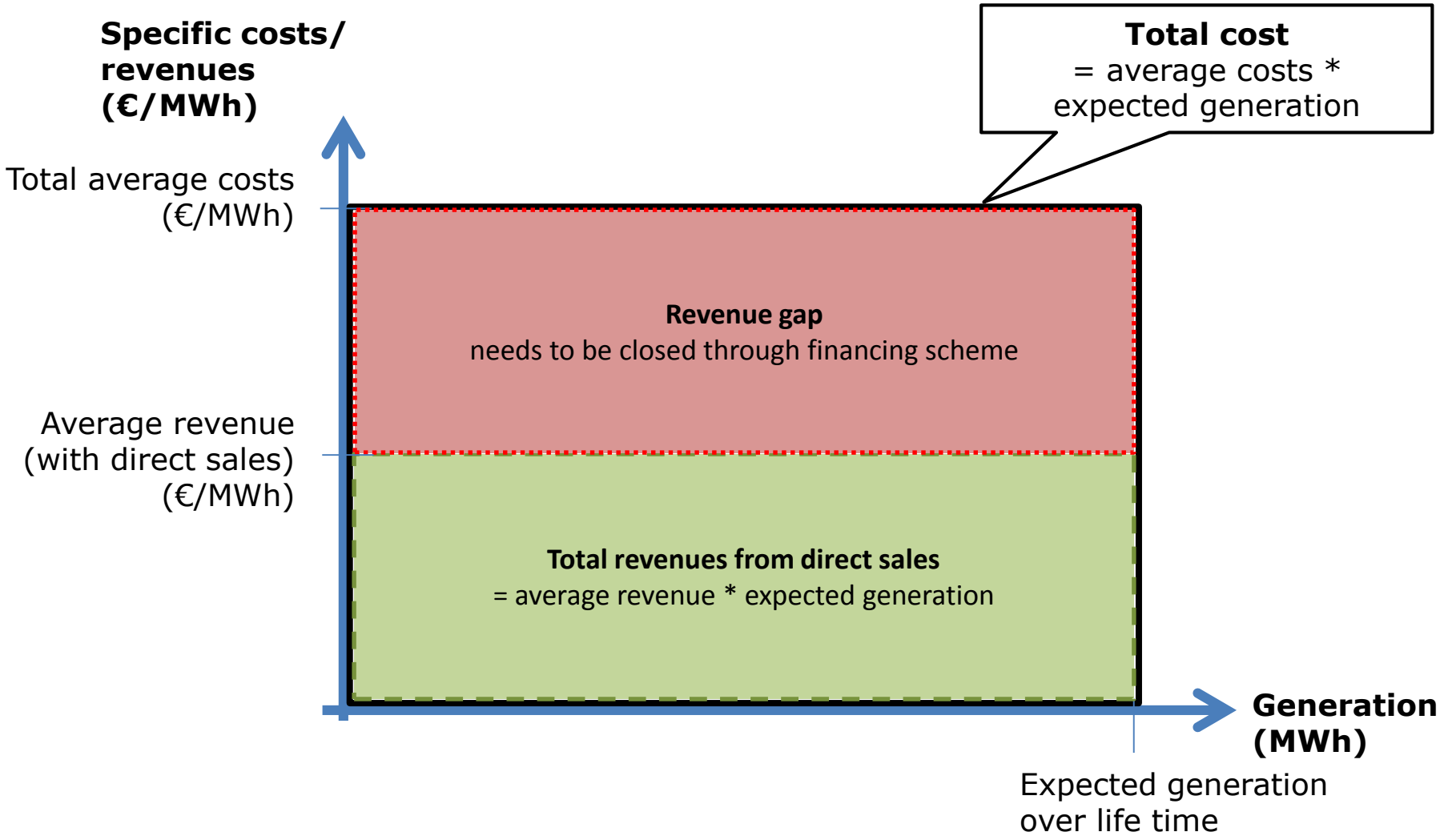
EEG needs to be "improved" or replaced?

- Important to note:
  - Energiewende needs private investors
    → incentive to invest imparative
  - Merit-order effect of RE reduces power price, thus revenues:

    →With high shares of intermittent renewables, investments do not refinance in current market scheme (revenue gap)

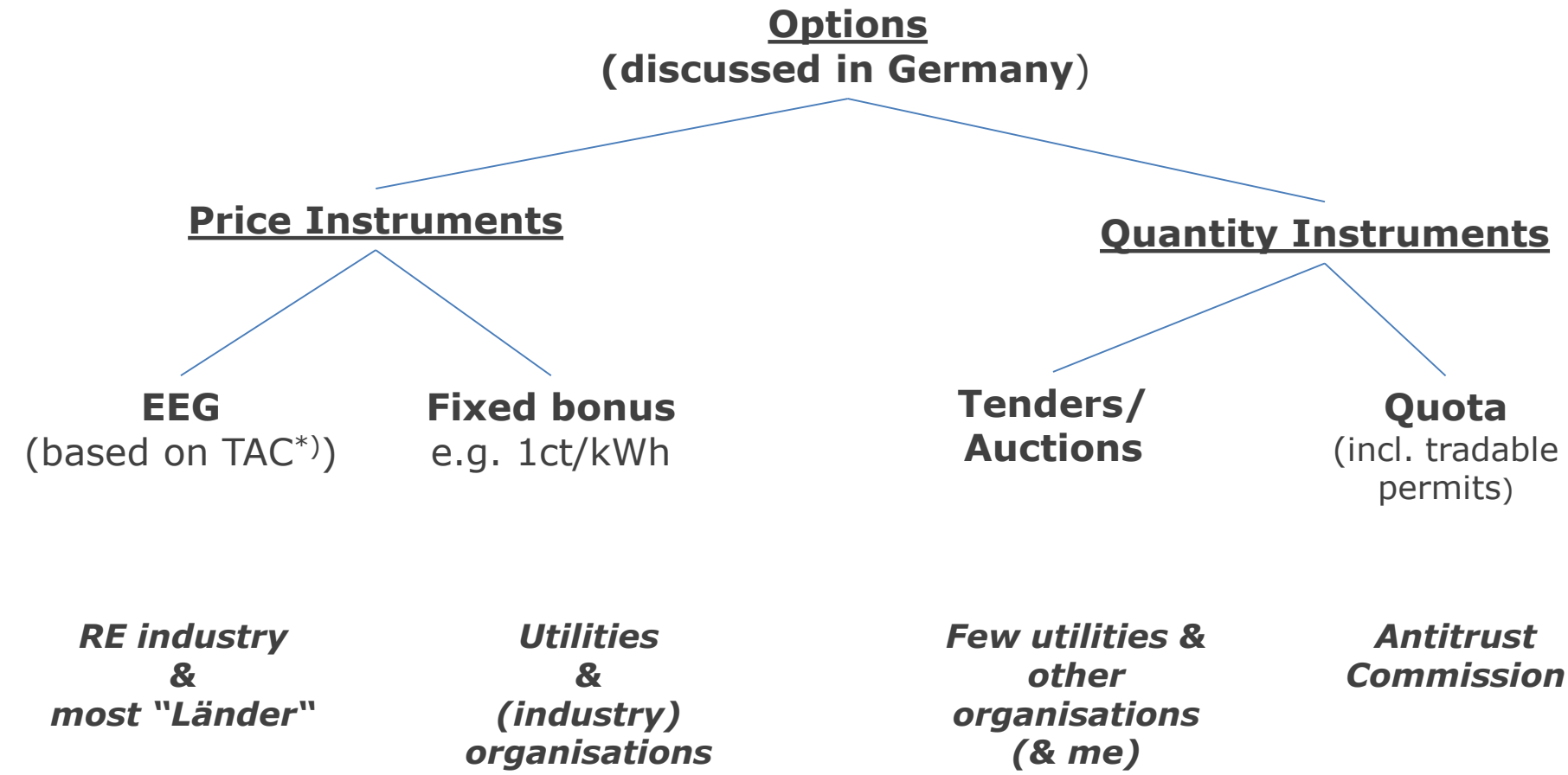
    → additional revenues are required; need for "support scheme" (better "financing scheme" when talking about 80% market share)

EEG-Reform



EEG-Reform

EEG needs to be "improved" - or replaced?



*) TAC = Total Average Costs

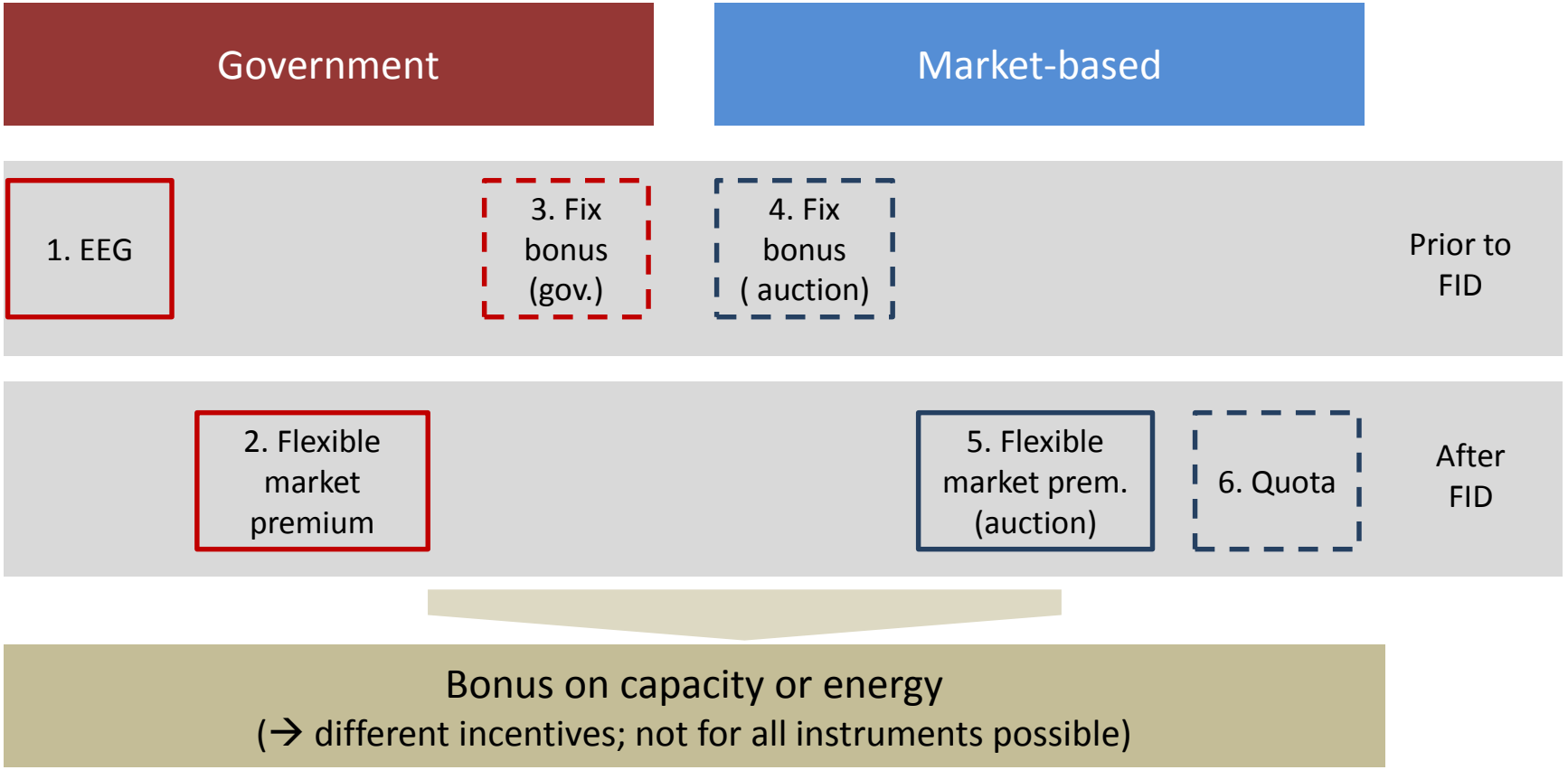
EEG-Reform

Aspects to be considered

- Direct marketing vs. central buyer
- Market-based vs. governmental determination of support/ financing level
- Financing schemes focuses on total average cost vs. revenue gap

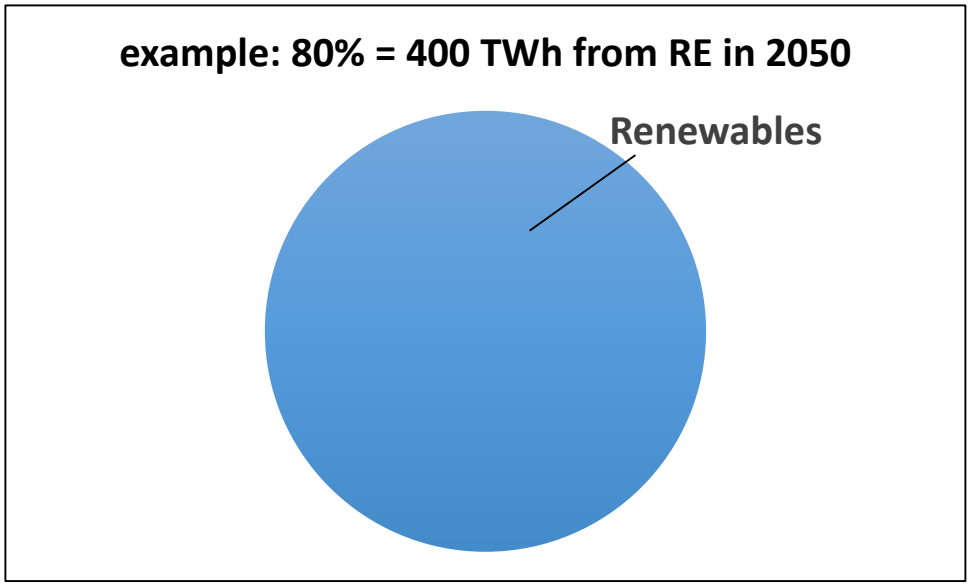
EEG-Reform

Aspects to be considered



*) TAC = Total Average Costs

Looking back from the end: 80 % RE in 2050 *)



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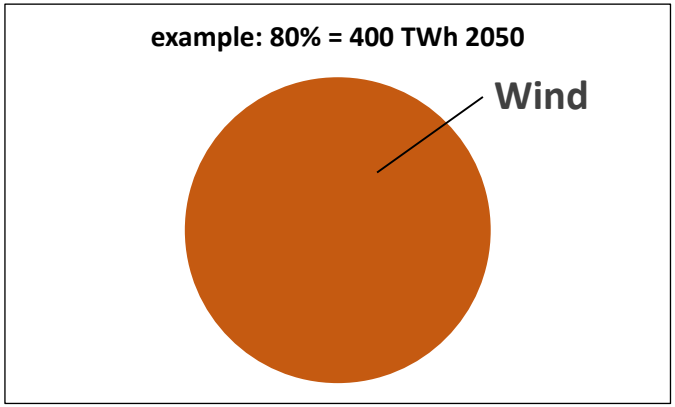
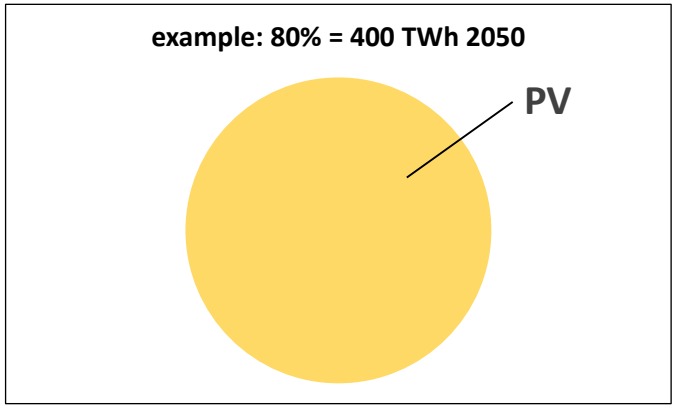




- Hydro
- Bio-energy
- ...

?

Presumably not...

*) similar for different targets in different years

Perspective

Trade-off

- High preference for market-based
  - Policy makers do not want to decide for/ against certain technologies/ companies → the market shall decide

- Need for financing scheme (to bridge revenue gap)
  - This schemes needs to determine contributions of the different technologies (sooner or later)

Short comments on the instruments

Price instruments

1. EEG:
   - Pro: stable revenue stream / high incentive to invest
   - Con:
     - quantities different to control (best ex-post)
     - TAC*) to be estimated by government
2. Flexible market premium
   - Pro:
     - power value driven investment/ operation (≠ produce & forget)
     - stable revenue stream / high incentive to invest
   - Con:
     - quantities different to control (best ex-post)
     - TAC*) to be estimated by government

*) TAC = Total Average Costs

Short comments on the instruments

Price instruments

3. Fix bonus (government)

- Pro: ?? *(less expensive than EEG?)*
- Con:
  - Government must assess
    - TAC*)
    - Power prices / revenue gap over project life-time (20 yrs)
  - Quantities even more different to control (best ex-post)

*) TAC = Total Average Costs

Short comments on the instruments

Price instruments

4. Fix bonus (auction)

- Pro: Use of private information of project developers
- Con: Possibly still high risk with regard to invest
  (e.g. for Germany: design of capacity mechanism, discussion on EU emission trading scheme: backloading, carbon-prices: development of power prices highly uncertain)

Short comments on the instruments

Quantity-based instruments

5. Flexible market premium (auction/ tenders)

- Pro:
  - Use of private information of project developers
  - Quantity control (via tenders)
  - Control on regional distribution (hot spots/ bottlenecks)
- Con: ??

Short comments on the instruments

Quantity-based instruments

6. Quota (incl. certificate trading)

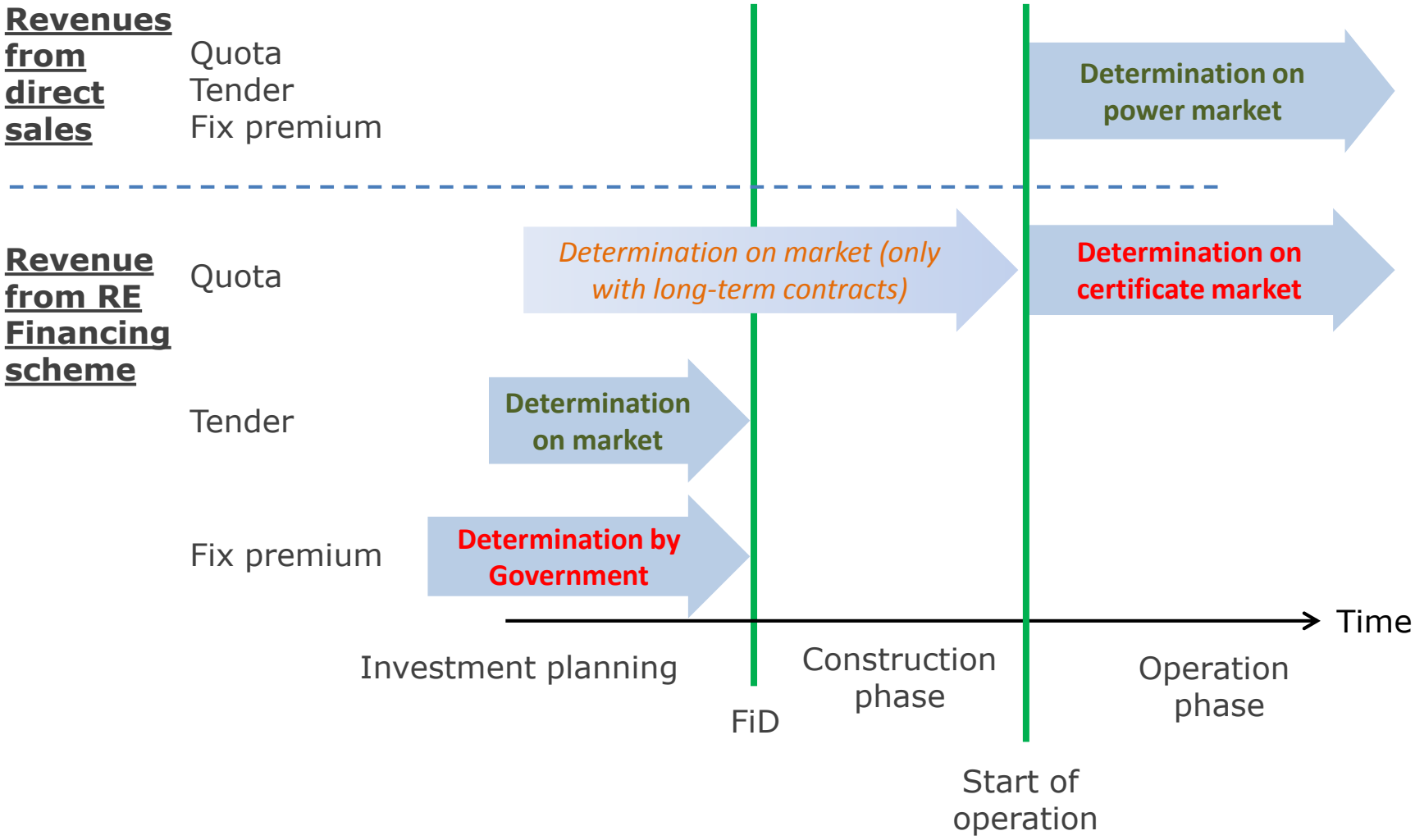
- Pro:
  - Use of private information of project developers (e.g. TAC*)
  - Quantity control
  - *EU common (energy) market compatible (?)*
- Con:
  - High risk with regard to certificate prices*)
    → high investment risk (with no benefits)

*) see Bode (2008) Anreize für Investitionen in Anlagen zur Stromerzeugung aus erneuerbaren Energien im liberalisierten Strommarkt, in ZfU 4, S. 497 – 516 (in German only)

*) TAC = Total Average Costs

Short comments on the instruments

IF the EEG is to be replaced…



Conclusion

There is a strong case for tenders (auctions) as financing scheme for RE…

…but presumably we won't see it for quite a while.

(short comment on elections in Germany on September 22)