POTSDAM INSTITUTE FOR CLIMATE IMPACT RESEARCH

California and German market and policy lessons in high penetration renewables

Michael Pahle

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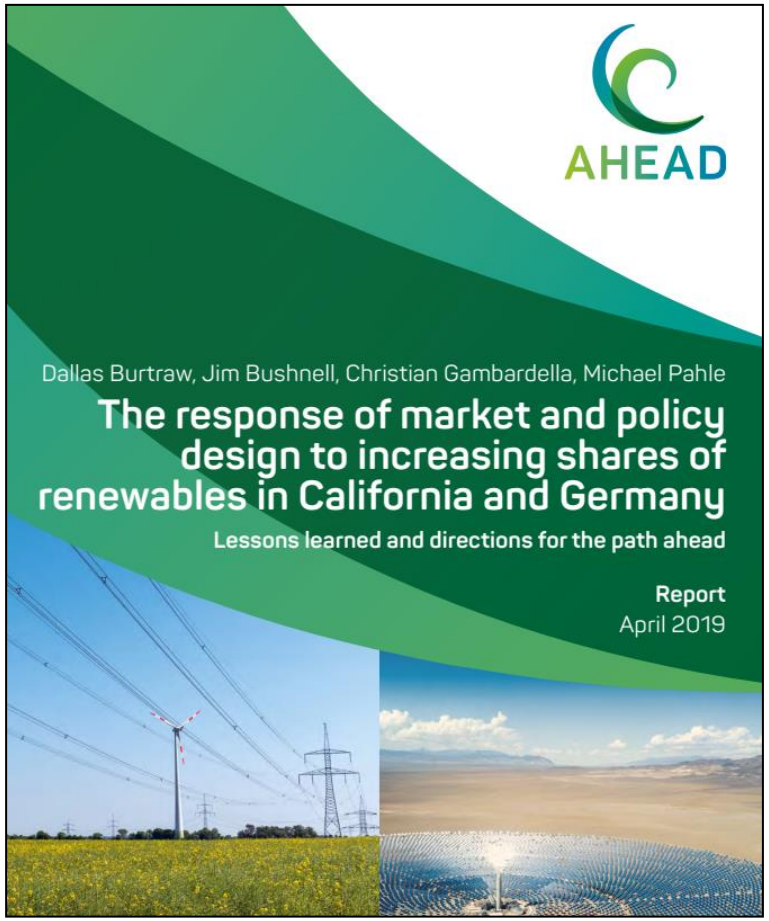
AHEAD project report



- How has market and policy design **responded** to increasing shares of renewables in both jurisdictions?
- What are the **needs/trends** in pursuing deep decarbonization in both jurisdictions?

US/CA partners:

UC DAVIS ENERGY ECONOMICS PROGRAM

RESOURCES FOR THE FUTURE

Available from: http://www.pik-potsdam.de/ahead

Why comparative analysis?

- **Practical** value: **Facilitate cross-jurisdictional learning** by identifying “transferable” lessons

- **Scientific** value: Explain **variation** between different policy/market models, assess if models **converge or diverge**

Differences diminish, inflection point reached

"In California, the market reforms following the 2000-2001 electricity crisis positioned the state well to accommodate subsequent rapid growth of renewables."

"In contrast, Germany started out with a problematic legacy electricity industry structure, which required substantial responses to growing renewables."

"Historical differences diminish as both jurisdictions are trying to go where electricity systems have not gone before."

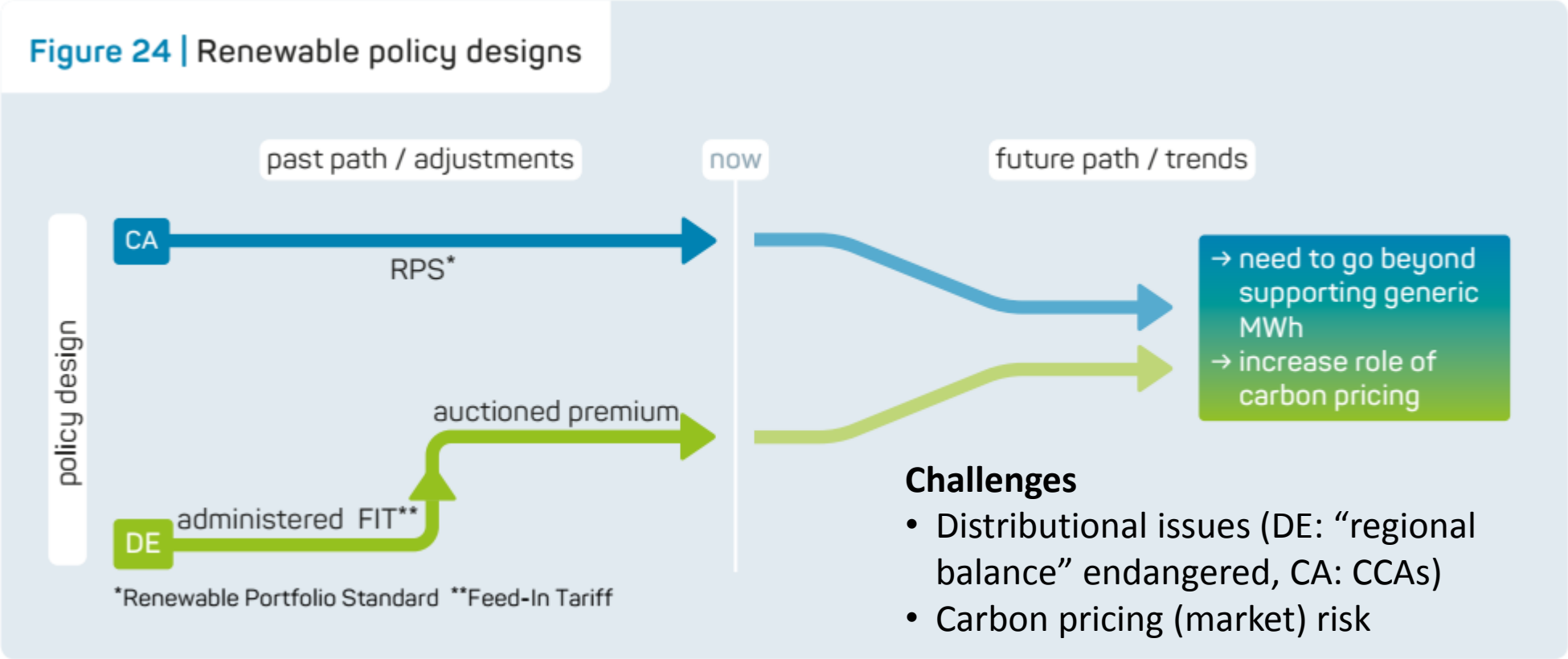
"As renewable shares increased, efficiency and equity issues have become a major concern for regulatory responses."

Inflection point

- next X% more challenging then previous 35%
- major deviation form current policy path (needed)

increasing share of renewables

Example: Renewable policy design

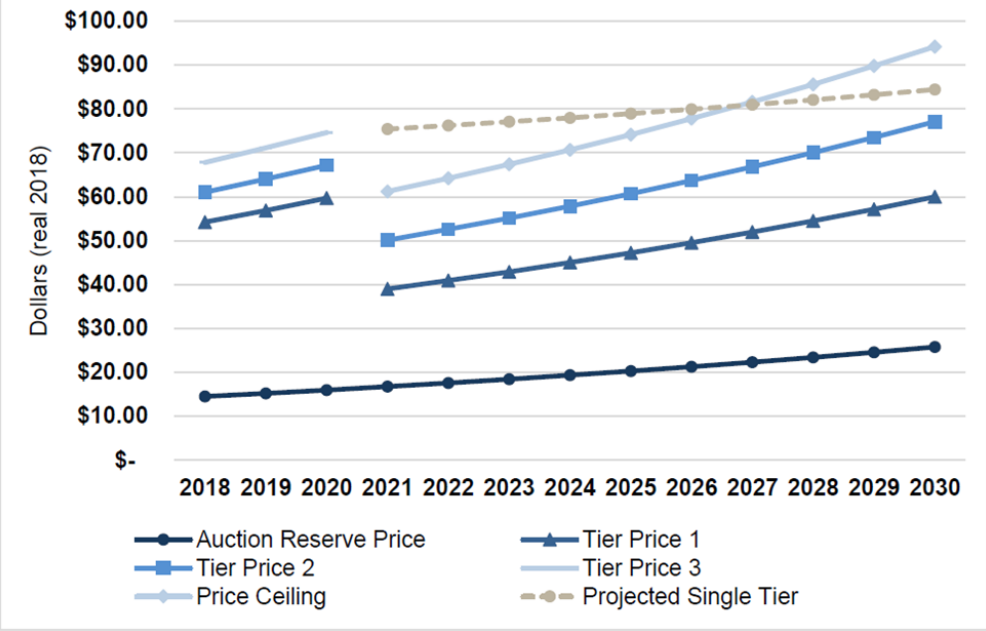


Challenges

- Distributional issues (DE: “regional balance” endangered, CA: CCAs)
- Carbon pricing (market) risk

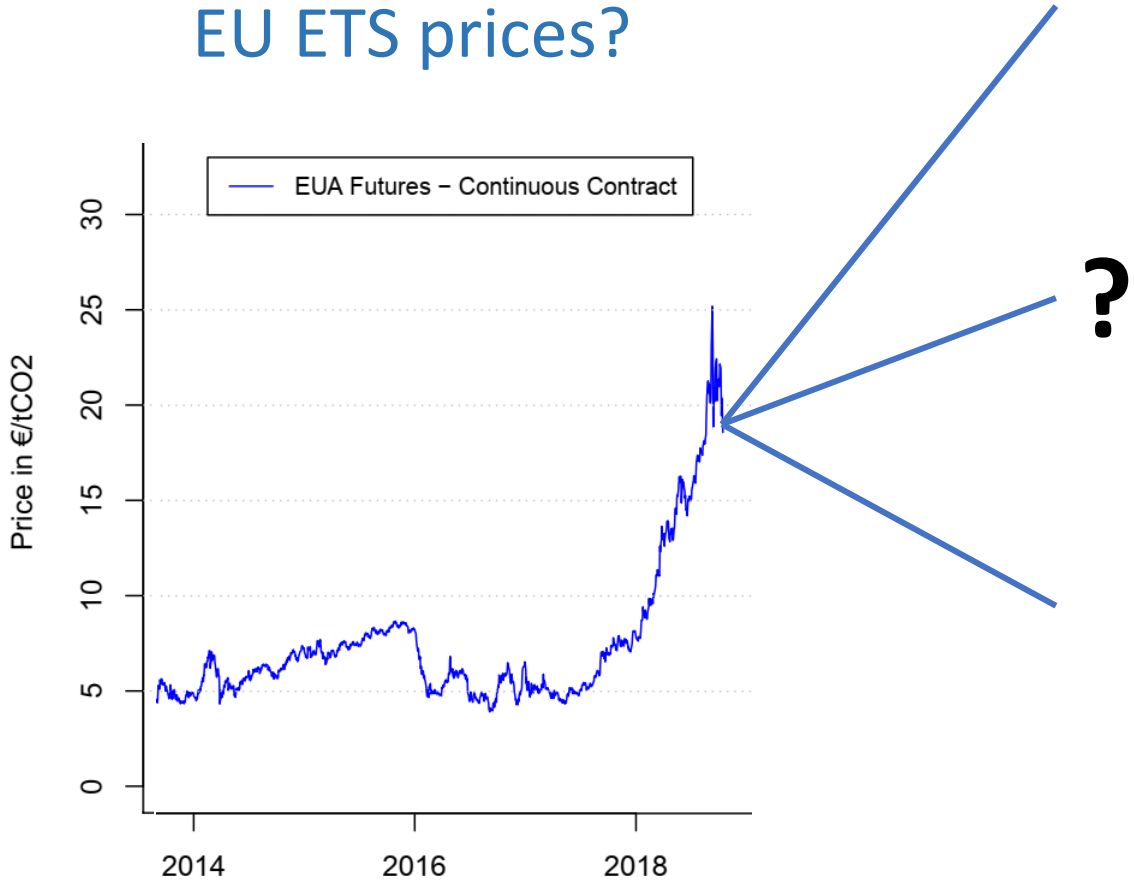
Different approaches to manage carbon price risk

CAL post-2020 price collar



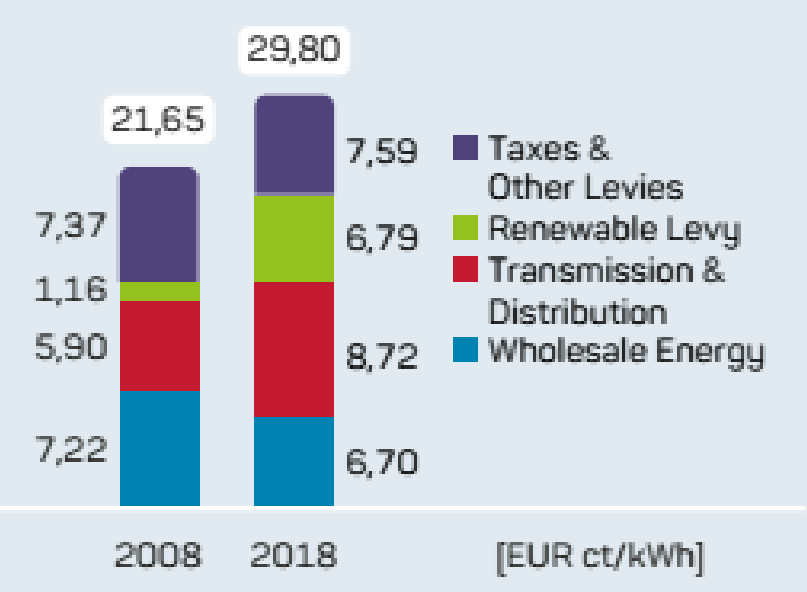
Source: RFF, based on CARB

EU ETS prices?

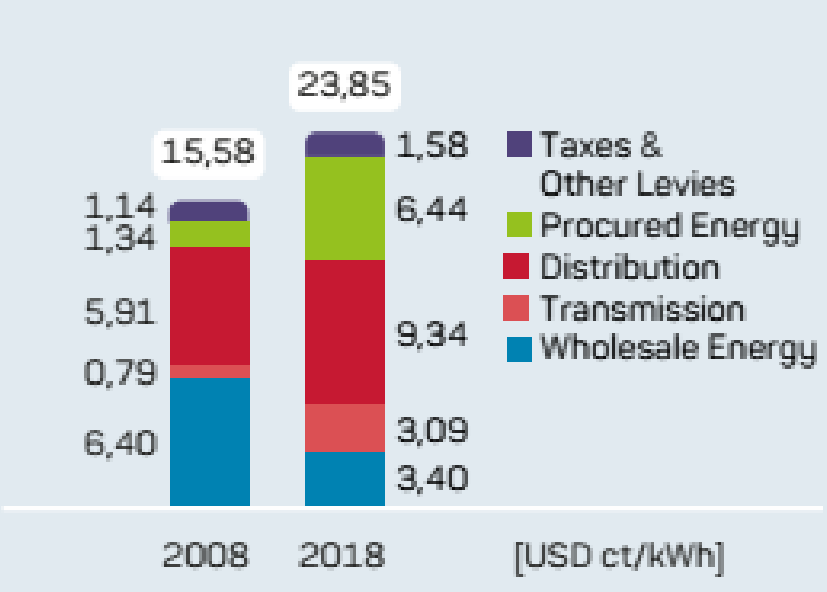


Common challenges for next stage at a glance

Germany

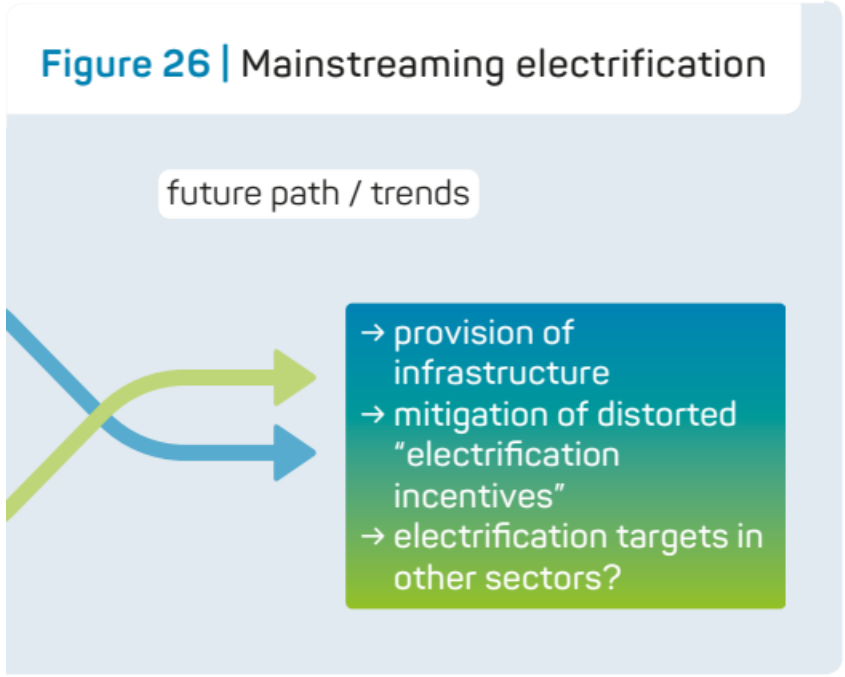


California



High fixed costs challenges: (1) distributional implications, (2) integration of renewables, (3) electrification

Example: Electrification / sector-coupling



- ZEV subsidies, charging infrastructure, rate design, smart meter rollout on the way
- But major open questions remain:
  - Role of power-to-x vs. electrification, wholesale vs. retail market
  - Large scale (household/industrial) consumer adoption of new technologies
  - Role of price signals vs. technology standards

→Regulatory **branching points** (uncertainty)