



Flex4RES

Flexible Nordic Energy Systems



Electricity grid tariffs to increase the flexibility of Power-to-Heat in district heating

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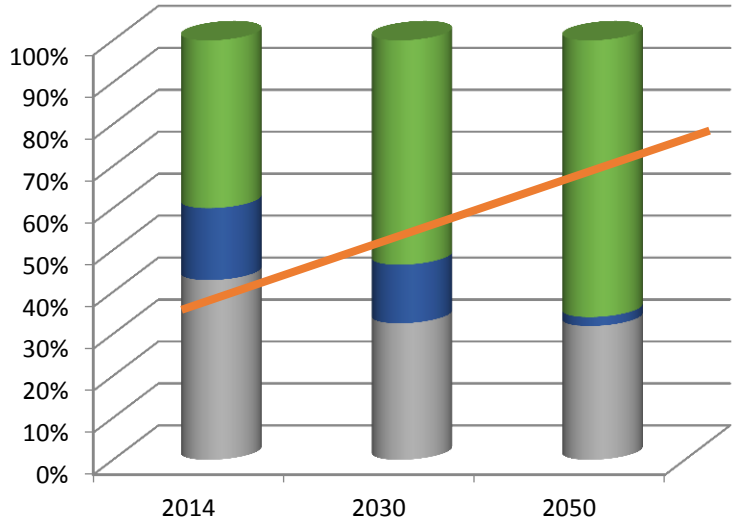
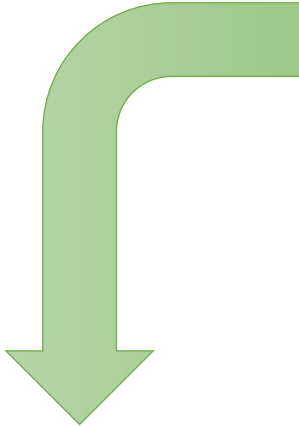
DTU – Energy Economics and Regulation

HAEE conference, May 18-20, Athens



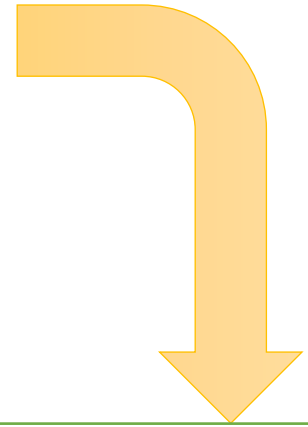
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Nordic Energy Research



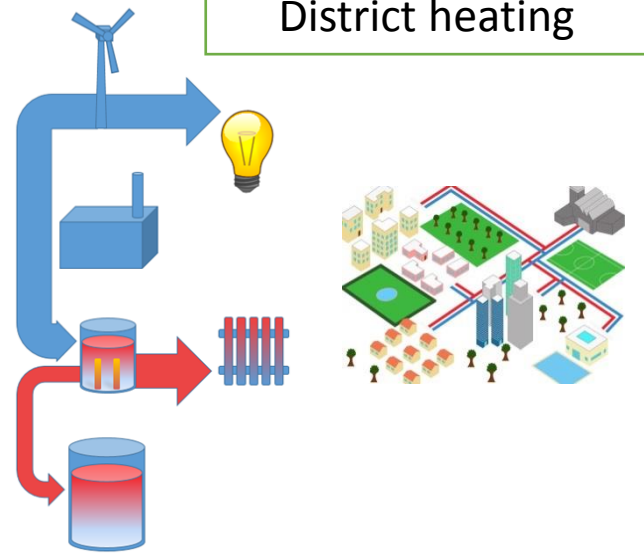
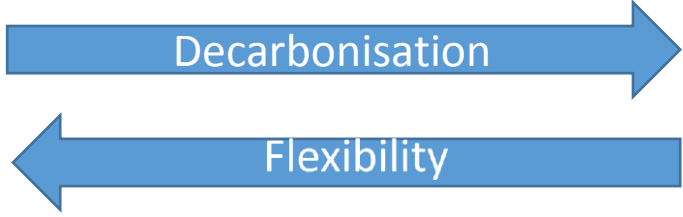
Source: NETP 2014

- Demand
- VRE
- RES
- fossil fuels



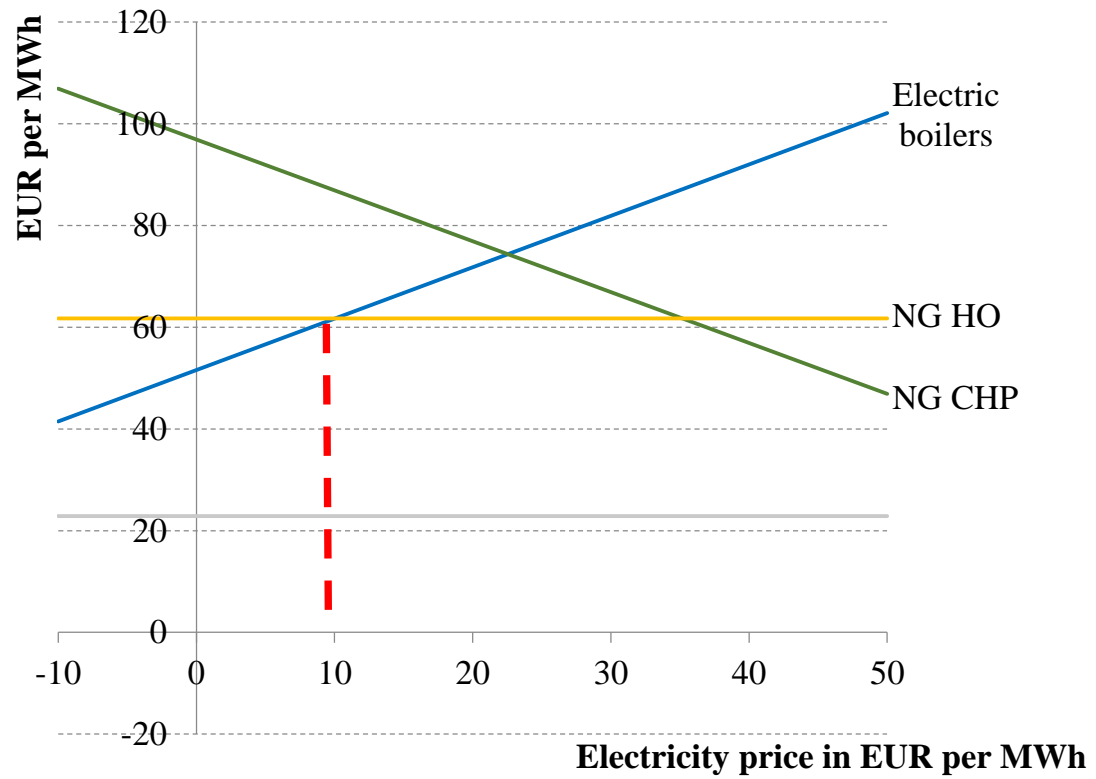
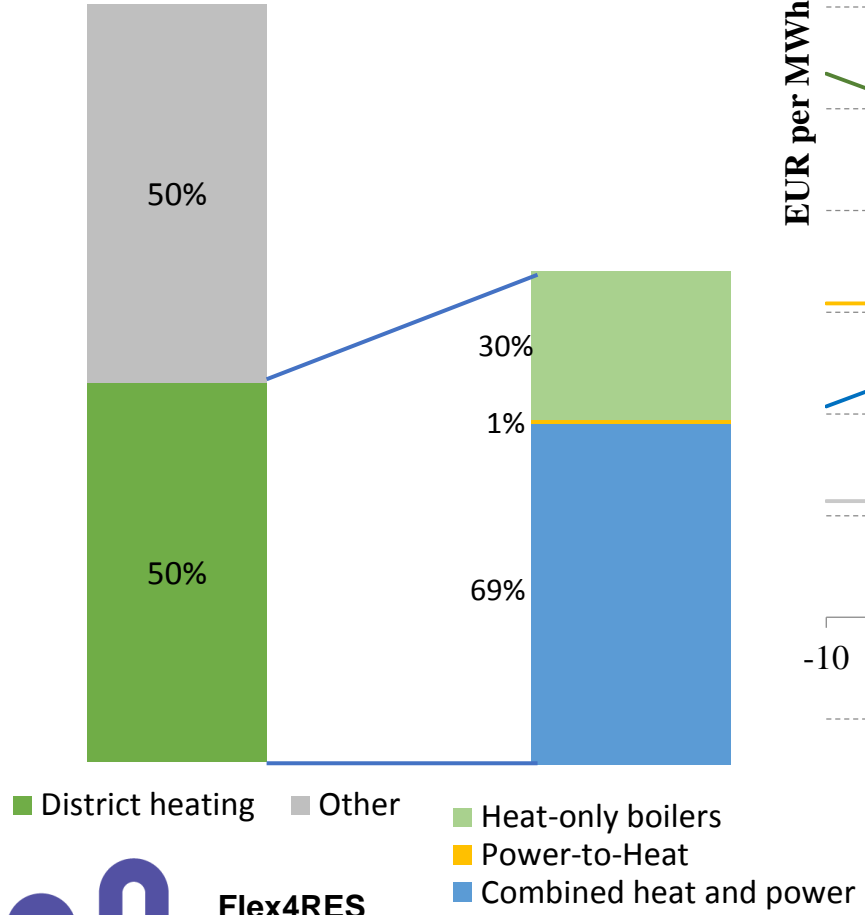
District heating

Electricity sector

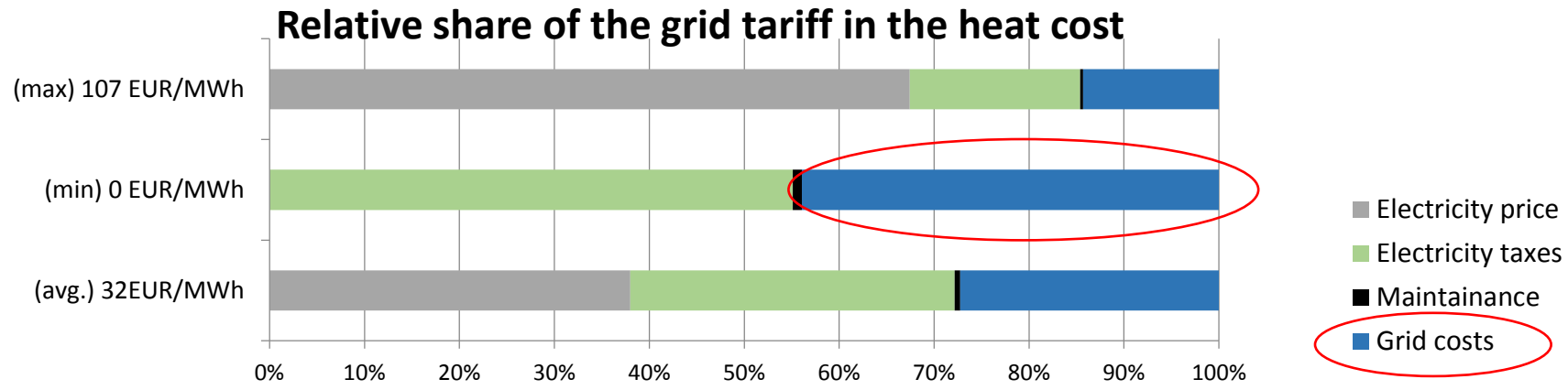


Large flexibility potentials in district heating that are not operated due to regulatory barriers

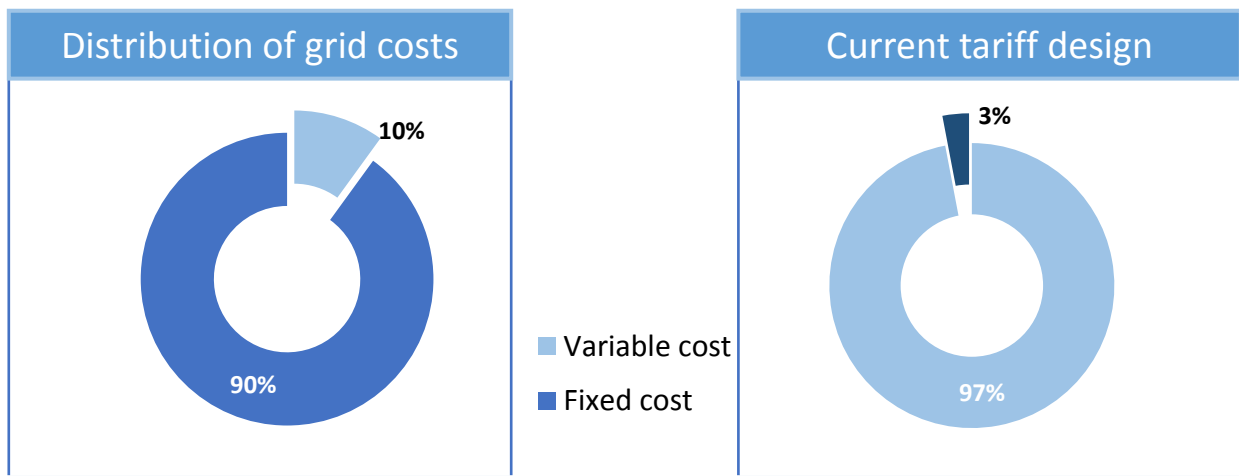
Power-to-Heat (P2H)



Grid tariff structure as a barrier to P2H flexibility

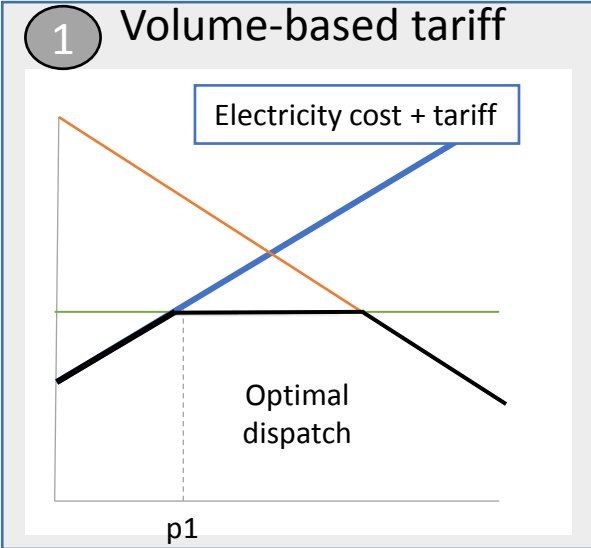


Grid tariffs accounted for up to 43% in the marginal cost to produce heat in Denmark in 2014

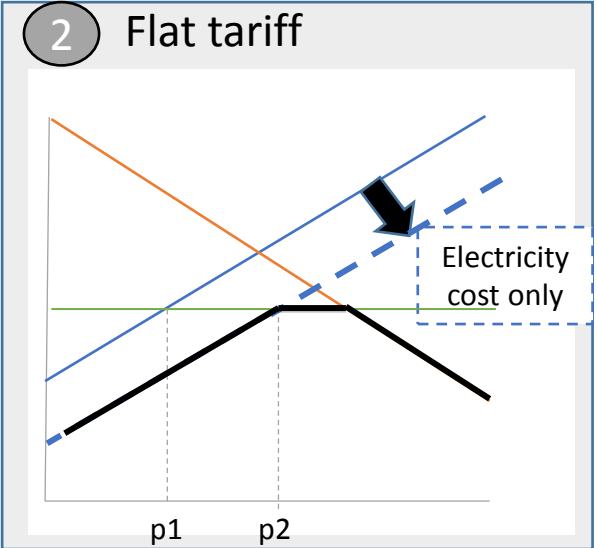


Alternative tariff designs that better reflect costs would improve system's flexibility

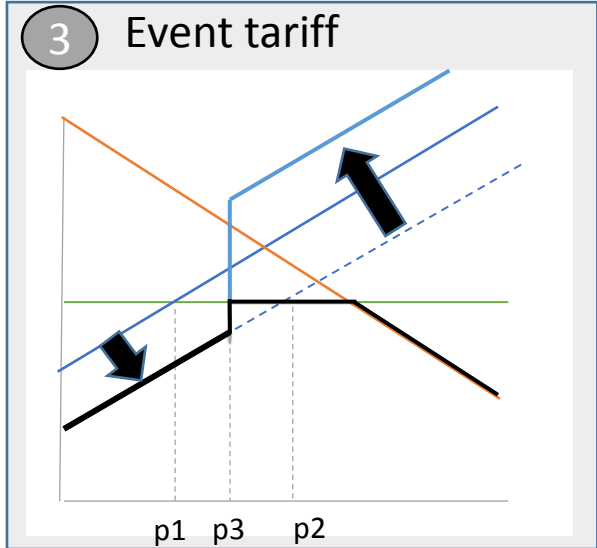
Alternative tariffs to enable flexibility



- Energy charge EUR/MWh added on the spot price

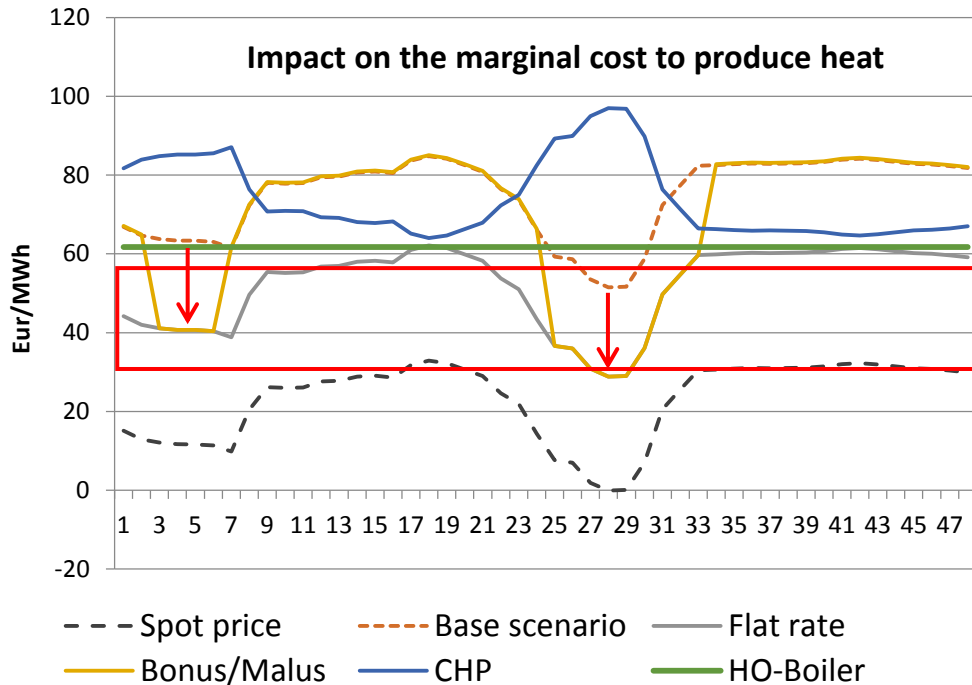


- Energy charge reflects variable costs;
- Capacity charge paid by billing period.



- The energy charge varies according to the residual demand;
- Bonus granted when the residual load is low;
- Malus applied during high residual load

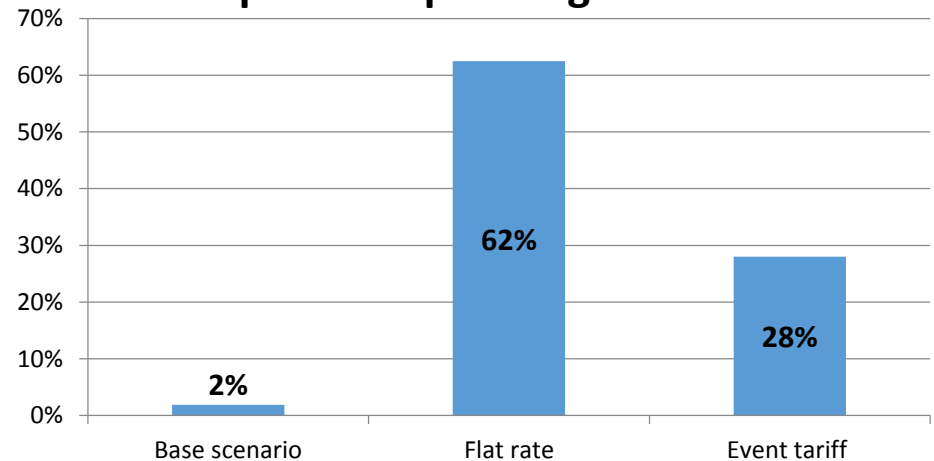
Results



- **Modifies the marginal cost of P2H;**
- Increases competitiveness;
- The flat rate shows the **maximum flexibility potential**;
- The event tariff creates additional time-based incentives to load adjustment and flexibility.

- Improves the number of **operating hours**
- With potential positive outcomes on **investment choices.**

Impact on operating hours



Concluding remarks

- P2H can play a key role in future energy system's flexibility
- However, current grid tariffs prevent from sending the signal that flexibility is needed
- And deteriorate the competitiveness of P2H

- Alternative tariff structures would improve the competitiveness of flexible P2H
 - Create value for flexibility
 - Positive outcome distributed along the electricity chain

- A capacity-based and an event tariff were tested on Danish P2H
- Improves the number of operating hours with positive effect on profit opportunities and investment choices

- However, the impact of alternative tariffs should be carefully scrutinised



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