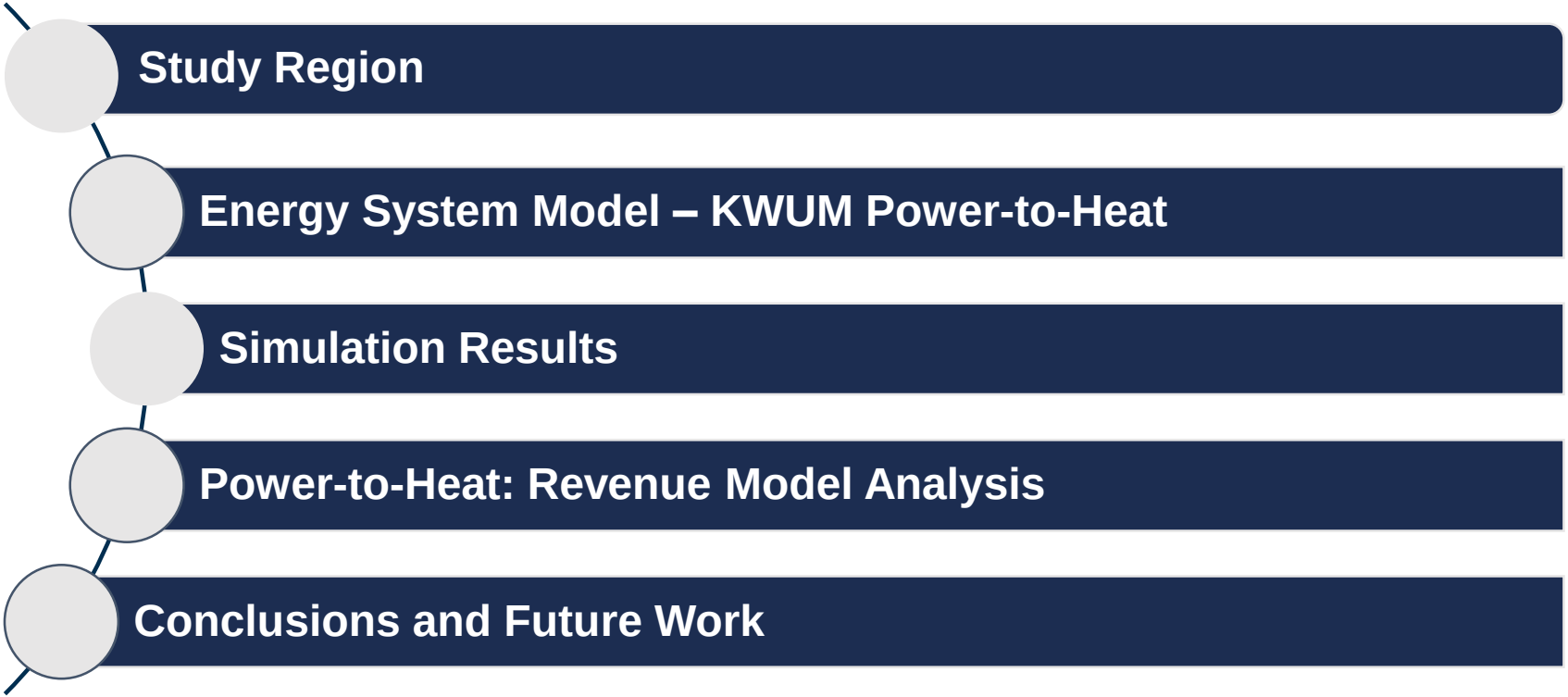
Bewertung der SINTEG-Verordnung in Bezug auf die Nutzung von abgeregeltem Grünstrom – Zwischenergebnisse aus dem Verbundprojekt „WindNODE“

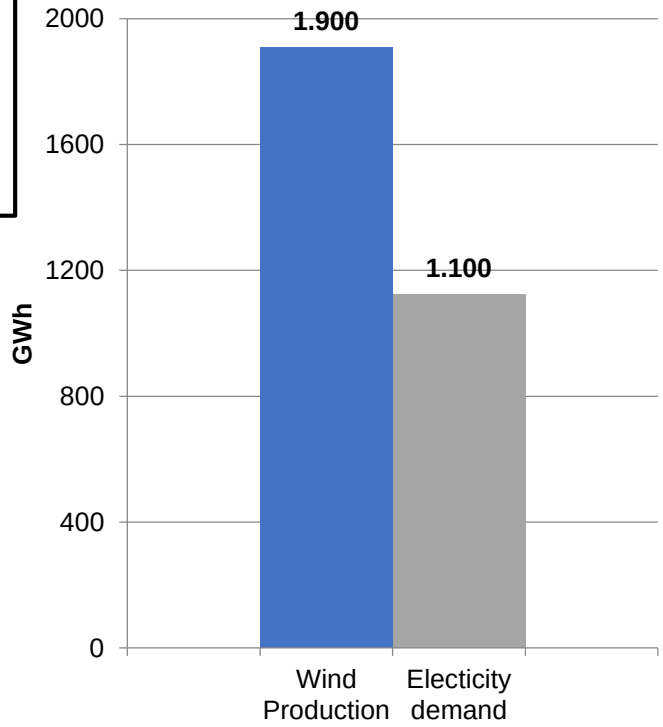
Pamela García Romero

Agenda


Study Region
Energy System Model – KWUM Power-to-Heat
Simulation Results
Power-to-Heat: Revenue Model Analysis
Conclusions and Future Work

Wind Generation in the Uckermark

70% more wind production than electricity demand **(2016)**



Sources:
[1] Bundesnetzagentur (2018) EEG-Registerdaten und EEG Fördersätze
[2] Kartendienst Energiekonzepte Brandenburg

Study Region for Power-to-Heat

160 Km^2

District Heating Demand

PRENZLAU

27 MW_{th}

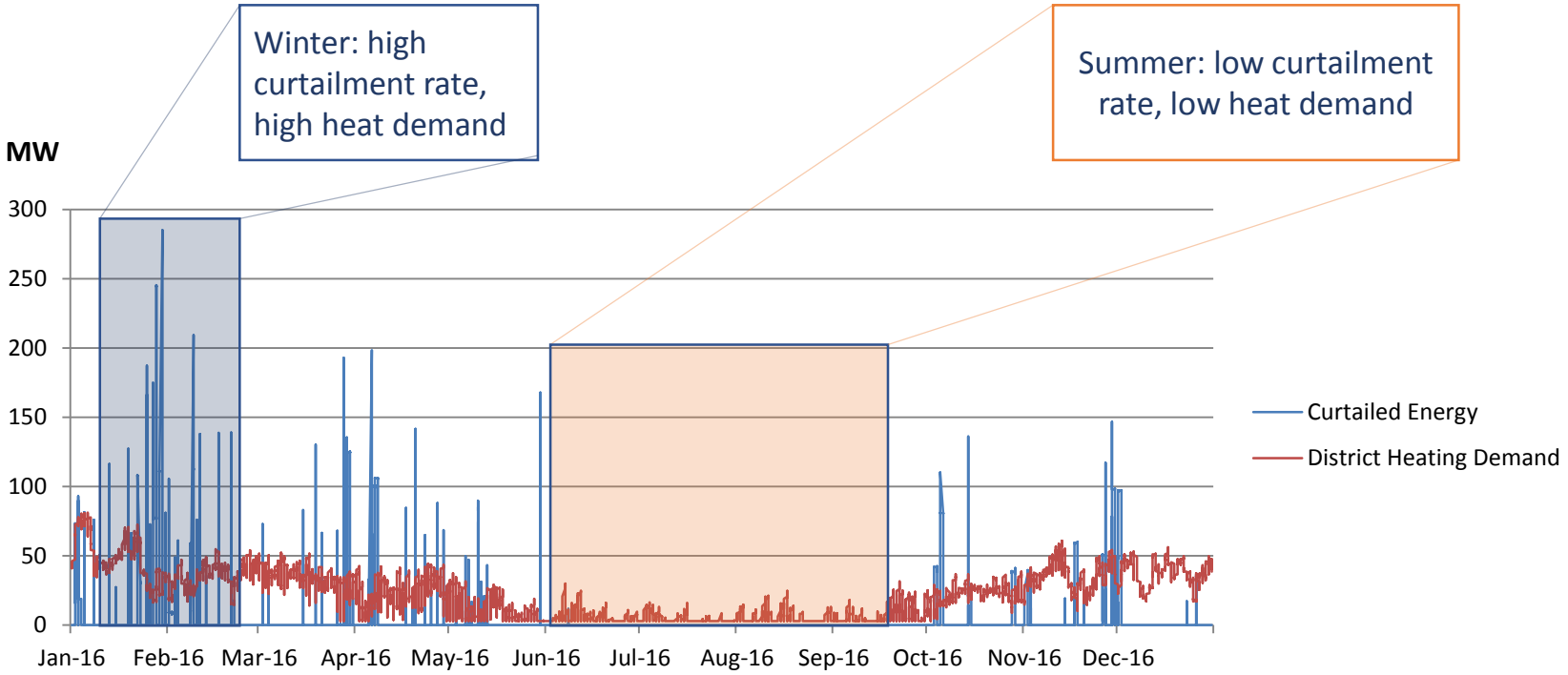
36 GWh_{th}

SCHWEDT

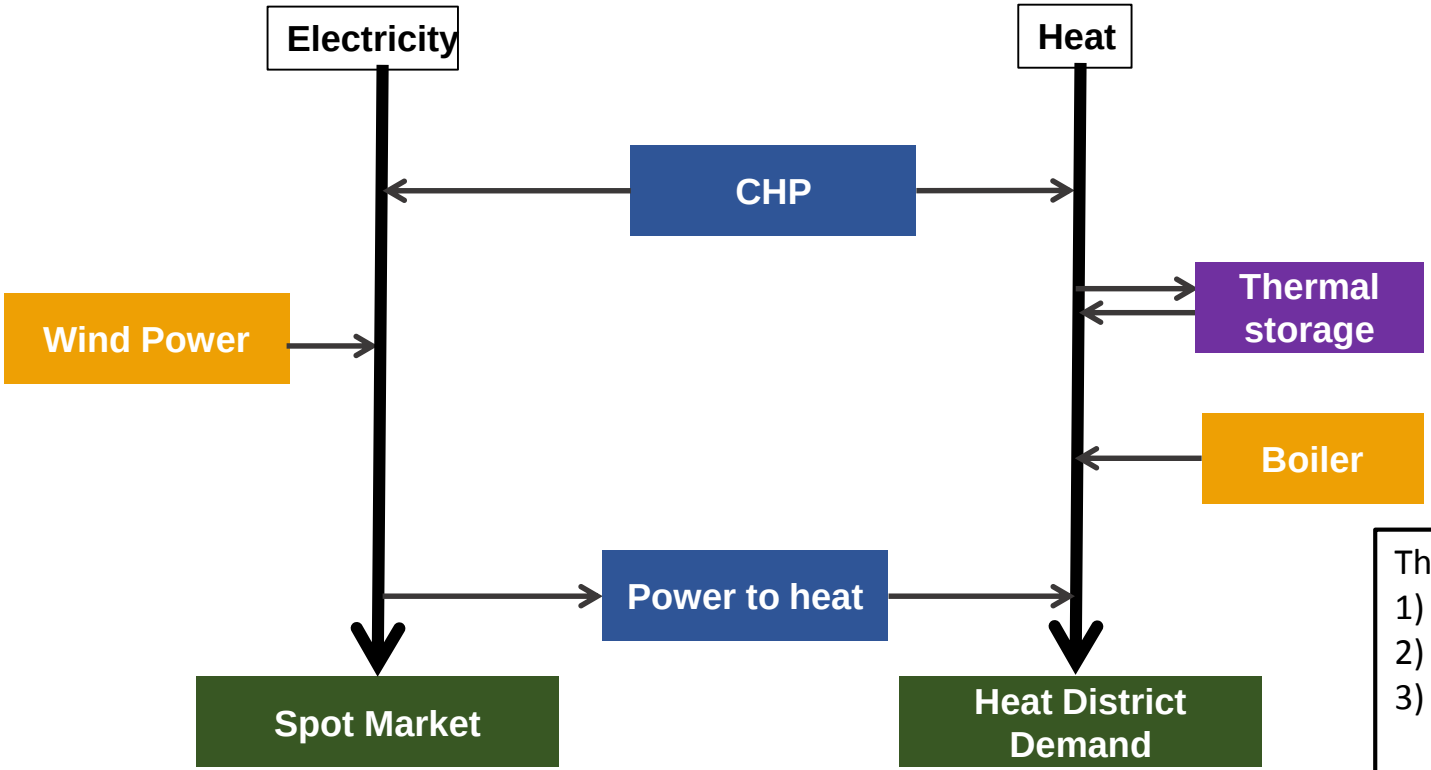
54 MW_{th}

155 GWh_{th}

Correlation between electricity curtailed and heat demand



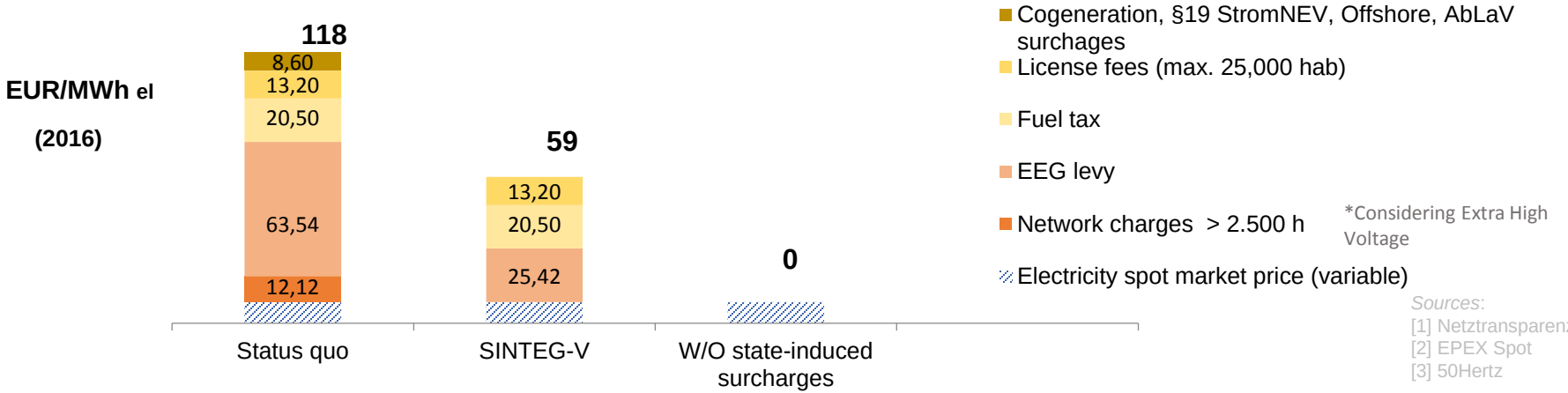
Energy System modeling using oemof framework: KWUM – Power-to-Heat



Three economic scenarios:
1) Status quo
2) SINTEG-V
3) Without state-induced surcharges and grid fees

Economic Scenarios used in the KWUM Model

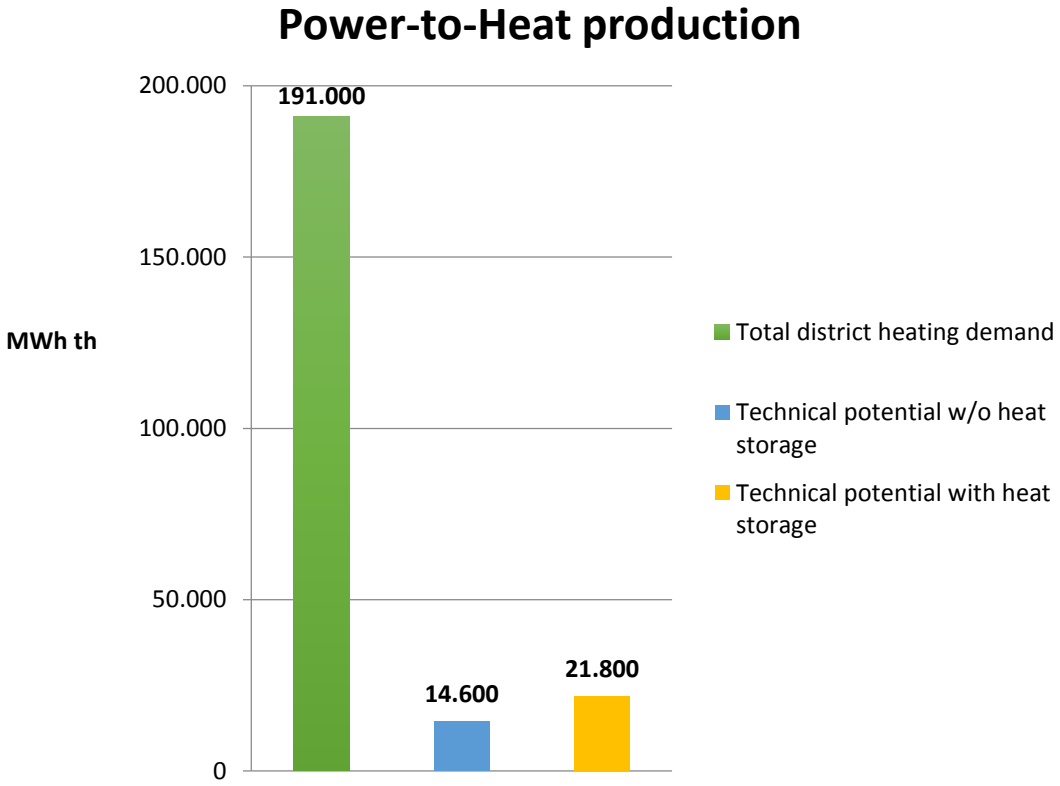
1) **Status quo.**
   1) Current regulations (EEG 2017)
2) **SINTEG-V regulation**
   1) Netzentgelte, KWK-Abgabe, §19 StromNEV, Offshore, AbLaV Umlagen= 0
   2) 40% EEG-Umlage
3) **Without state-induced surcharges and grid fees**



*Considering Extra High Voltage

Sources:
[1] Netztransparenz
[2] EPEX Spot
[3] 50Hertz

Simulation Results: Technical Potential

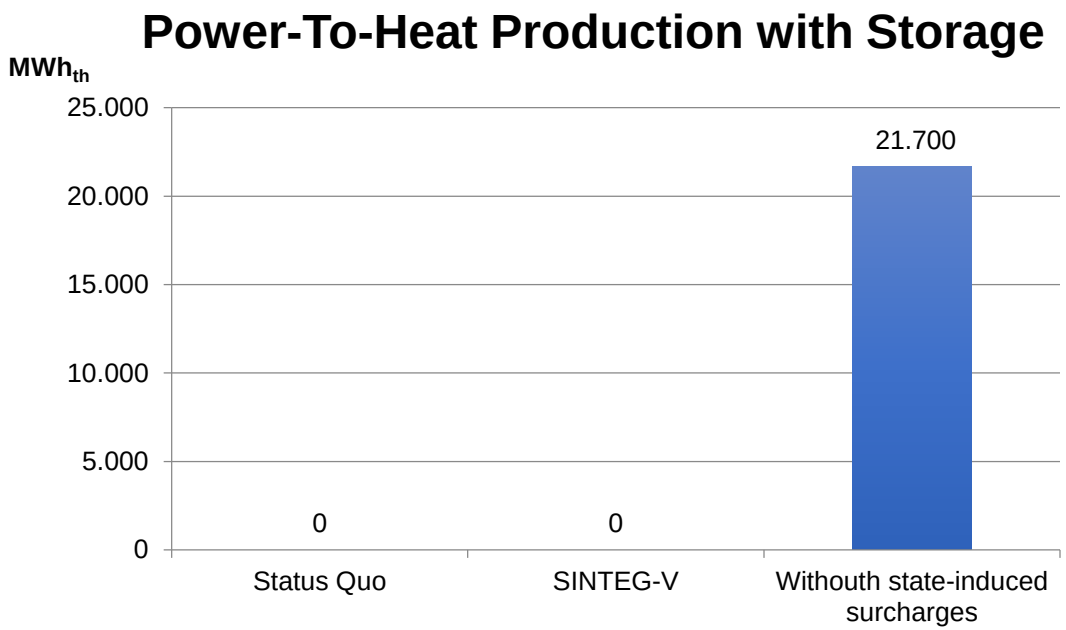


Using heat storage*, Power-to-Heat could supply around 11% of the total district heating demand in the study region

**Modeled as a heat storage tank: 400 MWh, 0.98 efficiency.*

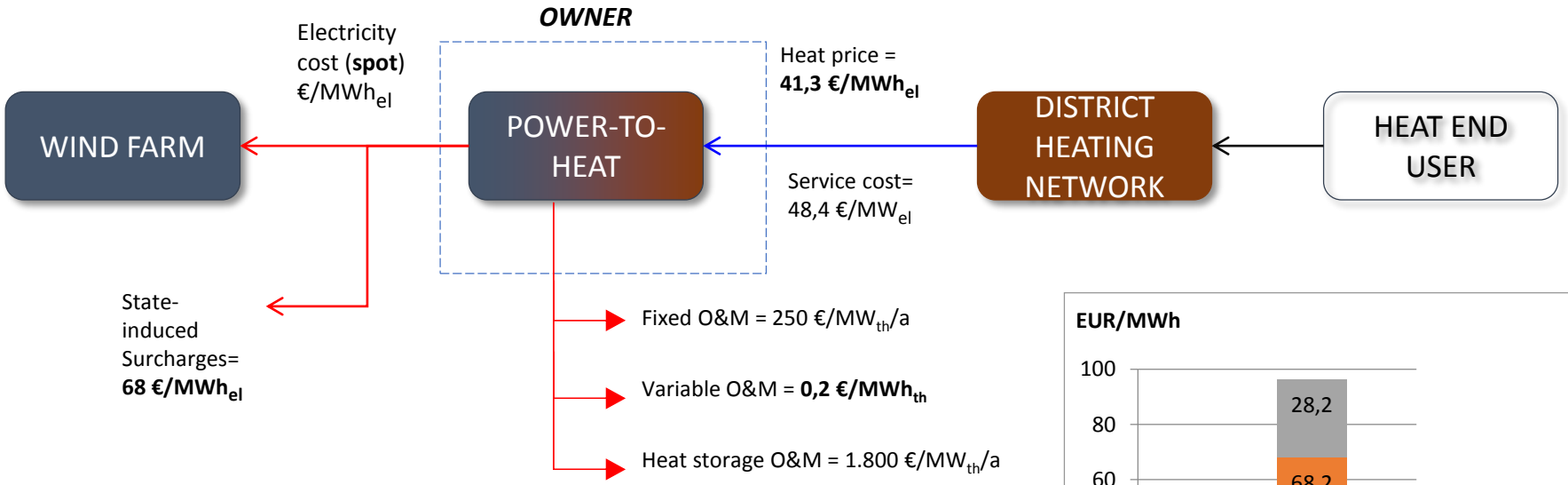
PTH size assummed 42 MW

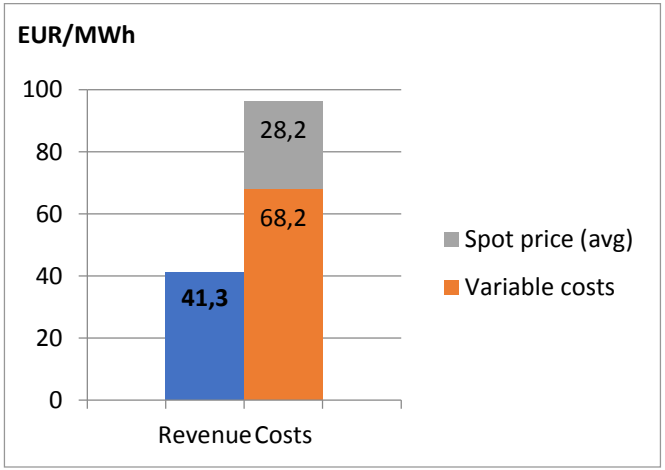
Simulation Results: Economic Potential



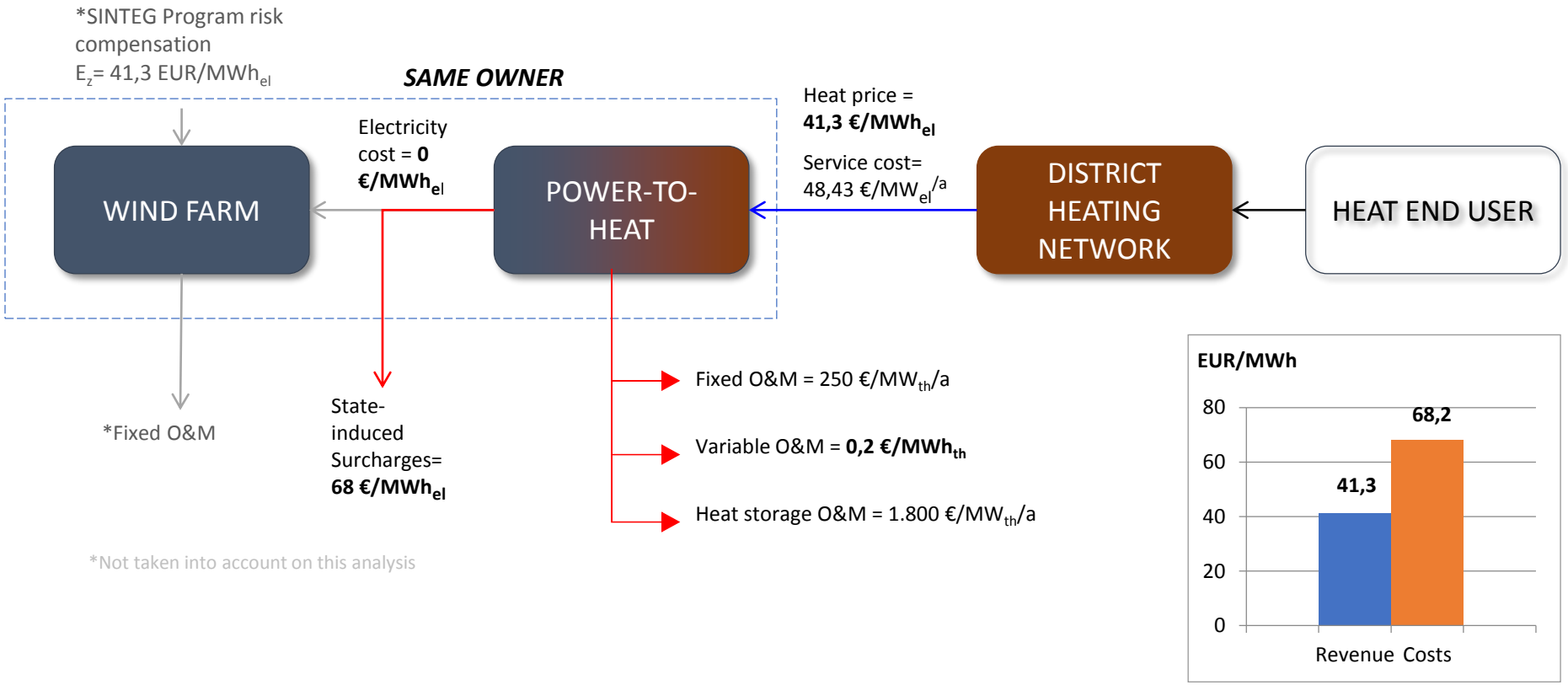
The economic potential of Power-to-Heat systems is being hindered by the state-induced surcharges and grid fees.

Power-to-Heat: Revenue Model Analysis within SINTEG-V

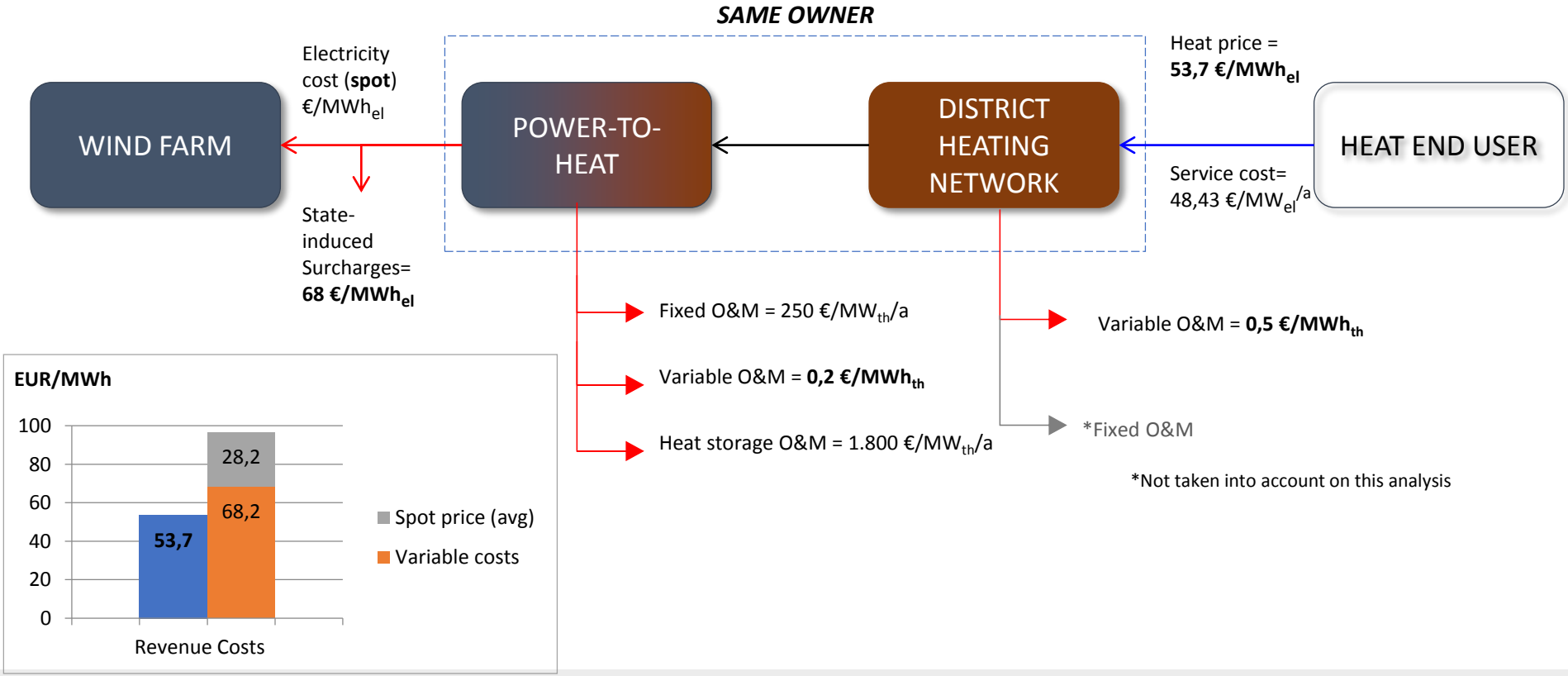




Power-to-Heat: Revenue Model Analysis within SINTEG-V



Power-to-Heat: Revenue Model Analysis within SINTEG-V



Conclusion

- Technically, a 40 MW **Power-to-Heat plant could supply 7,5%** of the total district heating demand; using a 400MWh heat storage this would increase up to **11%**

- Under the current legal framework, Power-to-Heat is not economically attractive because the cost of electricity is very high due to state-induced surcharges.

- The business model in which Wind farm owns a Power-to-Heat facility is the one that brings **more benefits** because the cost of electricity can be set to zero.

Further Work within KWUM Model

- Sensivity analysis on Power-to-Heat and storage capacities
- Include PV
- Include other flexibility options:
  - Power-to-Heat decentralized
  - Power-to-Gas
  - Electromobility
  - Electric batteries
- Include future scenarios, e.g.:
  - NEP 2035 and 2050
  - Very high RES penetration
- Include different business model scenarios

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