vito EnergyVille KU LEUVEN EGATEC2015 European Gas Technology Conference

GERG

Young Researcher's Prize

Nov 25, 2015

OVGW ÖSTERREICHISCHE VEREINIGUNG FÜR DAS GAS- UND WASSERFACH

marcogaz TECHNICAL ASSOCIATION OF THE EUROPEAN NATURAL GAS INDUSTRY

GERG groupe européen de recherches gazières the european gas research group

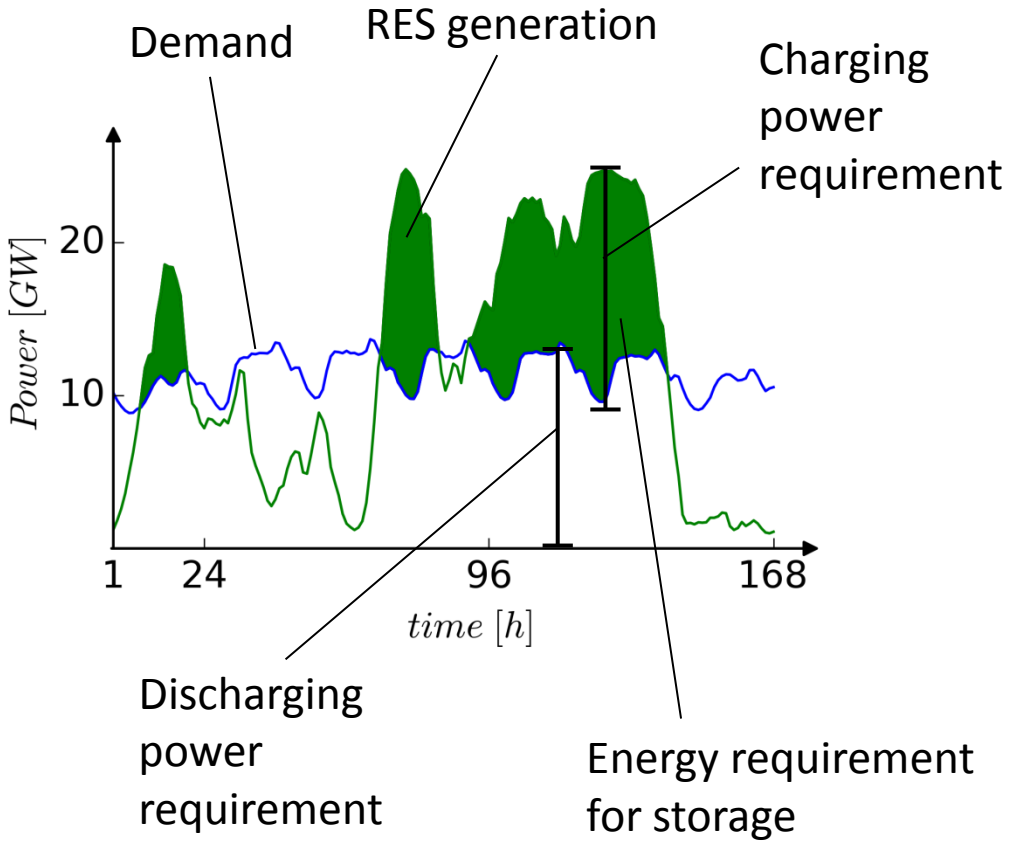
Andreas Belderbos

Erik Delarue and William D'haeseleer

Influence of external factors on the share of power-to-gas in an optimal storage portfolio

GERG
Young Researcher's Prize

Need for flexibility in electricity system



Higher RES penetrations may lead to higher variability

→ Need for flexibility
→ Need for storage
- Power rating
- Energy rating

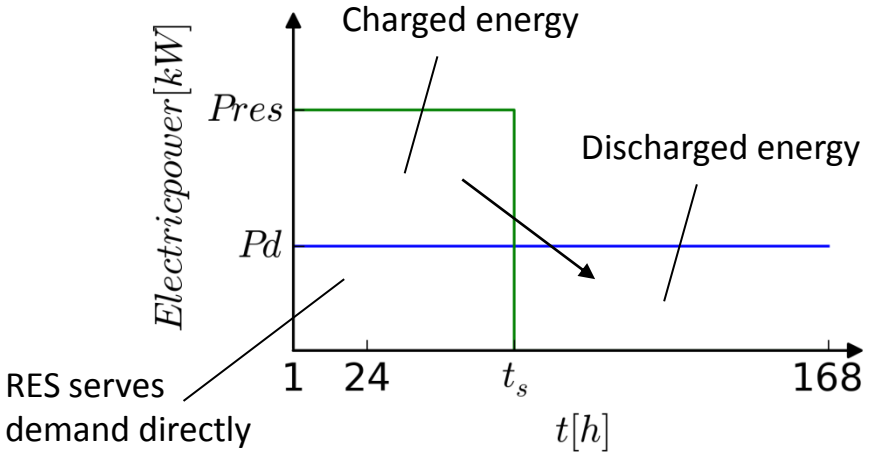
Different storage needs, different storage technologies

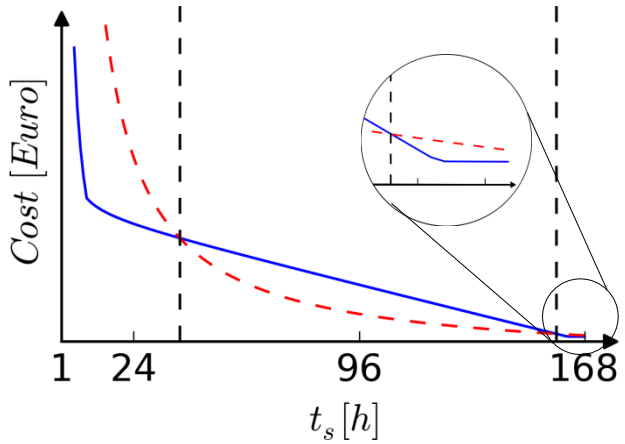
EGATEC2015
European Gas Technology Conference

- Power-to-gas + gas fired power plant:
  - Large (cheap) energy capacity
  - Expensive power capacity
- NaS Battery:
  - Large (cheap) power capacity
  - Expensive energy capacity

Sensitivity parameter
Battery cost
Power-to-gas cost
Battery efficiency
Power-to-gas efficiency
Energy-to-Power ratio.

Influence of storage profile



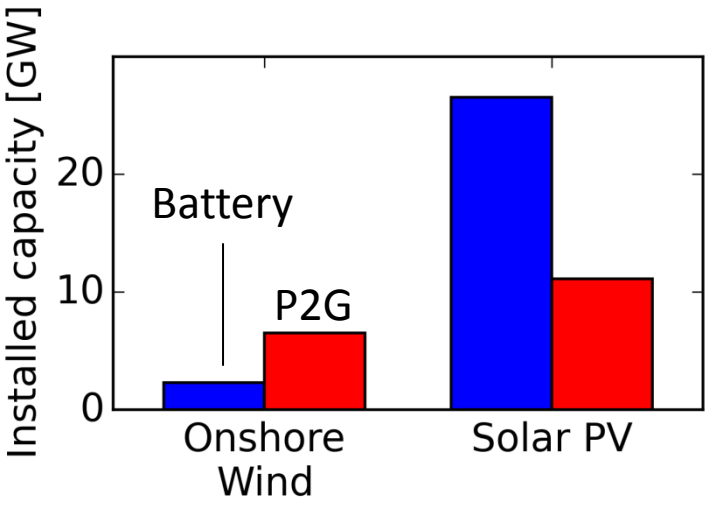


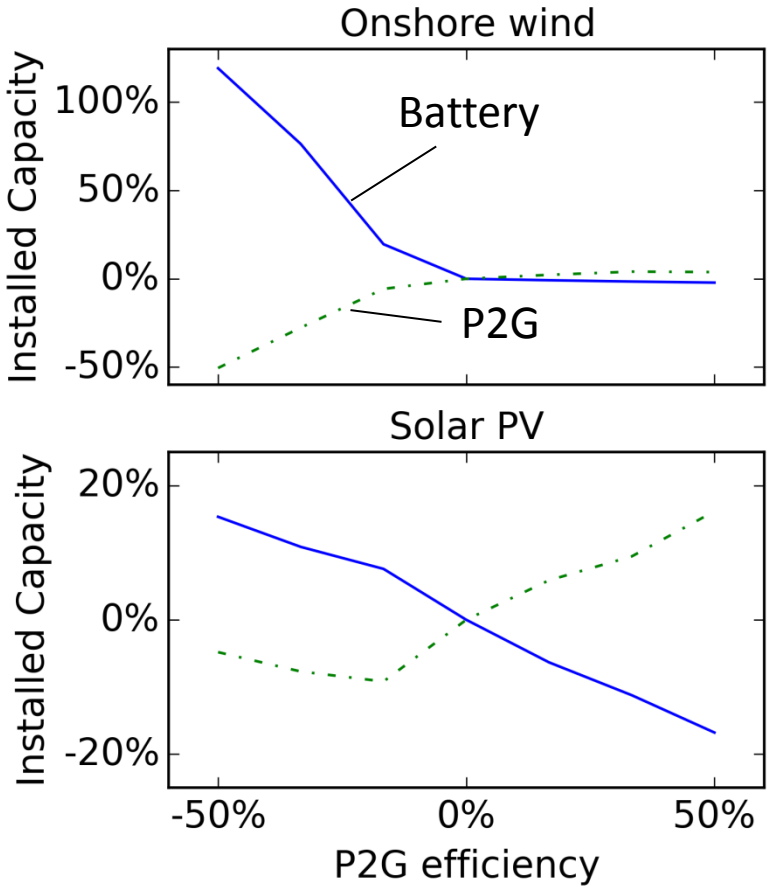
Both power and energy can determine installed capacity

- High energy need
  → power-to-gas + gas fired power plant
- High power need
  → Battery

⚠ Once P2G installed, it can also be used for power needs (and vice versa).

Optimizing the storage portfolio





- Both P2G and batteries have a place in the optimal storage portfolio
- Depending on RES profile, P2G and batteries may act as substitutes but possibly also as complements

Conclusions

EGATEC2015
European Gas Technology Conference

1. Both power and energy can determine installed capacity
   - High energy need → power-to-gas + gas fired power plant
   - High power need → Battery
2. Both P2G and batteries have a place in the optimal storage portfolio
   - Depending on RES profile, P2G and batteries may act as substitutes but possibly also as complements
   - Installed power-to-gas capacity only limited influenced by varying technical characteristics and costs

Contact: andreas.belderbos@kuleuven.be

vito EnergyVille KU LEUVEN

OVGW ÖSTERREICHISCHE VEREINIGUNG FÜR DAS GAS- UND WASSERFACH

marcogaz TECHNICAL ASSOCIATION OF THE EUROPEAN NATURAL GAS INDUSTRY

GERG groupe européen de recherches gazières the european gas research group