ETN's 20th Annual General Meeting & Workshop

"Accelerating turbomachinery pathways to net-zero"

19-21 March 2024, Leiden, the Netherlands

Event sponsors

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Thomassen Energy
a Hanwha company

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Robinson

Integrated energy solutions

Chair: Peter Breuhaus, NORCE,
Co-chair: Giuseppe Tilocca, ETN Global

This session will explore integrated solutions for decentralised energy systems including storage and flexibility, and address the following questions:

- Integration of intermittent renewables
- Change/adaptation of the demand
- Integration of carbon free fuel and/or CCS

Presentation/New Activities

Objective:

Identification of open issues and gaps of decentralized energy systems to form a base for follow up activities

Overview of ETN initiatives

Integrated energy systems

Initiatives	Scope	Objectives	Start-End dates
Identification of “Gaps to close”	Identify open issues and gaps to close from the users’ point of view	Identification of open issues and gaps of decentralized energy systems to form a base for follow up activities Attracting additional / new members for ETN	Q1/2024 – Q4/2024

Identification of open topics

How to …

- Three categories which likely represent different boundary conditions:
  1. Up to 1MW: representing house, multi-house, building level
  2. Up to 50 MW: representing small industries & businesses
  3. above 50 MW: large industry
- Identification on the expected future boundary conditions for operating the GT
  - Integration with intermittent renewables
  - Change /adaptation of the demand profile
  - Carbon free fuel and / or CCS
  - Change in criteria to select a GT (e.g. band-width of operation & emission profile versus “traditional” performance values.

Identification of the GT expected operating condition

Giuseppe Tilocca, ETN Global

Security of supply/Flexibility

Integration with intermittent renewables

- 220 houses + 1 care home: electric and thermal demand (heat pump)
- Solar power: 2MW
- Wind power: 2MW
- Excess RES power stored as H2

Security of supply/Flexibility

Integration with intermittent renewables

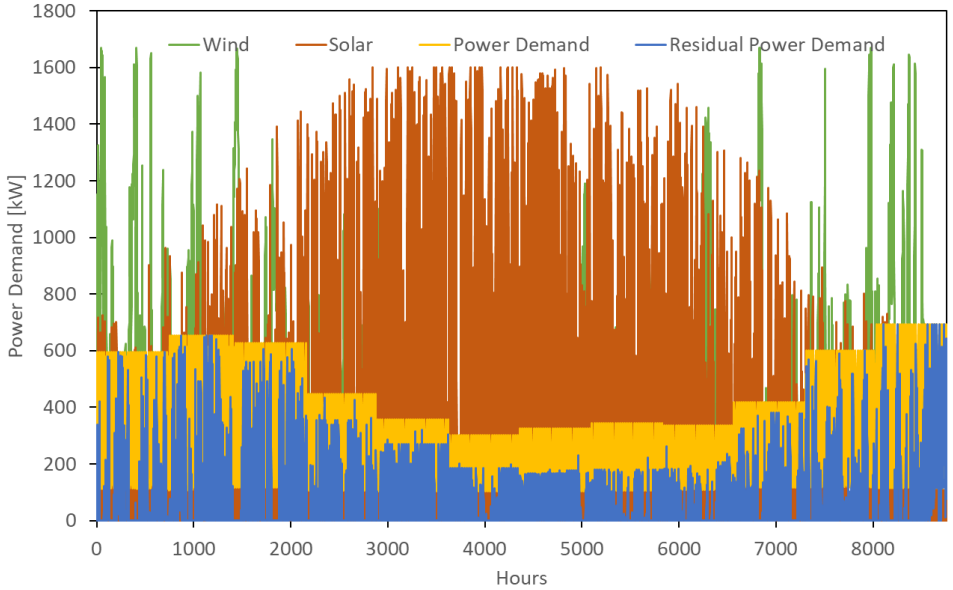
220 houses + 1 care home: electric and thermal demand (heat pump)

Solar power: 2MW

Wind power: 2MW

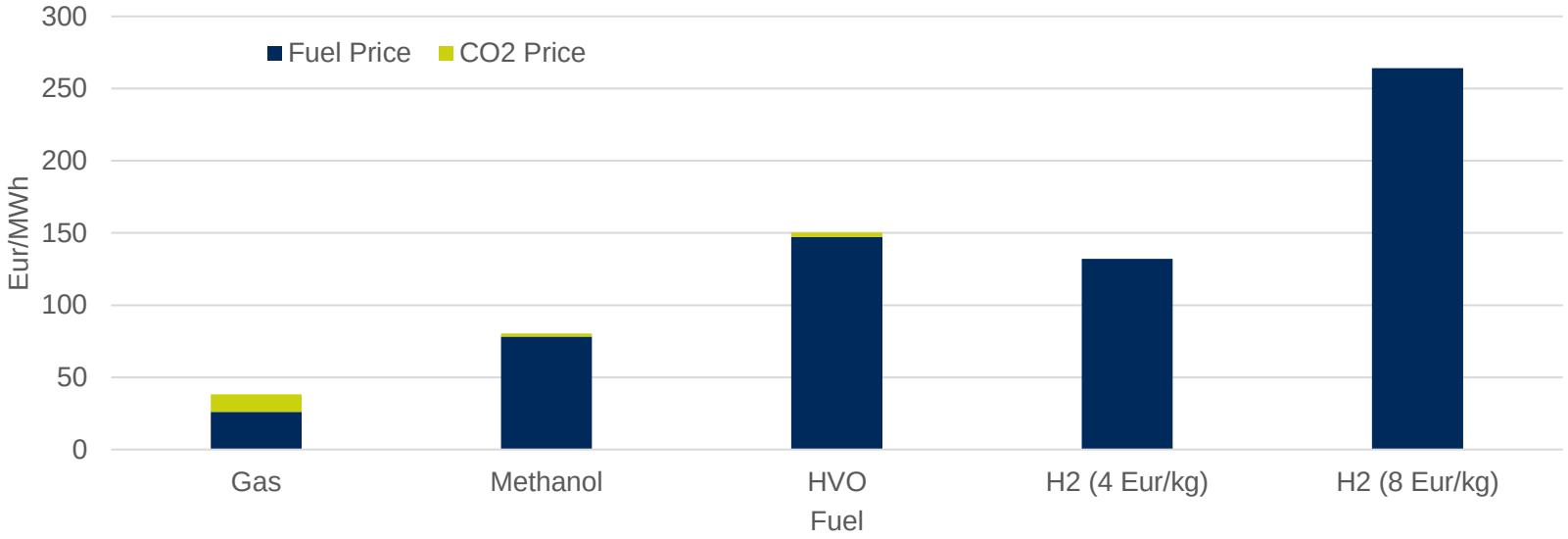
Excess RES power stored as H2

2x400kW Gas Turbines



Sustainability VS Affordability

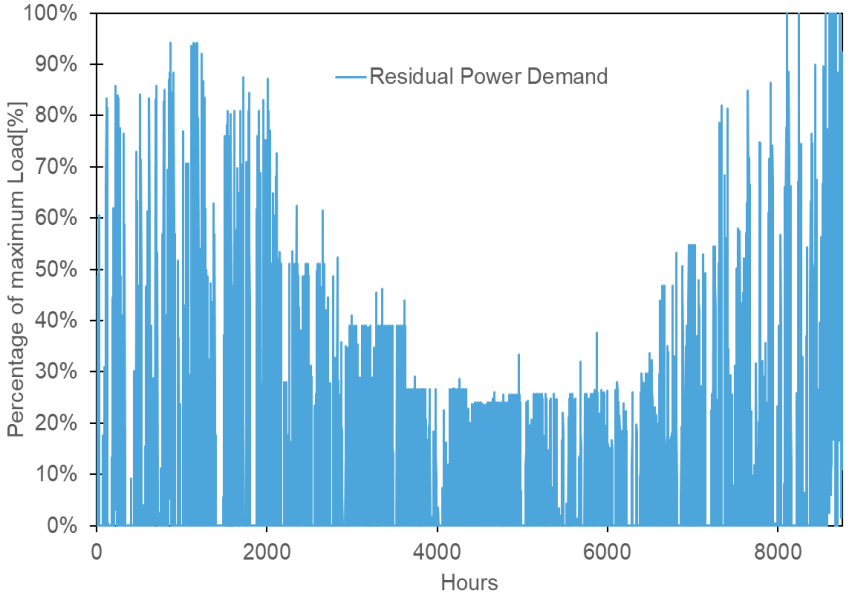
Cost of fuel



Alternatives: CCS, ERG?

Change in criteria to select a GT

Operational Limits

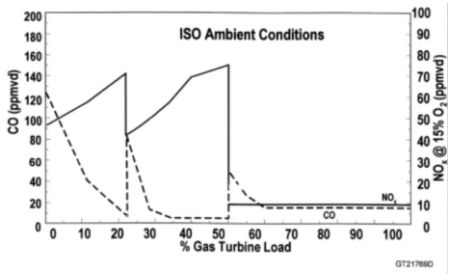


From 10^1 to 10^2-10^3
Startups & Ramp-up/down

Lifing	O&M Cost

Part load operations >>50%

Rated VS Part-Load Efficiency	NOx Emissions VS Operational envelop	In which Direction R&D should go to?



Open question?

Technology gaps

- E.g.: Maximum ramp rates:
  - Hybrid systems integration (GT+ Batteries/flywheels)
- …

Open discussion

Thank you for your attention