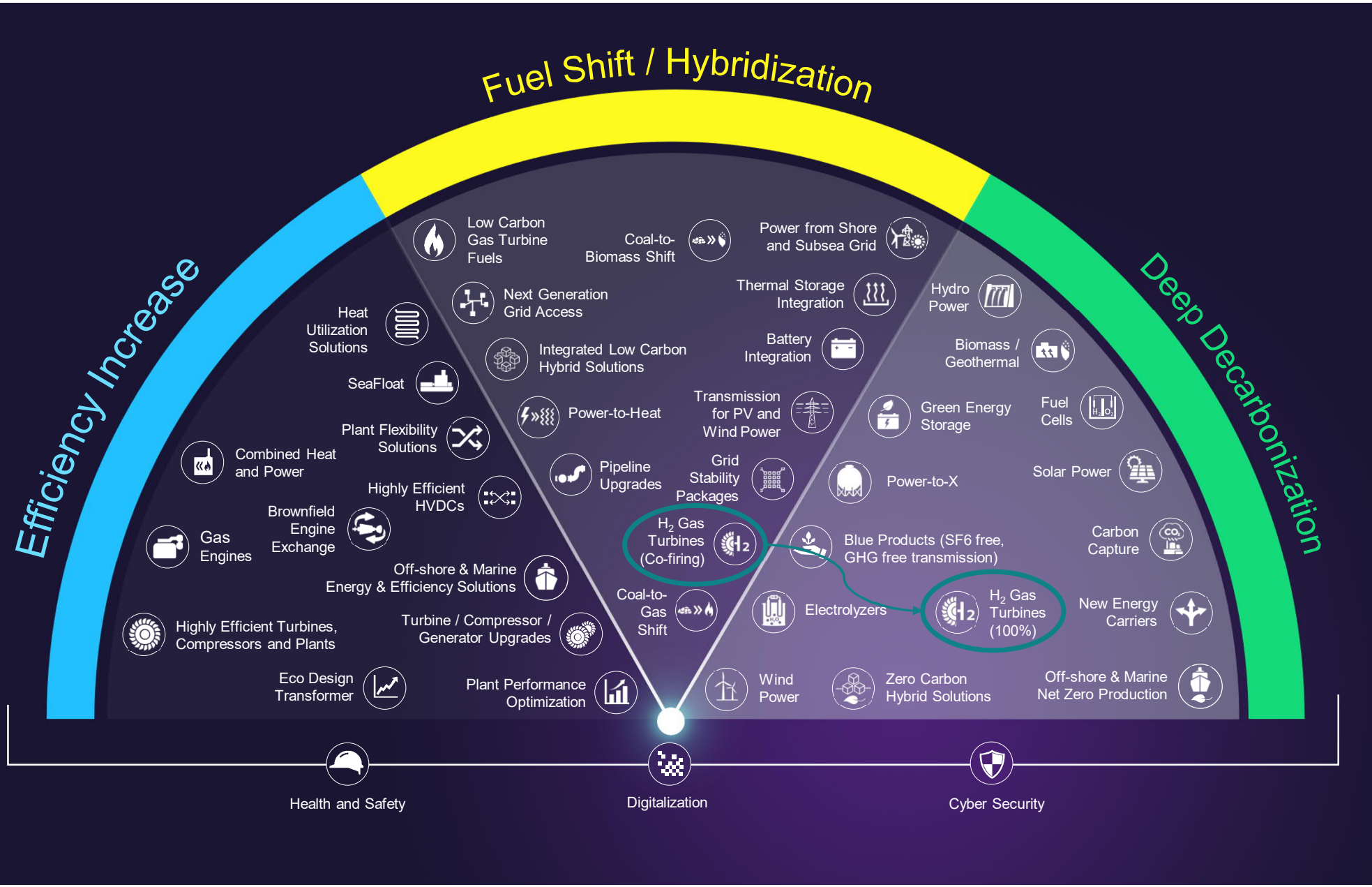
Frukostwebinarium “Vätgasens roll i kraftsektorn”

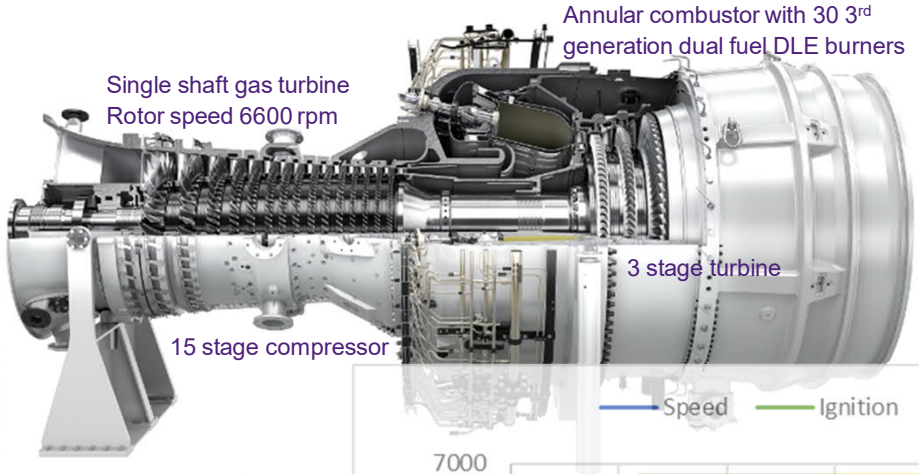
Möjligheter med P2G2P

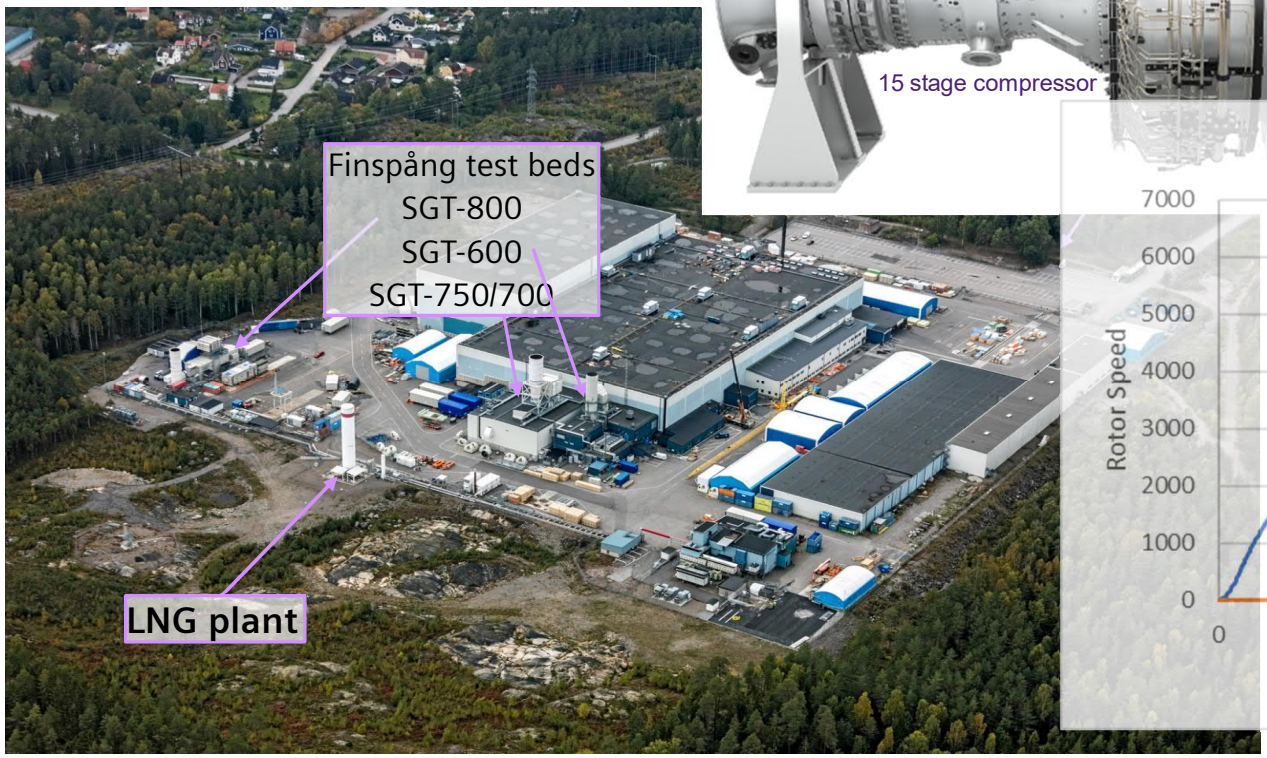
Prof Jenny Larfeldt

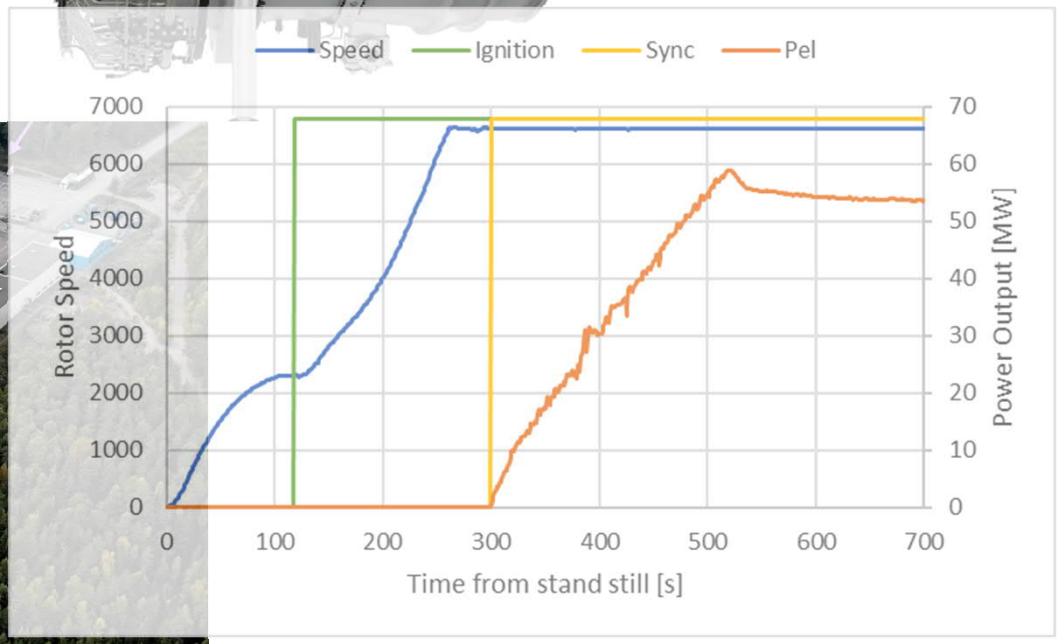

Efficiency Increase
Fuel Shift / Hybridization
Deep Decarbonization
Low Carbon Gas Turbine Fuels
Coal-to-Biomass Shift
Power from Shore and Subsea Grid
Heat Utilization Solutions
Next Generation Grid Access
Thermal Storage Integration
Hydro Power
SeaFloat
Integrated Low Carbon Hybrid Solutions
Battery Integration
Biomass / Geothermal
Plant Flexibility Solutions
Power-to-Heat
Transmission for PV and Wind Power
Green Energy Storage
Fuel Cells
Combined Heat and Power
Pipeline Upgrades
Grid Stability Packages
Power-to-X
Solar Power
Highly Efficient HVDCs
Brownfield Engine Exchange
H2 Gas Turbines (Co-firing)
Blue Products (SF6 free, GHG free transmission)
Carbon Capture
Gas Engines
Off-shore & Marine Energy & Efficiency Solutions
Coal-to-Gas Shift
Electrolyzers
H2 Gas Turbines (100%)
New Energy Carriers
Highly Efficient Turbines, Compressors and Plants
Turbine / Compressor / Generator Upgrades
Eco Design Transformer
Plant Performance Optimization
Wind Power
Zero Carbon Hybrid Solutions
Off-shore & Marine Net Zero Production
Health and Safety
Digitalization
Cyber Security

Siemens Industrial Gas Turbines

SGT-800	57 to 62 MW
SGT-750	40 MW
SGT-700	33 MW
SGT-600	24 MW







Industrial gas turbine hydrogen road map
R&D speed enabled by additive manufacturing

SIEMENS energy

Vision

Demonstration of 100% H_2 industrial turbine operation at customer site with high combined cycle efficiency and acceptable dry emission levels.

2012

SGT-700
Single burner feed in full engine test 40 vol-% H_2.

2014

SGT-700
Single burner feed in full engine test 60 vol-% H_2.

2017

SGT-800
Bid ready 50 vol-% H_2 at 25 ppm NO_X.

SGT-600
Bid ready 60 vol-% H_2 at 25 ppm NO_X at full load.

2019

SGT-800
High pressure single burner test 100 vol-% H_2 and 50 ppm NO_X. Flashback out safety system tested.

SGT-600
Braskem Delivery test 1&2 verifying;

1. Guarantee point 60 vol-% H_2 at 25 ppm NO_X at full load.
2. Off design reliable operation with 80 vol-% H_2.

2020

SGT-800
Sector test in full engine with up to 75 vol-% H_2 and 40 ppm NO_X achieved. Flashback out system integrated in SGT-800.

2021

SGT-700 planned
Sector test in full engine targeting 85 vol-% H_2.

SGT-600
Braskem commercial operation 60 vol-% H_2.

2022

2023

2025

SGT-6/7/800 collaboration foreseen
Operator having access to carbon neutral/ free fuels.

2030

Siemens additive manufactured burner used in SGT-600, SGT-700 as well as in SGT-800. Also available for retrofit in existing units.

https://www.siemens-energy.com/global/en/news/magazine/2019/hydrogen-capable-gas-turbine.html

Zero Emission Hydrogen Turbine Center
The future energy system

SIEMENS energy

Develop the gas turbine test facility towards a zero emission demonstrator plant by:

- Utilize power from turbine test runs to produce hydrogen in an electrolyzer
- Installing solar panels for continuously hydrogen production
- Use produced hydrogen as turbine fuel to reduce LNG consumption

Three year project.

- Operation planned to start in 2021

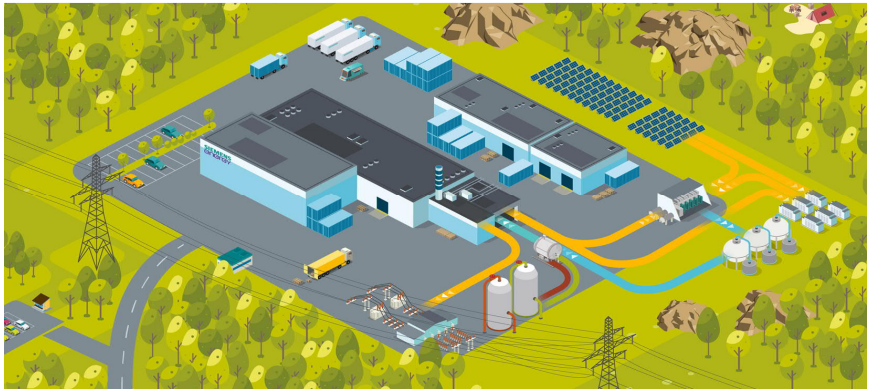
CHALMERS UNIVERSITY OF TECHNOLOGY

ALMA MATER STUDIORUM UNIVERSITÀ DI BOLOGNA

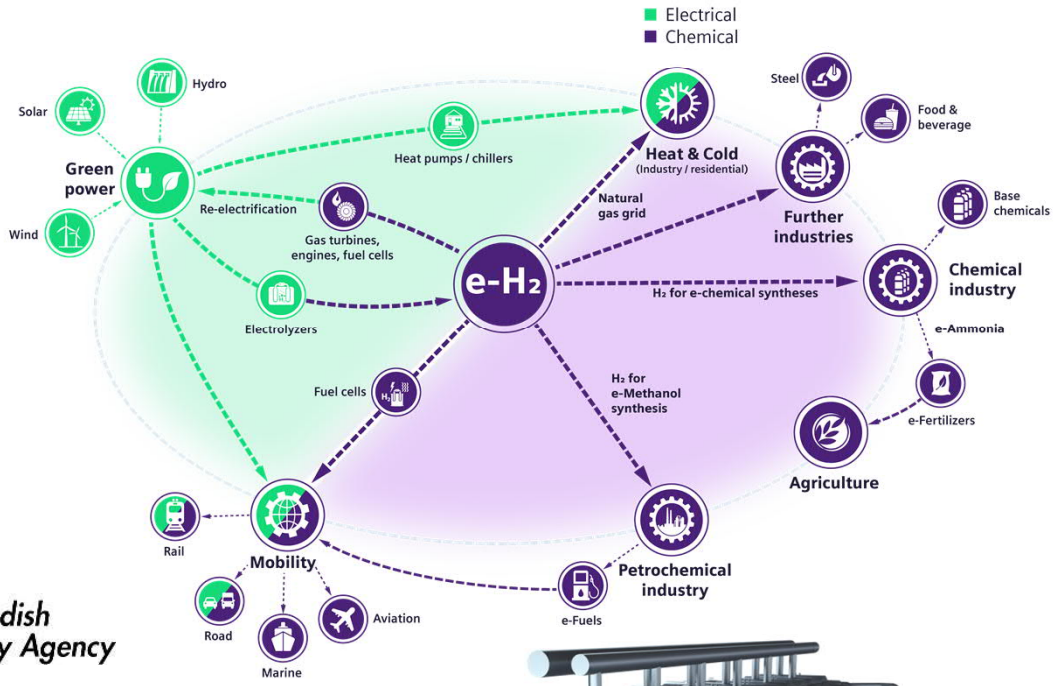
FINSPÅNG

LÄNSSTYRELSEN ÖSTERGÖTLAND

Linde



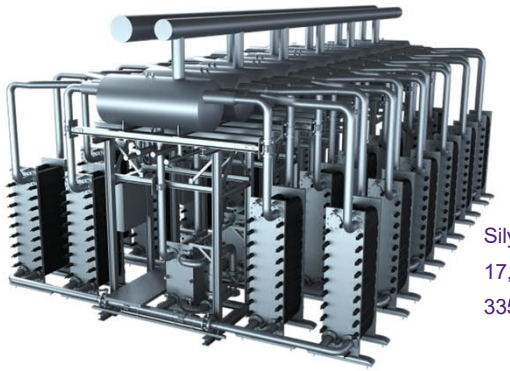
https://www.zehtc.org/



Swedish Energy Agency

Smart Energy Systems ERA-Net

Funding gratefully acknowledged
Swedish Energy Agency and EU
ERA-Net Smart Energy System



Silyzer 300
17,5 MW
335 kg H_2/h

Tack!

Prof. Jenny Larfeldt

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