The Pathway Forward for Gas Turbines in a Decarbonized Europe

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EUTurbines

- Only association of European gas and steam turbine manufacturers

- Advocates a competitive economic and legislative environment for the sector
- Promotes the role of turbine-based power generation
- For further information see http://www.euturbines.eu/

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- Changes in energy policy in Europe
- Challenges in operating gas-fired power plants profitably
- Best suitable types of gas-fired power plants to cover the transition period
- Carbon lock-in discussion
- Power-to-gas-to-power-approach

Europe's Energy Landscape

- Massive change in the generation landscape
- Strong political pressure on all types of fossil fuel power generation
- Growing understanding for the need of an increasing amount of flexibility solutions

Gas-Fired Power Generation

- Seen as best available flexibility technology for a transition period
- Views diverging regarding length of the transition period
- Discussion about best suitable types of gas-fired power plants to cover this transition period
  - Big efforts by industry in developing even more efficient combined-cycle power plants
  - Growing number of voices suggest to invest in simple-cycle plants only

Gas Fired Power Generation

" You're perfect for our transition team since you're easily replaceable. "

CartoonStock.com

Operational Changes

- Backup plants with only a few hundred operating hours per year
- Trend to smaller and more decentralized plants
- Limited transition period

  -> investment costs and flexibility weigh more than efficiency

- Growing competition from gas engines

Long-Term Perspective for GT's

- Convincing answer needed to the "carbon lock-in discussion", i.e. decarbonising the operation of gas-fired power plants

- Two options
  - burning gases that do not emit greenhouse gases
  - capturing the emitted green house gases

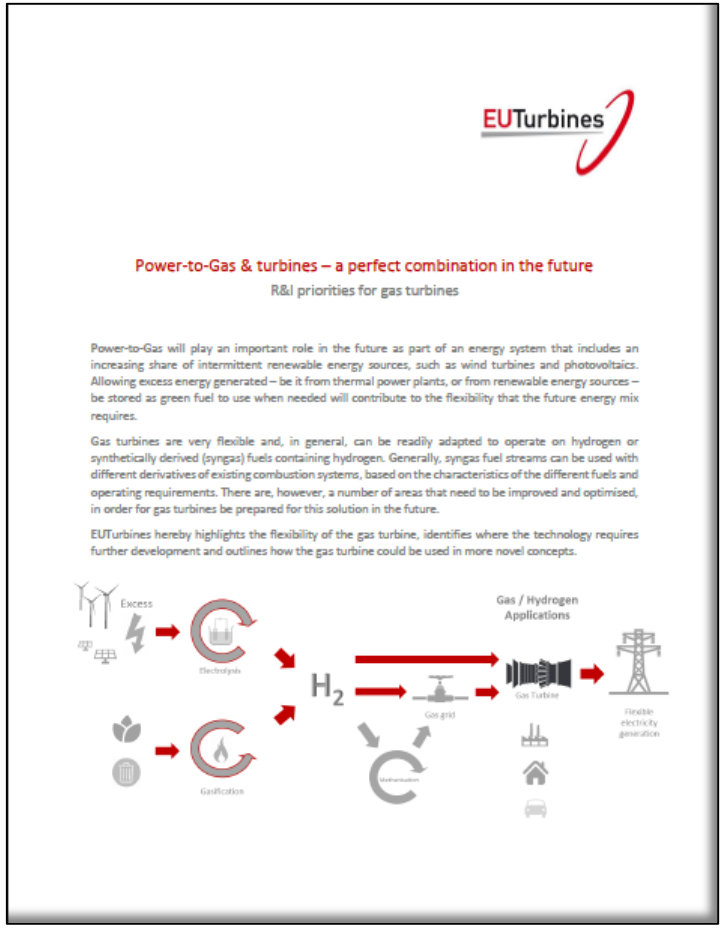
Option «Capturing GHGs»

- Even in times of base load operating plants, carbon capture & storage (CCS) or carbon capture & utilisation (CCU) were too expensive

- With less running hours and smaller decentral plants the cost pressure even increases

Option «Power-to-Gas»

- Approach of power-to-gas-to-power seems the better option
- Con:
  - Economic challenges caused by the low efficiency
- Pro:
  - Growing availability of “green excess energy”
  - possibility to use the existing gas grid as large and seasonal energy storage option
  - Supports need for flexibility
  - Allows re-electrification, also



So, is there a future for GT‘s in Europe?

Short-term

- ✓ **Flexible complement to vRES**
- ✓ … but „transitional technology“

OCGT

Aeroderivatives

Industrial cogeneration & demand response

District Heating

Longer-term

- ✓ **Zero-CO2 Emission Solution**

Burning green hydrogen or synthetic methane

+

Biogas, CCU (CCS)