Advantages of micro gasturbine based CHP

- Cost effective
- Reliable
- Low maintenance
MTT Introduction

• MTT is an innovative company, active since 2008 on the development and commercialization of micro CHP systems based on its in-house developed micro gas turbine;

• MTT is located in Eindhoven Netherlands, and currently employs 18 highly qualified staff;

• To develop and commercialize its CHP products, MTT has risk sharing contracts with various relevant industrial partners and with knowledge institutes;

• Together with its partners, ± 45 skilled engineers work on the optimization of the micro CHP system.
Delivering the most cost effective micro CHP

Market assessment:
High investment - and maintenance cost are obstructing fast market introduction of micro CHP

EnerTwin is aiming to be the most cost effective micro CHP system:
• Allowing acceptable pricing at relatively low volumes
• Customer pay back target between 2 and 5 years

MTT’s strategy:
• Use Commercial Off The Shelf (COTS) components (automotive)
• Involve business partners and installation companies during development
• Outsource component development & manufacturing to keep costs low and development speed high
• Improve product efficiency once volumes are realized
Low cost (investment + maintenance) are essential for the success of micro CHP!
Technology: micro gas turbine

- Gas turbines have been used since 1930:
  - Very reliable & long life: only 1 moving part, moves in only 1 direction
  - Low maintenance costs
  - Highest power to weight ratio / power density → relative low weight
  - High frequency noise: can easily be damped

- Multi fuel: Natural Gas, Bio Gas, LPG, Heating Oil

- Turbochargers are produced in millions → low costs, very reliable
Specifications for the EnerTwin micro CHP system:

- Power (natural gas) input: 20 kW
- Thermal power: 14.4 kW
- Electrical power: 3.0 kW
- Power to Heat ratio: 21%
- Total efficiency: 87% *
- Weight: ± 225 kg
- Clean combustion: < 40 ppm NOx
- Substantial CO2 reductions: 3 - 6 tons per year
- Low noise: < 55 dB(A)

Additional specifications:

- Able to modulate to ~ 50%
- Maintenance: > 5.000 hrs (± 2 years, similar to condensing boilers)
- Lifetime: > 30.000 hrs +
- Remote control / smart grid ready

* At ISA conditions and 30/50: can be improved by adding a condensing unit
Target maintenance cost EnerTwin

- **5,000 hrs (small service):**
  - Replacement of CAP seal, air intake filter, oil filter
  - Check oil level
  - Visual inspection of system + computer read out
  - **Total cost:** material Euro 45,- plus ~ 1 hour labor

- **10,000 hrs (large service):**
  - Similar as 5,000 hrs service, plus:
  - Change fuel compressor head, replacement of UPS battery
  - Replacement of oil (4 liters)
  - **Total cost:** material Euro 245,- plus ~ 1.5 hour labor

- **30,000 hrs (overhaul service):**
  - Similar as 10,000 service, plus:
  - Replacement of micro turbine (~ Euro 750,-)
  - **Total cost:** Euro 995,- plus ~ 3 hours labor
  - Life extension to 45,000 – 50,000 hrs

- Maintenance cost Σ 30,000 hrs: ~ Euro 625 + 6 hrs labor (@ Euro 80) = Euro 1,105,-
- **Per kWh electricity:** 1,3 Eurocent (@ 85,000 kWh)
Best use cases EnerTwin

- EnerTwin can best be used in situations where many running hours are possible;
- Aiming at annual heat demand of > ~3.500 m³ of natural gas;
- Combination with a heat buffer is advised to enable long running periods;
- Systems can be placed in cascade when higher heat demand is required;
- Examples: large houses, houses with pool, family hotels, fitness centers, schools, elderly homes, multi family homes, restoration projects, municipality buildings etc.
EnerTwin in Field Test

- Certification for field test Q1 2013;
- Field tests started July 2013 (Phase 1):
  - Initially 12 systems
  - Lab endurance testing partly in parallel
  - Main objective: reliability
- Field Test Phase 2:
  - Planned to start Q2, 2014
  - Up to 50 systems
  - Main objective: use cases
- Commercialization planned for mid 2015
Field test locations in NL and DE (phase 1)
Remote monitoring FT units

- Continuous on-line monitoring on key parameters by MTT team (PC and mobile phone)
- FT units are equipped with local PC for detailed data logging
- Data is transferred to MTT database every minute for analyses, extra loggings in case of errors (1 sec)
- Weekly update report to partners
- FT units for supporting R&D (DLR, KIC-Eifer, KIC-IREC, FH Soest) are locally monitored, independent test results are shared with MTT
USP’s

• Pay back of investment 2 - 5 years;
• Low investment cost (3 kWe micro CHP system);
• High reliability - low maintenance costs;
• Able to modulate while retaining high electrical efficiency;
• Substantial CO2 reduction (3 – 6 tons per unit per year);
• Multi fuel: Natural Gas, Bio Gas, LPG, Heating Oil;
• Low weight, low noise and easy installation – plug & play;
• Allows new business models for energy distribution companies & -utilities.
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