Bio-fuelled Micro Gas Turbines in Europe

Market Opportunities and R & D Requirements

Status of biofuelled Turbec microturbines

Turbec Spa, Italy
Enrico Bianchi
What is a Microturbine?

A small and simple gas turbine driving a high speed generator
The thermodynamic cycle

Air at Ambient Temperature

500 V 2,5 kHz

Compressor

Turbine

Turbine Exhaust, 650°C

Combustor

Combustor exhaust, 950°C

Recuperator Exhaust, 270°C

Generator

Fuel

350 kW

Water in, 50°C

Water out, 70°C

Exhaust to Atmosphere, 0.8 kg/s at 85°C

Hot water heat exchanger

Turbine Exhaust, 650°C

Exhaust to Atmosphere, 0.8 kg/s at 85°C

Hot water heat exchanger

Water in, 50°C
T100 CHP Main Components

- Generator
- Gas turbine
- Recuperator
- Heat exchanger
- Control System
- Combustor
- Power electronics
The electrical System

1. Generator
2. Rectifier/ Start converter
3. DC bus
4. Converter
5. Line filter
6. EMC filter
7. Main circuit breaker
Improving T100 Microturbine

- Power production only
- Blackstart and stand alone
- Easy installation with new package
- Biogas
- Liquid fuels
Biofuels development

The use of biogas to fuel T100 micro turbine is an excellent way of utilizing the biogas. The general idea is to keep the installation easy it is not economically viable to do to heavy pretreatment installations.

Turbec biogas applications have currently been tested in two types of gas: sewage gas and landfill gas.

Sewage gas has typically 60-65% Methane
Landfill gas ranges from 35-55% Methane
Biofuels development

The Turbec T100 uses filtering down to 1 micron and apart from this the system removes water directly in the gas compressor.

In some cases, small changes are needed in the fuel system and in the combustion chamber.

Today Turbec has 8 biogas installations up and running and one plant in Sweden for evaluation of future solutions.

Liquid fuels and biofuels are an R&D priority which is addressed thanks to strong automotive background.
## Turbec Reference list

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### Operating Hours Experience

- **Total Accumulated**: 748,885 hours
- **Leading Unit**: 24,000 hours
Thank you for your attention

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