Cogeneration & trigeneration with gas microturbines

Turbec S.p.A.
In the early 80s, Volvo started the development of two different gas turbine systems for vehicles like cars, bus and trucks (VT40 and VT100)
Turbec T100: the development

First Prototype (1997)

SERIES I (1998-1999)

SERIES II (1999-2001)

SERIES III (2002-2009)
**Turbec T100**

- **Dimensions (CHP)**
  - 900x1810x2527/3652 mm (WxHxL)

- **Weight**
  - 2650 kg

- **Electrical output**
  - 100 kW (ISO condition)
  - Electrical efficiency 30%

- **Produced heat (hot water)**
  - 167 kW (about 144.000 kcal/h)
  - Thermal efficiency 48%

- **Noise level**
  - 70 dBA (at 1 meter)

- **Volumetric exhaust gas emissions at 15% O₂ and at 100% of the load:**
  - NOₓ <15 ppm v (<32mg/MJ fuel)
  - CO <15 ppm v (<18mg/MJ fuel)
  - UHC <10 ppm v

**Remote control option**

- **Reliability**
- **Low maintenance costs**
- **Life in operation (60.000 hours)**
- **Easy direction of the equipment**
- **Flexibility on the use of the heat**
- **Easy installation**
- **Lower emissions values**
- **Functioning with different type of fuel**
Remote control

Central Station

Head Office
Administration
Energy trading
Sales

Maintenance Team
Analysis of the current situation

100% ENERGY INPUT (FUEL)

55% WASTE HEAT

8% NETWORK LOSSES

37% ELECTRICITY

CONVENTIONAL SYSTEM TOTAL PERFORMANCE ~ 37%
OUR SOLUTION

100% INLET ENERGY (FUEL)

20% WASTE HEAT

30% ELECTRICITY

55% HEAT

COGENERATION TOTAL PERFORMANCE

~ 30+55 = 85%
The Turbec experience

450 installed equipments
>4,000,000 functioning hours for the installed equipments
Some applications

Swimming pools: Legnano, Ispra, Monza

Energy Efficiency

89%
Retirement house (Bergamo - Italy)
Resort ***** Le Fay (Lago di Garda - Italy)
Block of flats (300 flats) Milano - Italy
Process heat

ALENIA INDUSTRIE AERONAVALI (Venezia - Italy)
References

Fabriano Hospital (Ancona - Italy)
Trigeneration shopping center
(Ipercoop Arca Torino)
Heating and greenhouses carbon fertilising (SW)
Electric energy costs: 0.11€/kWh
Methane costs: 0.35€/m³

Electric power: 100kW
Thermic power: 160kW

Operating hours/year: 8,000

Total Revenues: €18,38

Gas cost: €11.96
Maintenance costs: €1.40
Total operation costs: €13.36
Hour revenue: €5.02
Electric Energy: €11.00
Thermal Energy: €7.38

40,156 €/YEAR
Particular attention is given to the development of machines for applications with fuels from renewable sources, the real distinguishing feature of the microturbine.

- BIOGAS
- EXTERNAL COMBUSTION OF BIOMASS
- SOLAR APPLICATION
- VEG OIL
Biogas from landfill (Perugia - Italy)
Application models

Biogas from digesting manure & biomass
Special applications

Biomass - External combustion
The functioning
Special Applications

Biomass - External combustion (chips) (ENEL Livorno - Italy)
Special Applications

Solar application

The functioning
Solar Application
Plataforma solar de Almeria (Spain)
Special Applications

Solar Application
Kibbutz Samar (Israel)
Micro CHP

Electric power 5 kW
Thermic power 12 kW

In cooperation with baltur
Energy efficiency

It is an important environment protection factor, enabling savings on non-renewable energy sources and avoiding emissions from fossil fuels.

- 66% CO₂

With cogeneration, the efficiency increases from 37% to 85%

Energy saving equal to 5,000,000 tons of petro if used over 100% of plant systems.