



Opportunities for Biofuel-driven Microturbines

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Project Consortium

- WIP – Munich, Germany
- ETA – Florence, Italy
- EUBIA –
The European Biomass Industry Association
- Energidalen, Sweden



Project Start: January 2003



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Microturbines (20 – 100 kW) for Distributed Power and Heat Generation

Advantages

- Simple and compact technology
- Modularity
- Low emissions
- Low investment and maintenance costs
- Reliable provision of electricity and heat for stand-alone and grid-connected applications
- Potential operation on a variety of fuels (natural gas, diesel, gasoline, bio-fuels)



Capstone MT (30 kW)



Heat recovery for MT (microGen™)



Project Aim

- Assessment of technological potential and economic perspectives of biofuel-driven microturbines
- Promotion of the development of an efficient and environmentally friendly technology
- Stimulation of the market penetration of liquid biofuels



Project Structure

- Overview of conventional microturbine technology applications (phase 1)
- Overview of liquid biofuel applications in the heat & power sector (phase 2)
- State of development of biofuel-driven microturbines (phase 3)
- Identification of market opportunities for biofuel-driven microturbines (phase 4)
- Dissemination activities (phase 5)

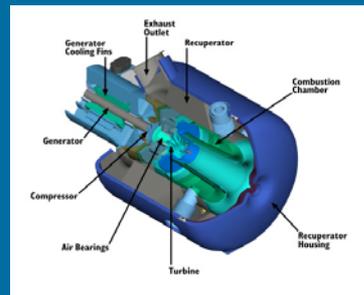
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Overview of Conventional Microturbine Technology Residential, Commercial, Industrial and Distributed-power Applications

- Technology performance characteristics (energy efficiency, environmental indicators)
- Key players and manufacturers
- Product status (reliability, availability, maintenance)
- Overall current market and applications



Function diagram of Capstone Microturbine

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Liquid Biofuels

Application for Power systems

- Biofuel production and consumption in Europe
- Cost of biofuel production
- Distribution systems and logistics
- Current utilisation of biofuels in the micropower sector (technical/environmental performance in conventional applications)



BioDiesel Production Plant in Bruck, Austria (15.000 t/year)



Application of Biofuel-driven Microturbines

- Current status of utilisation in Europe (R&D, Demonstration projects)
- Key manufacturers
- Analysis of technical, economic and environmental performance
- Comparison with 'conventional' microturbine technology
- Comparison with 'competing' technologies (e.g. fuel cells)
- Required future developments (e.g. materials, sub-components, control systems)



Market Opportunities for Biofuel-driven Microturbines

Potential Applications

- Continuous operation (> 6000 h per year)
- Peak power (< 1000 h per year)
- Back-up power (e.g. hospitals, airports)
- Premium power (high quality)
- Remote power applications (off-grid)
- Small-scale co- and tri-generation systems



Elliot Energy Systems Inc. (80 kW)



Market Opportunities for Biofuel-driven Microturbines

Barriers and Benefits

- Electricity production costs
 - Fuel cost
 - Technology cost
- Legislative and institutional barriers
- Economic opportunities („Green certificates“)
- Potential benefits
 - Energy savings
 - Environmental benefits (GHG emissions)
 - Job opportunities



Project Target Groups

- Utilities and micropower providers
- Microturbine manufacturers
- Biofuel sector
- Decision makers and governments
- Energy consultants

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Outlook

- Microturbines provide the electric power industry with opportunities for the deregulated and competitive market
- The application of biofuel-driven microturbines are in line with the EC goals for the energy sector
 - Improvement of energy efficiency
 - Guarantee of security of supply
 - Environmentally friendly power & heat production



World's largest Microturbine
Tri-generation project (540 kW), USA

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