



## **Micro-Gas Turbine: State-of-the-art and Market Potential**

The OPET – Austria partners E.V.A. “The Austrian Energy Agency” and OEKV “The Austrian Energy Consumer’s Association” have conducted a research on the market potential in Austria for micro-gas turbines . The study was commissioned by ATEL company, which investigates the market potential for Parallon™ 75 plants below 100 kW<sub>el</sub>.

In Austria, micro-gas turbines have not been so far deployed, although micro- and mini-engine based CHP plants are well known in various industrial and public sectors. The research may be seen as a contribution of OPET Austria to the facilitation of micro-gas turbines introduction on the market by outlining specific market potential and the specific legal, techno-economical and environmental framework conditions in Austria.

### **1. Present CHP Structure in Austria**

The cogeneration has been up to today well implemented in Austria. Hydro-power in the country accounts for about 66 % of electricity production. Around 77 % of total electricity generated from thermal power, comes from cogeneration. This is due to the wide use of CHP in district heating (DH) as well as by independant producers in industrial sector. The share of CHP generated electricity accounts to 64 % of total electricity produced by thermal power plants and this share by independant industrial producer accounts for even 97 %.

	<b>CHP BY UTILITIES (ELECTRICITY AND DISTRICT HEATING)</b>		<b>CHP IN OWN USE BY INDUSTRIAL PRODUCERS</b>		<b>CHP IN AUSTRIA (TOTAL)</b>	
	<b>1994</b>	<b>1996</b>	<b>1994</b>	<b>1996</b>	<b>1994</b>	<b>1996</b>
<b>CAPACITY</b>						
- electricity (MWe)	2,368	2,391	878	1,081	3,246	3,471
- heat (MWe)	2,450	2,644	3,551	4,614	6,001	7,258
<b>PRODUCTION</b>						
- Electricity (GWh)	7,001	8,332	4,720	6,125	11,721	14,457
- Heat (TJ)	16,551	23,951	62,627	77,688	79,178	101,639

Between 1994 and 1996, the total electricity production capacity has dynamically increased by 7 % and the thermal capacity production by 21 %. From 1996 to 1997, the extension of thermal capacity has almost been stopped, during which the total electricity production capacity increased by 8 %.

Due to the liberalisation of the electricity market, the frame conditions for CHP have been changend so that the industry hasitates with CHP investments. Between 1998 and 2000, the CHP capacity of industrial producers decreased slightly, exactly by 14 MW.

As mentioned above, small scale CHP – plants are also widely implemented in Austria. According to a rough analysis of OEKV, since 1990 about 360 fossil driven plants (up to 1 MW) and 238 biogas plants have been installed in Austria.

## 2. Contents of the Study

The study “analysis of the market potential for micro-gas turbines in Austria” considers legal and environmental requirements for deployment of micro-gas turbines as well as market price situation concerning electricity and gas. The study has been focused on the following themes:

- legal basis, benefits and/or restrictions for operation of micro-gas turbines in Austria
- Austrian environmental requirements, benefits and/or restrictions for operation of micro-gas turbines (allowed NO<sub>x</sub> and CO levels, noise levels, etc.)
- type test requirements
- governmental programmes for support of micro-gas turbines
- typical electricity and gas tariff structure

## 3. Estimated Market Potential for Micro-gas Turbines

The number of potential clients for micro-gas turbines has been identified independently from the price level at which the micro-gas turbine produces electricity, and heat, and also independently from the local prices of electricity and gas. The criteria for the potential clients were the following:

- The client does run continuously at more than 75 kW<sub>el</sub>
- The client has an annual electricity consumption of between 1 and 10 GWh
- The client has a continuous heat demand for hot water of 150 kW<sub>th</sub>

Estimations – based on these criteria – represent the theoretical technical market potential in Austria’s industrial and public sector, without any economic and site-specific considerations:

Overview of the market potential for micro-gas turbines in the different market segments in Austria

<b>Market segment</b>	<b>Minimum estim. number</b>	<b>Maximum estim. number</b>
Hotels with more than 150 rooms	100	150
Small/medium industries (24 h operation)	9	26
Large residential house complexes	23	69
Hospitals	188	225
Large shopping centres	0	14
Large schools and universities	25	60
Indoor swimming pools, spas, and recreation facilities	13	190
Small paper mills	0	6

#### **4. Conclusions of the study**

The Austrian gas and electricity tariff situation offers some potential for micro-CHP installations. A tough competition between well established engine technology and approaching innovative micro-gas turbine systems may be expected. Furthermore, a product comparison among microturbine technology providers shows that competing systems with

- the lowest investment costs
- the lowest operation and maintenance (O&M) costs
- the most favourable economics
- the best O&M services (most likely offered by local companies)
- the most compact system design (integrated compressor, CHP module etc.) and
- the least emission levels

will succeed in the race of baling out existing market potentials in Austria.