



ProEcoPolyNet Fact Sheet

“Market analysis micro CHP”

RTD Project Identification

RTD Project Name: study “Use of micro CHP units in the electrical power range 1 – 5 kWe for Berlin “

Project No. 05 950

Summary of the study

The market study focused on producers and conversion techniques with a high development status. These products are close to market introduction and either undergoes CE-certification procedures (currently) or are already mature products. Background of this classification is the precondition of a timely entrance to the market with the analysed products.

Out of this classification there was taken another determination of conversion techniques as Stirling engine, hot air engine and combustion engine. The present study excluded fuel cells and micro-gas-turbines because of their low development status and their unfavourable and inefficient application in the small-scale housing and the trading sector.

15 relevant products concerning micro-cogeneration were identified and analyzed. For further research on feasibility and application of micro-cogeneration the following products were chosen:

1. Lion Powerblock (free-piston steam engine)
2. WhisperGen MicroCHP (Stirling engine),
3. Microgen M-CHP (Stirling engine)
4. Ecowill (combustion engine),
5. Dachs (combustion engine),
6. ecopower Mini-CHP (combustion engine)

The profitability of the chosen products was analysed considering a cost benefit calculation of the product's application in single consumption states and different buildings in Germany.

The results of evaluation of the product's application were in most of the examples negative, a larger number of the case studies were analysed as economically inefficient. The energy costs of the different products varied in a range from 38,0 to 9,8 ct/kWh.

Operating principle

Stirling engines, combustion engines, steam engines

Technical and investment characteristics of identified/analysed products

WhisperGen microCHP

- ▶ *Technology: Stirling*
- ▶ *Electrical output capacity (kW): 1*
- ▶ *Thermal output capacity (kW): 12*
- ▶ *Cost of unit: 6.000 €*
- ▶ *Specific cost of unit (€/kWe): 4.500*

Microgen M-CHP

- ▶ *Technology: Stirling*
- ▶ *Electrical output capacity (kW): 1*
- ▶ *Thermal output capacity (kW): 15, 24, 36*
- ▶ *Cost of unit: 4.500 €*
- ▶ *Specific cost of unit (€/kWe): 4.090*

Sunmachine

- ▶ *Technology: Stirling (wood pellets as fuel)*
- ▶ *Electrical output capacity (kW): 1,5 - 3*
- ▶ *Thermal output capacity (kW): 4,5 - 10*
- ▶ *Cost of unit: 23.000 €*
- ▶ *Specific cost of unit (€/kWe): 7.670*

SoloStirling 161

- ▶ *Technology: Stirling*
- ▶ *Electrical output capacity (kW): 2 – 9,5*
- ▶ *Thermal output capacity (kW): 8 - 26*
- ▶ *Cost of unit: 25.000*
- ▶ *Specific cost of unit (€/kWe): 2.630*

Steamcell

- ▶ *Technology: steam engine*
- ▶ *Electrical output capacity (kW): 0,5 – 4,6*
- ▶ *Thermal output capacity (kW): 2,5 - 25*
- ▶ *Cost of unit: target: max. 10.000 €*
- ▶ *Specific cost of unit (€/kWe): 2.170*

Prototyp Cogen

- ▶ *Technology: steam machine*
- ▶ *Electrical output capacity (kW): 0,6*
- ▶ *Thermal output capacity (kW): 3,5 - 22*
- ▶ *Cost of unit: ?*
- ▶ *Specific cost of unit (€/kWe): ?*

Lion Powerblock

- ▶ *Technology: free-piston steam engine*
- ▶ *Electrical output capacity (kW): 0,2 - 3*

- ▶ Thermal output capacity (kW): 2 - 16
- ▶ Cost of unit: 12.500 €
- ▶ Specific cost of unit (€/kWe): 4.170

Ecowill

- ▶ Technology: combustion engine
- ▶ Electrical output capacity (kW): 1
- ▶ Thermal output capacity (kW): 3,25
- ▶ Cost of unit: 5.600 €
- ▶ Specific cost of unit (€/kWe): 4.170

Micro S8

- ▶ Technology: combustion engine
- ▶ Electrical output capacity (kW): 2 – 9,5
- ▶ Thermal output capacity (kW): 8 - 26
- ▶ Cost of unit: 19.000 €
- ▶ Specific cost of unit (€/kWe): 5.600

Energator GB4-8

- ▶ Technology: combustion engine
- ▶ Electrical output capacity (kW): 4
- ▶ Thermal output capacity (kW): 8
- ▶ Cost of unit: 14.863 €
- ▶ Specific cost of unit (€/kWe): 3.715

Ecopower

- ▶ Technology: combustion engine
- ▶ Electrical output capacity (kW): 1,3 – 4,7
- ▶ Thermal output capacity (kW): 4 – 12,5

Results

In the case of the STIRLING-engines WhisperGen MicroCHP and Microgen M-CHP there can be generated savings of 10% of the energy costs using it in existing one-family-houses. Because of the less heat consumption (50%) in new build one-family-houses the feasibility of micro-cogeneration is much lower than in an older building-stock. Concerning new-build one-family-houses the STIRLING is therefore at it's feasibility limit. The free-piston-steam-engine example Lion Powerblock is there the least cost efficient with an energy

- ▶ Cost of unit: 15.000 €
- ▶ Specific cost of unit (€/kWe): 3.829

Dachs

- ▶ Technology: combustion engine
- ▶ Electrical output capacity (kW): 5,5
- ▶ Thermal output capacity (kW): 10,3 – 12,5
- ▶ Cost of unit: 15.000
- ▶ Specific cost of unit (€/kWe): 3.272

Location and use

- ▶ Private Buildings: single-, two- and multi family residential (new and older build), commercial

State of Development/Market implementation

- ▶ Prototype: steamcell, prototype Cogen
- ▶ Field tested: Microgen M-CHP, sunmachine
- ▶ Serial production: WhisperGen microCHP, SoloStirling 161, all combustion engines, partly sunmachine
- ▶ Full market implementation: all combustion engines (Ecowill only in Japan)

price of 38 ct/kWh, what derogates the yearly energy costs.

Contact and further information

Name and contact details

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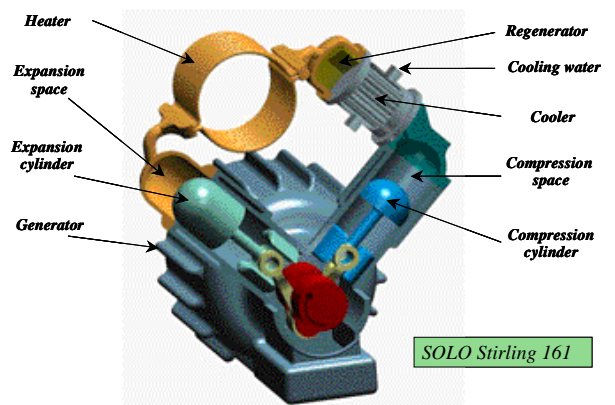
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Photos and function diagramms of selected micro CHP's



Solo Stirling 161



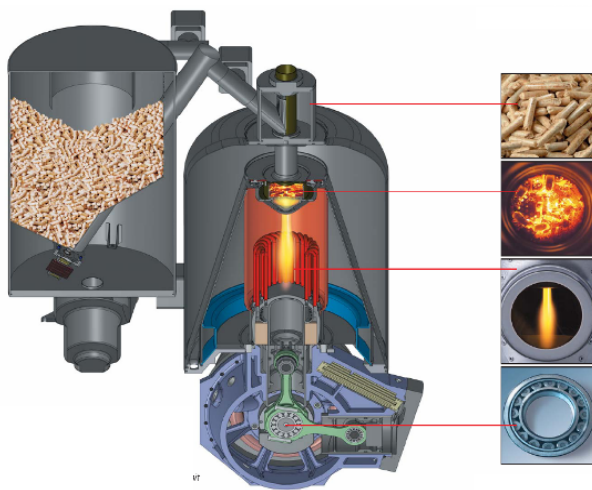
SOLO Stirling 161



WhisperGen microCHP



Honda Ecowill



Sunmachine

ProEcoPolyNet is a **Network** for the **Promotion** of RTD results in the field of **Eco-building** technologies, small **Polygeneration** and renewable heating and cooling technologies for buildings. The Consortium consists of the following partners.



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