

MicroCHeaP Technology Transfer Workshop Petten

Stirlingengines for MicroCHP in Germany

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Introduction

Introduction ISET

Market in Germany

Available Products

Developments with renewable Energies

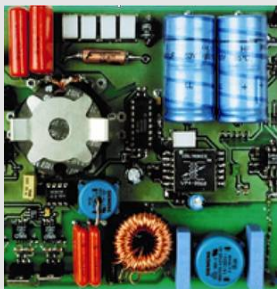
Institut für Solare Energieversorgungstechnik e.V.



System-technique for the use of renewable energy and the rational use of energy

Fields of R&D

- Wind Energy
- Photovoltaic
- Use of Biomass
- Energy-Conversion and Storage
- Hybrid-Systems
- Energy Economy
- Information and Training



Executive board: Prof. Dr.-Ing. Jürgen Schmid

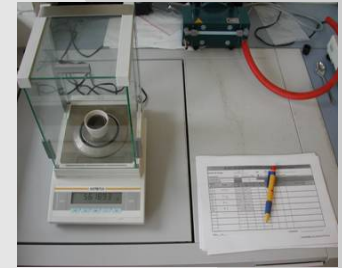
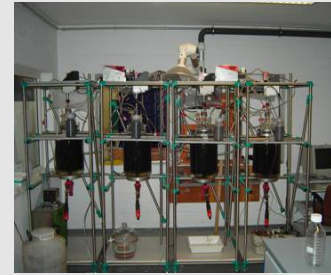
Dr. rer. nat. Oliver Führer

Personal: ca. 95 employees

Annual budget: about 8 Mio. Euro

Information: www.iset.uni-kassel.de

R&D-Division Energetic Use of Biomass (Hanau, Germany)



Fields of investigation:

Biogas Plants

- Process analysis
- Process optimisation
- Probe development
- Simulation
- System Integration

Thermal conversion processes

- Adaptation to Biogas
- Demonstration- and Pilot Plants
- System Integration
- Simulation
- New Applications



Market for CHP in Germany

Market in Germany

38,4 Mio Apartments

- 10,24Mio Single family houses
- 3,37Mio Double family houses
- 1,97 Mio Multi family houses

Average life time of a heating system: 20 years

Market size around 2,5 Mio heating units a year

Sold pellet heating units last year in Germany 40.000

Sold Stirling Engines for Micro CHP sold last year ???

Market barriers

Only No-Name companies do Stirling

Technology is too unknown to the public

Installation is not a standard task yet

There is no service network yet

It is very expensive



SOLO

Electrical Power output: 2-9 kW

Thermal Power output: 8-26 kW

Efficiency el.: 22-24,5%

Total efficiency: ca. 90%

Sound emission: 49-54 dB

Weight: ca. 450 KG

Size LxWxH in mm: 1280x700x980

Sunmachine



Electrical Power output: 1,5 - 3 kW

Thermal Power output: 4,5 - 10,5 kW

Efficiency el.: 20-25%

Total efficiency: ca. 90%

Sound emission: 49-54 dB

Weight: ca. 350 KG

Size LxBxH in mm: 800x1200x1500

Stirling Engine and Renewable Energy

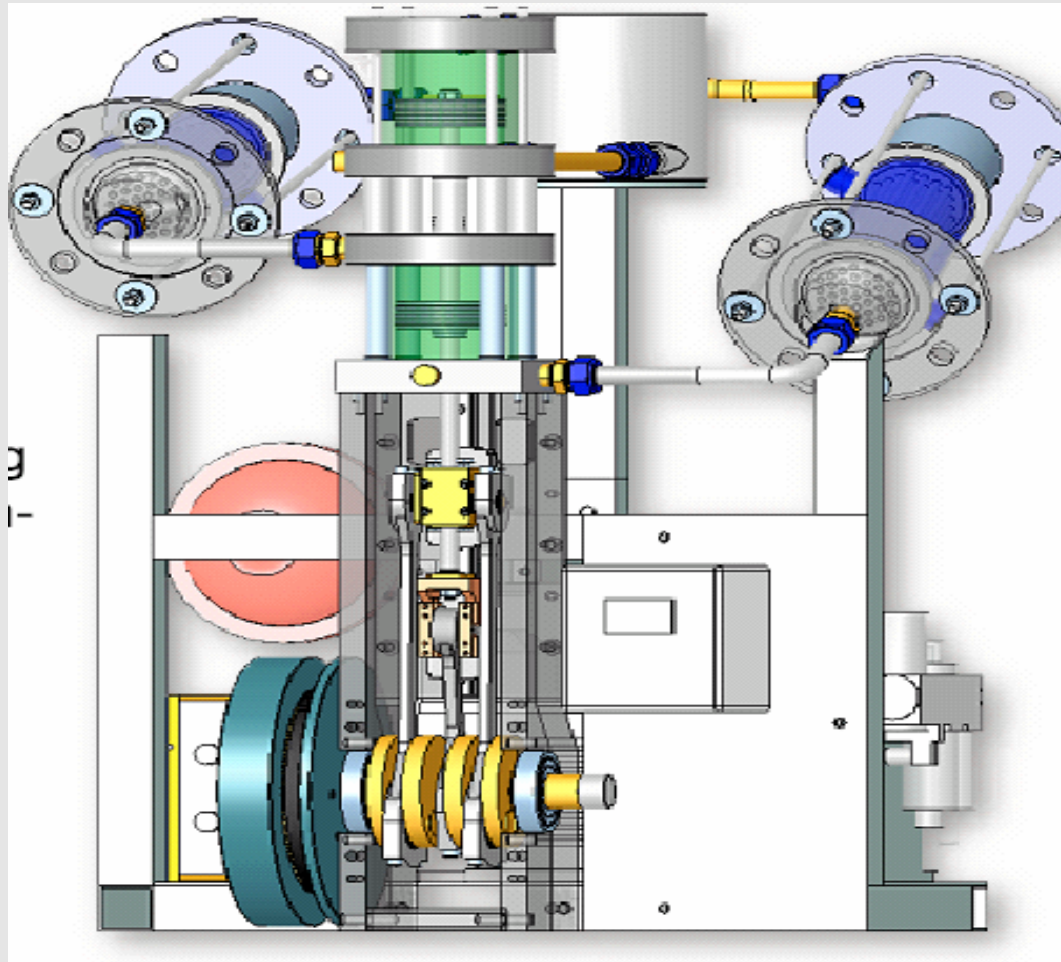
Small size engine for decentralised use

External combustion allows good use of different kinds of fuels

Permanent combustion allows good exhaust quality

Long lifetime and maintenance intervals are possible

Rapeseed Oil Powered Stirling Engine



Source enerlyt GMBH Potsdam

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- 1. Rapeseed Oil as fuel is easy to farm and has quite a potential**
 - 2. Quality of Rapeseed Oil is assure due to DIN 51605**
 - 3. High potential for CO2 saving**

Biogas powered Stirling Engine

Positive:

Only small changes to original NG Stirling are necessary

Biogas can come through the gas grid

Small biogas plants are available in many developing countries

Negative:

No company is interested in doing the changes

Biogas is not feed yet into the gas grid