

Micro-Scale CHP based on Biomass

Intelligent Heat Transfer with Thermoelectric Generators

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- **Micro-Scale CHP**
 - Basic Idea
 - Thermoelectric Power Generation
 - Combination of Technologies
- **Prototype**
 - Integration of Furnace and Thermoelectric Generator (TEG)
 - Performance in Experiments
- **Conclusions**

Automatically running Biomass Furnace with Thermoelectric Generator

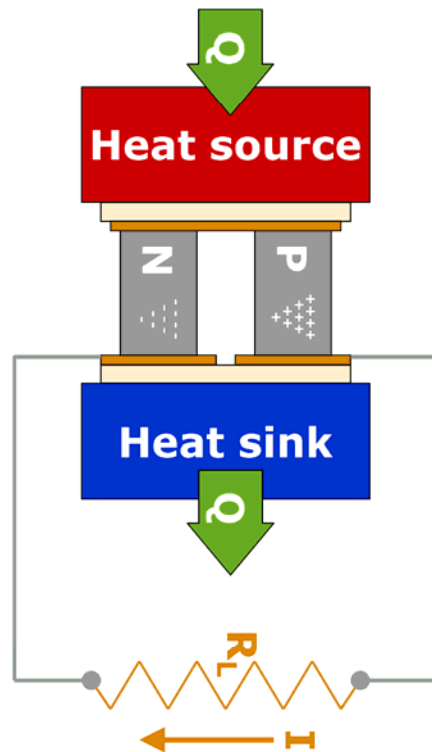


⇒ **Grid-Independent
Operation**

⇒ **Production of
Electricity**

Without losing Convenience

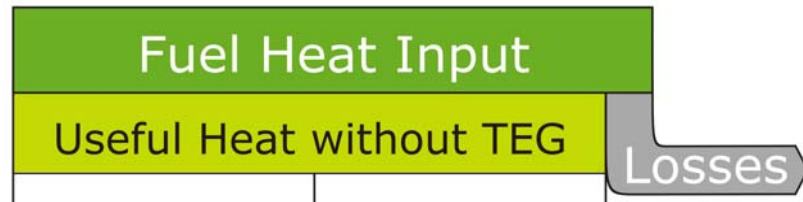
Thermoelectric Power Generation



Principle of TE
Power Generation

- Direct Energy Conversion
- Maintenance-free Durability
- Noiseless Operation
- No moving Parts
- No Working Fluids

Predestined for
Micro-Scale CHP
Based on Biomass



- Maximising Heat Flow through TEG
- High Temperatures on Small Surfaces
- Maximum Efficiency of the TEG

Energy Balance

Prototype Micro-CHP:

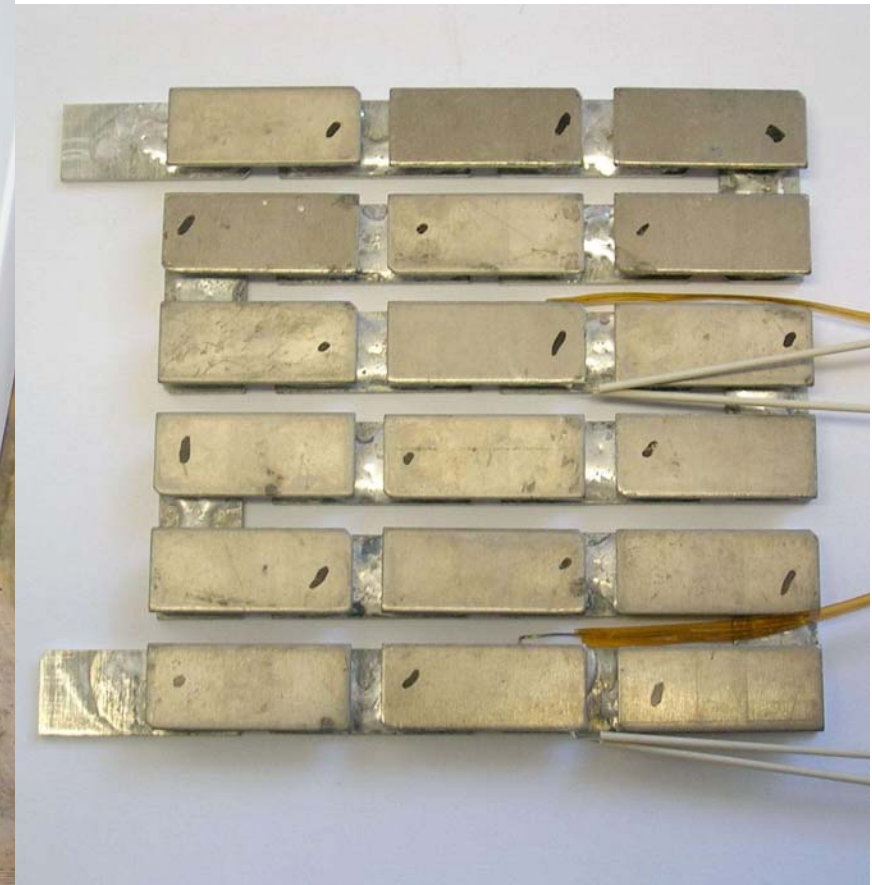
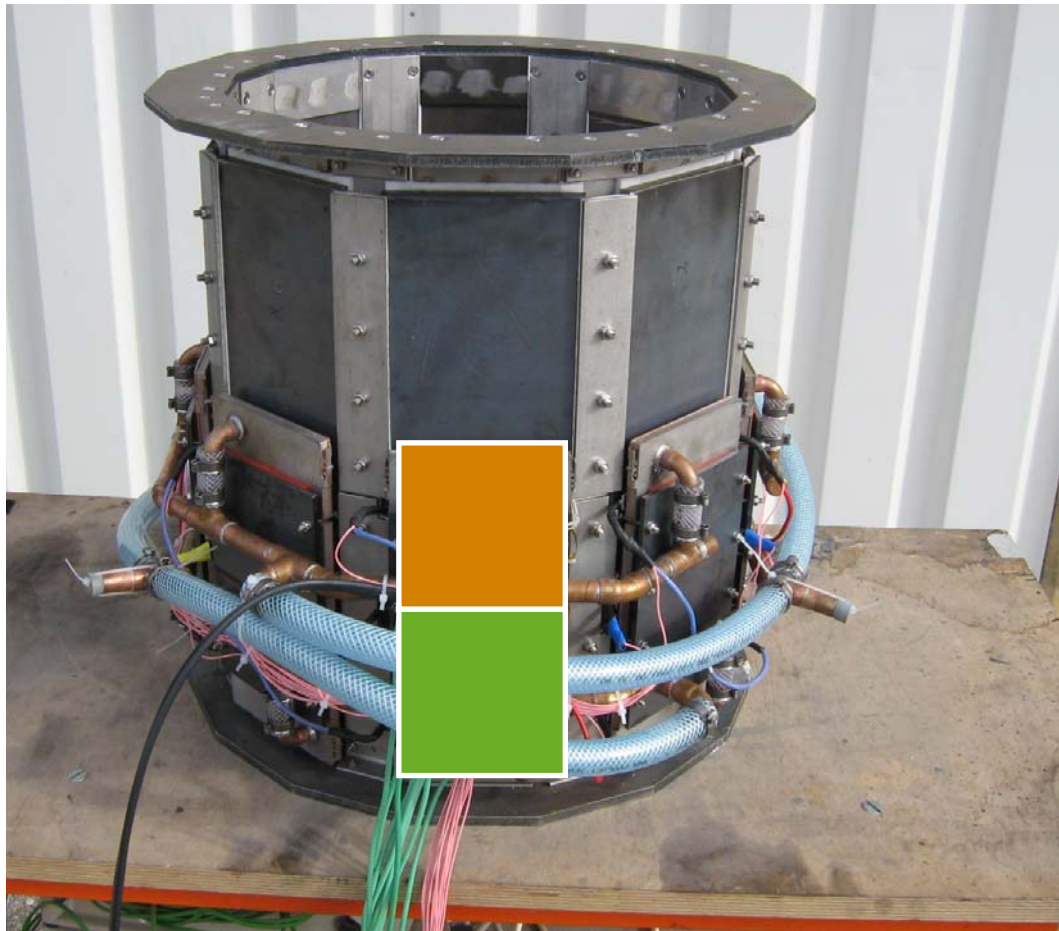
Biomass Furnace with TEG

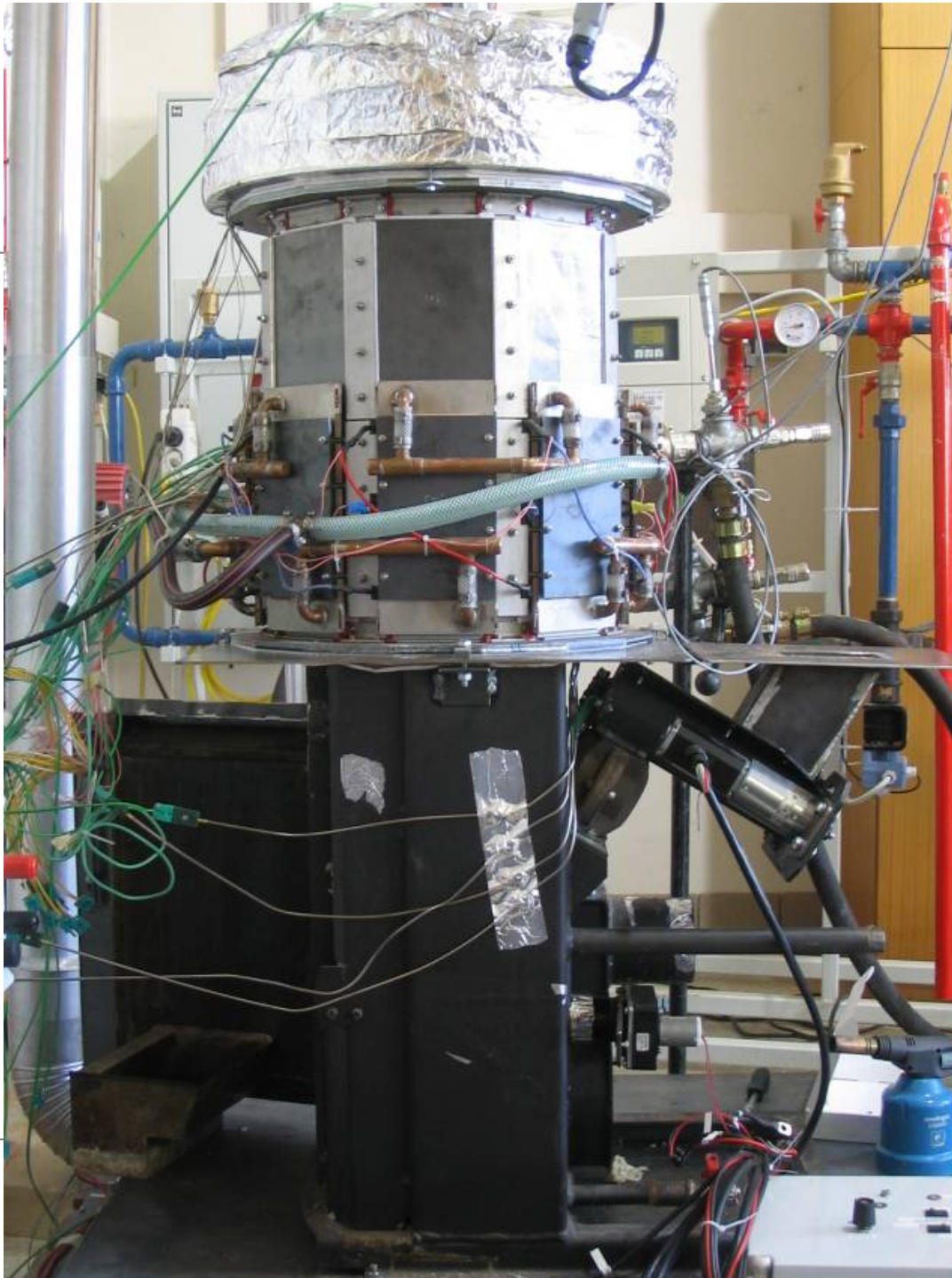
- Construction
- Build-Up
- Start-Up

Prototype – Adapted Furnace



Prototype – Constructed TEG



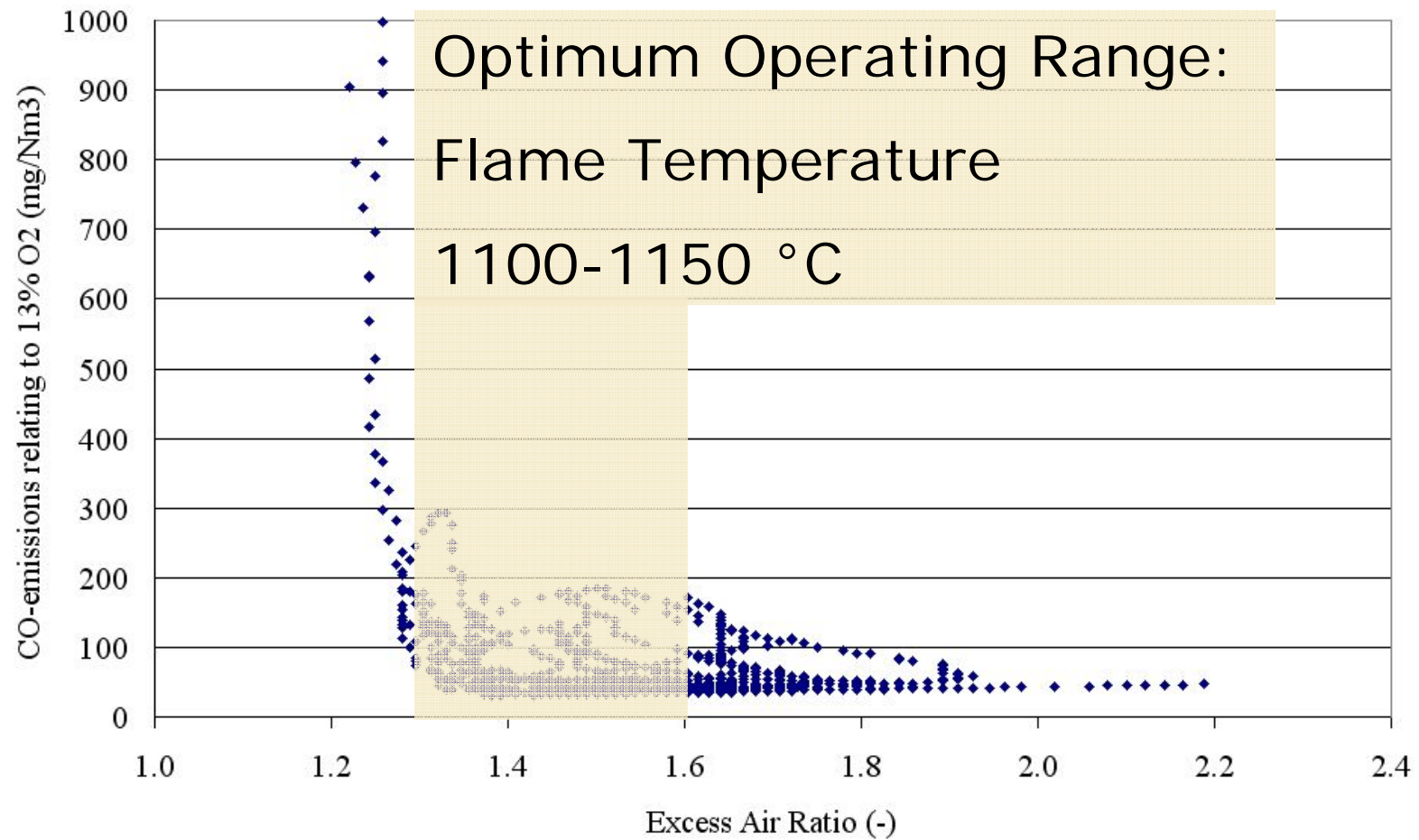


Experiments with the Prototype



- **Combustion**
- **Heat Transfer**
- **Thermoelectric Power Generation**

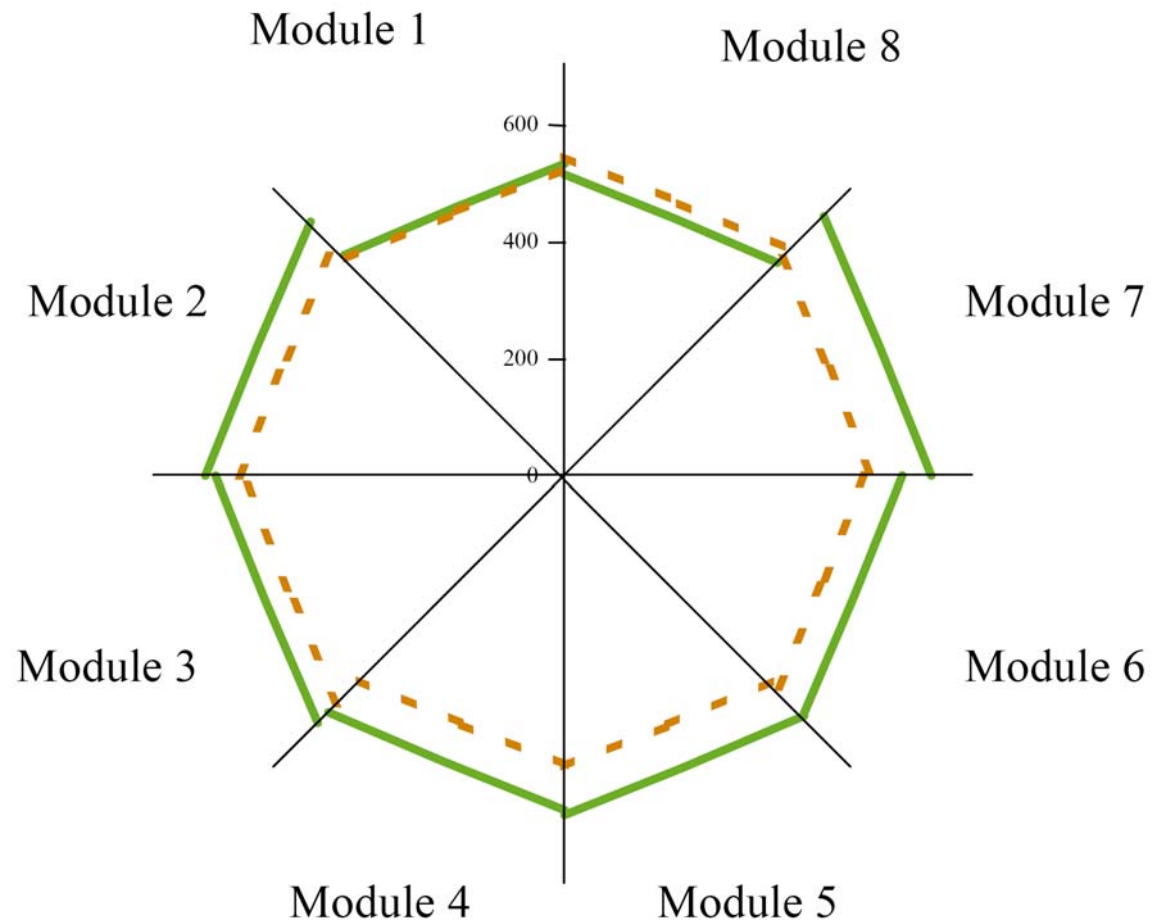
Combustion



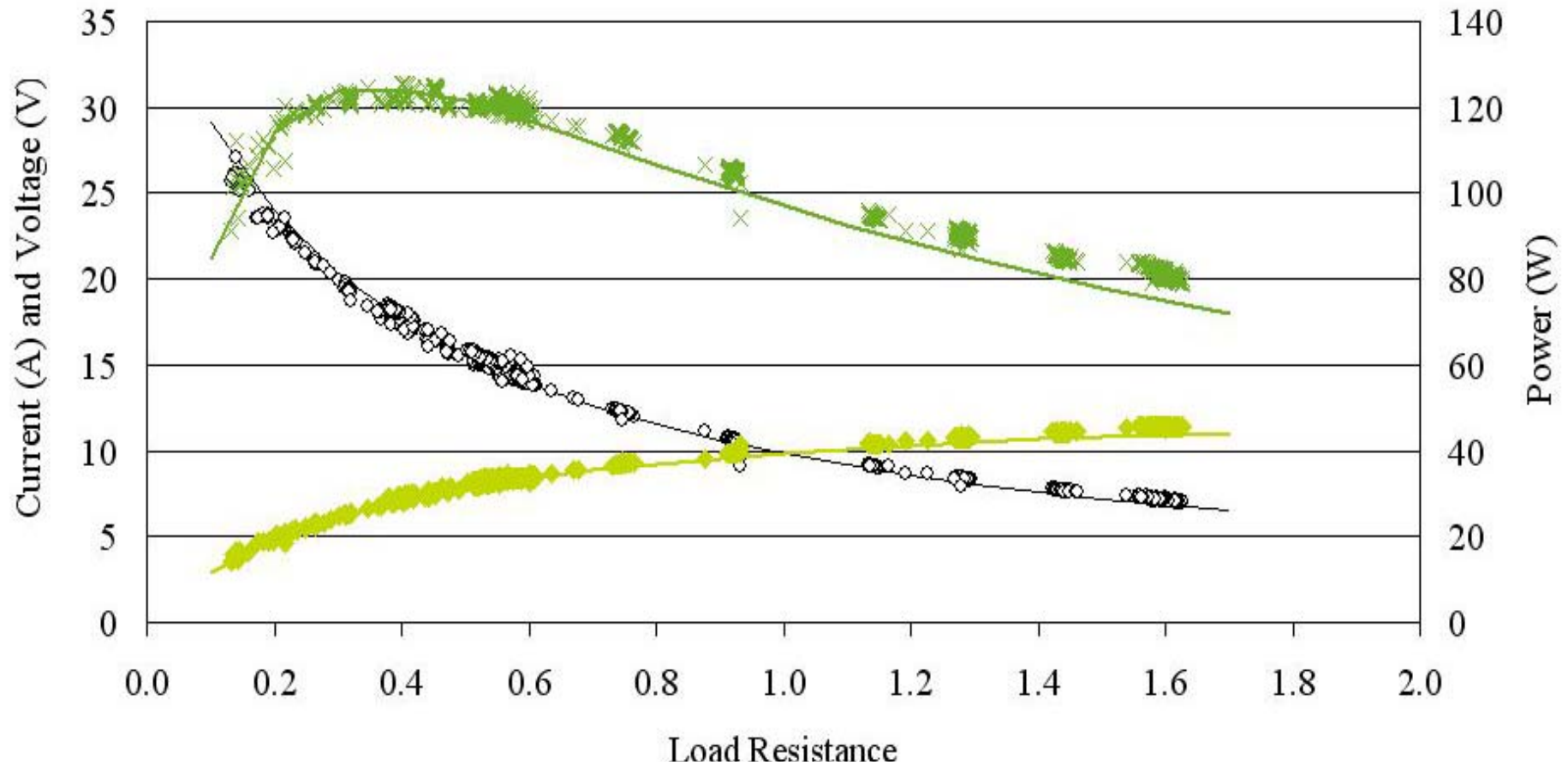
Heat Transfer

Voltage (mV) of
TE-Modules
Indicate
Local Heat Flow:
Radar Diagramm

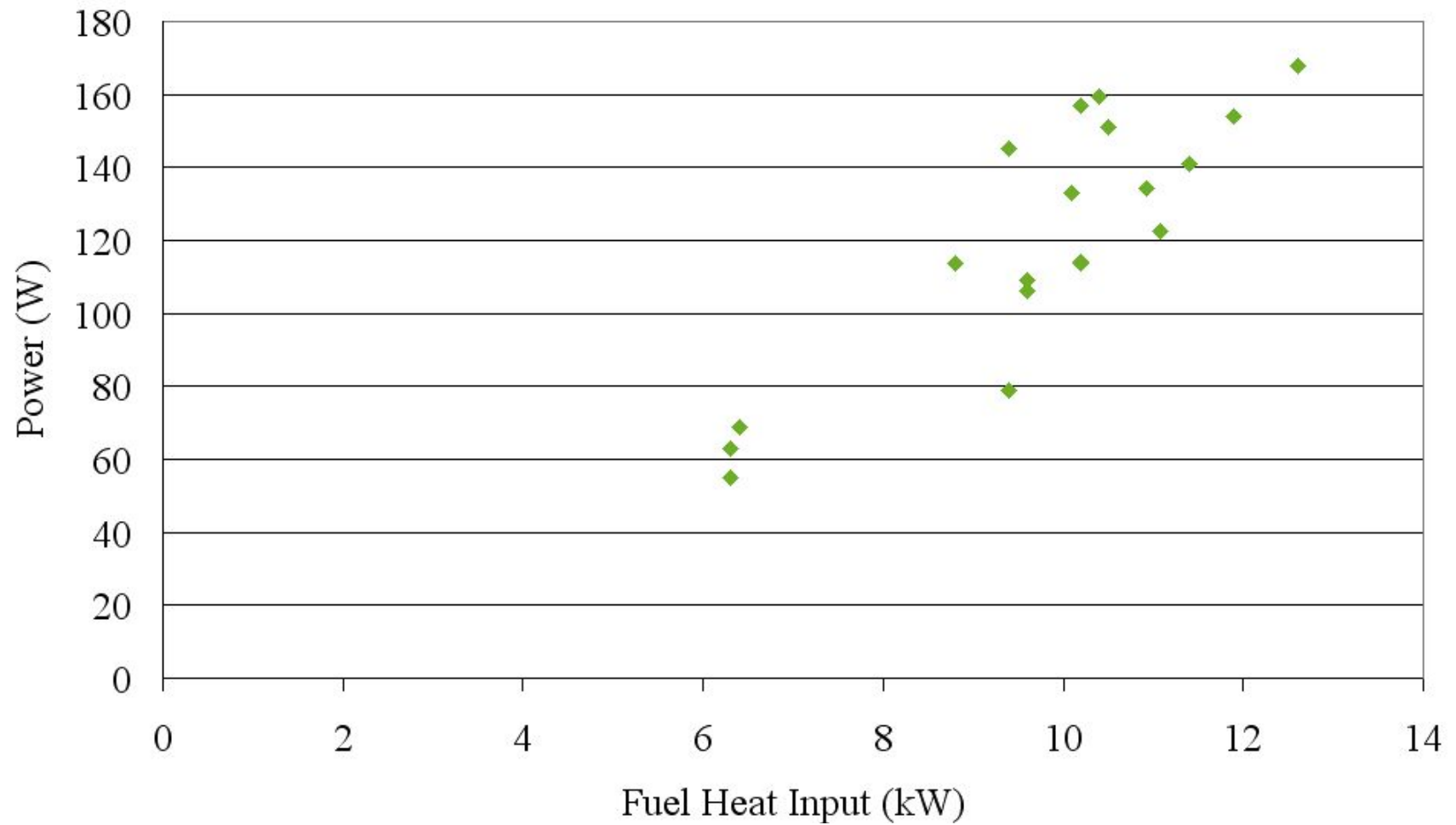
Continuous Lines:
Lower Ring
Dashed Lines:
Upper Ring



Thermoelectric Power Generation



System Performance



Conclusions

- **Successful Combination of Technologies**
- **Grid-Independent Operation**
- **Power Generation**
- **Cooperation with TEC COM GmbH and the German Aerospace Centre (DLR)**

Acknowledgements



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