

New key technology for B2B | B2C energy solutions!

INVESTORS



# Decentralised energy supply through waste heat recovery

Use heat, reduce losses, increase efficiency!

Kompetenzentrum  
energy4people.

THERMOELECTRIC Industrial Solutions GmbH



# Development and sale of a new economic key technology for the use of (waste) heat for energy recovery through its conversion into mechanical and electrical energy

## Level of development

- Company founded in 10/2012 (5 employees)
- Seed investment capital in excess of EUR 0.6 million in 2013
- Patent application by AQS Technology 06/2012
- Maturity of the technology: Prototyping in the laboratory finished, while prototyping in the industrial environment is next step
- Initial industrial partnerships and co-operations with pilot customers from the processing industry are already in place, including with AREVA GmbH, HeidelbergCement AG/plant site Geseke, TESOMA GmbH
- Science partnerships in research and industrial consorital projects are in place with TU Chemnitz, among others

## Business model

- Licensing of AQS technology for system providers, manufactures and engineering companies focusing on processing and energy technology:  
(e.g. manufacturers of cogeneration systems, gas and steam turbine power stations, coal-fired power stations, compressors, heating technology or ORC systems)
- Depending on the performance category, type of system and level of sales achieved, fixed-term licensing agreements are signed that grant the rights to use the technology in return for payment of an annual licensing fee

## Investment opportunity

- Break even in 2018 with a turnover of EUR 0.8 million, 7 employees and 0.7 MW installed performance
- Achieve market readiness by 2017 and increase licensing revenues through the sale of modules via the strategic licensing partner from 2017
- Licensing revenues of EUR 119 million achievable by 2025 with EU-wide sales of the first AQS-based product AQS INDUSTRY
- Additional increase in added value through the development/sale of own applications
- Eligible for BMWi 'investment subsidy risk capital'

## Need for finance

- EUR 0.5 million (2015)  
Finance for an industrial prototype
- EUR 0.9 million (2016/2017)  
Ensure ongoing material and personnel costs up to break even in 2018

## Short description

THERMOELECTRIC, as a cleantech start-up with high expertise in energy conversion processes and local energy supply, develops and sells a new economic key technology for the use of low-temperature heat (e.g. industrial process waste heat) for energy production through its conversion into mechanical energy to drive working machines and universally applicable electrical energy and cold

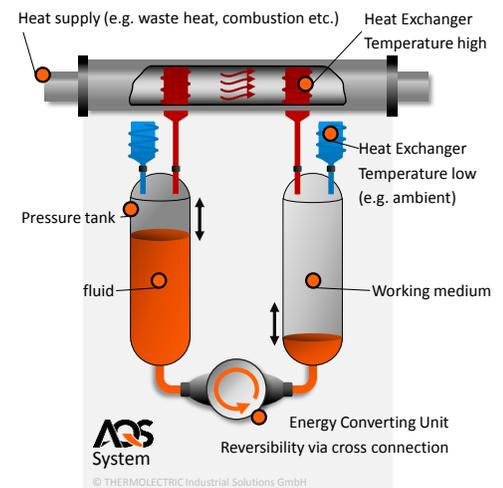
## Added value/benefits

In most industrial processes, waste heat in the low-temperature range ( $< 400^{\circ}\text{C}$ ) may only be released into the atmosphere without being used. There are *no economic and efficient technologies within the scope of energy utilisation*. Using the key technology AQS, it is possible for users to make existing, unused, energy (waste heat) economically viable for direct mechanical propulsion, and if necessary, also as electrical energy.

- Maximum performance figures and levels of effectiveness and operational capability
- Economic – short amortisation periods of less than 5 years
- Efficiency enhancing – to achieve specifications for energy-intensive companies
- Environmentally friendly – free from CO<sub>2</sub> emissions and almost soundless
- Needs-based and flexible for the forms of useful energy (operating power, electrical energy, cold, compressed air) and therefore additional conversion processes are no longer required

## Principle technology/IP

- Key technology defined with a utility patent and registered for an EU patent
- An energy transformer forms the core of the AQS system. The energy converter is a component that links a variety of thermodynamic changes of state of a working medium
- The system is marked by a periodically recurring conversion (cycle) of thermal into mechanical energy within an enclosed system
- *Practical example: an electric performance output of up to 1 MWe1 is possible for a thermal output heat performance of 5 MWth and a temperature difference of  $300^{\circ}\text{C}$*



Basic working principle of AQS-system

## Application areas/market

- Decentralised energy supply (B2B/B2C)
- Industrial process waste heat (food industry, chemical industry, metal/glass/paper industry, plastic industry, textile industry, electrical engineering, atomic energy, crude oil/natural gas industry)
- Energy storage/heat store
- Solar thermic/geothermal energy
- Energy efficiency in residential/commercial buildings
- Total addressed market (TAM): EUR 48 billion
- Segmented addressable market (SAM) energy-intensive industry Europe: EUR 7 billion
- Share of market (SOM) 10 years: EUR 119 million

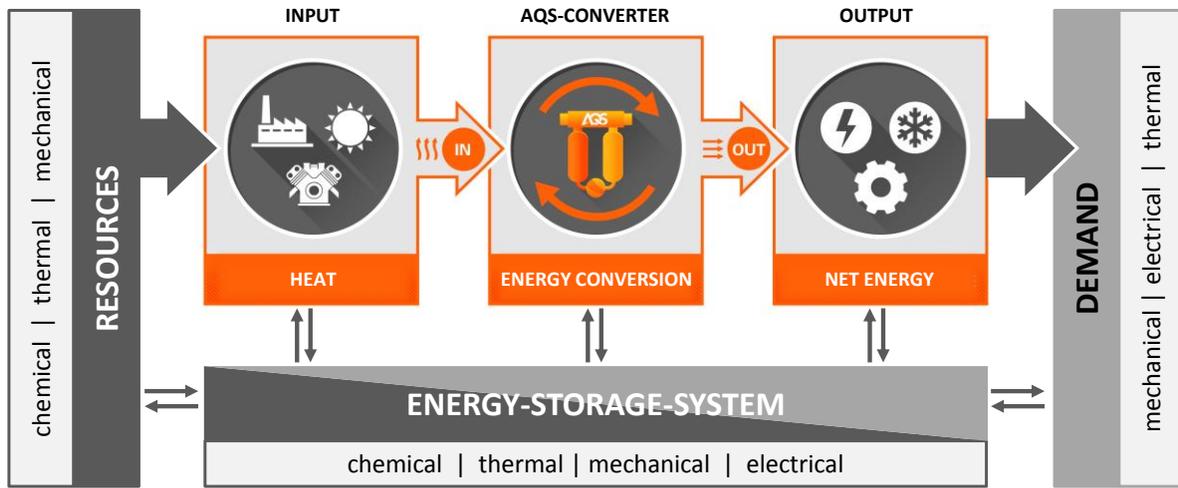
## CONTACT:

**Alexander Loos**  
THERMOELECTRIC Industrial Solutions GmbH  
Chief Executive Officer

P: + 49 351 41 89 34 57-0  
F: + 49 351 41 89 34 57-9  
M: info@thermoelectric.com  
W: www.thermoelectric.com

Address:  
Spitzwegstraße 66 A  
01219 Dresden  
Germany





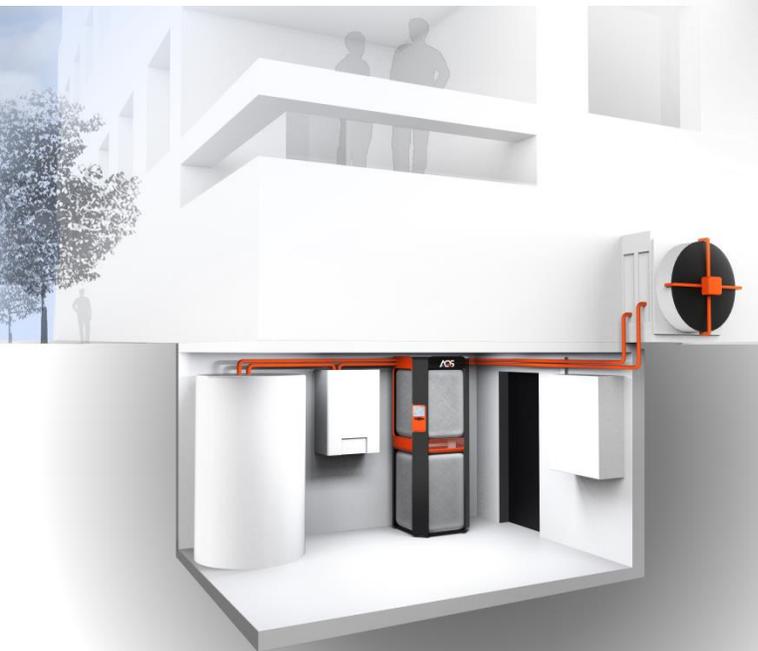
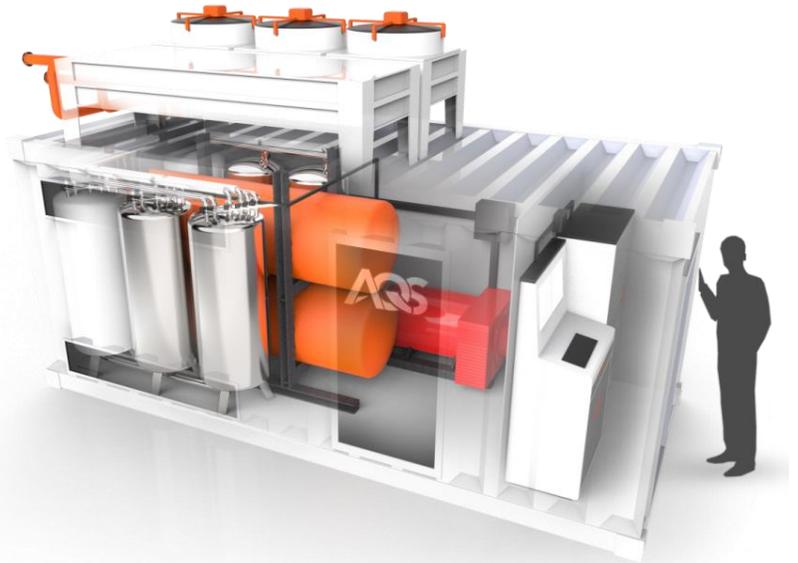
Analysis of Resources

Specification of AQS-Converter

Analysis of Energy demand

Application / Prototyping (B2B | B2C)

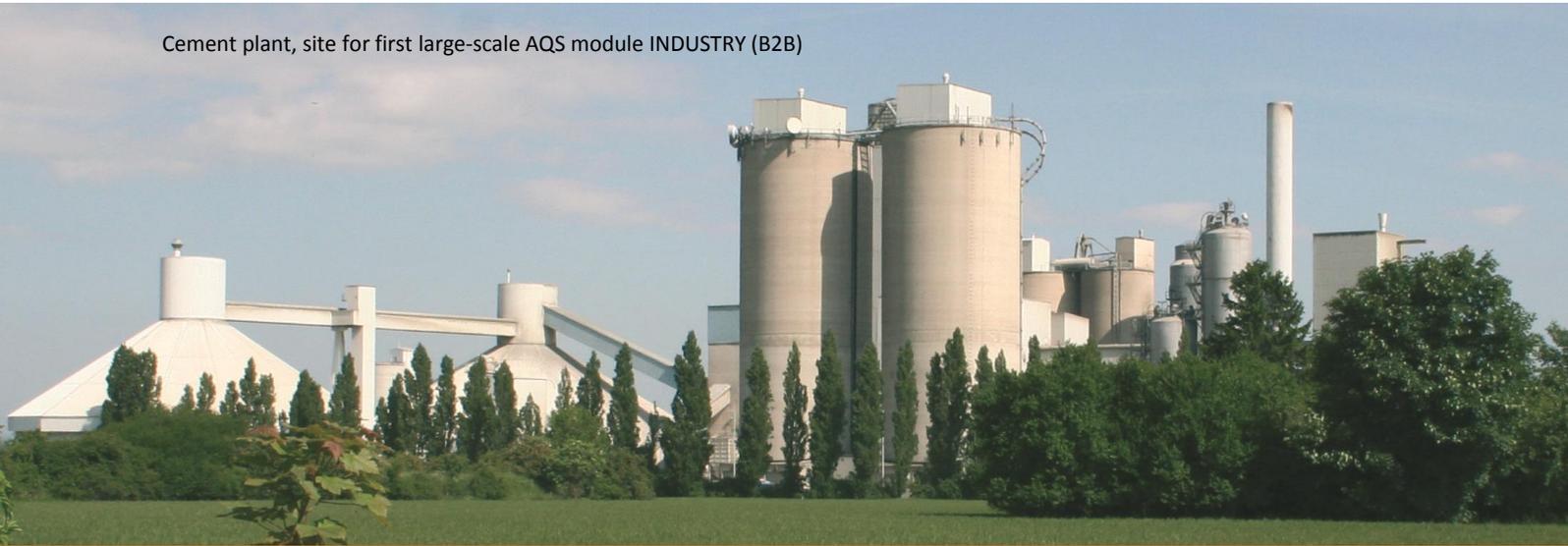
Compact and modulare  
AQS-Container Unit INDUSTRY (B2B)  
Design study ©THERMOELECTRIC



Decentral energy supply with AQS module HOME (B2C)  
Design study ©THERMOELECTRIC

## B2B|B2C Decentralised Energy Solutions!

Cement plant, site for first large-scale AQS module INDUSTRY (B2B)



### **THERMOELECTRIC Industrial Solutions GmbH**

Spitzwegstraße 66 A  
01219 Dresden  
Germany

CEO / Contact: Alexander Loos

Amtsgericht Dresden HRB 31678

Tel.: +49 (0) 351 / 41 89 34 57-0  
Fax: +49 (0) 351 / 41 89 34 57-9  
Mobile: +49 (0) 160 / 74 88 87 1  
E-mail: kontakt@thermoelectric.com

[www.thermoelectric.com](http://www.thermoelectric.com)



### **Kompetenzzentrum energy4people**

Project of association Förderverein dream4life e.V.

Schillerstraße 9  
DE-09337 Hohenstein-Ernstthal  
Germany

[www.e4people.de](http://www.e4people.de)

