INNECS

BALANCEREN MET STOOM EN STROOM

Emmtec

9-3-2017

Ger Bloem

Company history

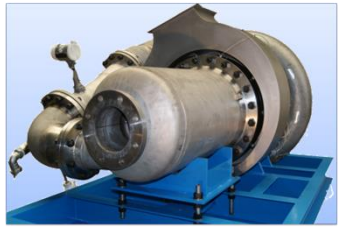
- 2004 Innecs founded
  innovative energy conversion systems, engineering & development

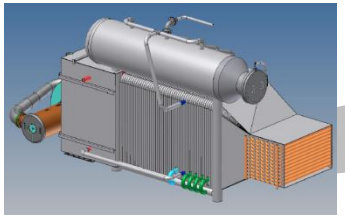
- 2012 Innecs Power Systems as OEM
  affordable technology in order to realise energy efficiency and environment benefits

Innovative Energy Conversion Systems

Shareholder structure

Innecs designs, manufactures and delivers: /4





Value proposition

- Higher efficiency
- Lower emissions
- Lower costs

SPOT <5 yr

Market segment

- 1-10 ton/hr

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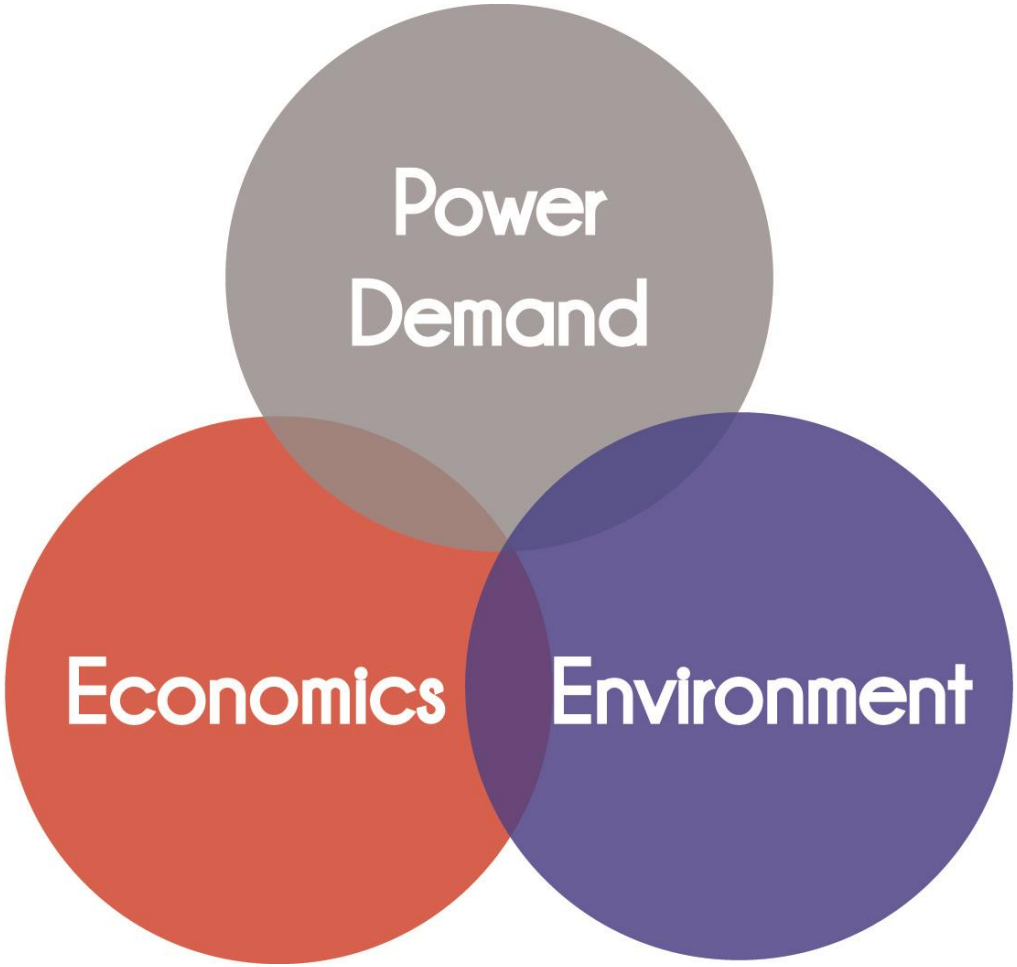
Innovative Energy Conversion Systems

Business model



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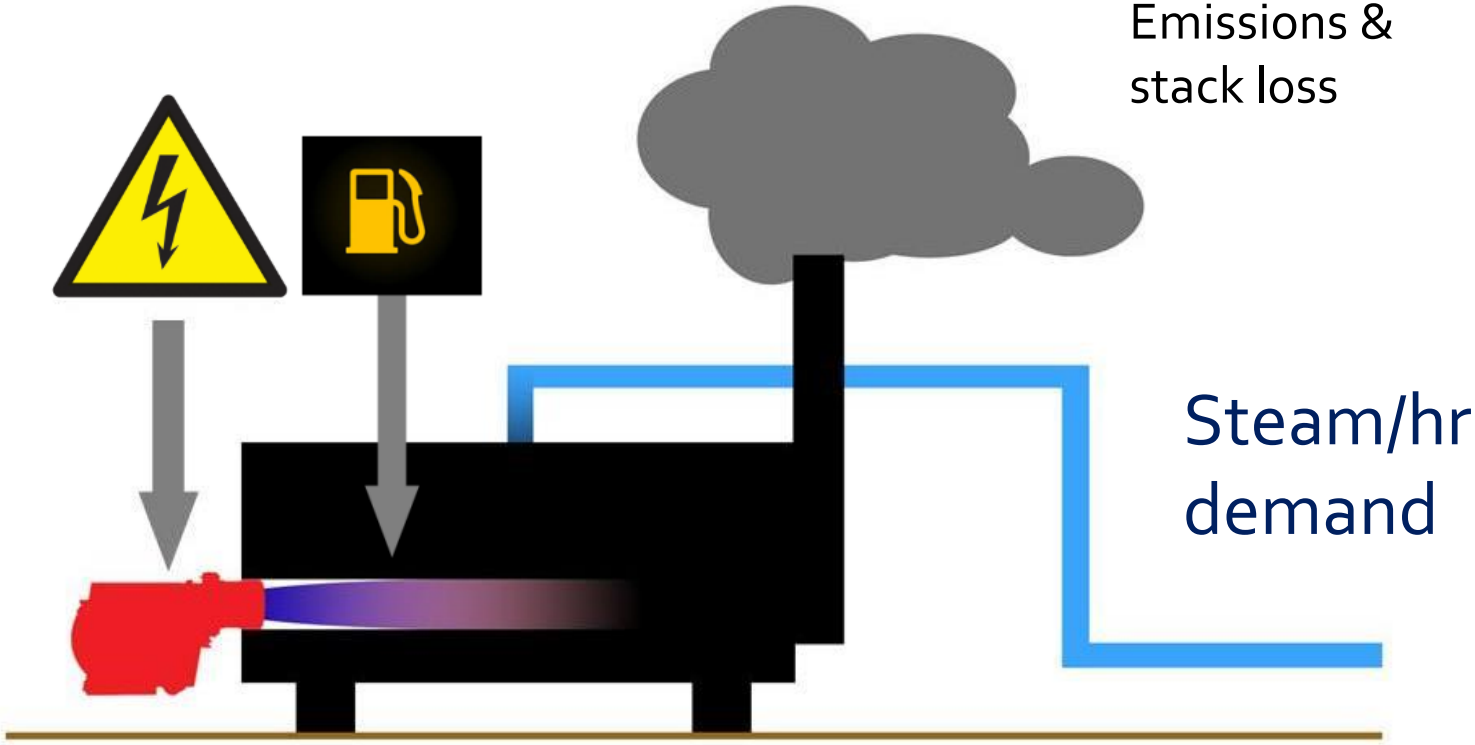
Conventional steam boiler principle

€ 1.475.000 energy cost/yr (NL)



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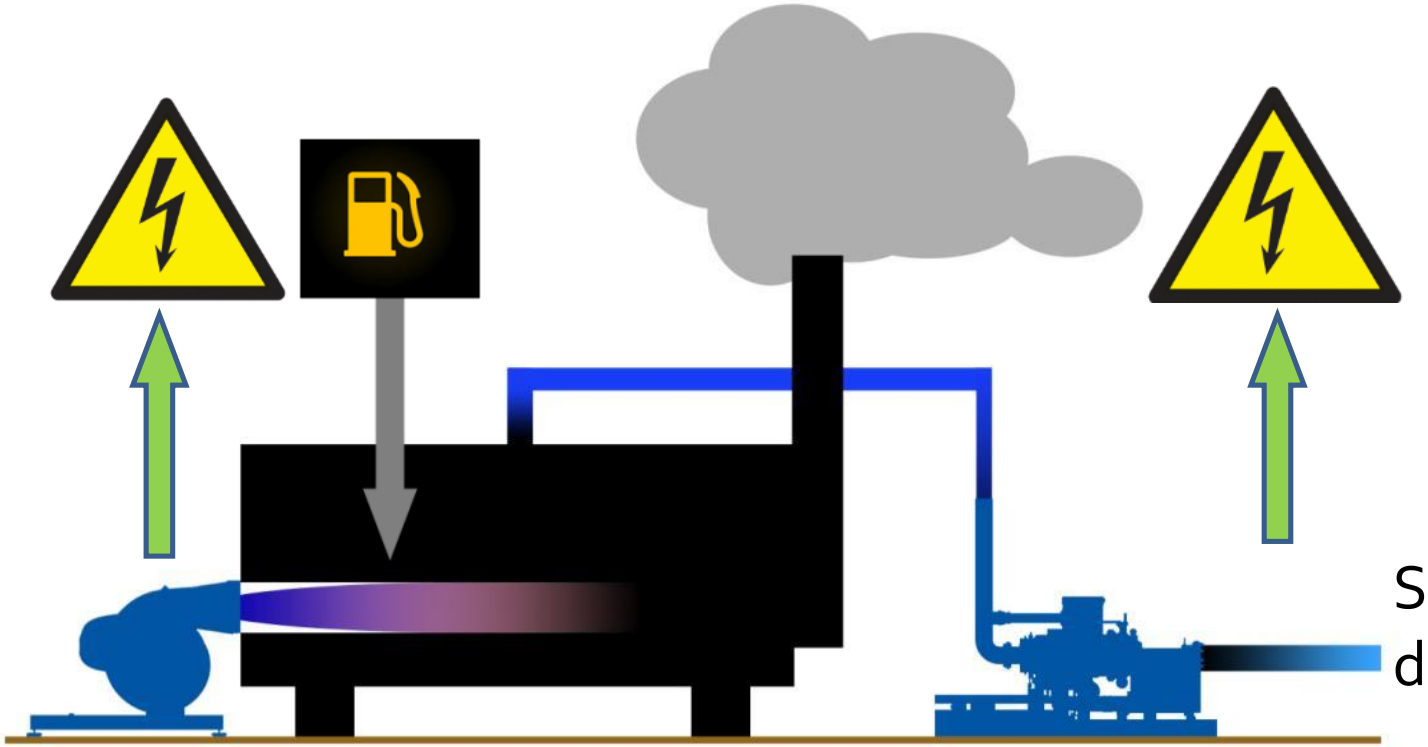
Innecs Power Systems



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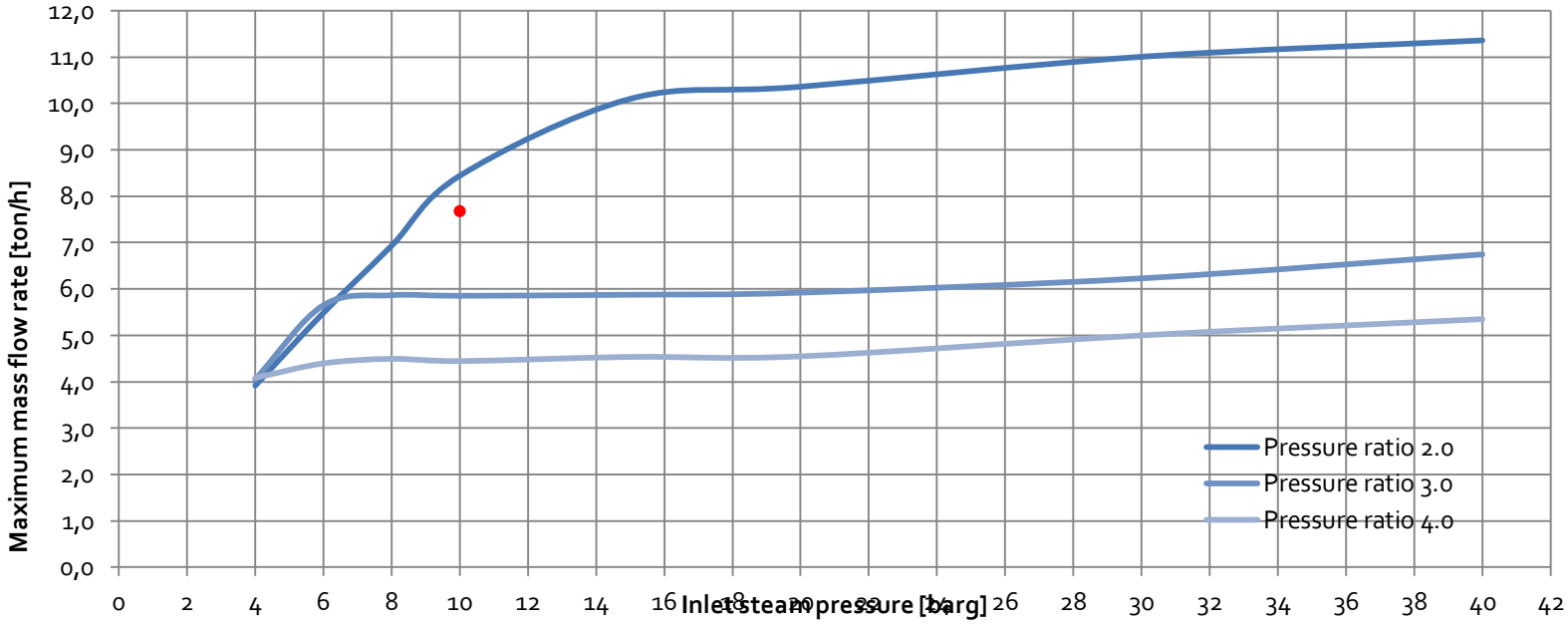
Innecs capabilities

- Concept design

➢ Cycle analyses; thermodynamics



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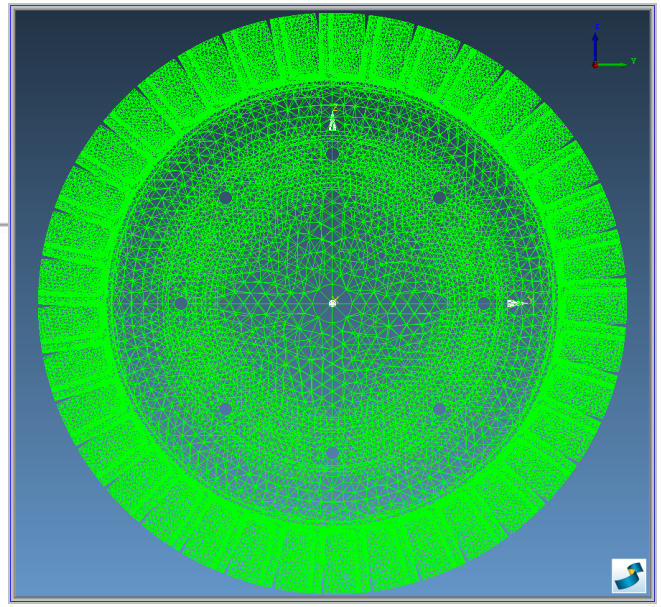
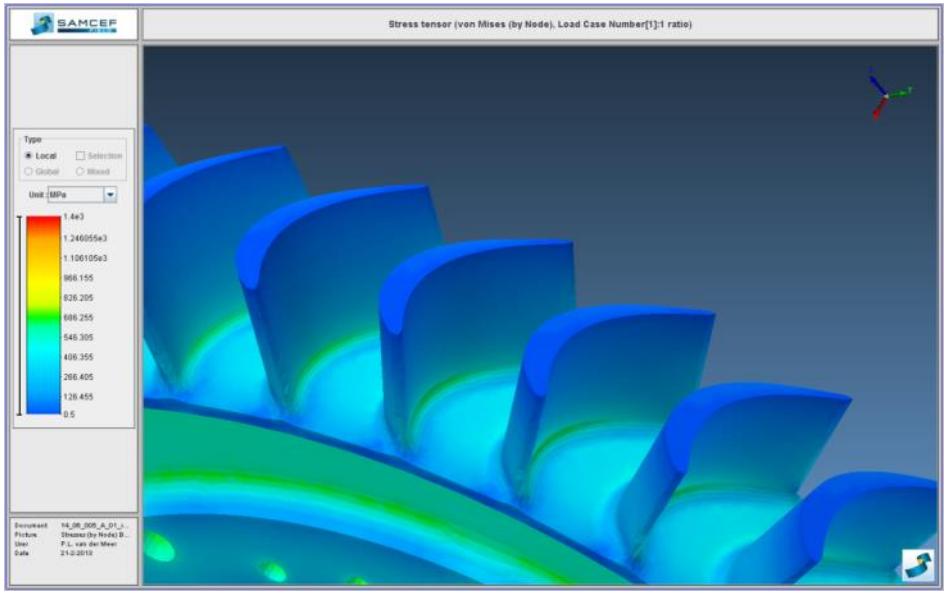
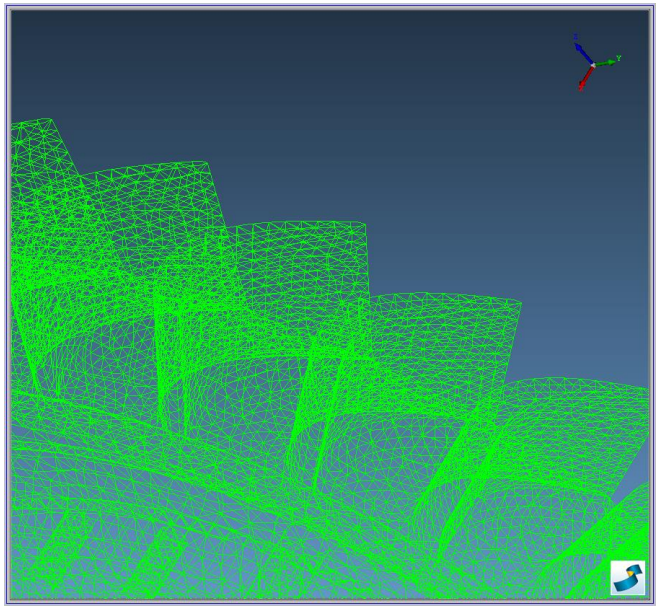
Innecs capabilities

- Concept design
- Cycle analyses; thermodynamics
- ➢ Finite Element Modelling







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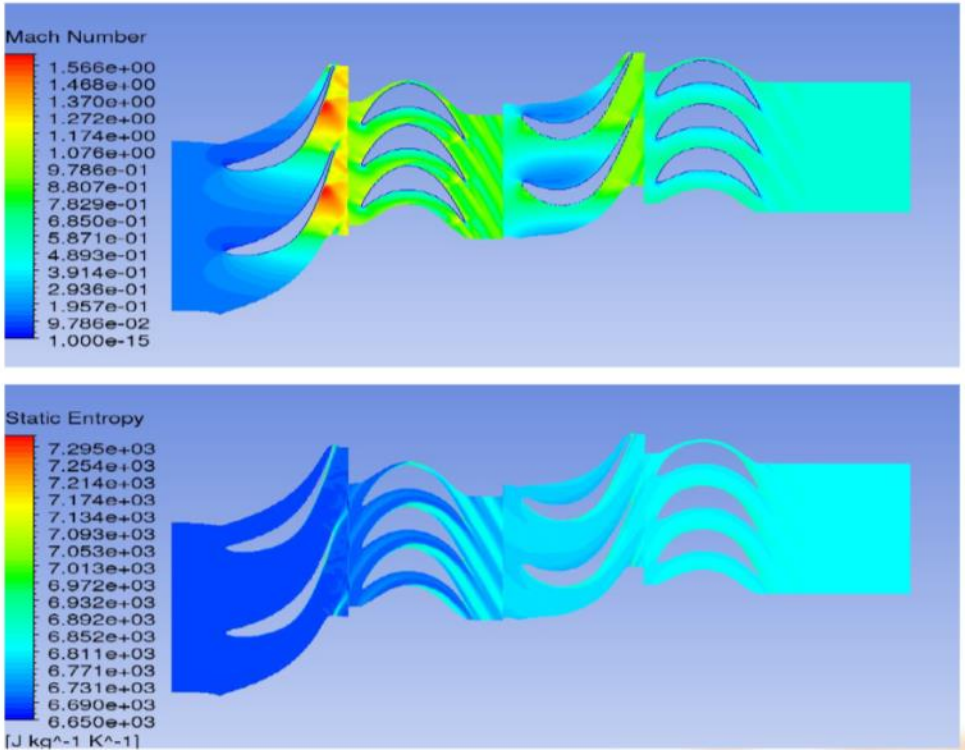
Innovative Energy Conversion Systems

Innecs capabilities

- Concept design
- Cycle analyses; thermodynamics
- FEM
- ➢ Flow Analysis



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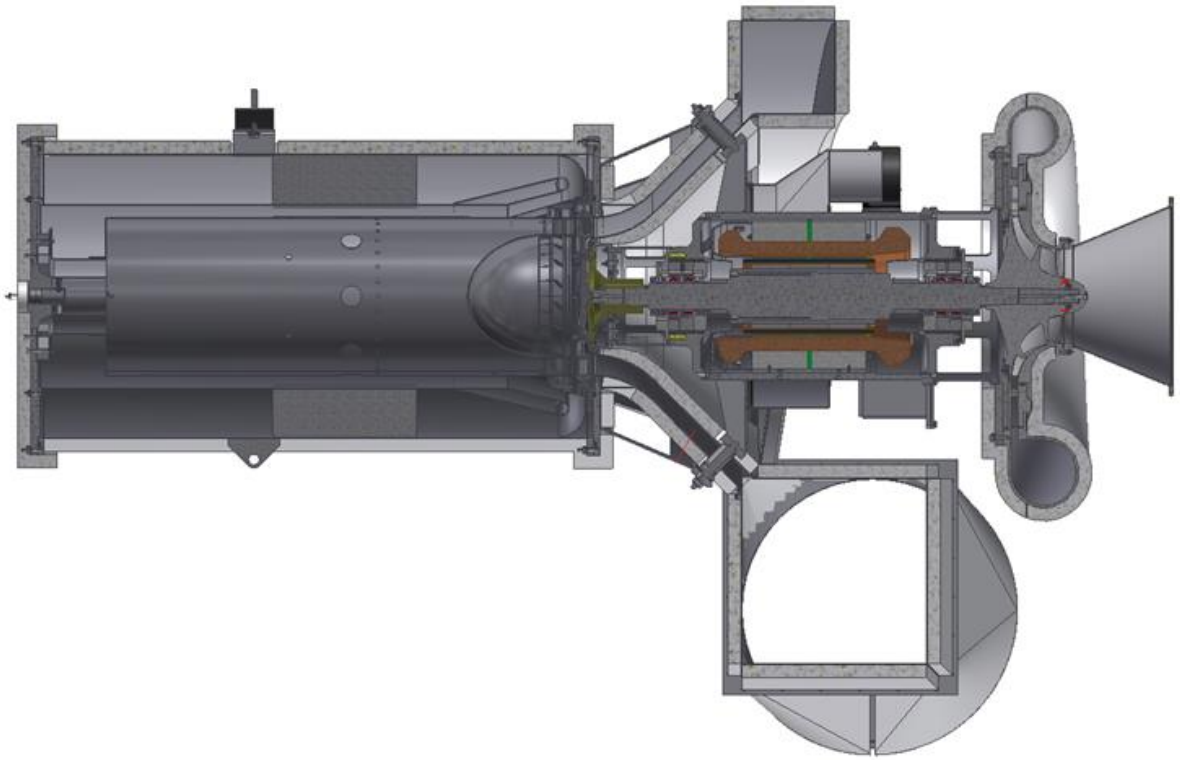
Innecs capabilities

- Concept design
- Cycle analyses; thermodynamics
- FEM
- Flow Analysis
- ➢ Engineering for production



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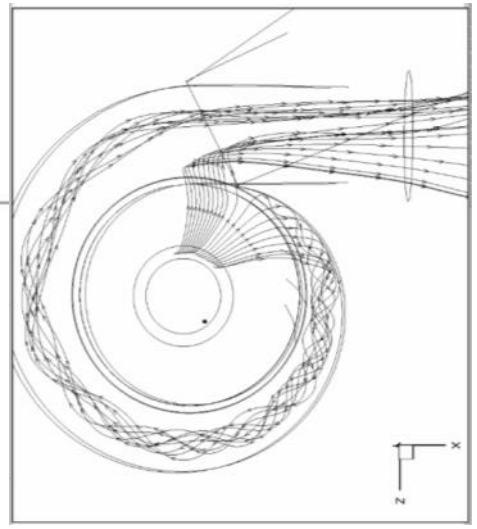
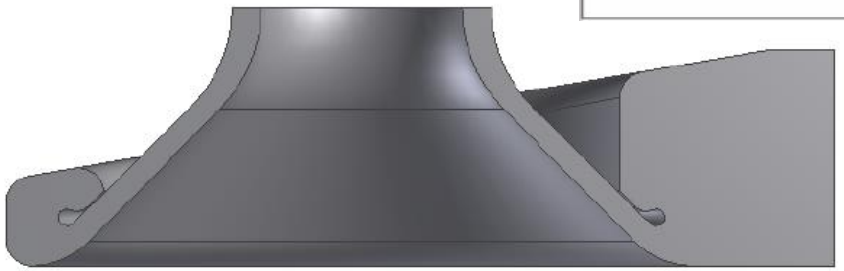
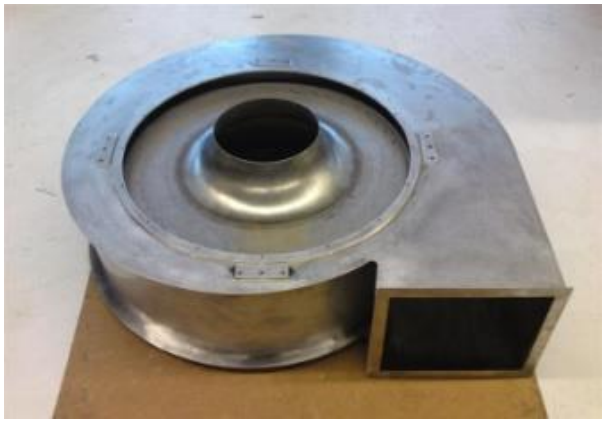
Innecs capabilities

- Concept design
- Thermodynamics
- FEM
- Flow Analysis
- Engineering for production
- ➢ Manufacturing







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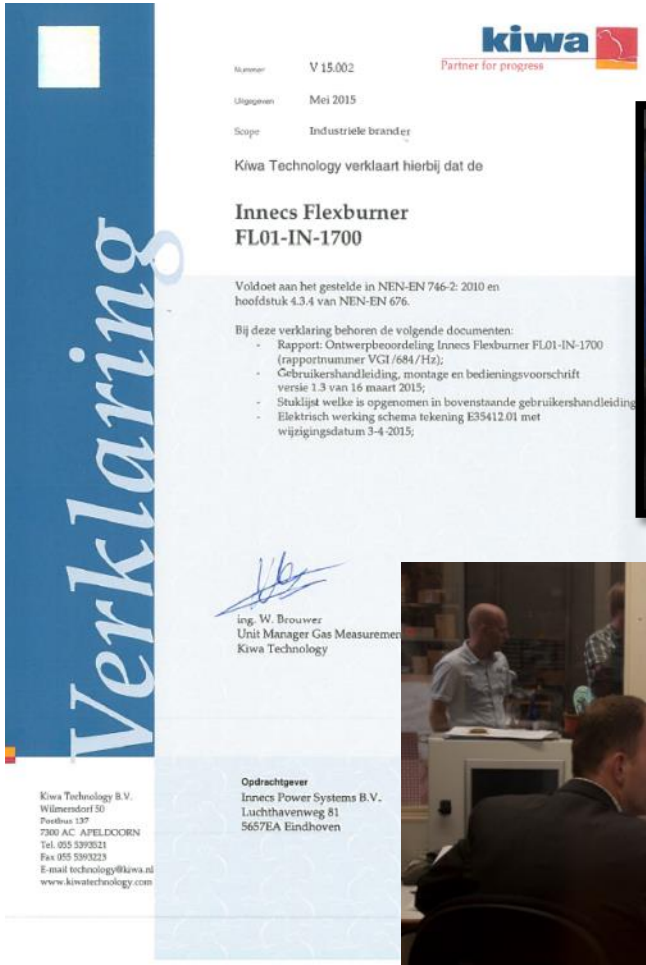
Innecs capabilities

- Concept design
- Thermodynamics
- FEM
- Flow Analysis
- Engineering for production
- Manufacuring
- ➢ Test & verification


Verklaring

kiwa
Partner for progress

Nummer V 15.002
Uitgegeven Mei 2015
Scope Industriele brander

Kiwa Technology verklaart hierbij dat de

Innecs Flexburner
FL01-IN-1700

Voldoet aan het gestelde in NEN-EN 746-2: 2010 en hoofdstuk 4.3.4 van NEN-EN 676.

Bij deze verklaring behoren de volgende documenten:
- Rapport: Ontwerpbeoordeling Innecs Flexburner FL01-IN-1700 (rapportnummer VGI/684/Hz);
- Gebruikershandleiding, montage en bedieningsvoorschrift versie 1.3 van 16 maart 2015;
- Stuklijst welke is opgenomen in bovenstaande gebruikershandleiding
- Elektrisch werking schema tekening E35412.01 met wijzigingsdatum 3-4-2015;

ing. W. Brouwer
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Kiwa Technology

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Opdrachtgever
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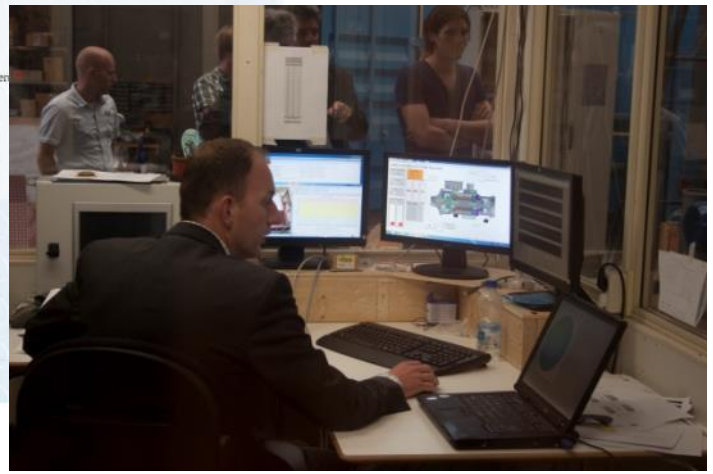

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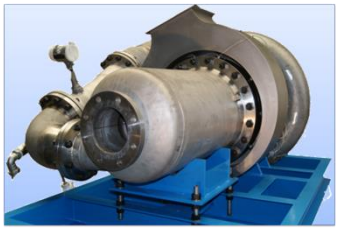
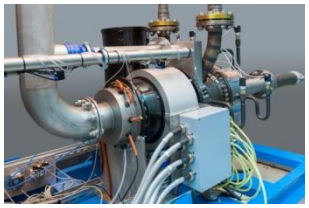
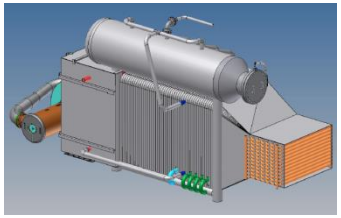
Products and Services



PowerBurner



SteamExpander



MiniSTEG

BoilerBurner

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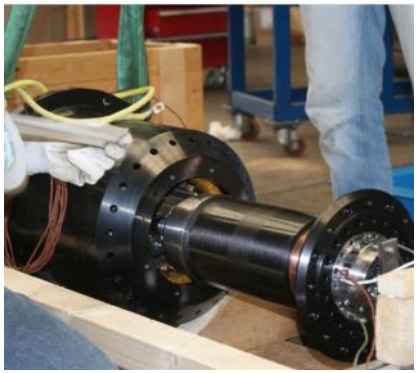
Innovative Technology

High-speed Direct Drive Electricity Generator



- Compact
- Cost effective
- Efficient
- Low maintenance

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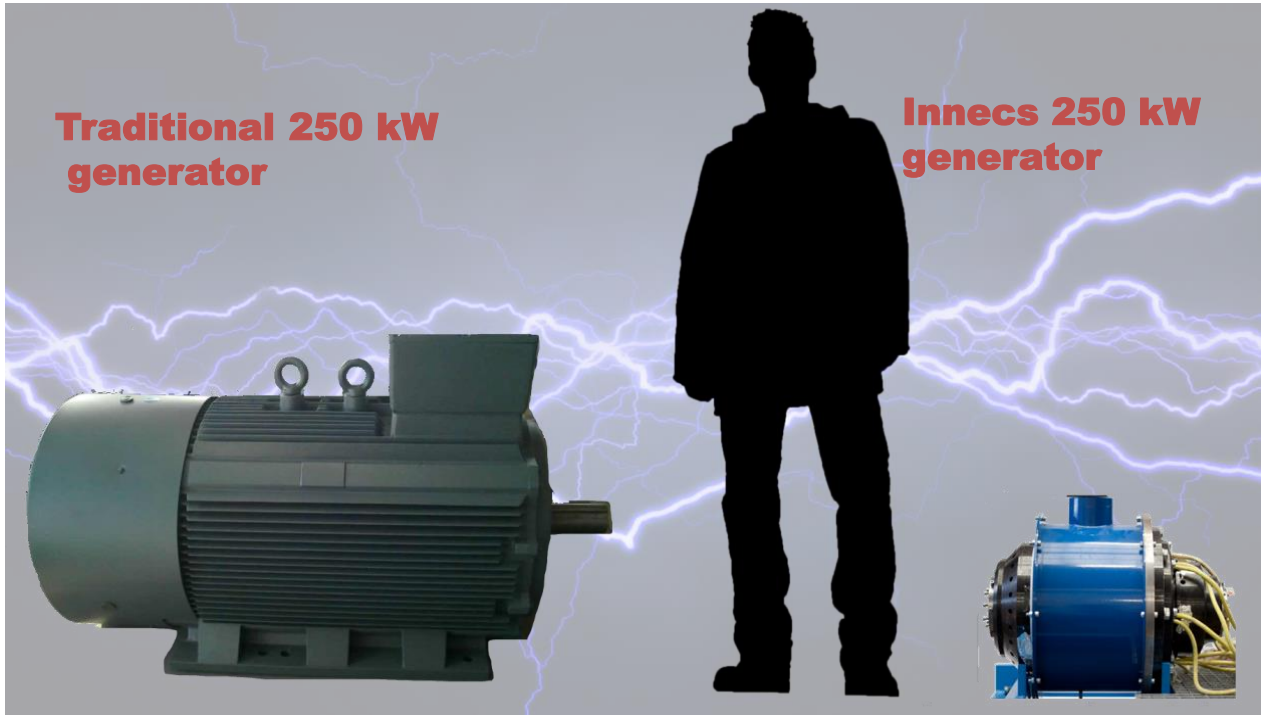
High speed: Compact, efficient, low cost

- ✓Saves Space
- ✓No Gearbox needed
- ✓Very few Rotating Parts



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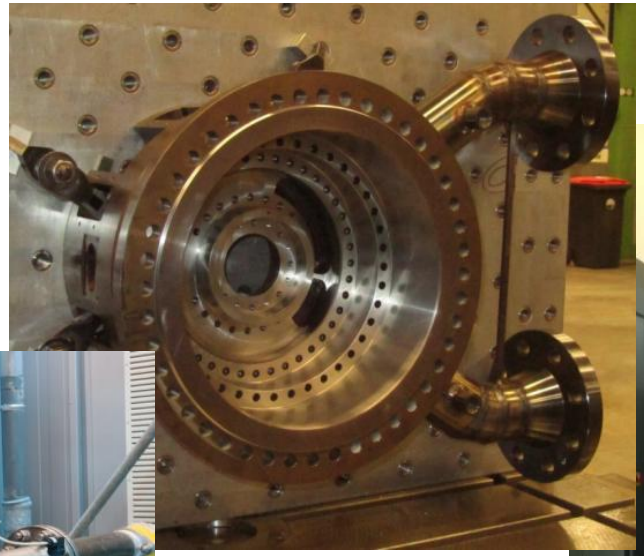
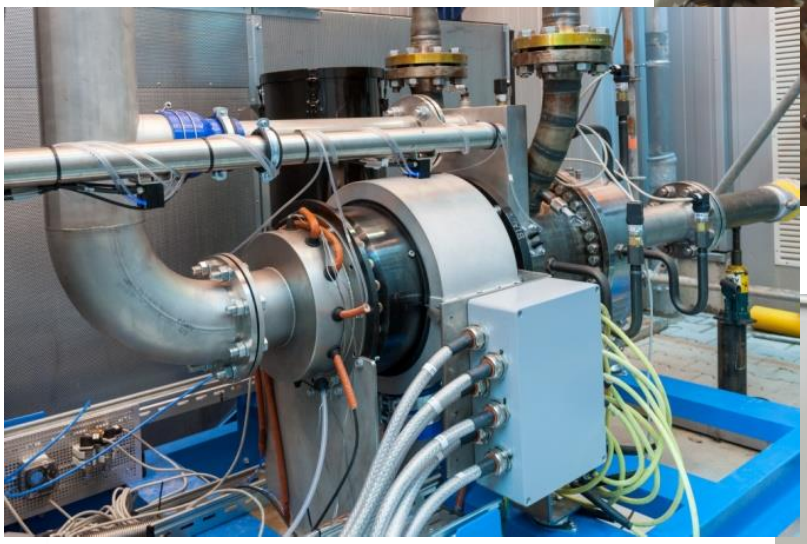
SteamExpander





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Innovative Energy Conversion Systems

SteamExpander:
>7500 hrs in operation

NO
VA

novaprintex

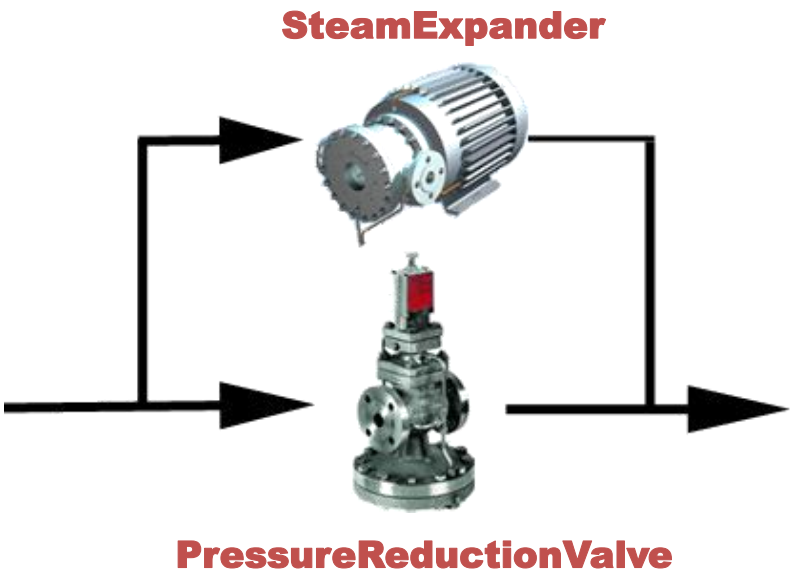
emmtec
Industry & Businesspark

SteamExpander benefits

"Transforms Steam Pressure Reduction into Electric Energy"

Depending on Energy prices savings range from € 45 K to € 150 K a year

System Emission (CO_2, NOx) reduction compared to traditional pressure reduction 10%.



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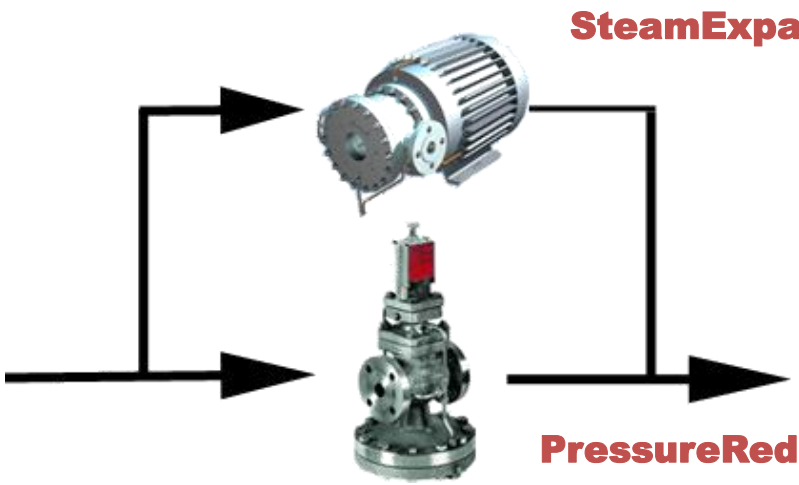
SteamExpander Applications

- If there is a need for Pressure Reduction
- Tune up the existing boiler (pressure and temperature) in order to use the enthalpy to generate electricity
- Produce electricity from excessive heat (combination with Boiler)



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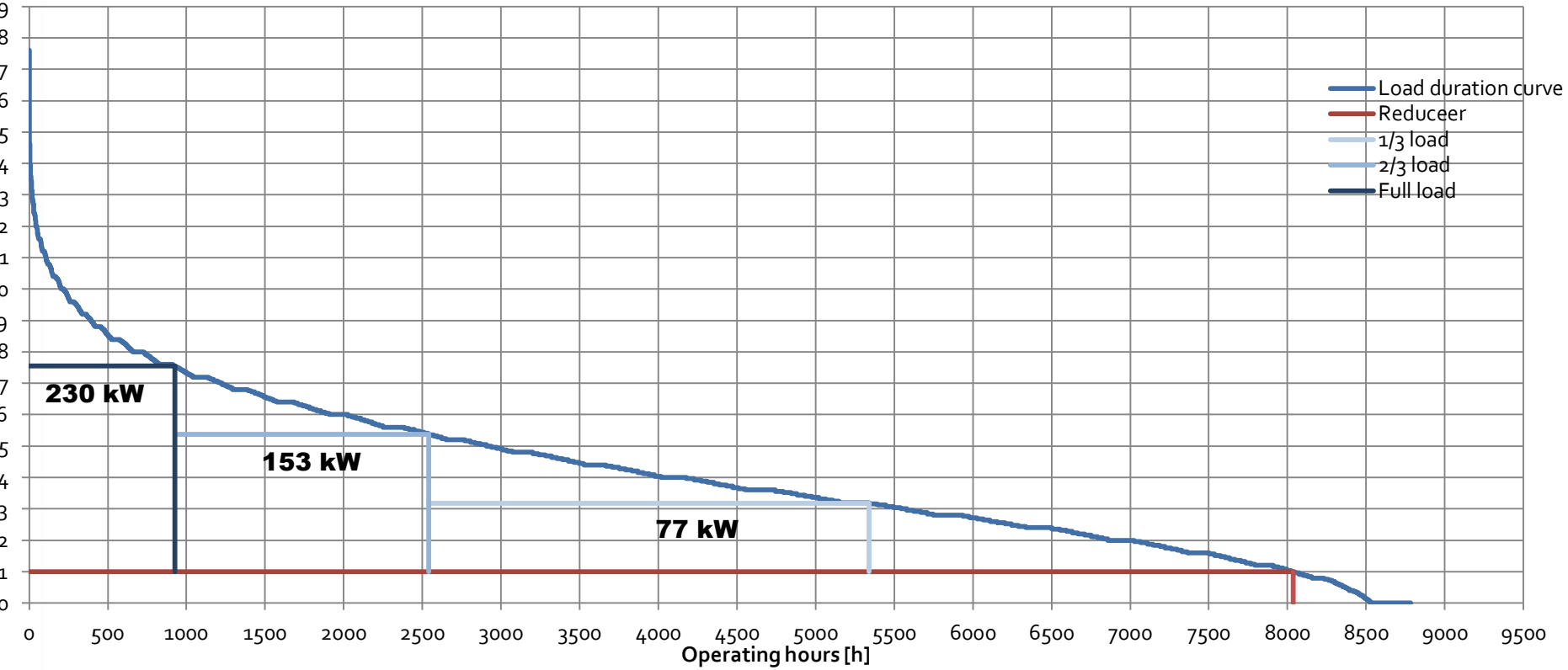
SteamExpander Options

- Fluctuating steam flow > partial admission



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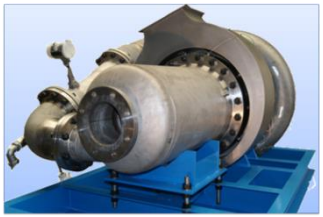
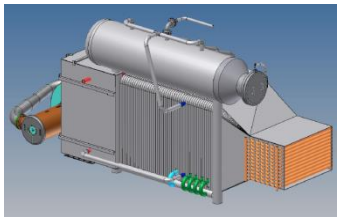
Products OEM

				
USP	BoilerBurner Low NOx Multi fuel Low cost	SteamExpander Value from steam Low cost	PowerBurner Value from heat Low cost	MiniSTEG Efficient Clean Flexible Low cost
Technology	*Swirl controlled*	*Direct drive generator*	*Direct drive generator*	*Combination of BB, SE, PB*

Questions?

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+31 6 36177487

Thank you

INNECS

Industry

Continuous balanced energy supply.

Value. Delivered.

The extremely simple storage solution allows:

- Efficient use of thermal power on demand.
- Full flexibility in time-shifting energy production to peak price periods.
- Most efficient energy storage solution for long discharge periods.
- Returning excess energy back into a process for electric power generation.
- Storage can supply saturated or superheated steam up to 100 bars.

Integration made easy.

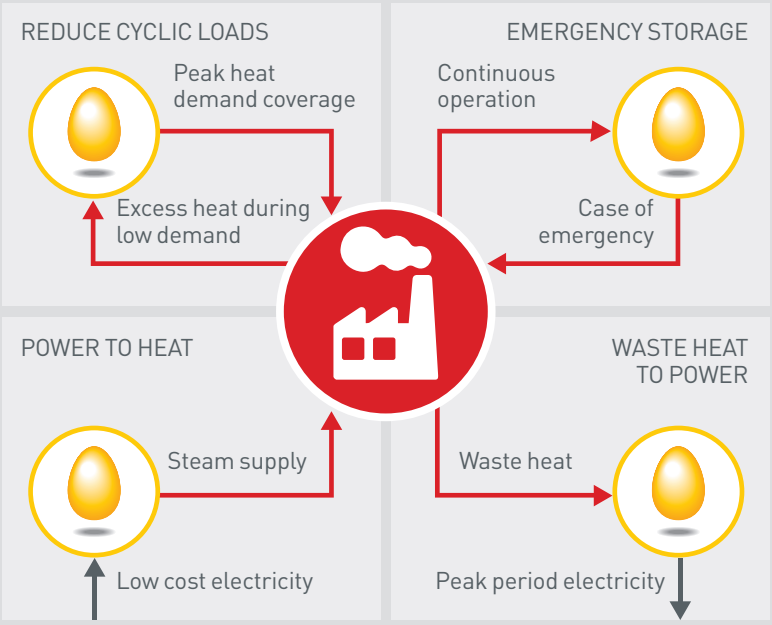
- Compatible with most heat transfer fluids and types of processes.
- Our thermal energy storage can drive both organic and Rankine steam cycles.
- Simple implementation as upgrade of existing installations.
- First class complementary solution.

Temperature up to 550°C

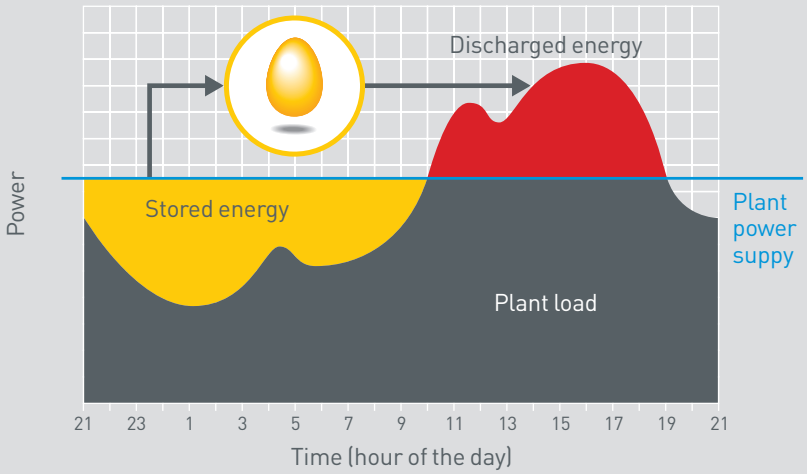
1 MWh to 10 GWh

25 USD per kWh for basic storage unit

POTENTIAL VALUE STREAMS



TIME-SHIFTING OF STEAM REQUIREMENTS



The need for efficient energy use has never been greater. Optimize your energy production and consumption by storing thermal energy and making it available on demand. The stored energy can be discharged to cover demand peaks, satisfy backup requirements and balance cyclic variations in energy consumption. The storage can also take advantage of affordable off-peak grid power to store thermal energy for your processes, or store excess heat for power production during peak tariff periods.

EnergyNest

Specific advantages

SMART DESIGN

SCALABLE

As a 'fit-to-purpose' system, the storage solution can take any proportion according to what the demand for storage requires.

DURABLE

As a 'fit-to-purpose' system, the storage system is capable of withstanding millions of stress cycles. It has a 50-year lifespan with practically no performance degradation.

STORAGE DURATION

Best suited for medium to long storage purposes (3 hours to several days)

EASE OF INSTALLATION

ECONOMICAL

The low-cost materials, including our unique HEATCRETE® storage medium, ensure extreme cost competitiveness.

LEGO-LIKE

Our standardized modules can easily be adapted to local space and process requirements.

LOCAL CONTENT

More than 80% of all materials required for the assembly of the storage facility can be procured locally.

EASE OF OPERATION

SAFE

The storage facility is made up of stable, non-hazardous, solid-state materials. It entails no HSE requirements beyond power plant specifications.

VERSATILE

Caters to a broad range of temperatures (50° to 550°C) and operates with both oil and steam as heat transfer fluids.

EASY TO OPERATE

The storage facility has no moving parts, almost no parasitic loads and requires absolute minimal maintenance.

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