



solutions for europe
natural refrigerants

15-16 October 2013, Brussels



boostHEAT

> *THERMAL COMPRESSION OF CO2
TO REDUCE BOILER CONSUMPTION
BY HALF*

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Innovation / Energy efficiency

I > Agenda

- > boostHEAT
- > New heat generator
- > Thermal compression
- > Prototype & Planning
- > Business model

2 > boostHEAT, ACTING IN ENERGY EFFICIENCY



Availability



Cost



CO₂



Renewable
Energy
sources

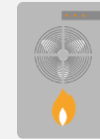
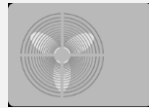


Energy
savings



Energy
efficiency

3 > A new heat generator



Two mature
heating technologies

107%
NCV

COP
2 - 5

A breakthrough technology

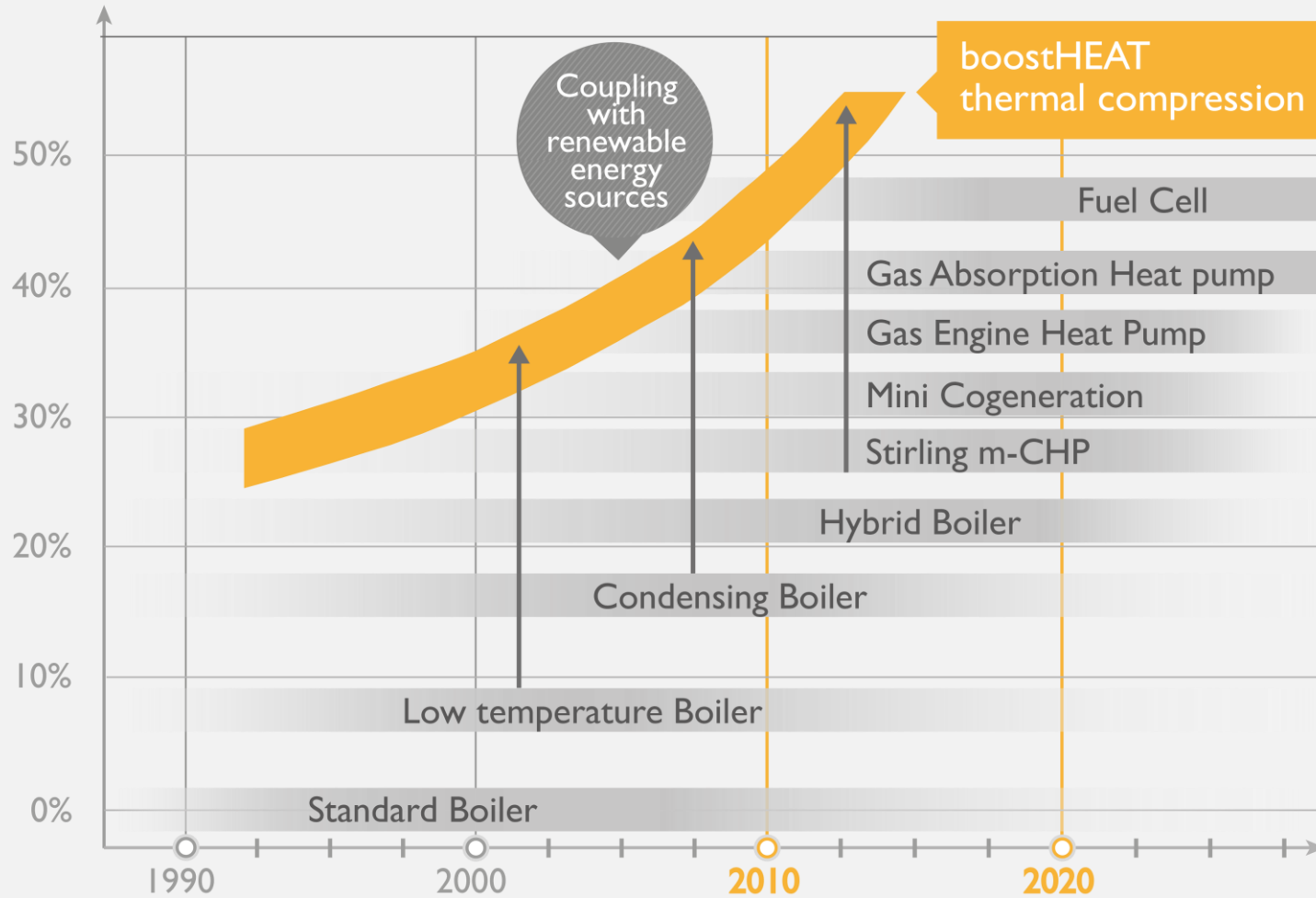
Thermal compression

A NEW HEAT GENERATOR

COP over NCV **200%**

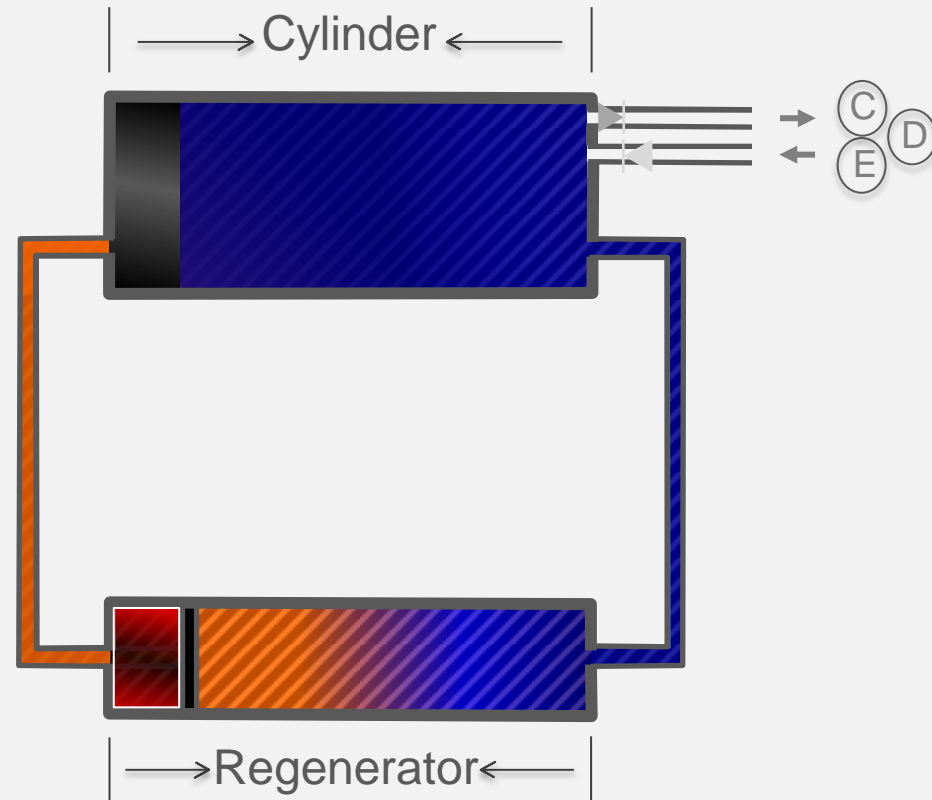
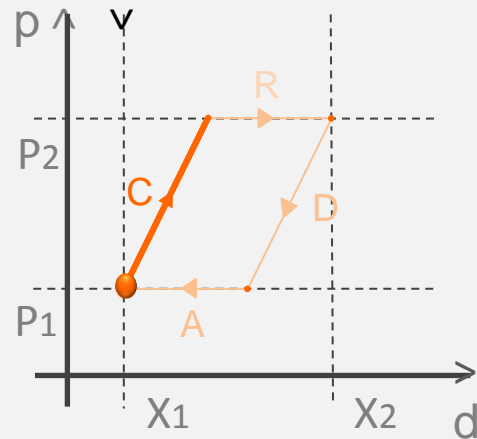
- > boostHEAT is NOT an hybrid boiler
- > boostHEAT is NOT a sorption cycle

4 > Primary energy savings compared to a standard boiler



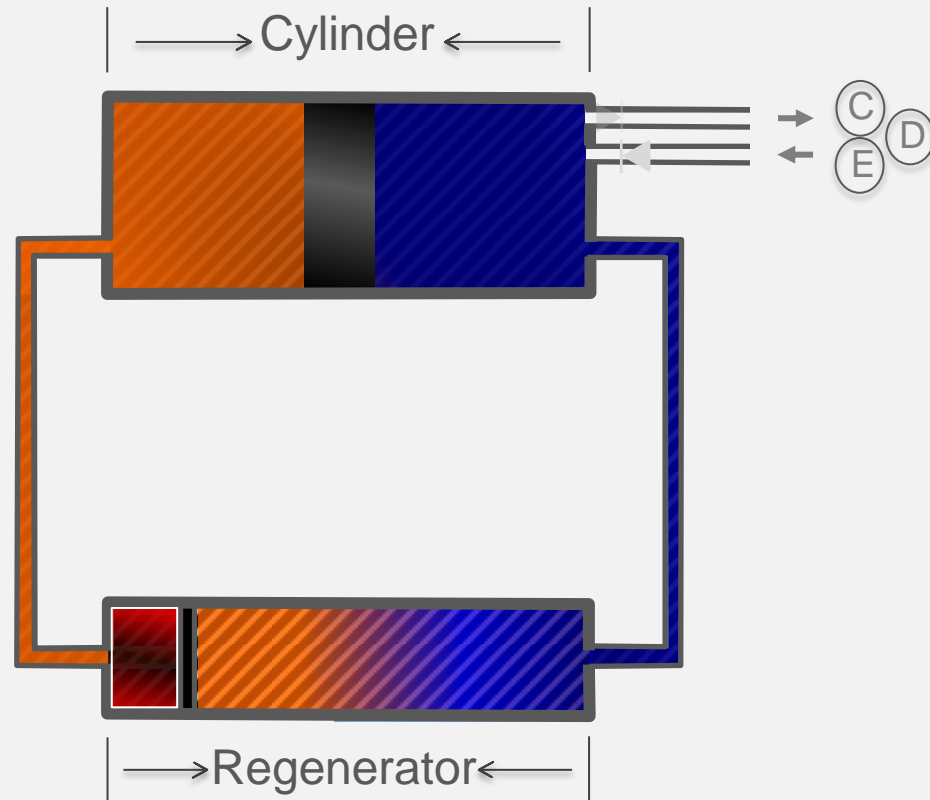
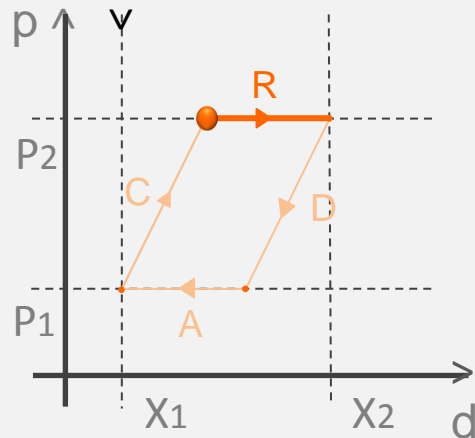
PRIMARY ENERGY SAVINGS COMPARED TO A STANDARD BOILER

5 > 4 Strokes cycle
Step 1 : Compression



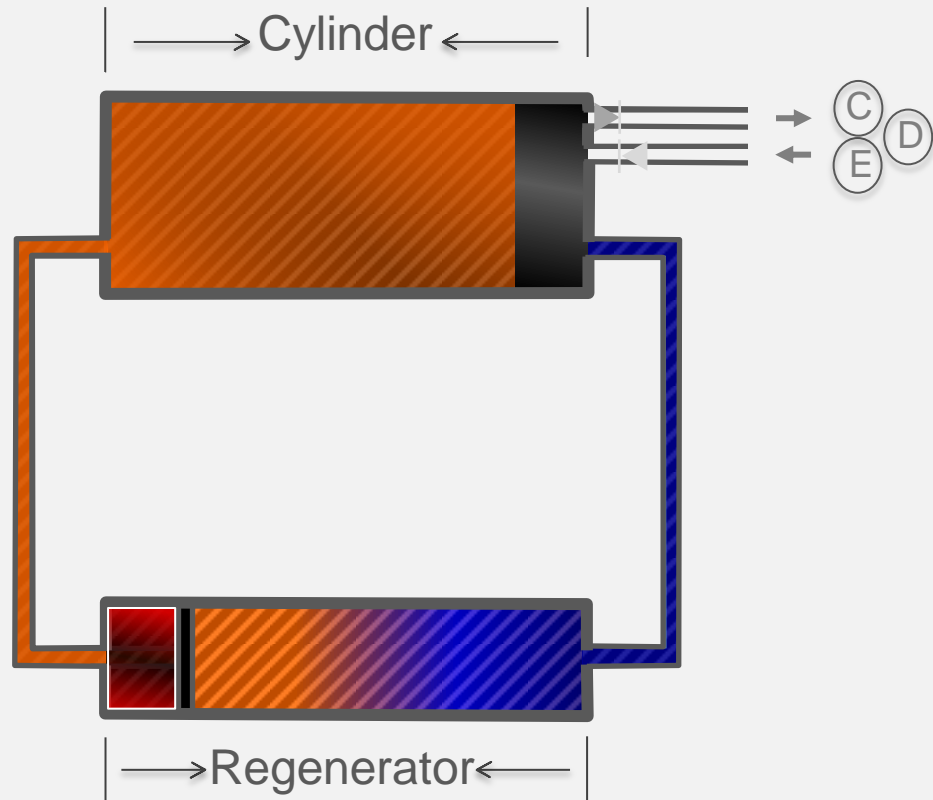
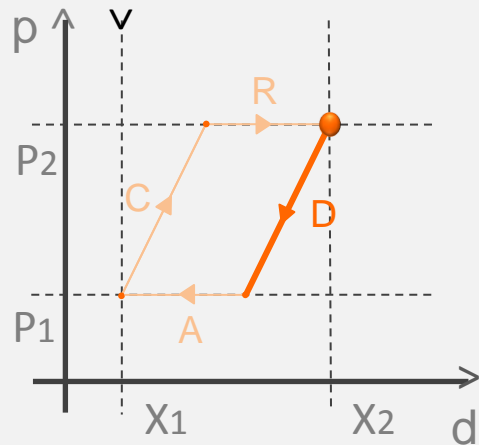
6 > 4 Strokes cycle

Step 2 : Discharge

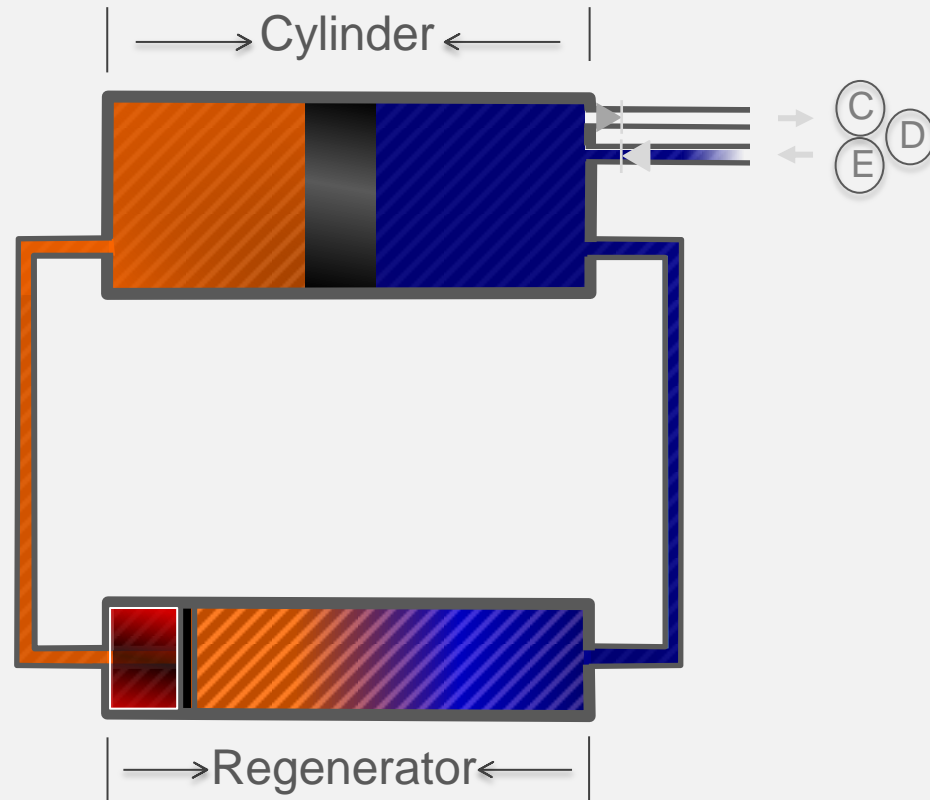
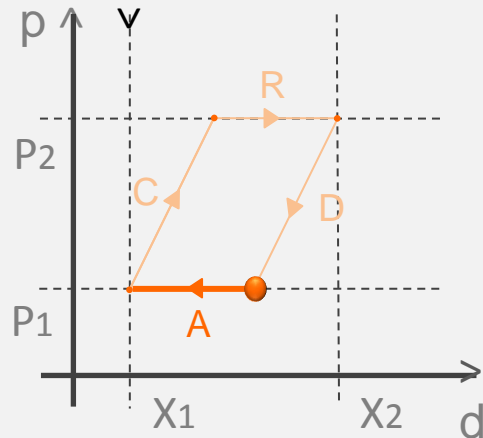


7 > 4 Strokes cycle

Step 3: Expansion



8 > 4 Strokes cycle
Step 4 : Suction

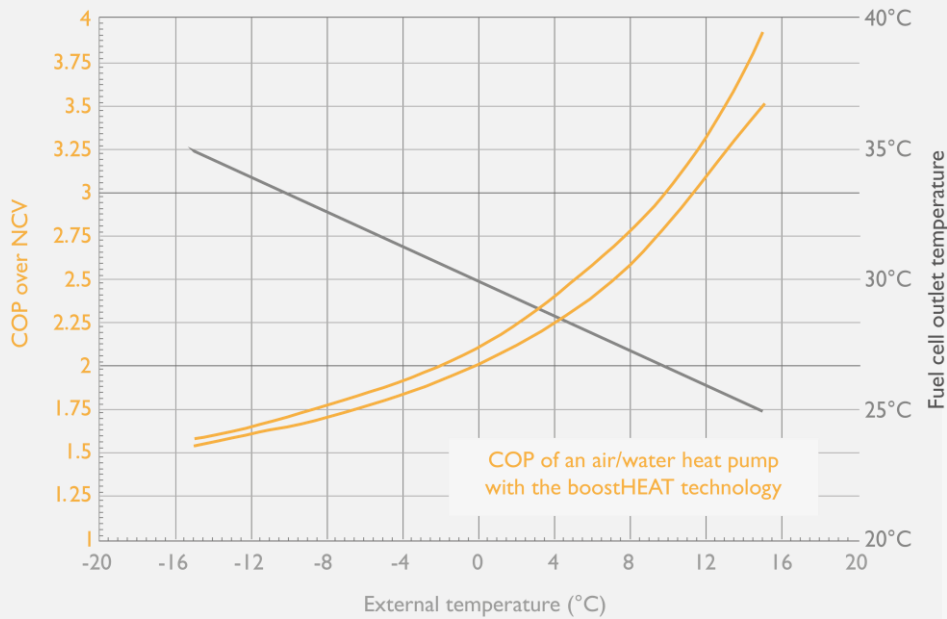


9 > CO2 COMPRESSION CYCLE : advantages

- > High Temperature → High Carnot efficiency
- > Natural refrigerant (CO2)
- > Direct thermal compression
 - No mechanical power transmission – Less losses
 - Low wear - lifetime linked to the cube of efforts

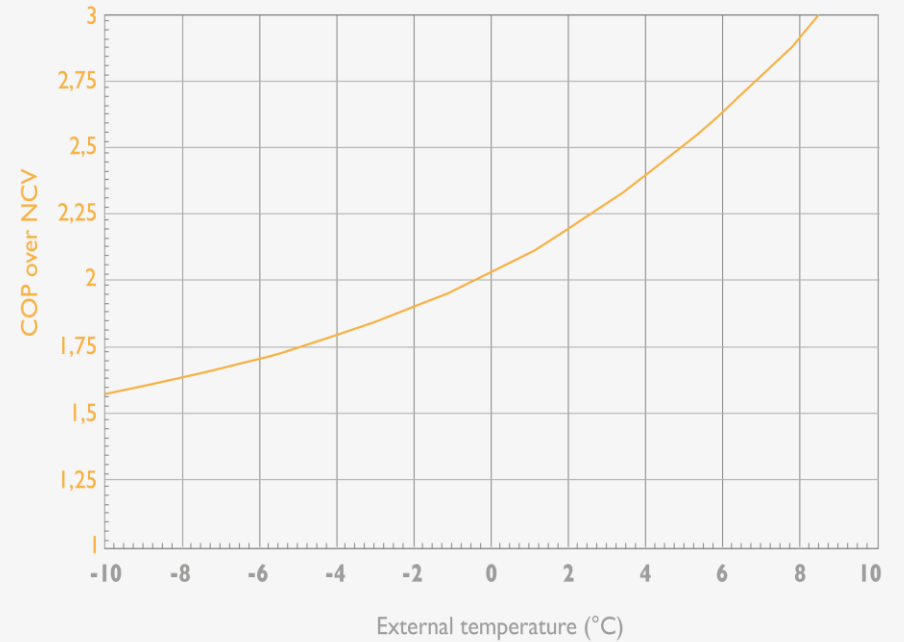
GLOBAL EFFICIENCY IS HIGH - SIMPLE - LOW WEAR

10 > COP



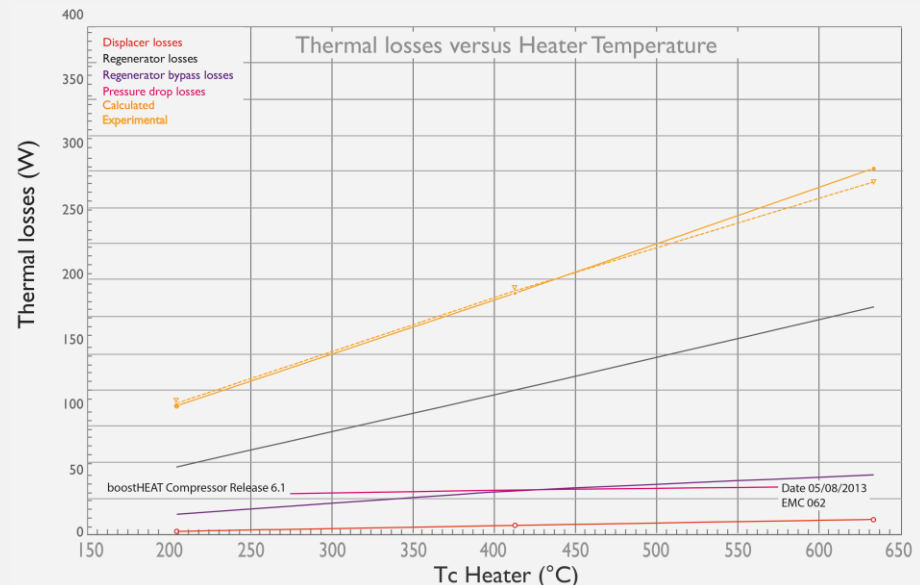
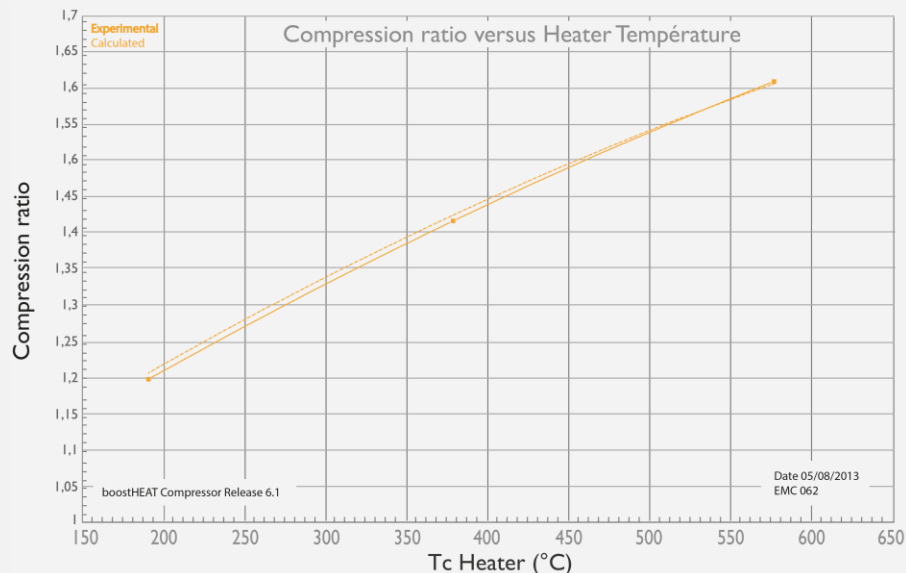
COP
*Underfloor heating (30-35°C)
 aérothermal*

COP
*Domestic hot water (55°C)
 aérothermal*



II > Prototype results

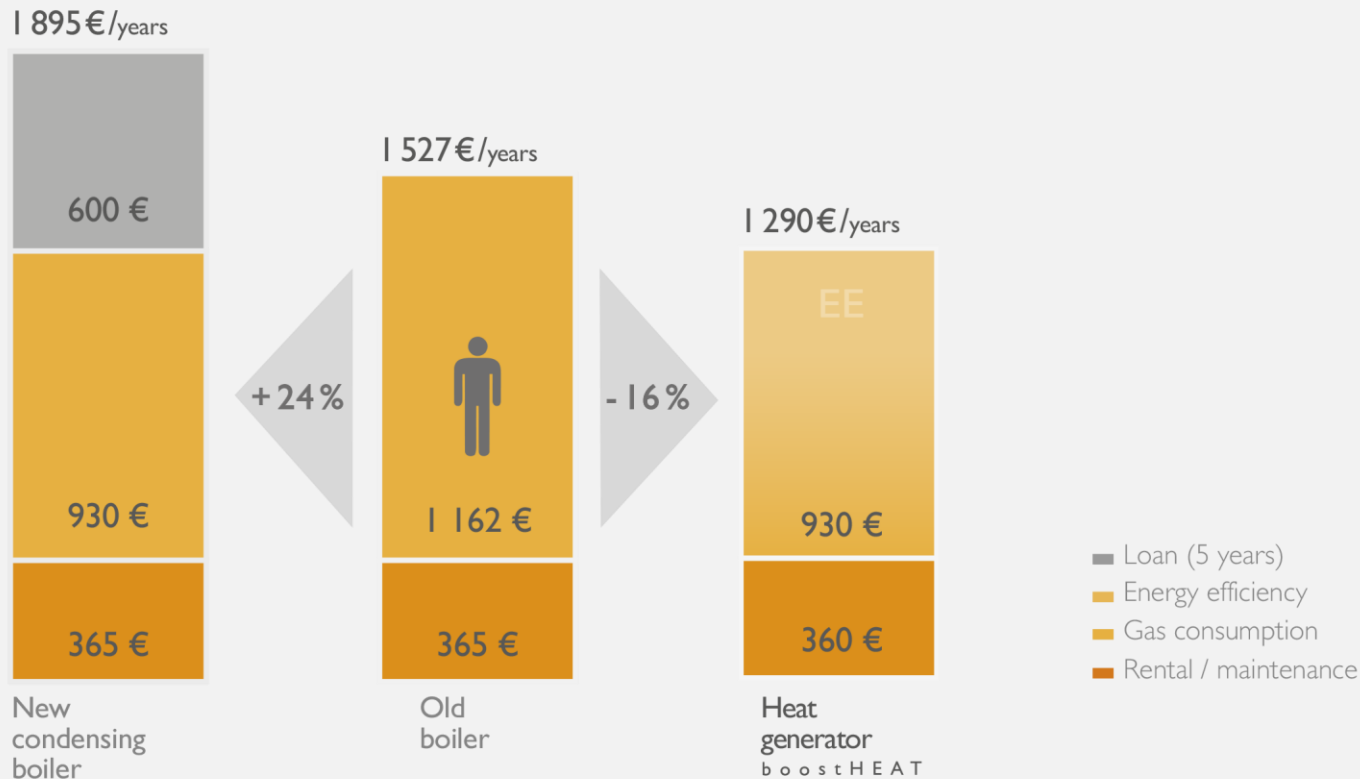
- > Prototype tested since January 2013
- > Methodology following the frigorific compressor performance test (ISO 917)
- > Audited by CRIGEN lab (GDF Suez) in June 2013



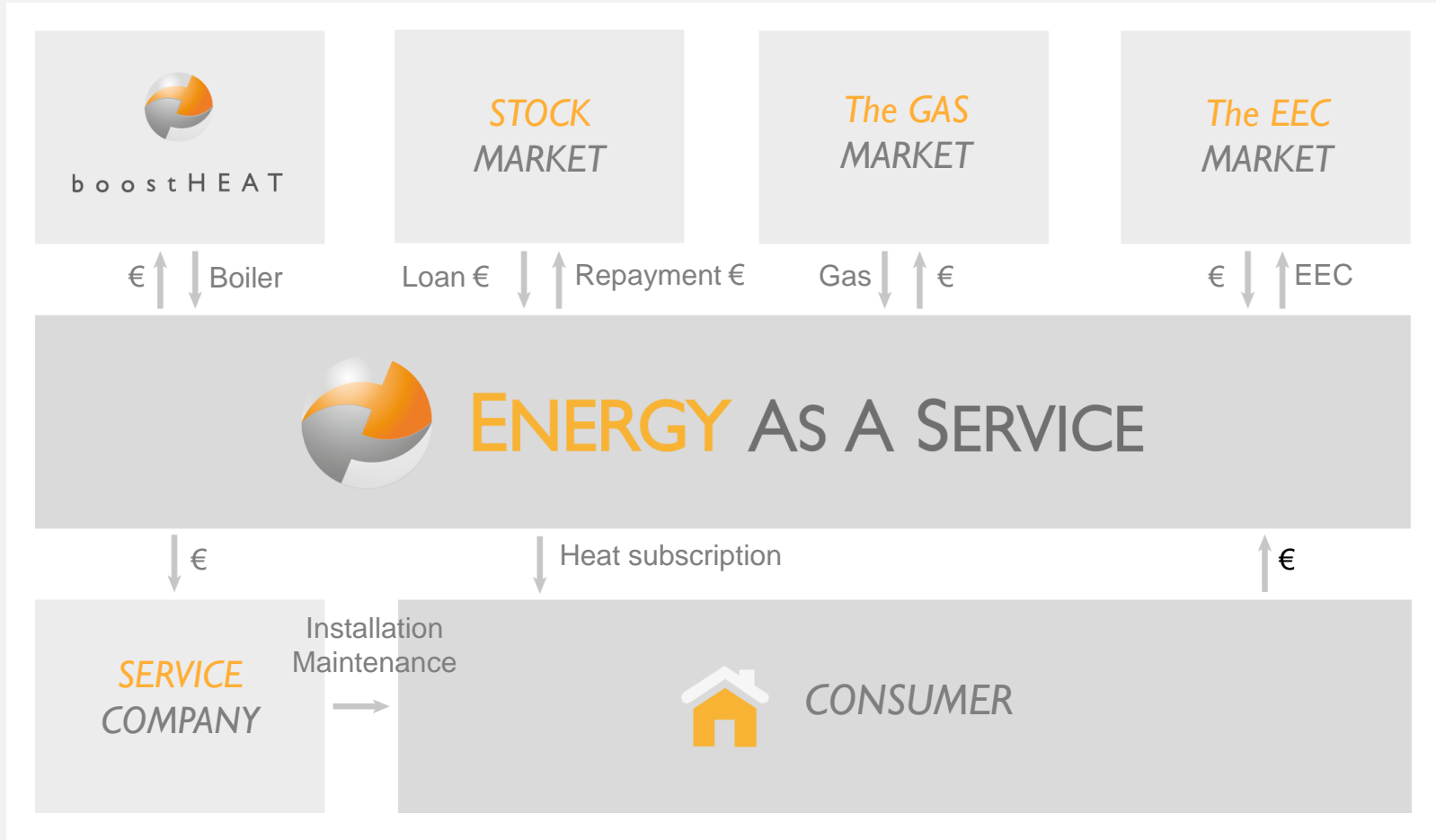
12 > Business Model

> Access to the market

- Boiler and heat-pump manufacturers
- Energy suppliers (EAAS)



13 > Energy As A Service





boostHEAT

- > *Technical innovation*
 - *Thermal compression*
- > *Business model innovation*
 - *Energy As A Service*



> *R & D*

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 **ATMO**
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Thank you