LOW-BIN PROJECT RESULTS

"EFFICIENT LOW TEMPERATURE GEOTHERMAL BINARY POWER"

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LOW-BIN objectives

- Develop and demonstrate a power generating ORC machine for 65-90°C geothermal water
- Develop and demonstrate a geothermal heat and power cogeneration machine cooled by district heating water

LOW-BIN consortium

- CRES (Greece-Coordinator)
- TURBODEN (Italy)
- GFZ-Potsdam (Germany)
- GEOTEAM (Austria)
- University of Oradea (Romania)
- ESTSetubal (Portugal)
- Politecnico di Milano (Italy)
- BRGM (France)
- ISOR (Iceland)

LOW-BIN budget distribution

Total budget : 3,935,713 €

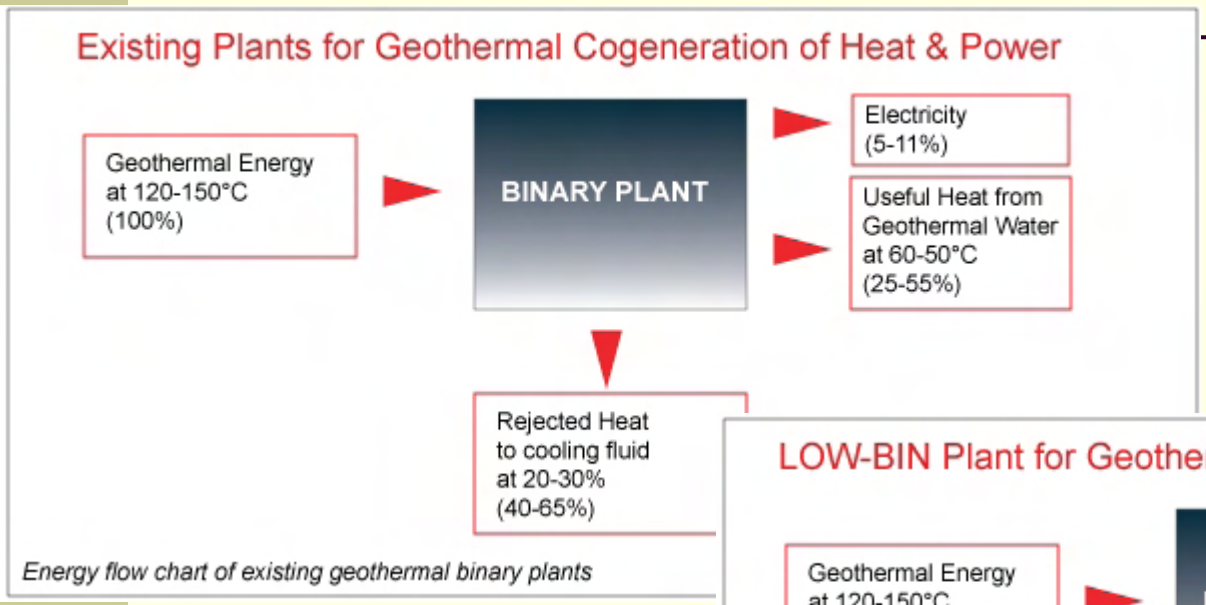
EU Funding : 1,878,812 € (47,74%)

- R&D activities : 13.70%
- Demonstration : 74.50%
- Innovation related activities : 8.46%

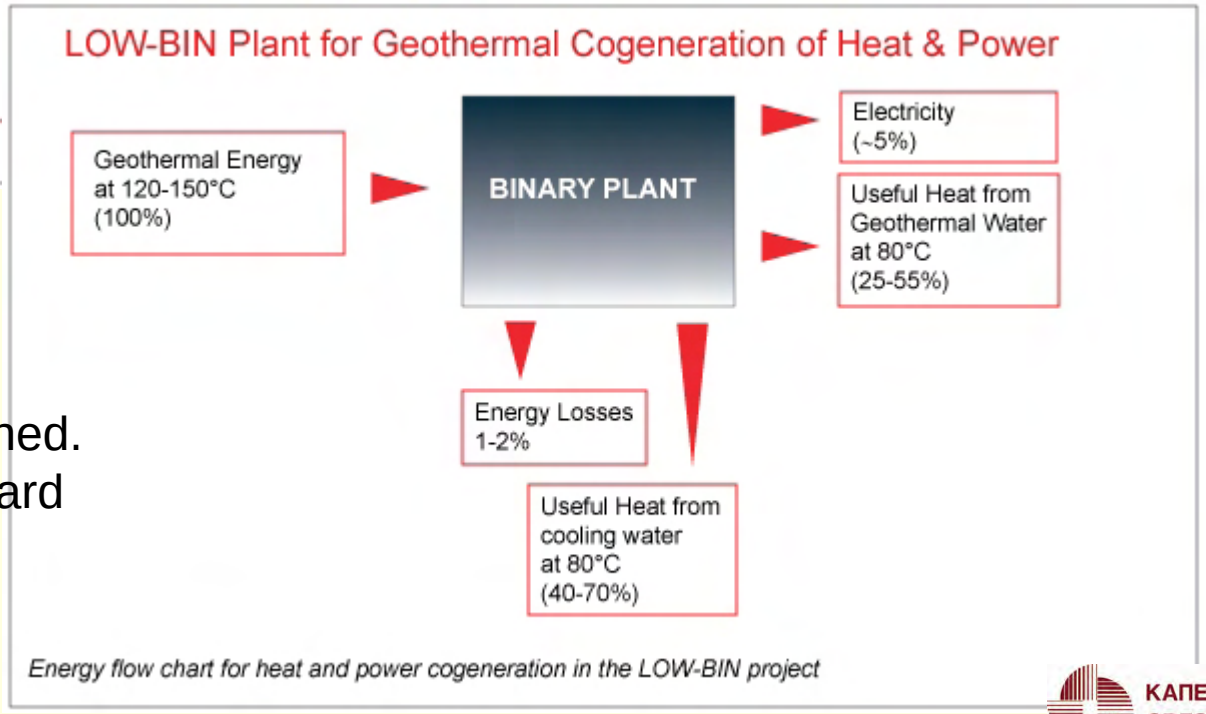
LOW-BIN project results

- Engineering design of the low temperature Low-Bin ORC machine
- Engineering design of the cogeneration Low-Bin ORC machine
- Feasibility study
- Market study
- Technology breakthrough evaluation
- Manufacturing the low temperature prototype
- Installation & Commissioning at the Simbach-Braunau demo site
- Monitoring
- Dissemination (brochure, web-site, scientific publications, press announcements, final workshop)

LOW-BIN cogeneration concept



Energy flow chart of existing geothermal binary plants



Energy flow chart for heat and power cogeneration in the LOW-BIN project

The machine has been designed. TURBODEN can straightforward proceed to its manufacturing.

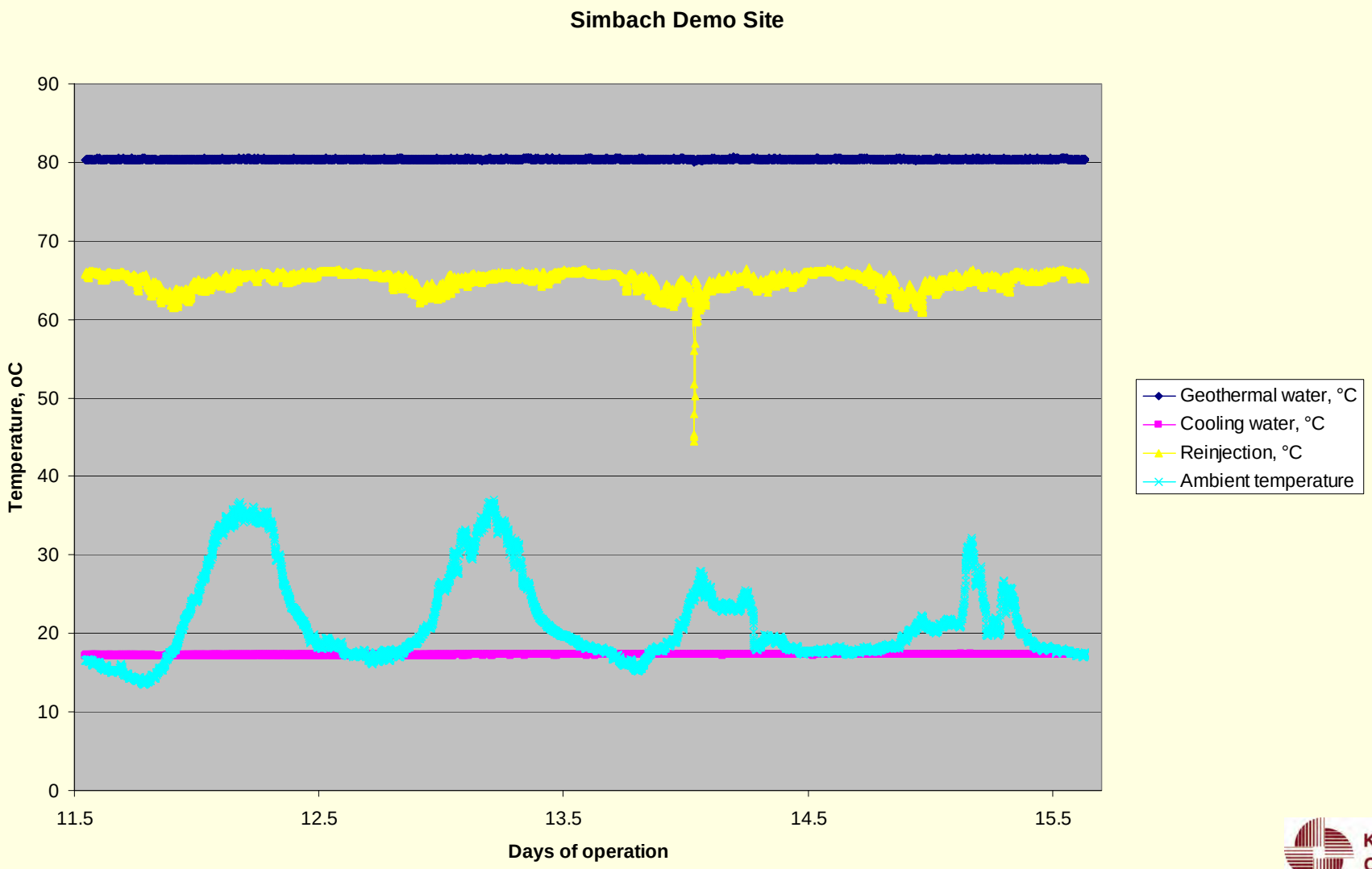
LOW-BIN low temperature prototype

- Nominal capacity 200 kWe
- **R134a as working fluid**
- Plate heat exchanger as preheater
- Shell and Tube heat exchanger as evaporator
- **New Turboden R134a vapour turbine**
- **High speed electricity generator**
- **Evaporative condenser**
- High efficiency R134a liquid pump
- Insulated piping
- PLC automation control
- Data acquisition system
- Remote monitoring and control
- Power board and equipment
- Mounting base

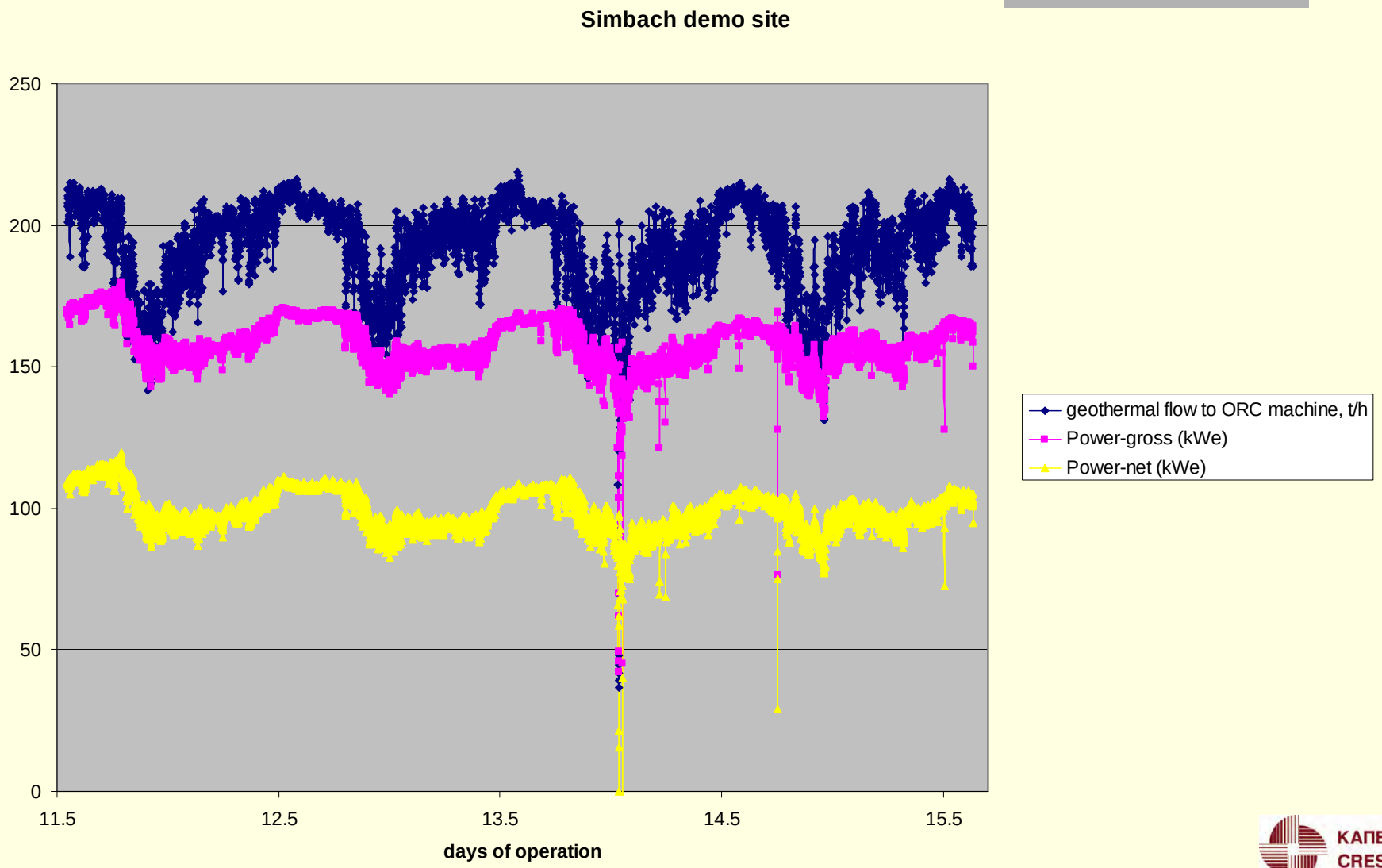
LOW-BIN demo site at Simbach

Production well - Reinjection well
Geothermal fluid supply: 75 lt/s 80°C
Water supply to ORC machine: 56 lt/s
Cooling water trench

LOW-BIN monitoring: temperatures



LOW-BIN monitoring: power output



Conclusion and recommendation

- Low-Bin project effectively demonstrated the feasibility of low temperature (80°C) geothermal power generation in an existing district heating system
- Both Low-Bin machines (low temperature and cogeneration) should be integrated in the product line of TURBODEN for immediate commercial deployment

Thank you for your attention