



solutions for europe

natural refrigerants

15-16 October 2013, Brussels



ENVIRONMENT-FRIENDLY HEATING WITH R290 HEAT PUMPS

Dr. Joachim Maul - Brussels, 15th of October 2013



CONTENT



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4. Conclusion

AIT-DEUTSCHLAND

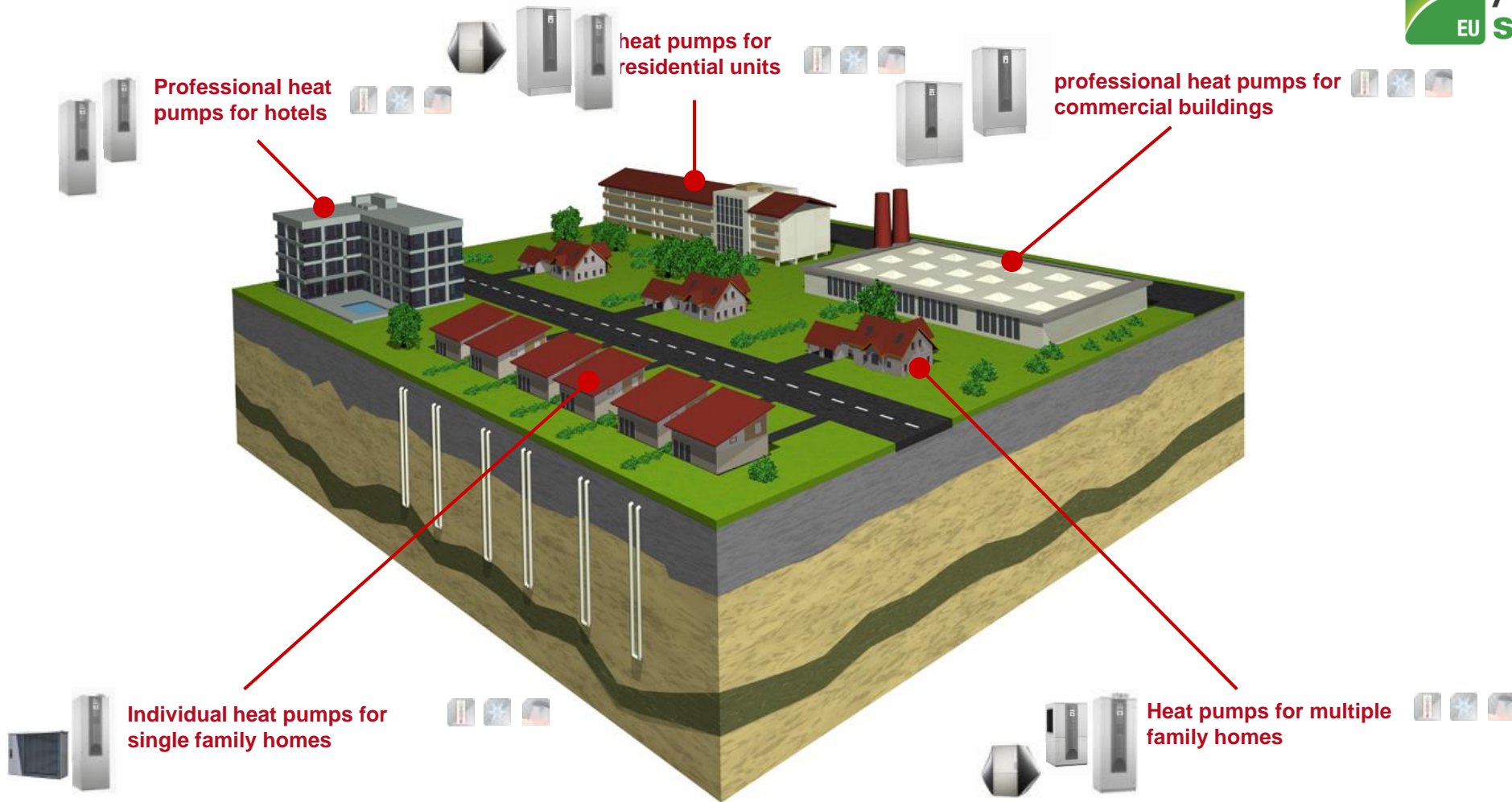


- Company is member of NIBE
- Location: Kasendorf (Bayern, D)
- Founded 1998
- Staff: 450
- Capacity: 50.000 units p.a.

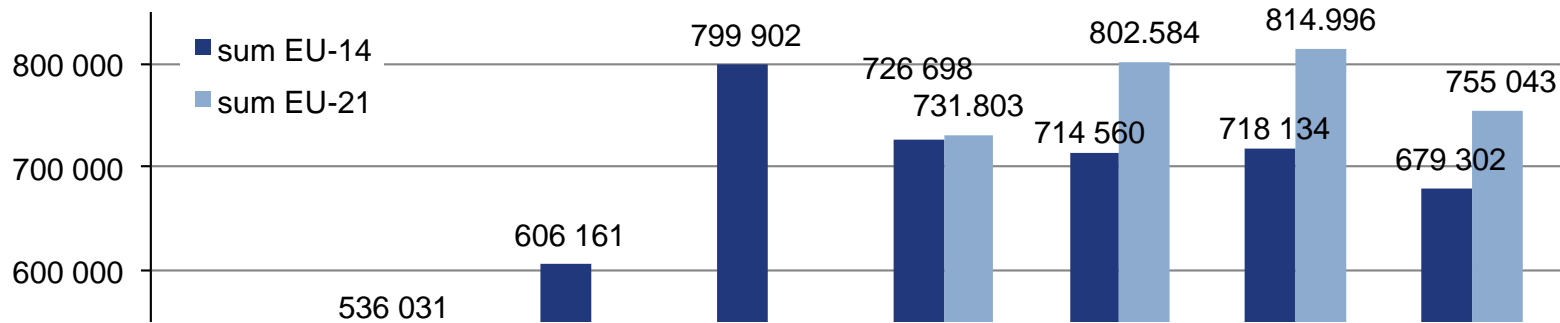
Products:

- Heat pumps in the range 3 -160kW (Air, Brine, Water)
- Sales of Heat Pumps in 21 european countries
- Chillers from 1kW – 800kW
- Sales of Chiller: worldwide

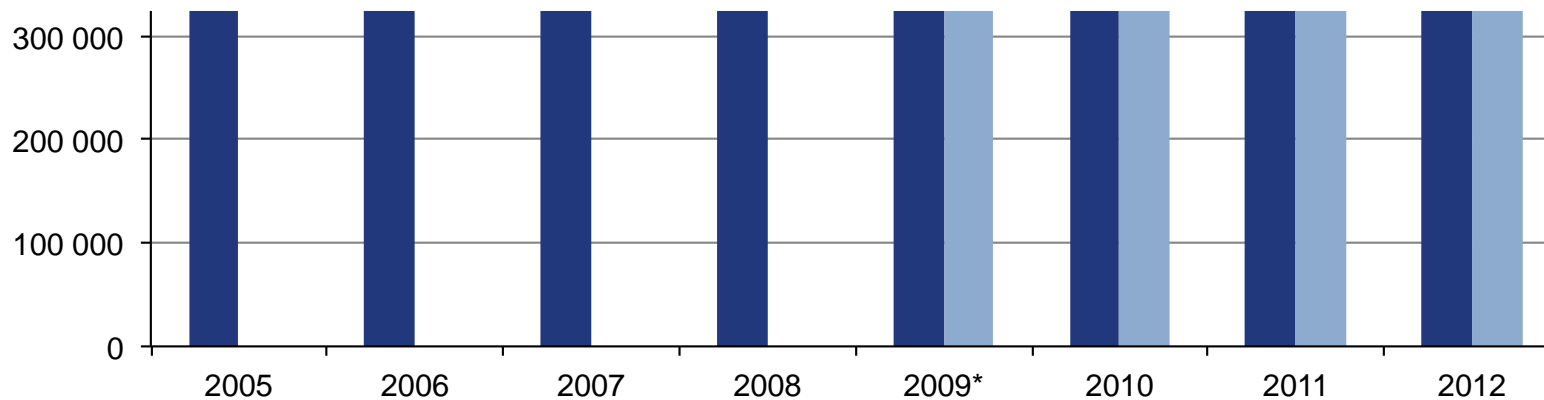
HEAT PUMPS



VOLUME OF THE EU-MARKET



Between 2005 and 2012 more than 5,4 Mio HP's are installed in Europe



Source: EHPA, 2013

LWD – R290 HEAT PUMP

ait
DEUTSCHLAND

ATMO
EU sphere

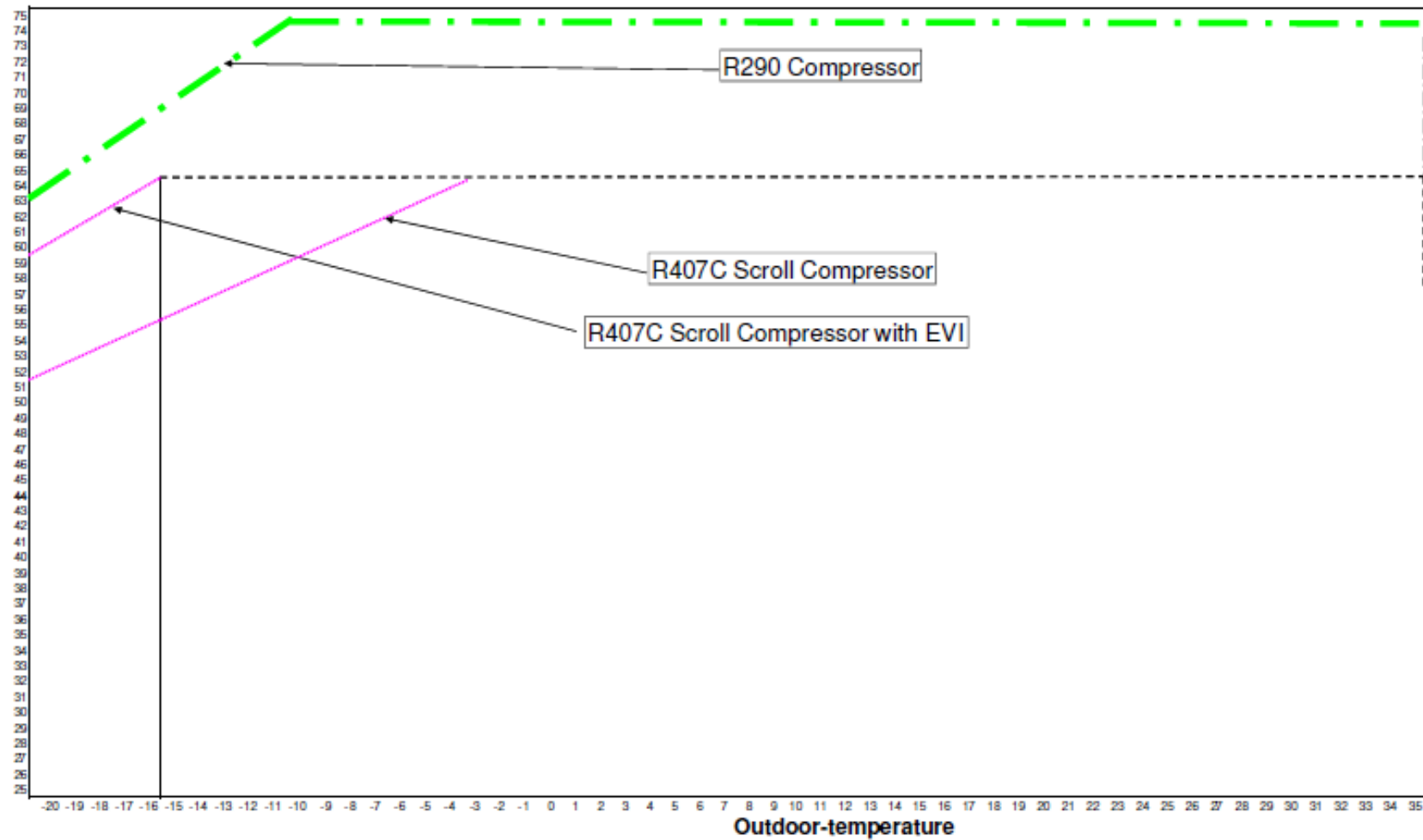
LWD 5 – 9kW



- Decision for R290 due to possibility to reach flow temperatures up to 70°C
- Water temperature 62°C at -20°C possible without additional electrical heater
- Long time availability and low GWP: 3
- Suitable for renovation markets

COMPARISON – R290/R407C

Flow temperature



EXPERIENCE WITH R290

Can R290 be used in a mass production?

Yes! 😊

- Additional sensor at filling station in production and test facilities
- Additional test due to pressure directive and test of tightness of electrical box
- Costs for R290 is in the range of HFC's
- Pressure in the system is in the range of other refrigerants
- But not every oil can be used



EXPERIENCE WITH R290



Experience with R290 as a refrigerant

- Training of production staff, service technicians and customers mandatory like it is for every refrigerant
- Easy to handle in production and service because it is no mixture (temperature glide)
- Refrigerant is long time available – future planning reliability for manufacturer and customer
- Additional manufacturing costs compared to HFC´s are low and acceptable
- Less components than compressors with EVI technology

R290 AS A REFRIGERANT FOR ALL HP



Is R290 a refrigerant for all heat pumps?

Due to its thermodynamic behaviour It is a good refrigerant for all heat pumps, but ...

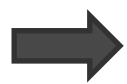
- Components (like compressor) covering the complete capacity range are not available today
- Additional research/investigation for the general usage and especially safety regulations are necessary
- Following existing safety regulations it is appropriate for outdoor heat pumps

R290 AS A REFRIGERANT FOR ALL HP



Is R290 a refrigerant for all heat pumps?

- For indoor applications additional safety devices are mandatory like a gas alarm device and ventilation



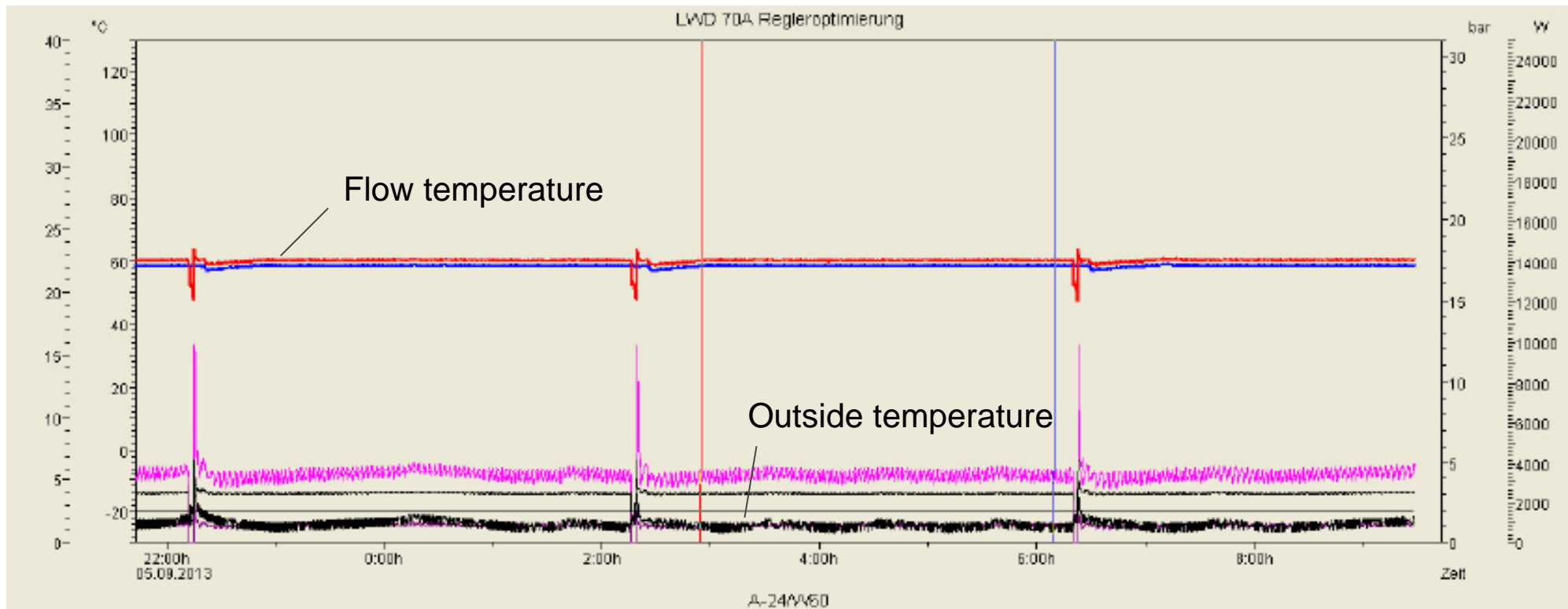
Due to additional installation costs (~350 - 500€) many customers would abandon from such a solution and decide for a heat pump with HFC or other technology (e.g. gas boiler)



In that case incentives for the end customer are necessary

APPLICATION EXAMPLES

Heat Pump running at A-24/W60 without additional electrical heater



CONCLUSION



- R290 is a good refrigerant for outdoor Air/Water-heat pumps
- Advantages are the high temperatures at low ambient temperatures
- R 290 can be handled in a mass production with less additional effort compared to HFC´s
- Due to it´s low GWP and to reduce CO₂-emission R290 is a proper refrigerant for environment friendly heat pumps
- It is not a refrigerant for all heat pump, especially for indoor applications because of additional safety installation costs
- If possible we want to extend our product portfolio (availability of components, compliance with international safety regulations)



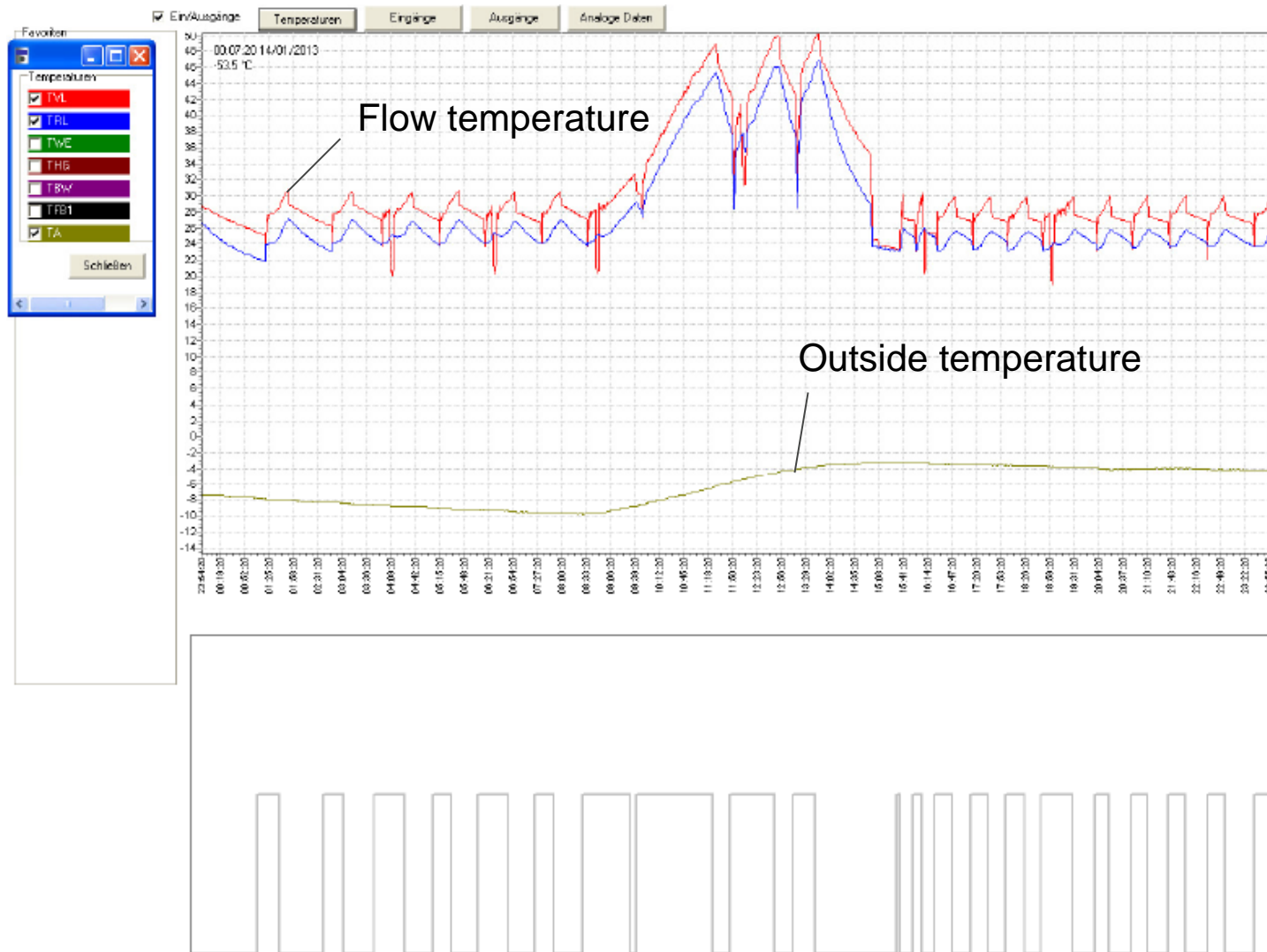
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Let's use the best solution – R290 is one!

APPLICATION EXAMPLES



Typical winter day

$T_{amb} = -3^{\circ}\text{C}$ to -10°C