



Energy research Centre of the Netherlands

Multi agent building study on the control of the energy balance of an aquifer

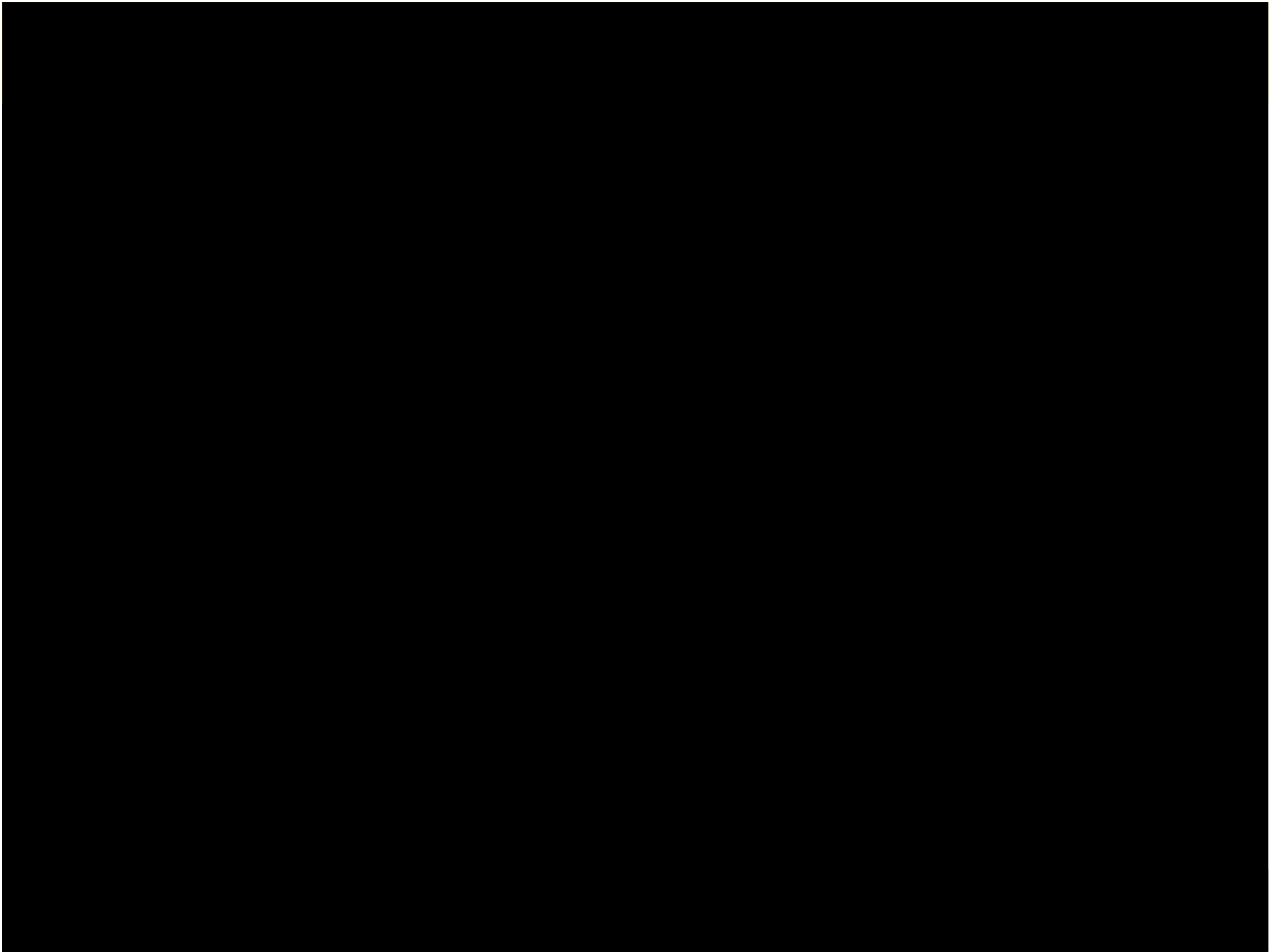
O.P. van Pruissen

Presented at the IEECB'10, 15 April 2010, Frankfurt, Germany

Multi agent building study on the control of the energy balance of an aquifer

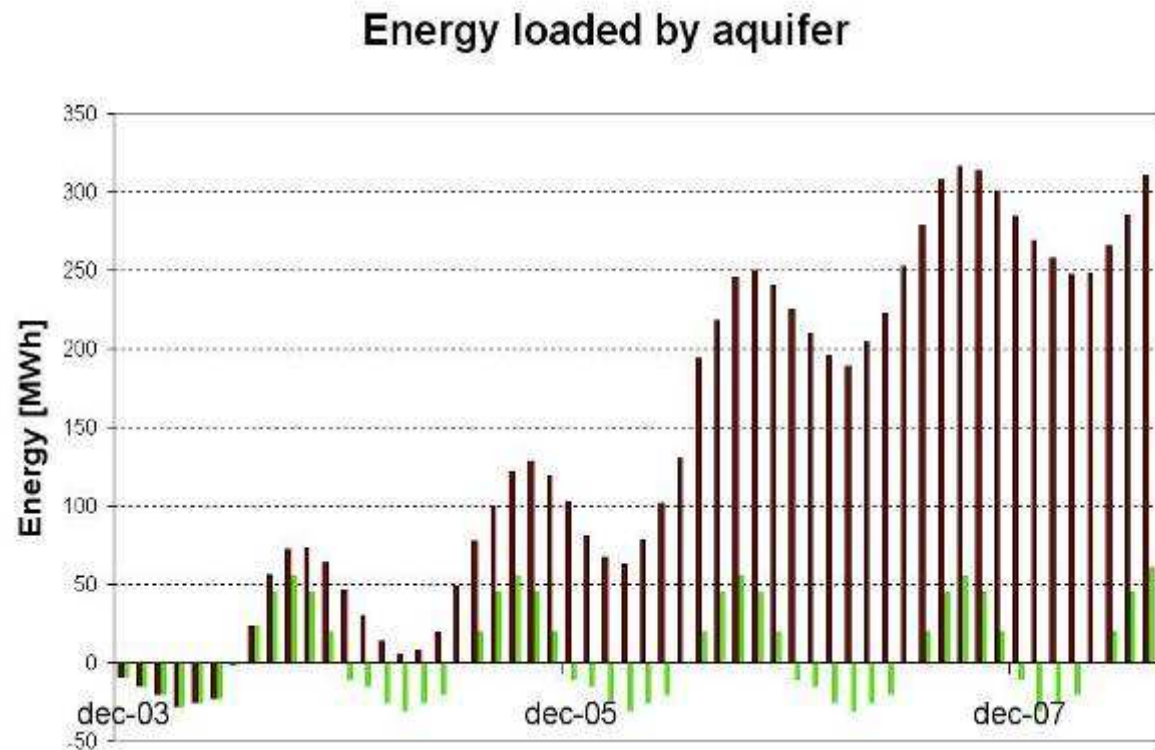
Building Energy Management systems
Olaf van Pruissen
Frankfurt, 14 april 2010

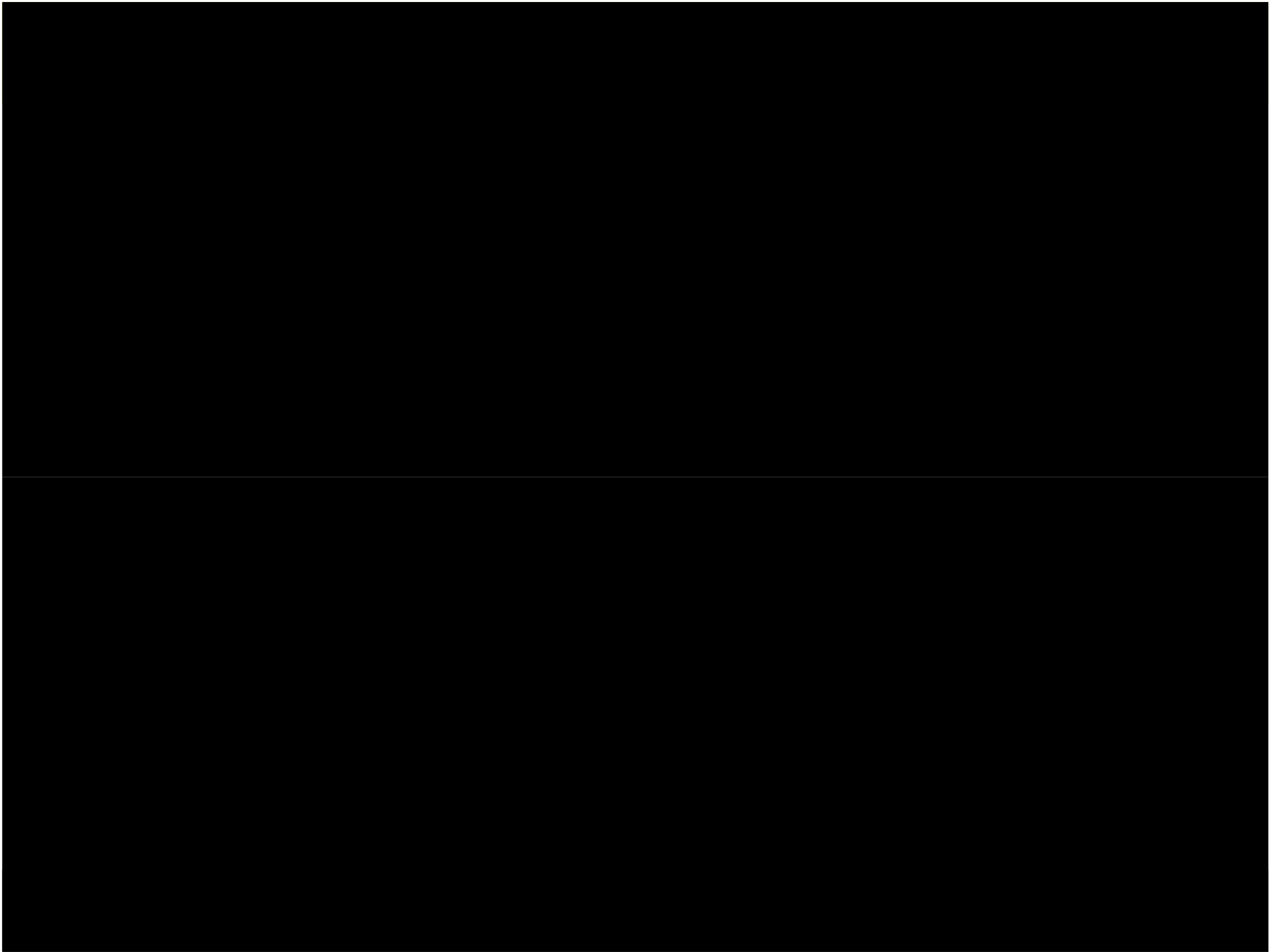




The energy balance of an aquifer

- More cold than heat
- Temperature aquifer increases



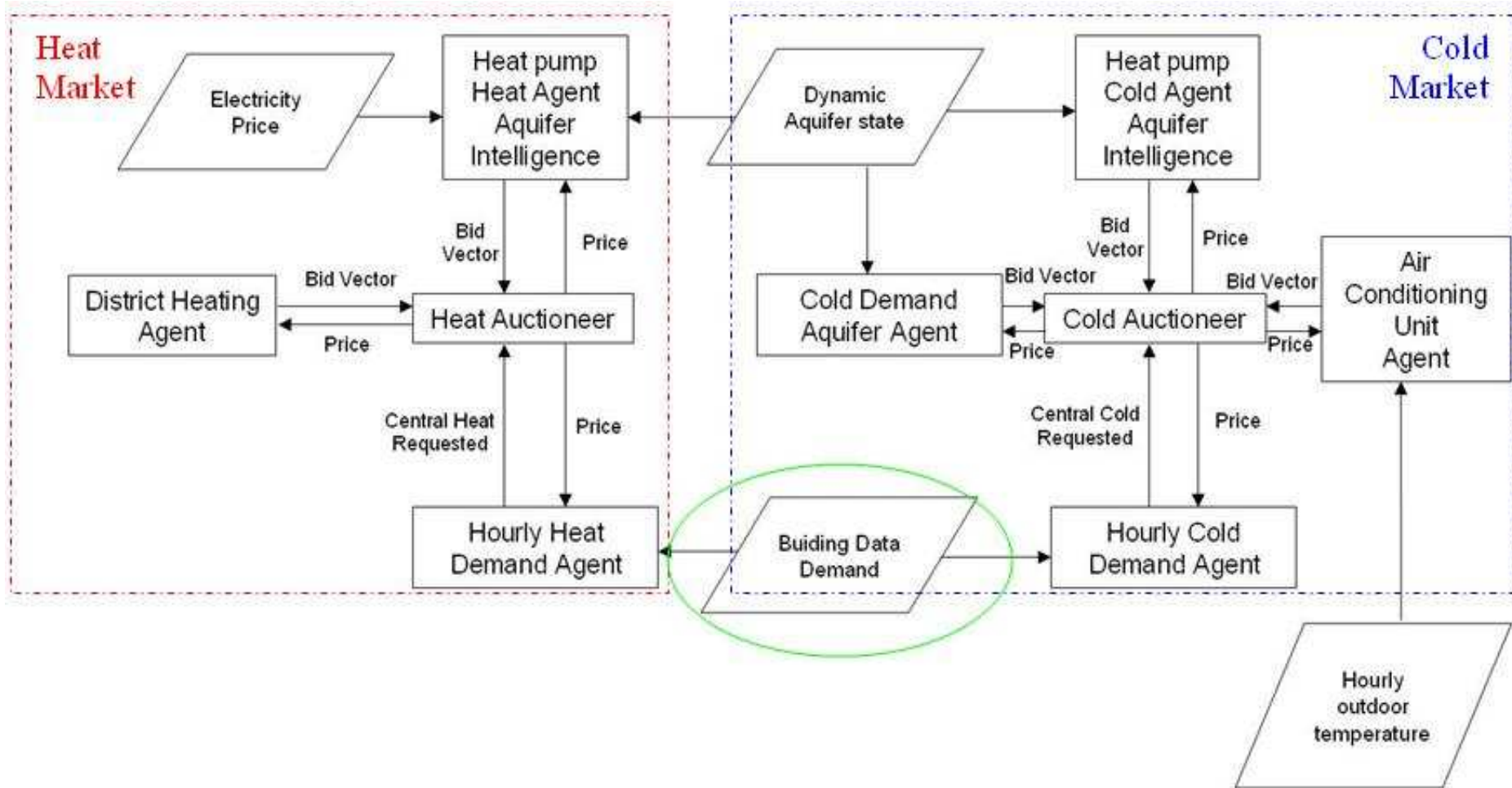


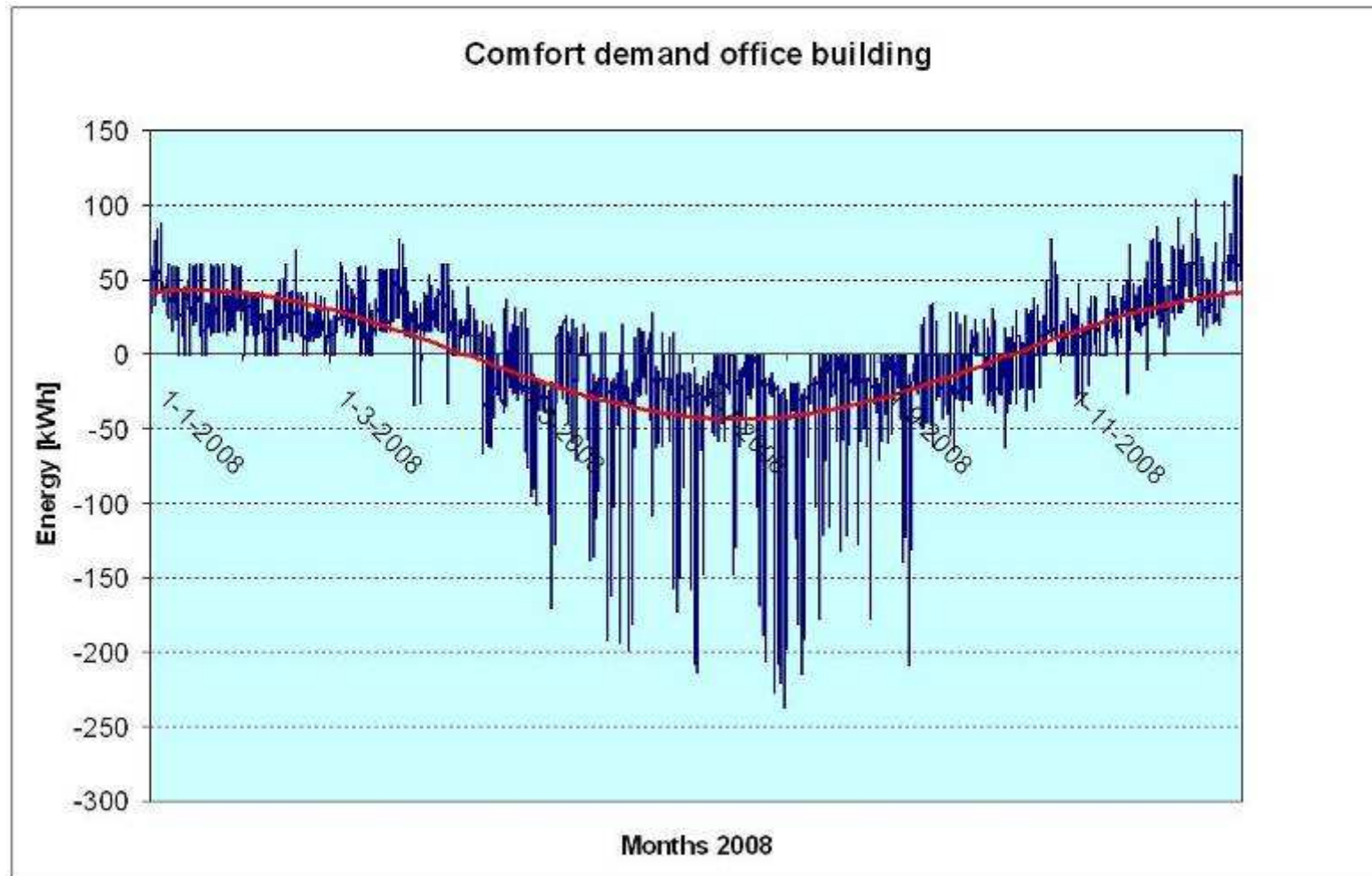
Heatpump connected to an aquifer: Aquifer Energy Balance

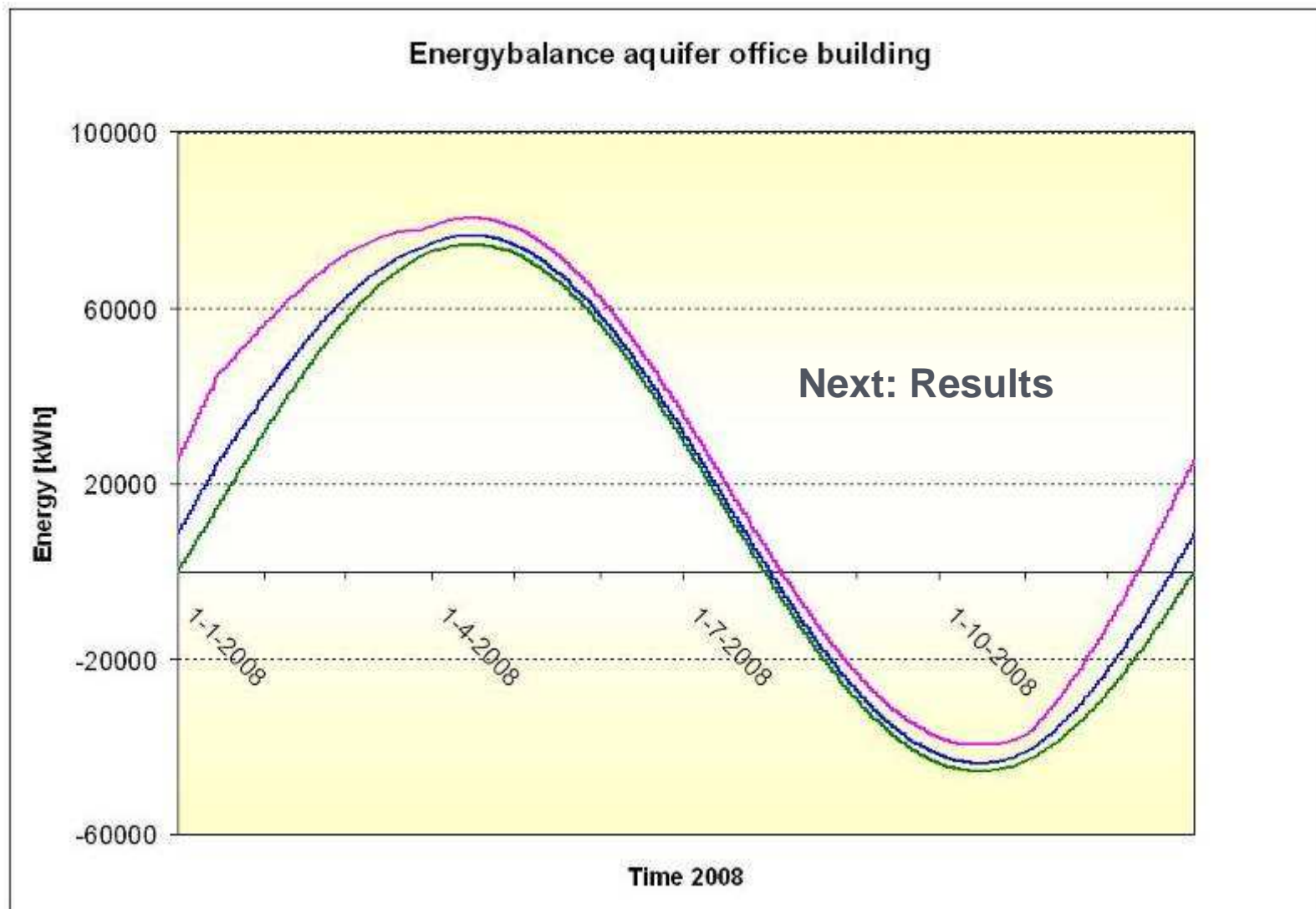
- Heat supply:
heatpump
district heating
- Cold supply:
heatpump
air conditioning unit

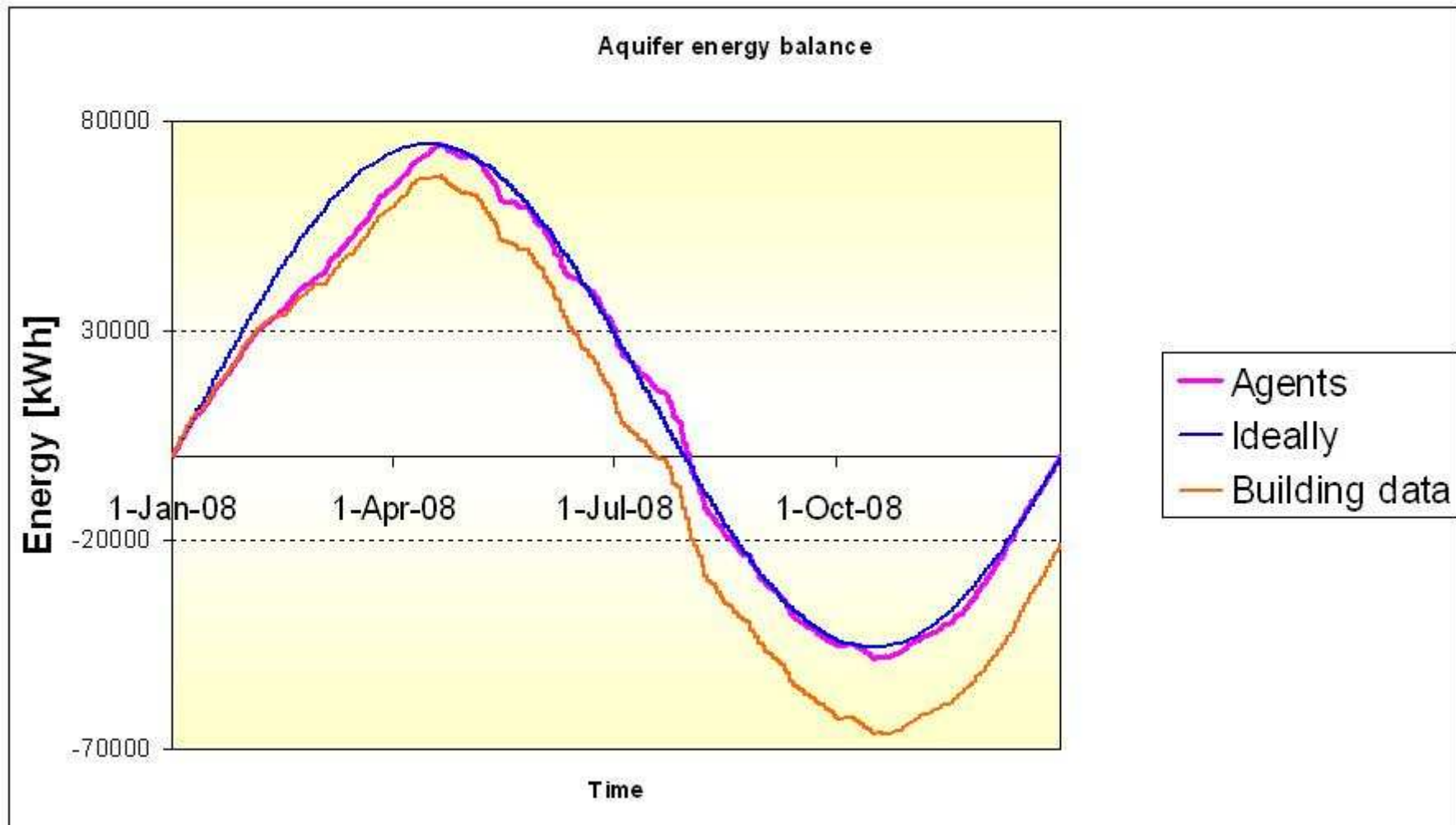


Powermatcher Agent Design Building

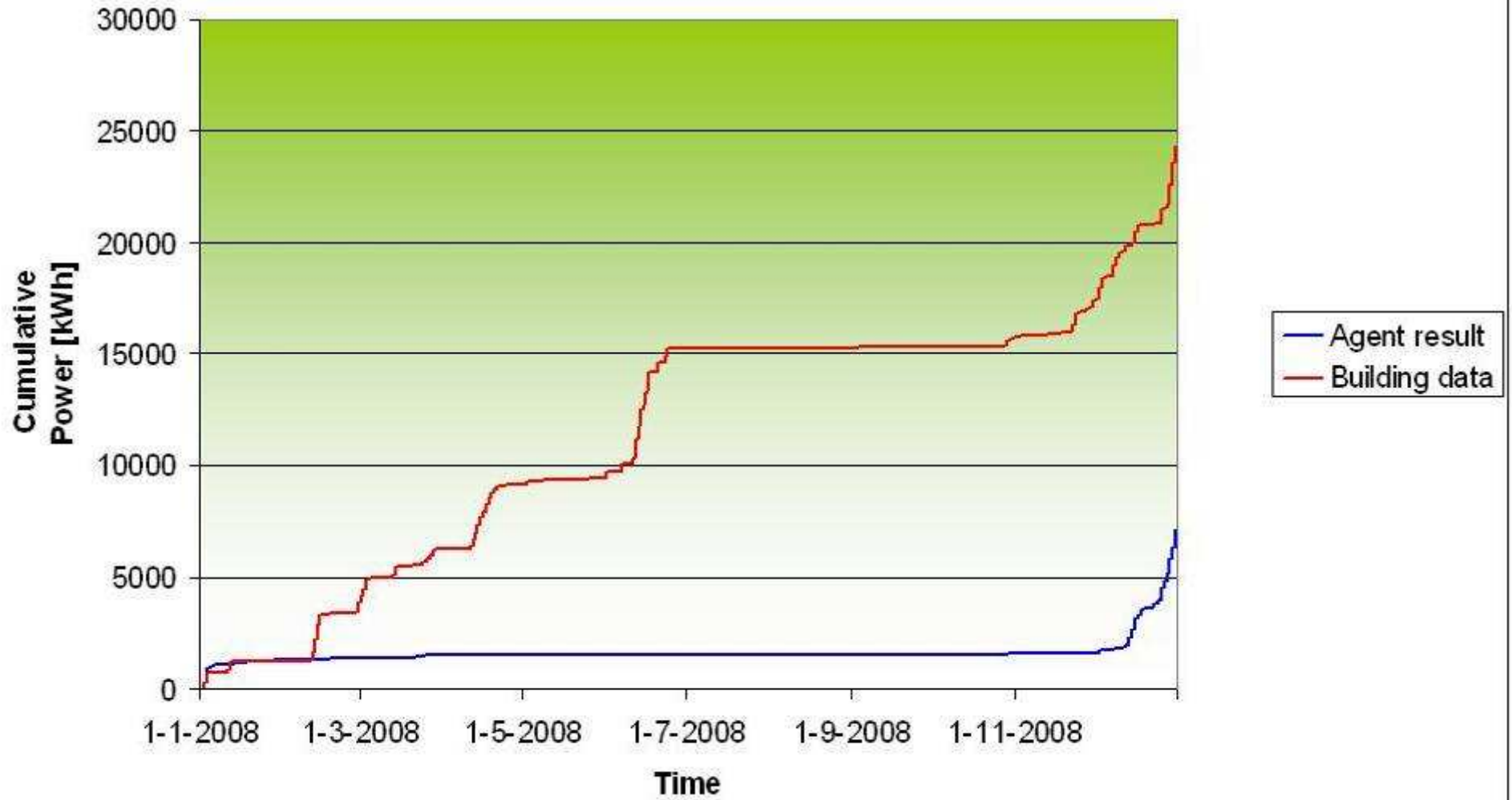




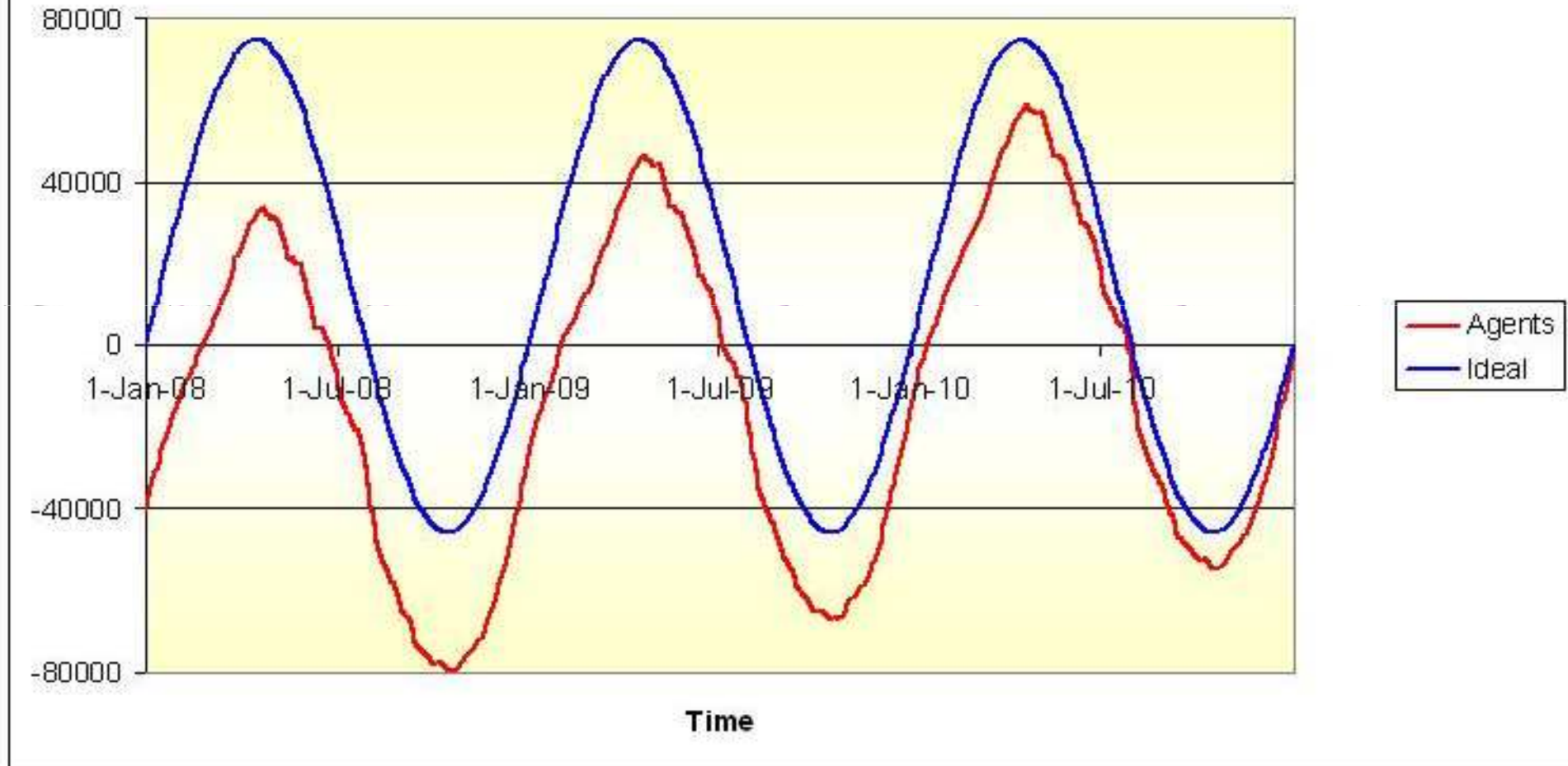




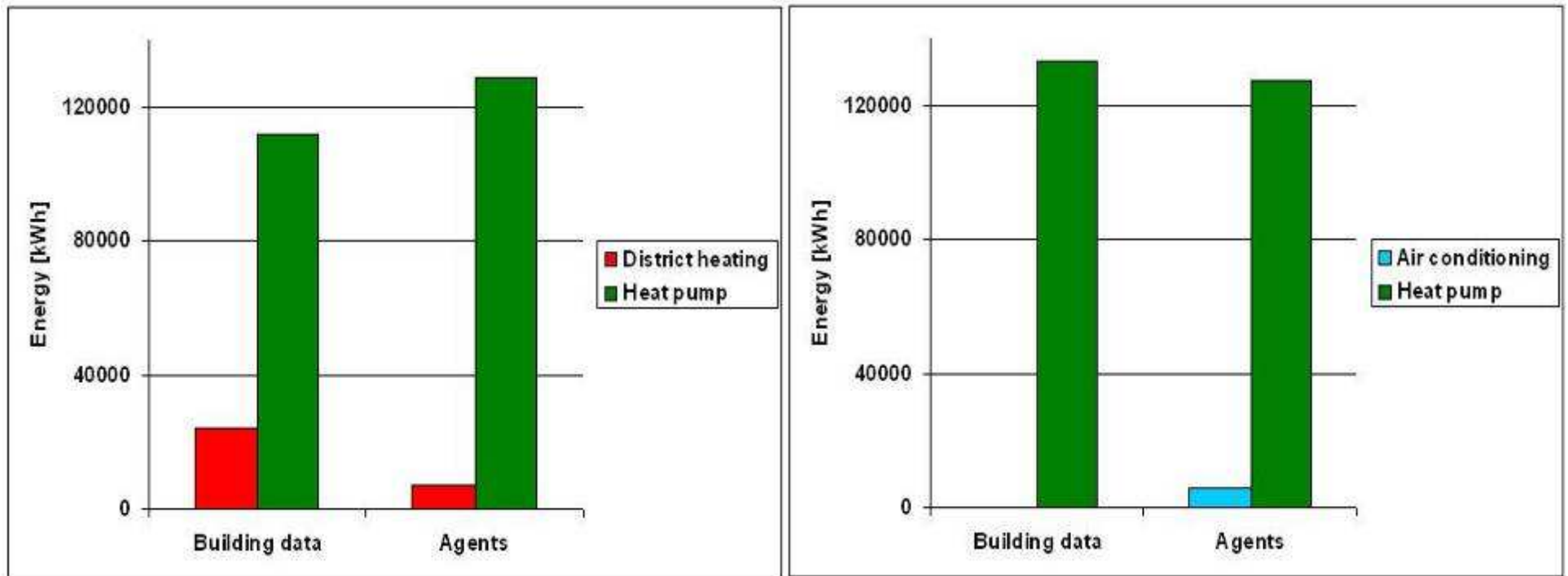
DistrictHeating; starting in balance



More years starting with (larger) cold shortage

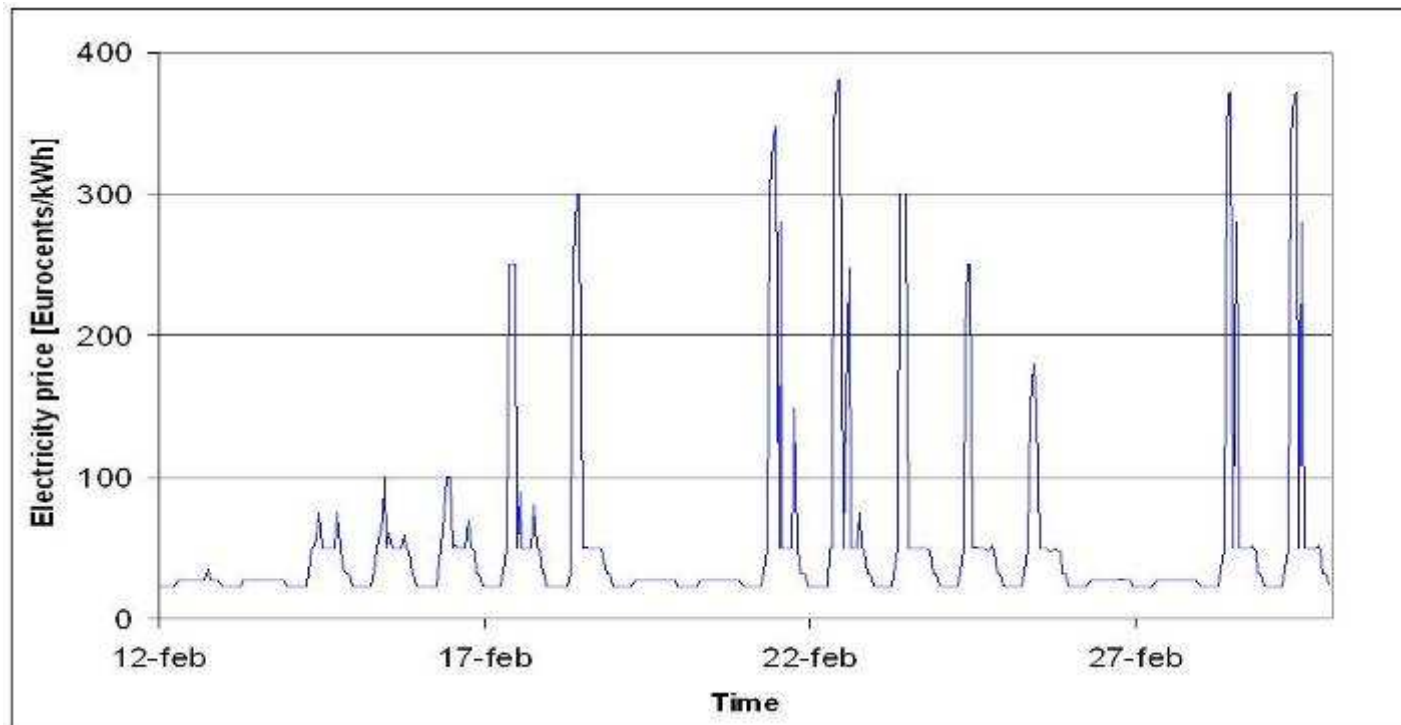


Energy savings

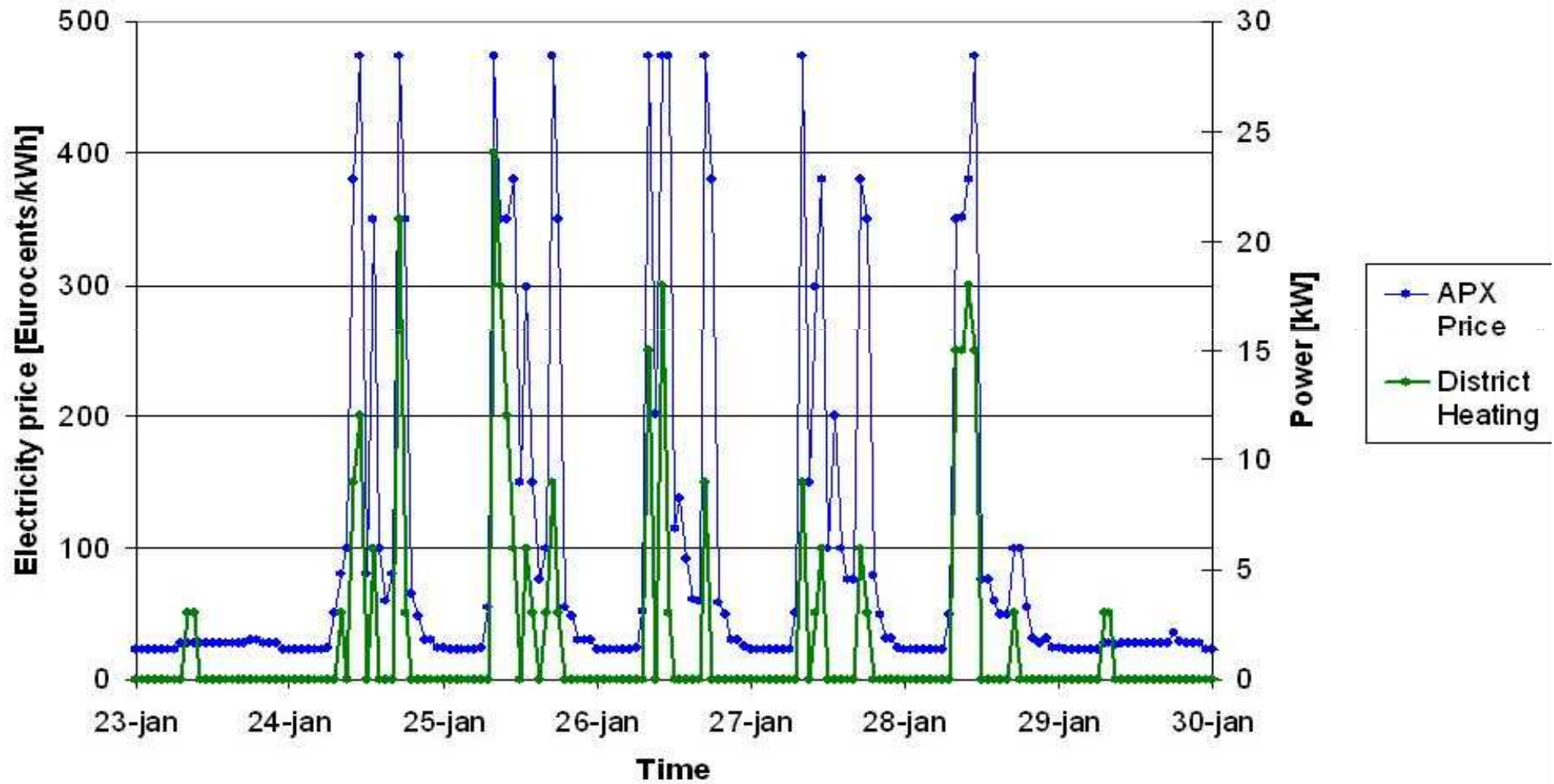


Cost optimisation

- Utility of heat pump depends on the electricity price (Wholesale market : APX)



Response Agents to Electricity price



Acknowledgements

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- J.A.J. van der Velden
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Conclusions

- **Agent technology is able to preserve the energy balance of an aquifer**
- **This particular office building can maintain energy balance of the aquifer by intelligent controlled district heating (2008)**
- **User comfort, Energy efficiency, Energy balance of aquifer and cost optimisation can be satisfied**

Thank you ...

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