

Performance Evaluation of a HP/ORC System with Optimal Control of Sensible Thermal Storage

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Mads P. Nielsen

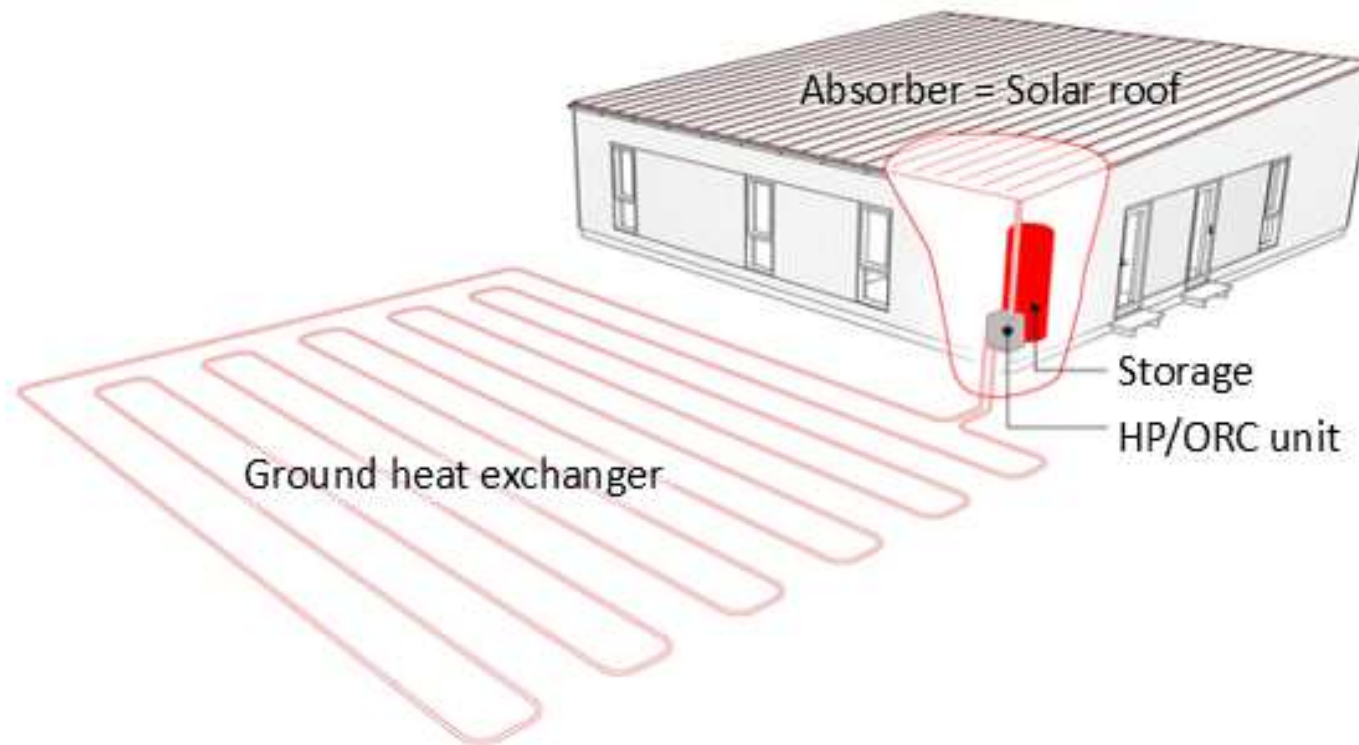
Brian Elmegaard

Olivier Dumont

July 11 -14, 2016

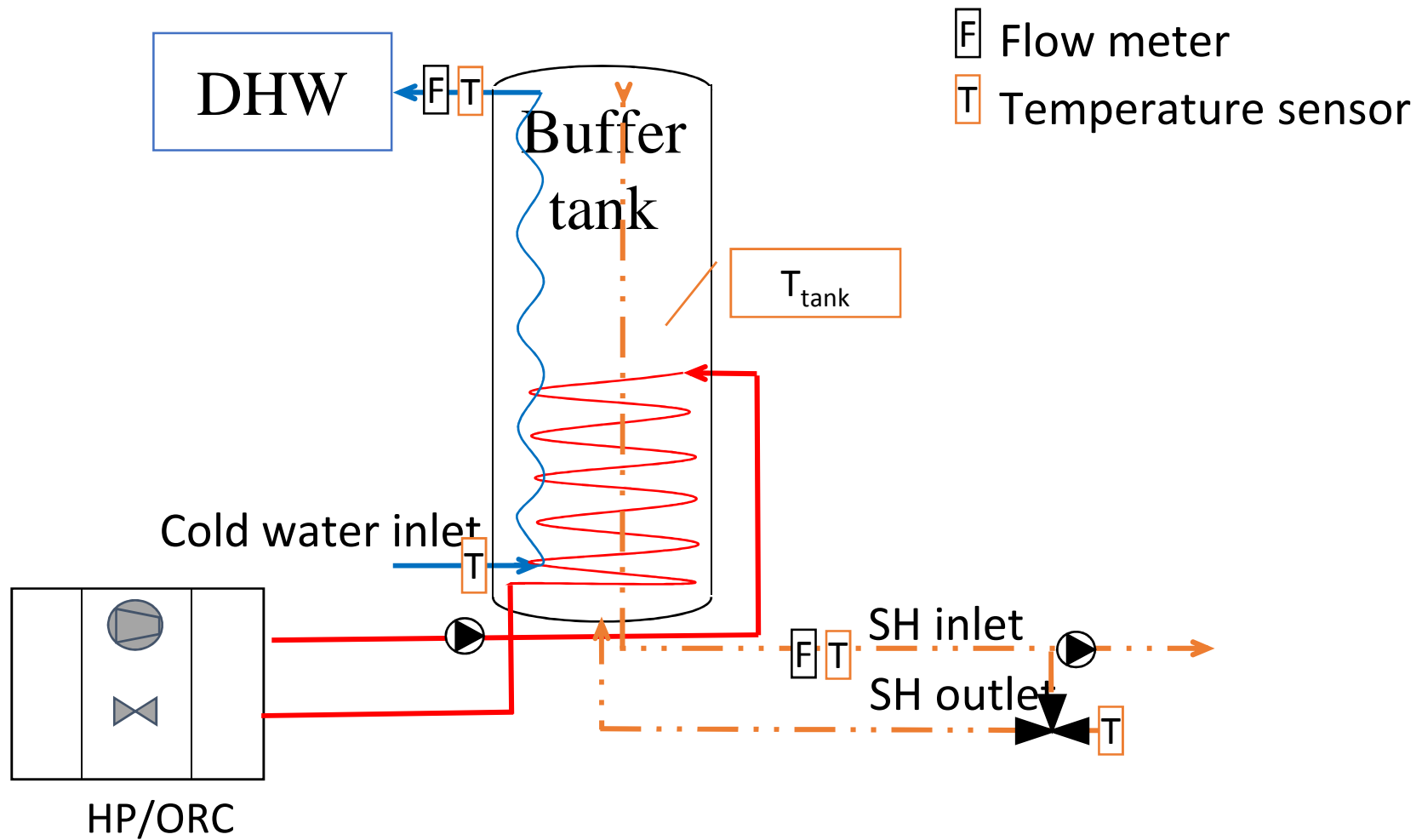


HP/ORC system



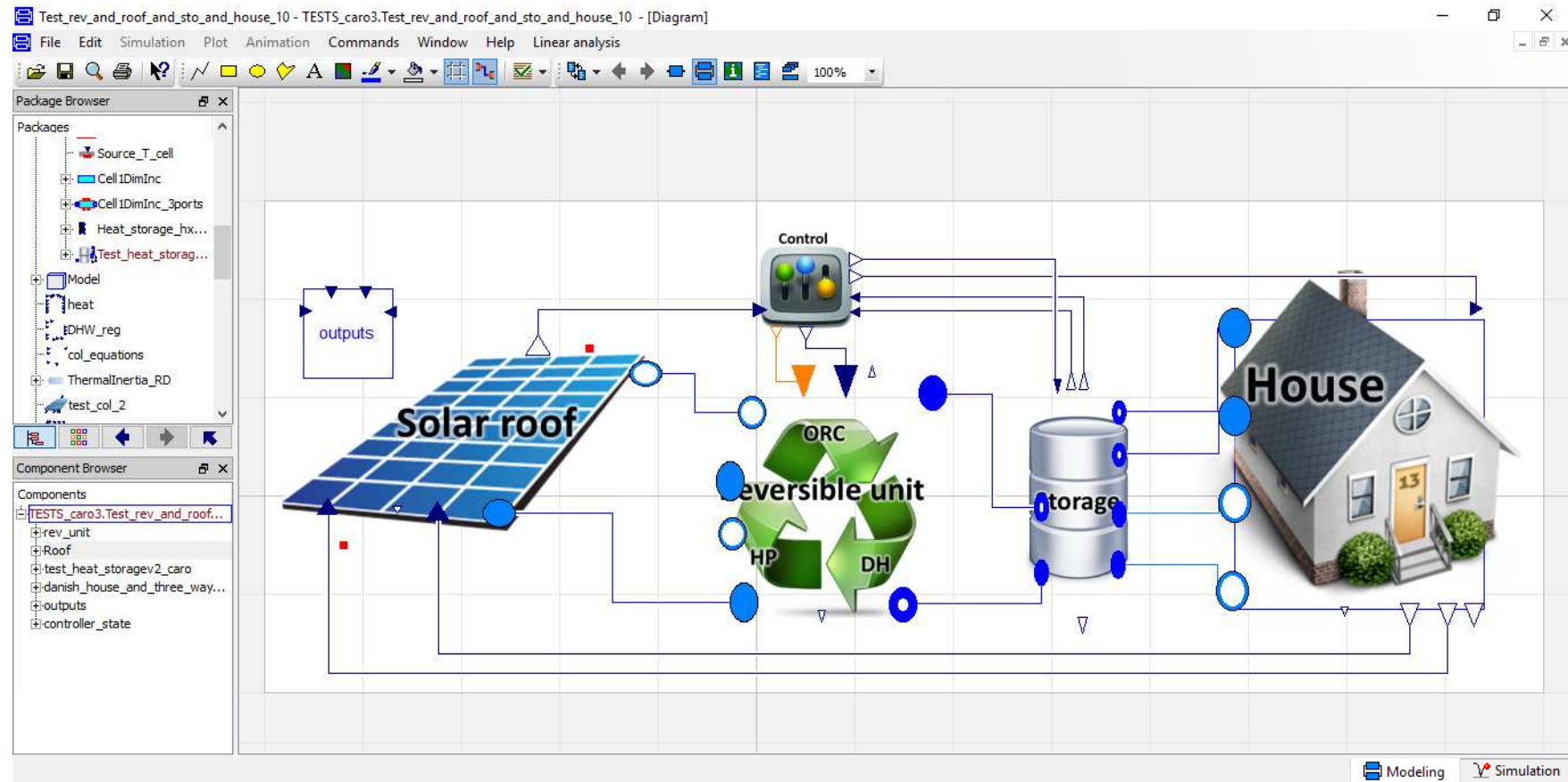


HP/ORC system



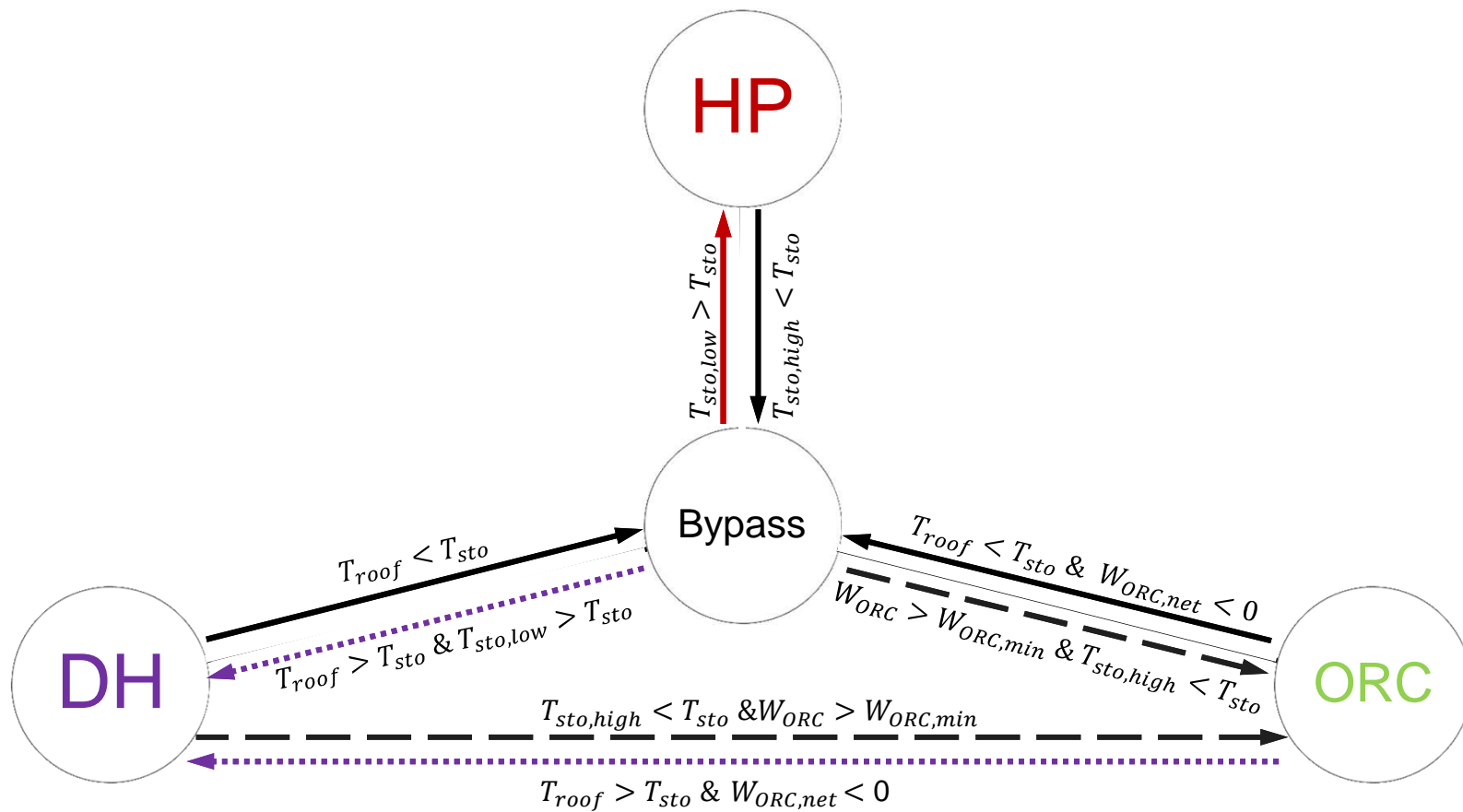


HP/ORC system in Dymola environment



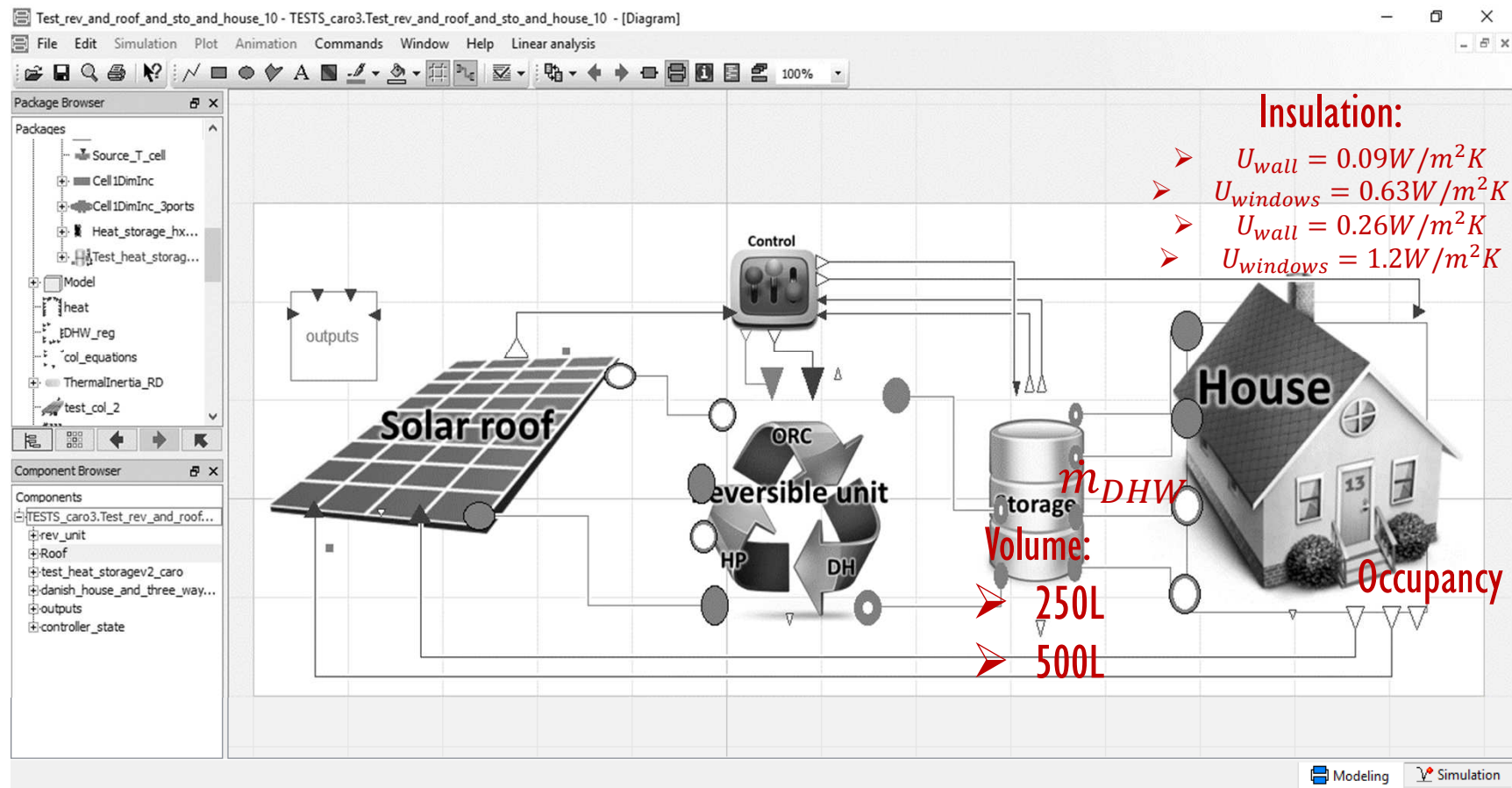


State diagram control



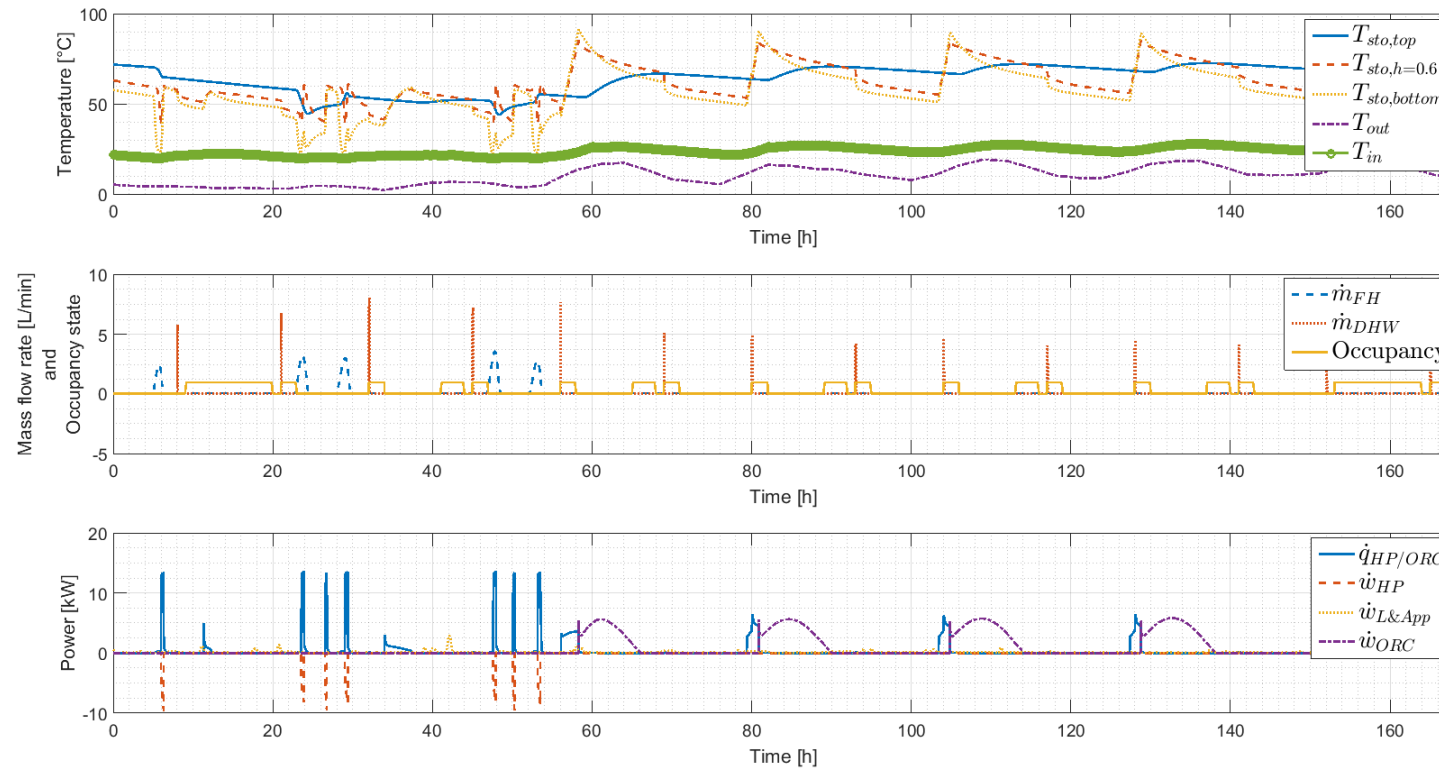


Control strategies



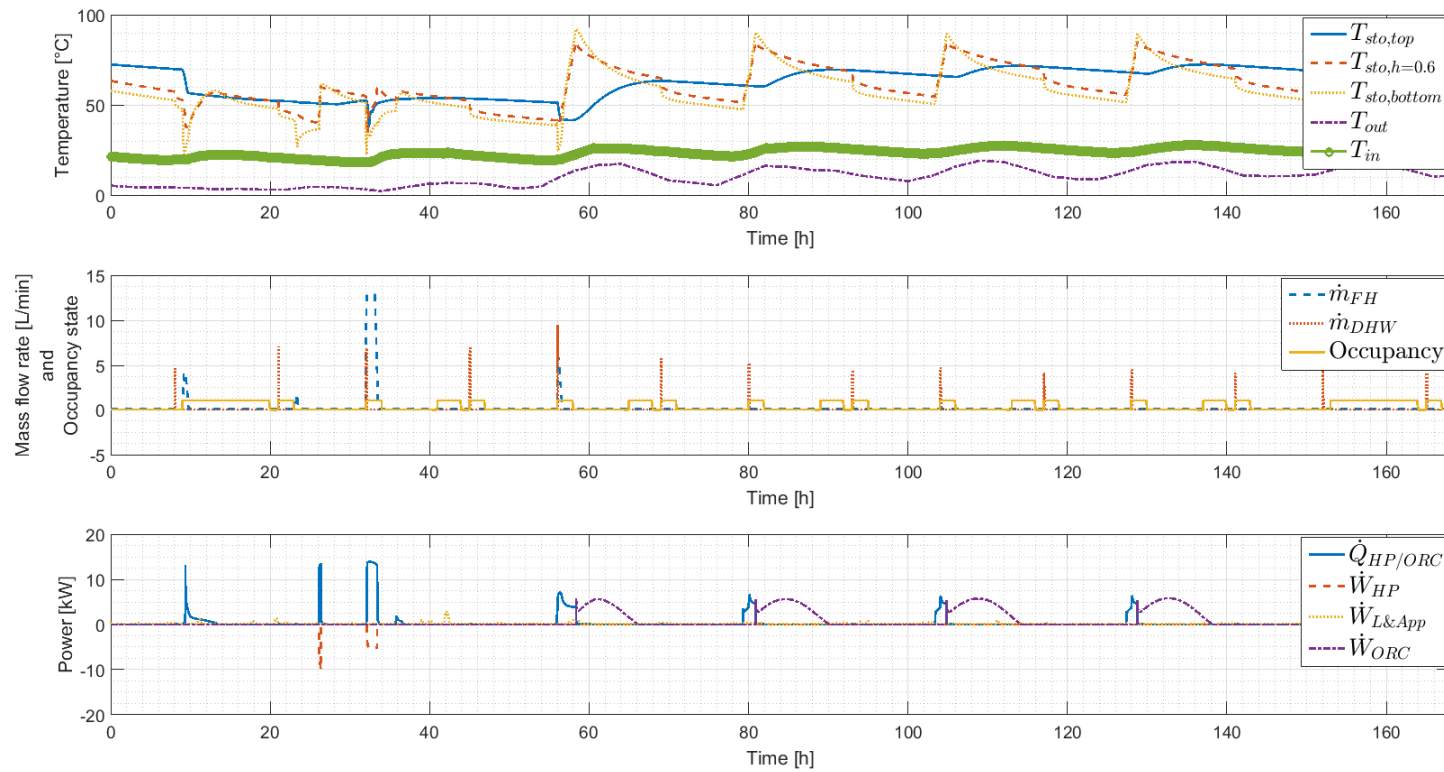


Results – Original control strategy



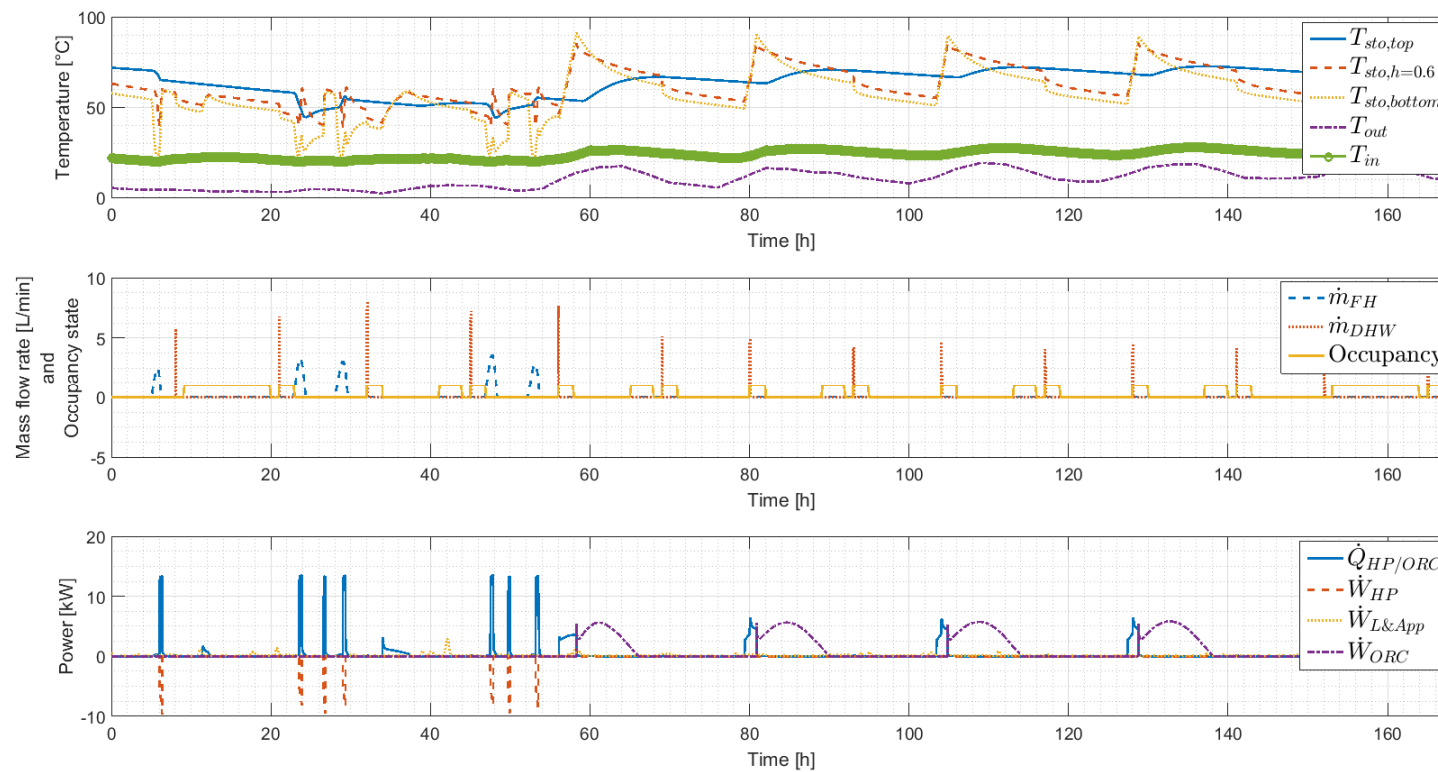


Results – Occupancy control strategy



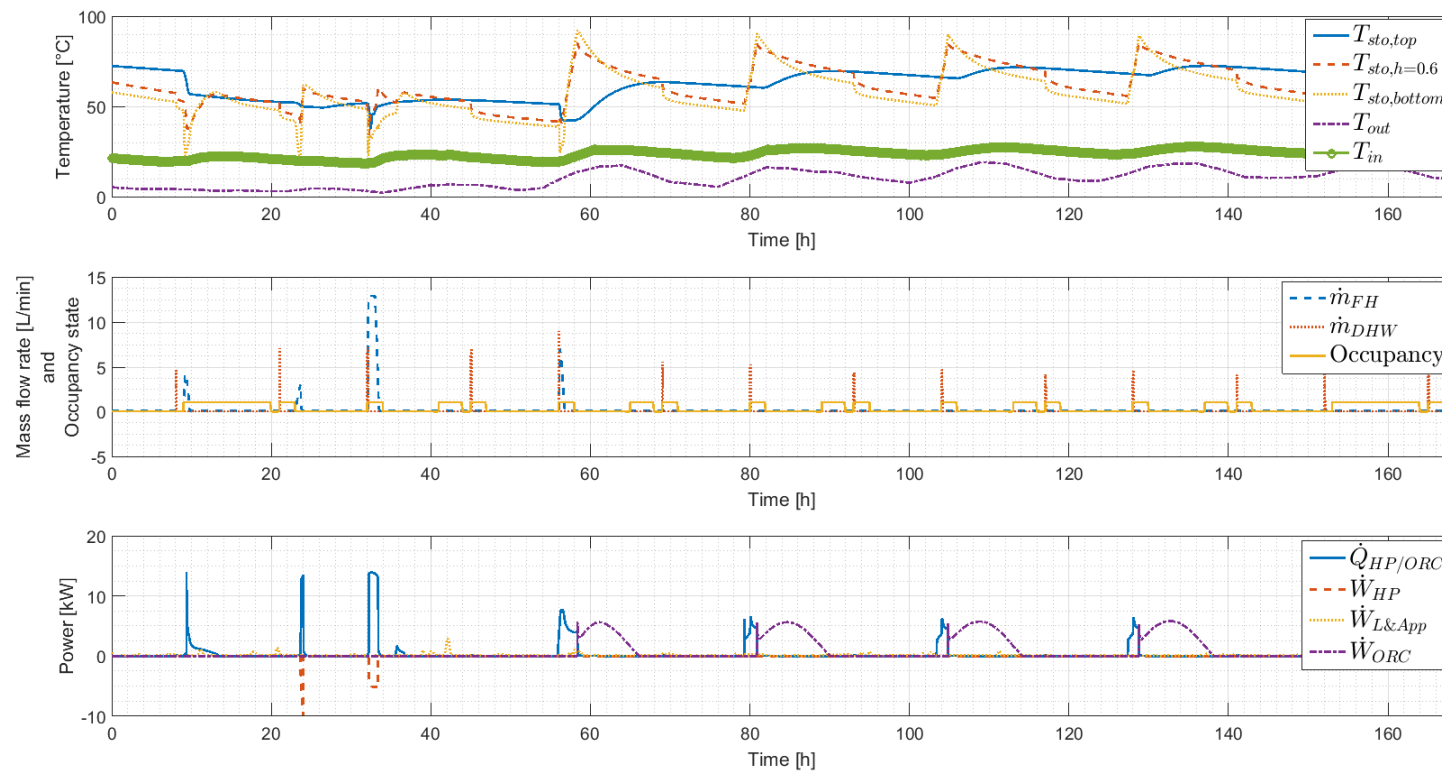


Results -DHW priority control strategy



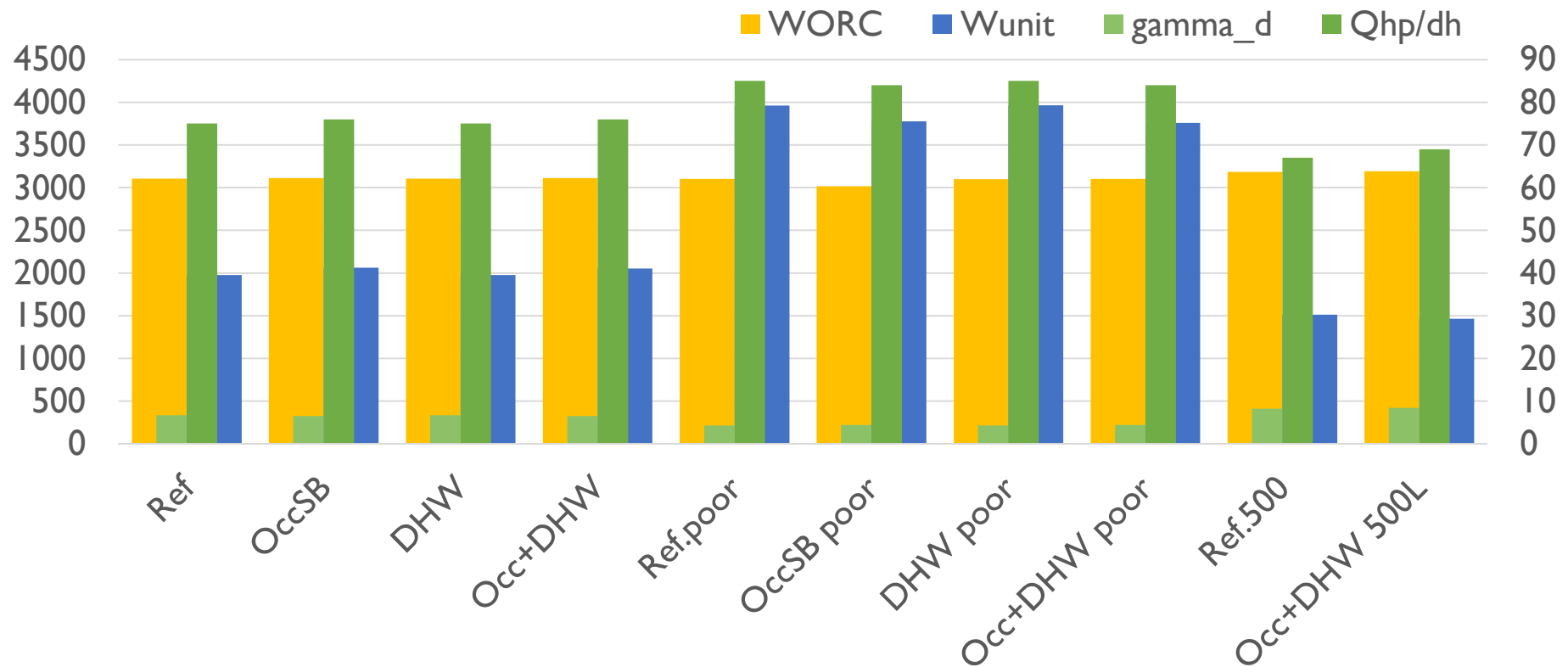


Results – Occupancy & DHW control strategy





Results – all controls





Conclusions



- Intro novel HP/ORC concept in single-family house
- Dynamic model developed in Modelica language
- 3 new control strategies applied based on real load
- Reduction of adverse effects of cycling in compressor
- RES in thermal energy demand up to 33%
- Up to 8.4% of electrical demand by RES
- Introduction of larger hot water tank reduced W_{unit} by 25%, increase SPF 44% and RES share 35% increase when compared to the reference case



Thank you for your attention

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