

The Electrification of Heat & Load Management

CIBSE HVAC Systems Group

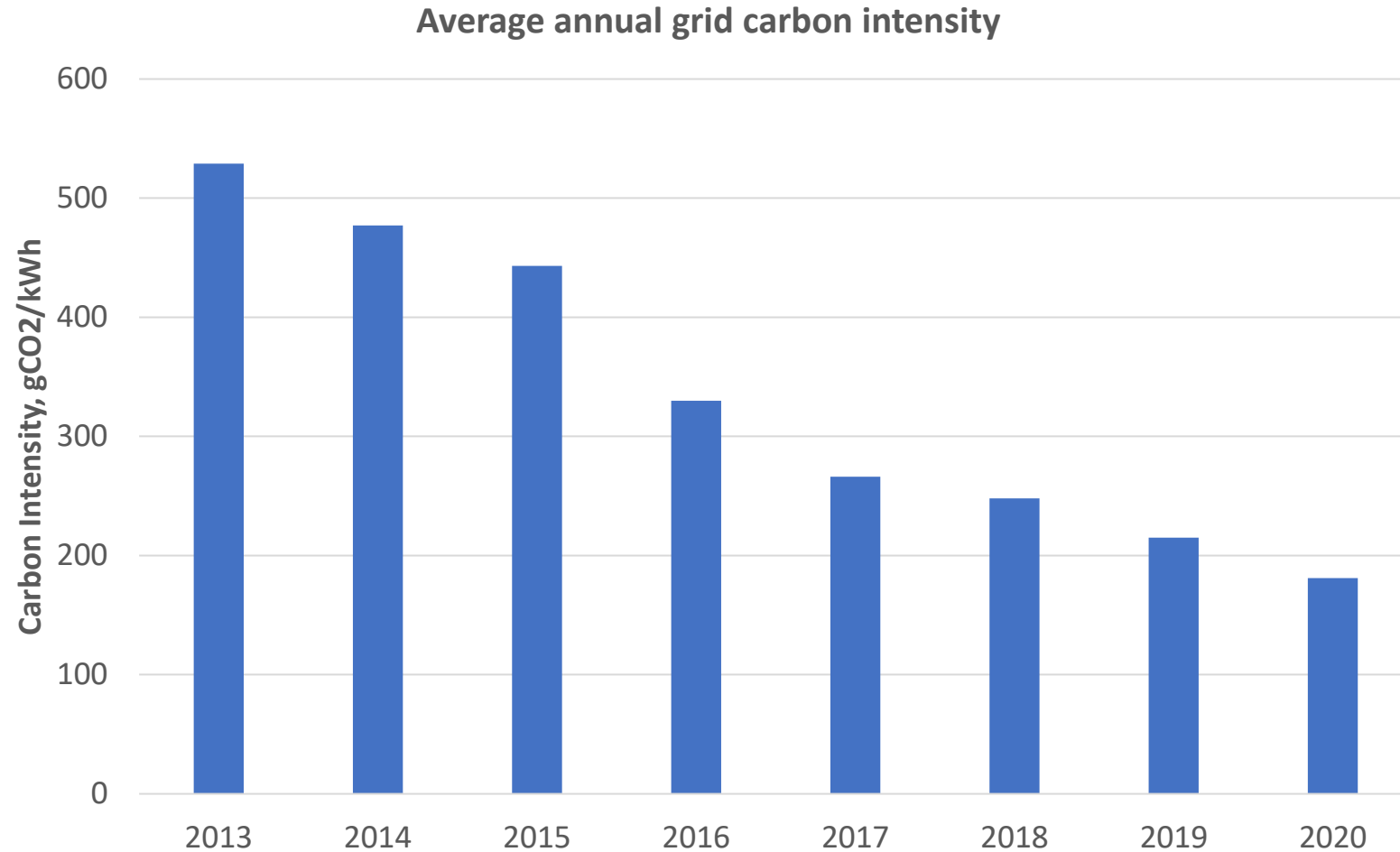
16 February 2022

Prof Tony Day

Electrification of Building Services

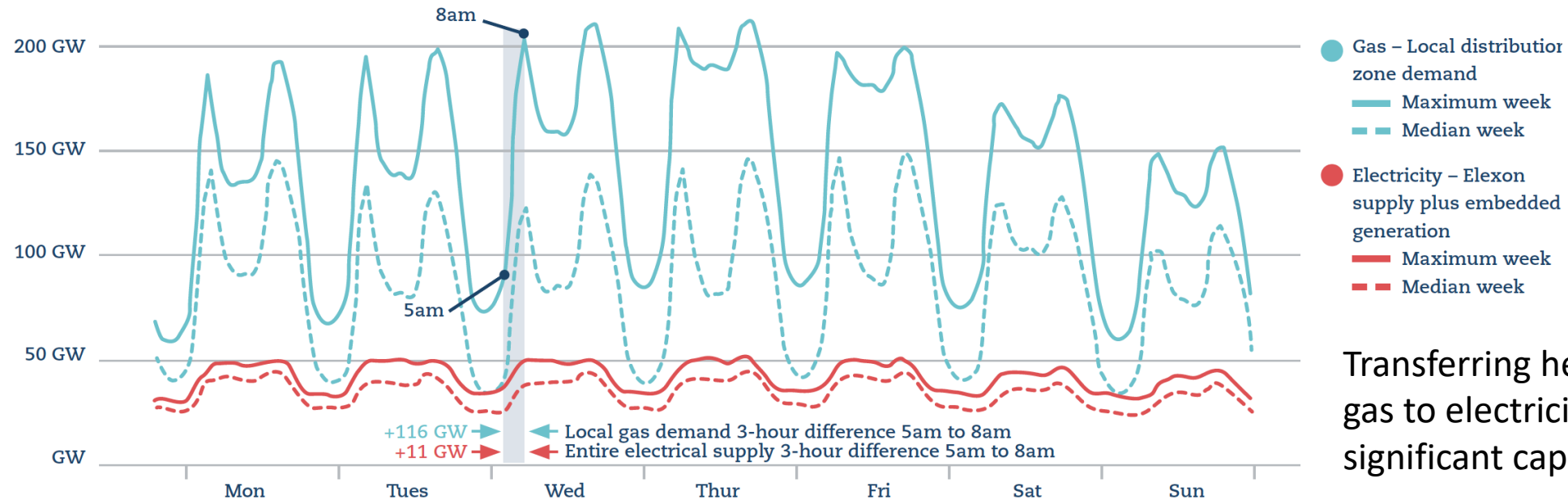
- CIBSE TM67: Electrification of Buildings for Net Zero, November 2021
- The electricity system has rapidly decarbonised
- Heat pumps are the current choice for low carbon heat
- Distributed generation is increasing local electricity flows
- EV charging is being added to the building loads
- Energy storage and control provide peak demand and cost management
- Energy markets are evolving as the transition accelerates

UK Electricity System Carbon Intensity



<https://www.nationalgrideso.com/news/introducing-our-carbon-intensity-app>

Gas and Electricity demand



Transferring heat demand from gas to electricity can add significant capacity requirement

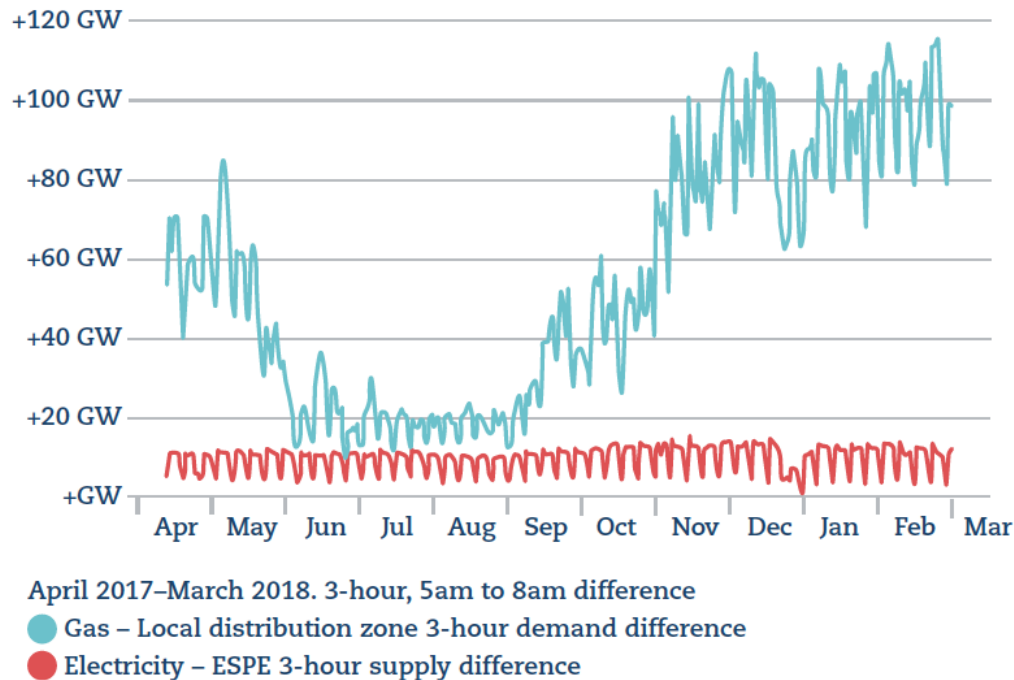
Even with heat pump COP of 3 this could double the system demand

Who pays?

GB gas and electricity use –median demand week and peak demand week 2017-18

Source: Wilson, Taylor and Ramsay, UKERC

Gas and Electricity demand ramp rates



The 3 hour difference represents the rate of change of demand on the networks at peak time

Electrification of heat could add significant capacity and response needs to the electricity grid

Heat pumps have a lower impact, and good design can lower the impact and increase diversity across the network

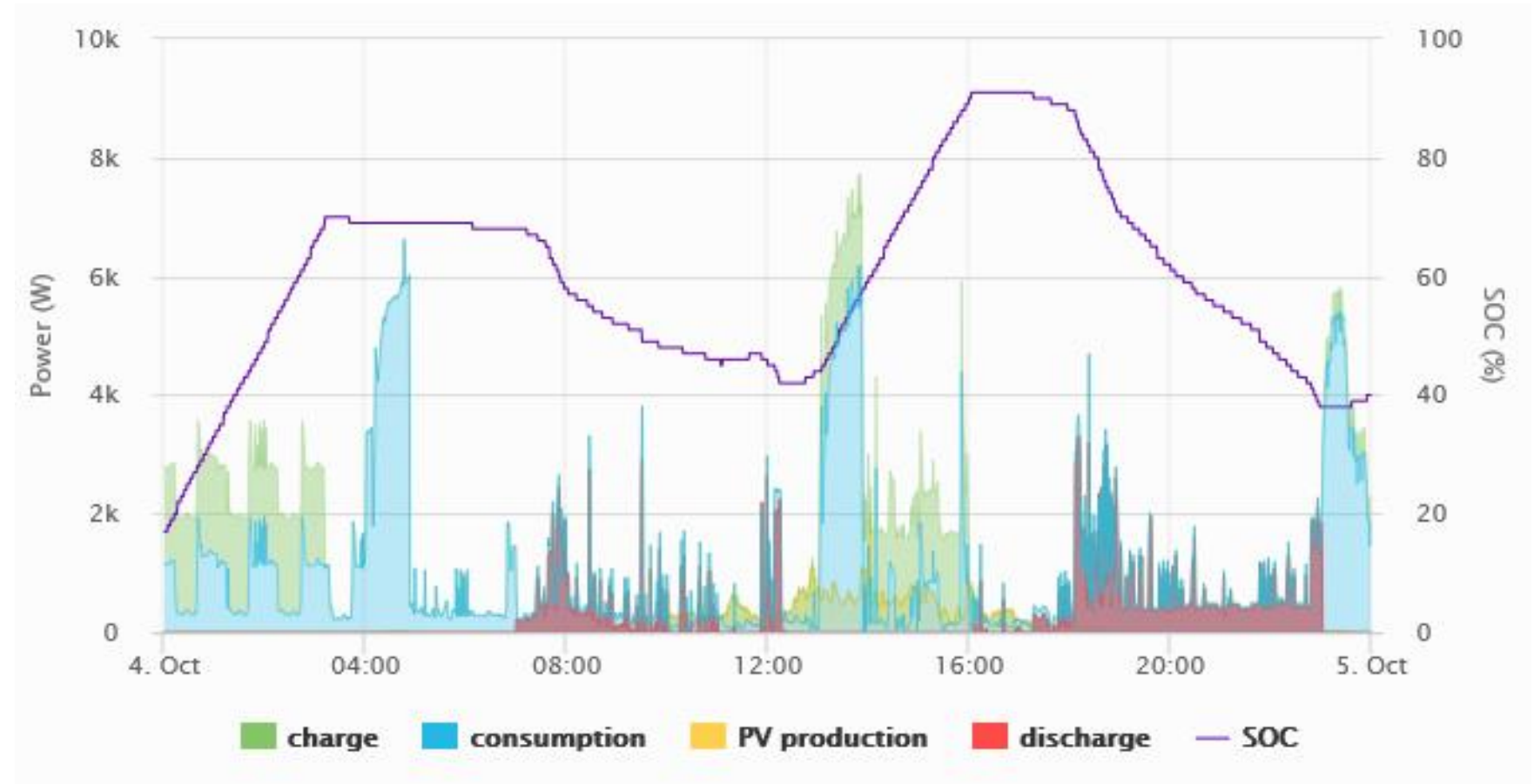
GB 3 hour (5am-8am) difference

Source: Wilson, Taylor and Ramsay, UKERC

The Electrified Home

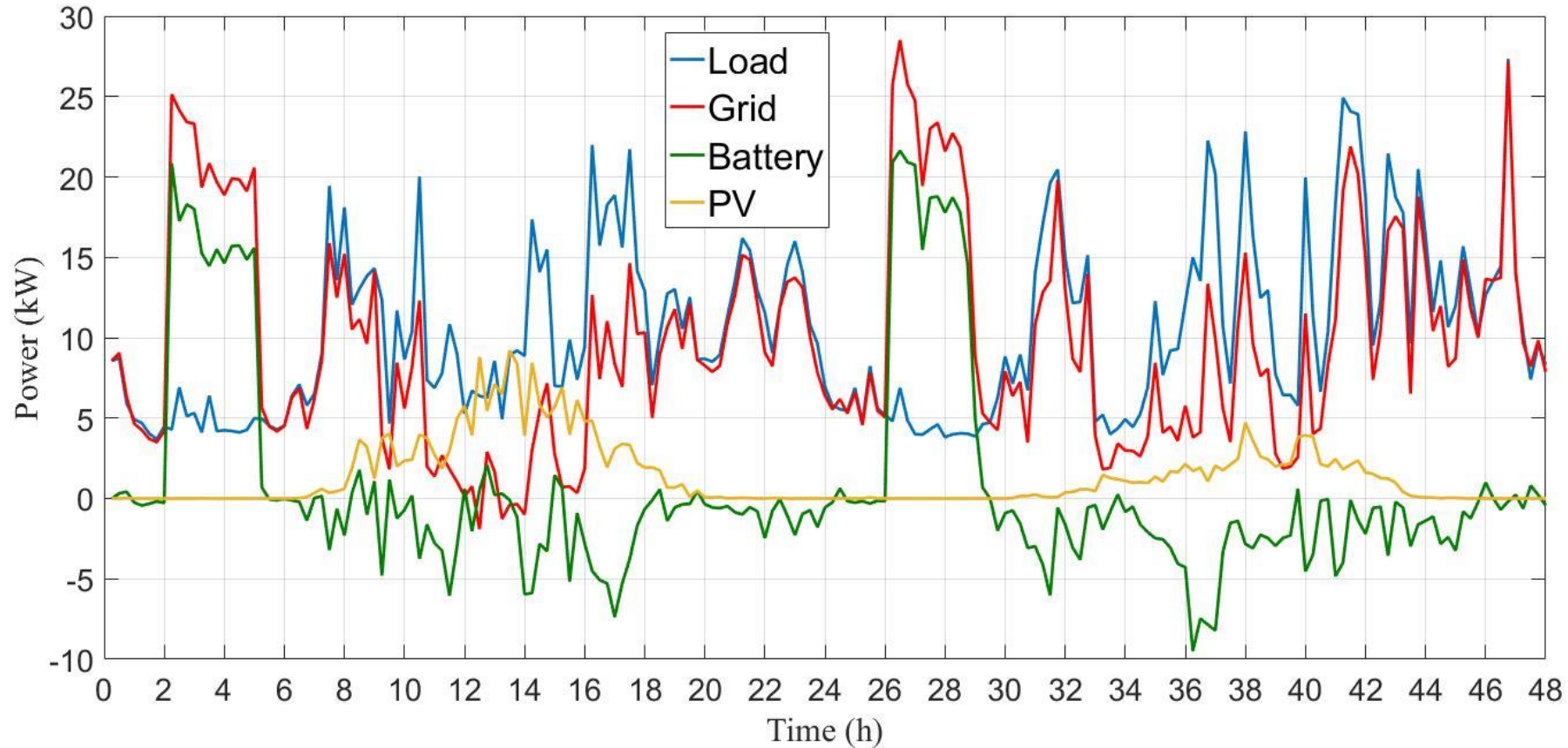
Residential property with:

- 10kWh battery
- Rooftop PV
- ASHP
- EV charging



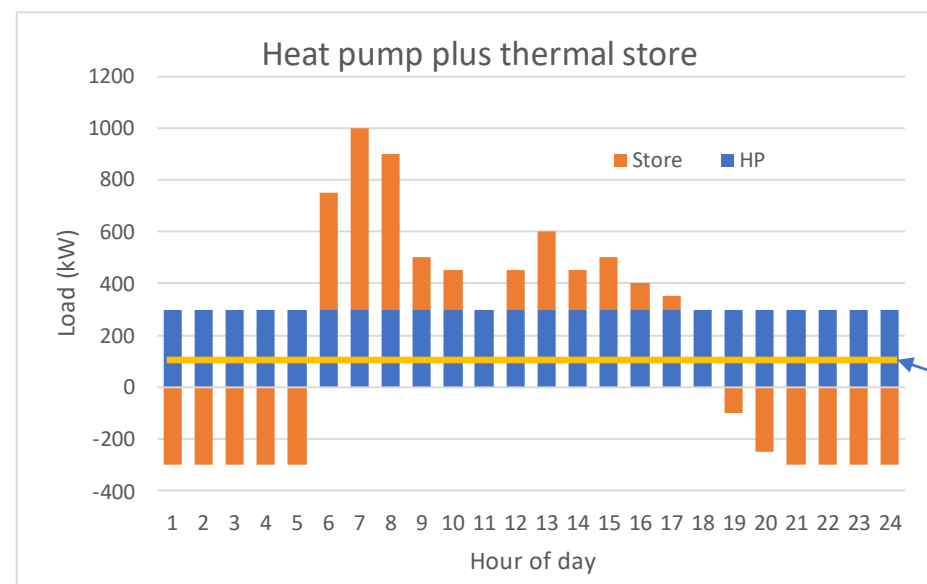
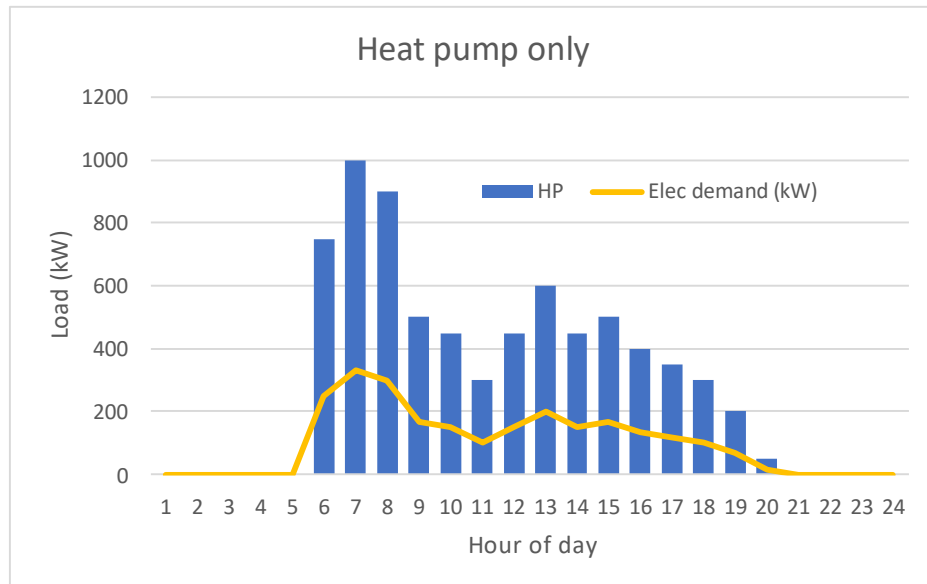
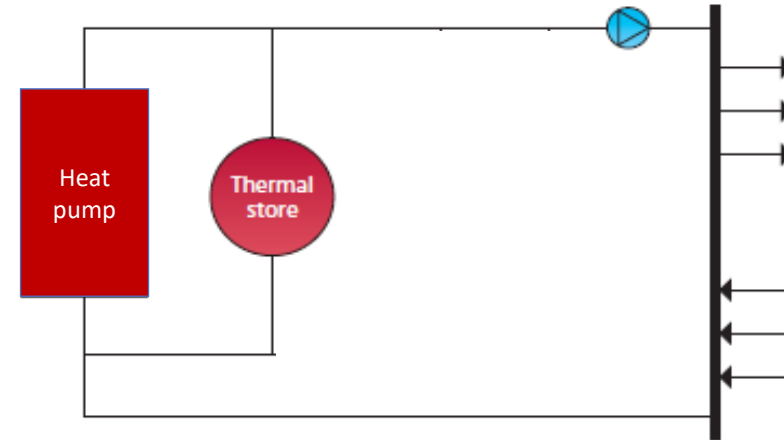
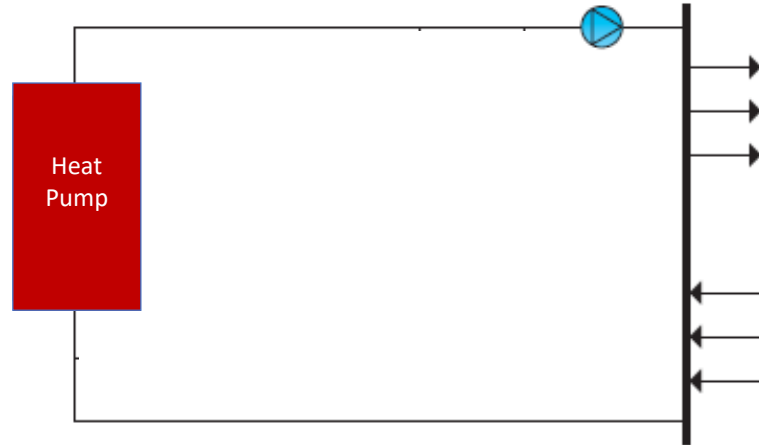
Managing energy and data flows

Aggregated load for 20 houses with ASHP, PV and battery storage



Source: IERC
StoreNet project,
Dingle, Ireland

The role of thermal storage



Elec demand constant 100 kW

Thank you for listening

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