

Unleashing the potential of existing biomass systems through District Heating and Thermal Storage: A Scottish perspective

Findhorn
Foundation 1/4 Mile



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Design problems in Scotland

1. Limited uptake of district heating
2. Thermal storage not properly used

Mismatch between best and current design practice

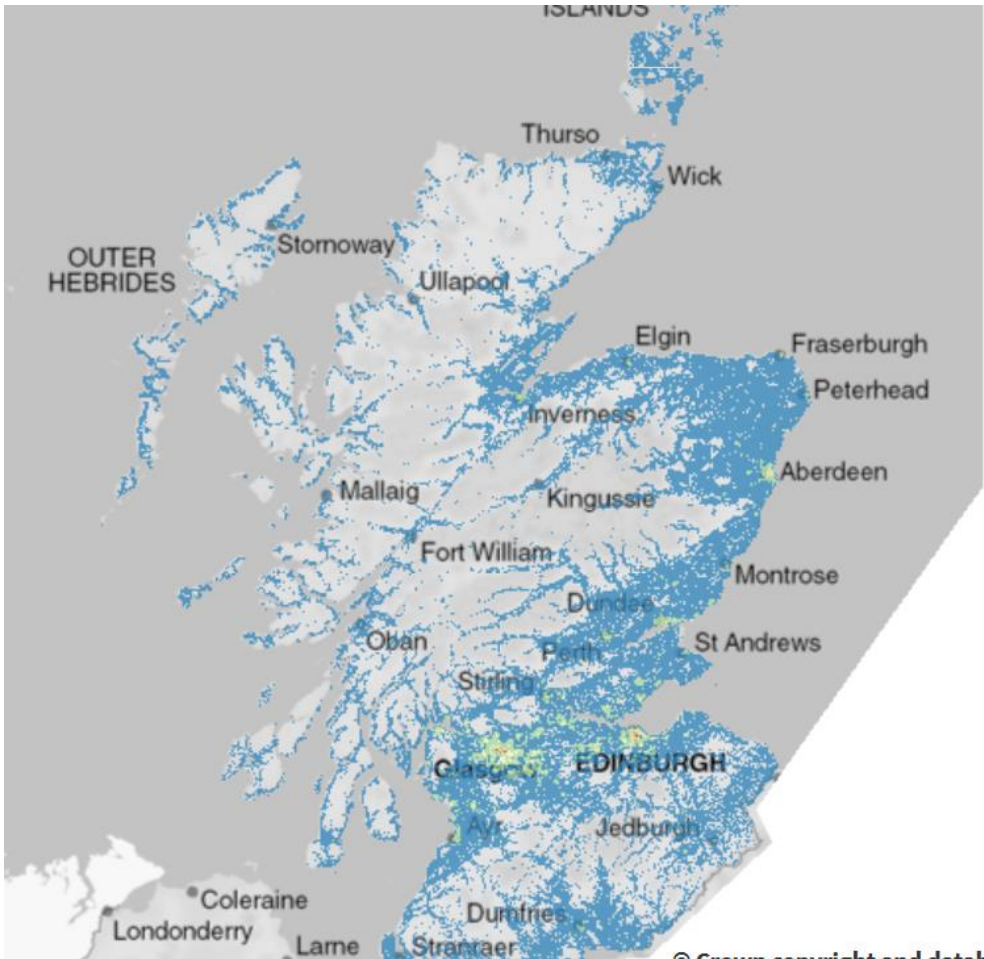
Insufficient support for industry standards



Outline

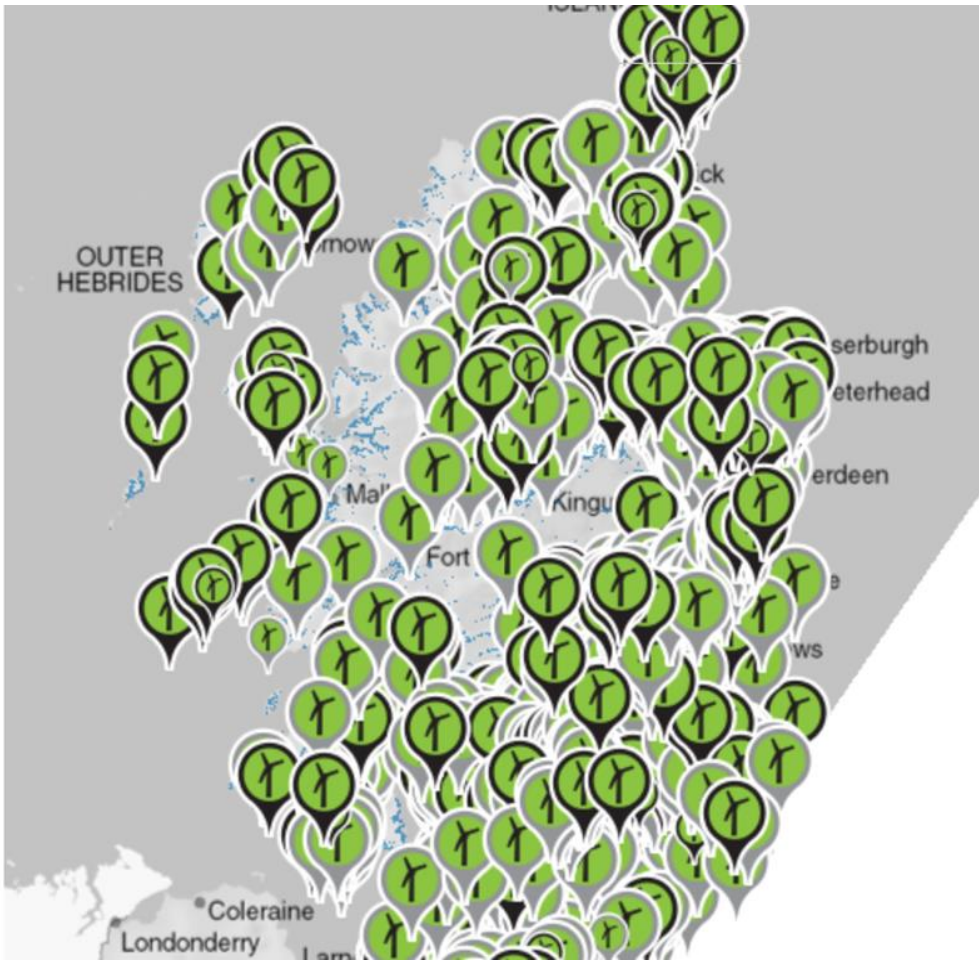
- ▶ Scottish context
- ▶ Design methods
- ▶ Two case studies
- ▶ Scotland design trends

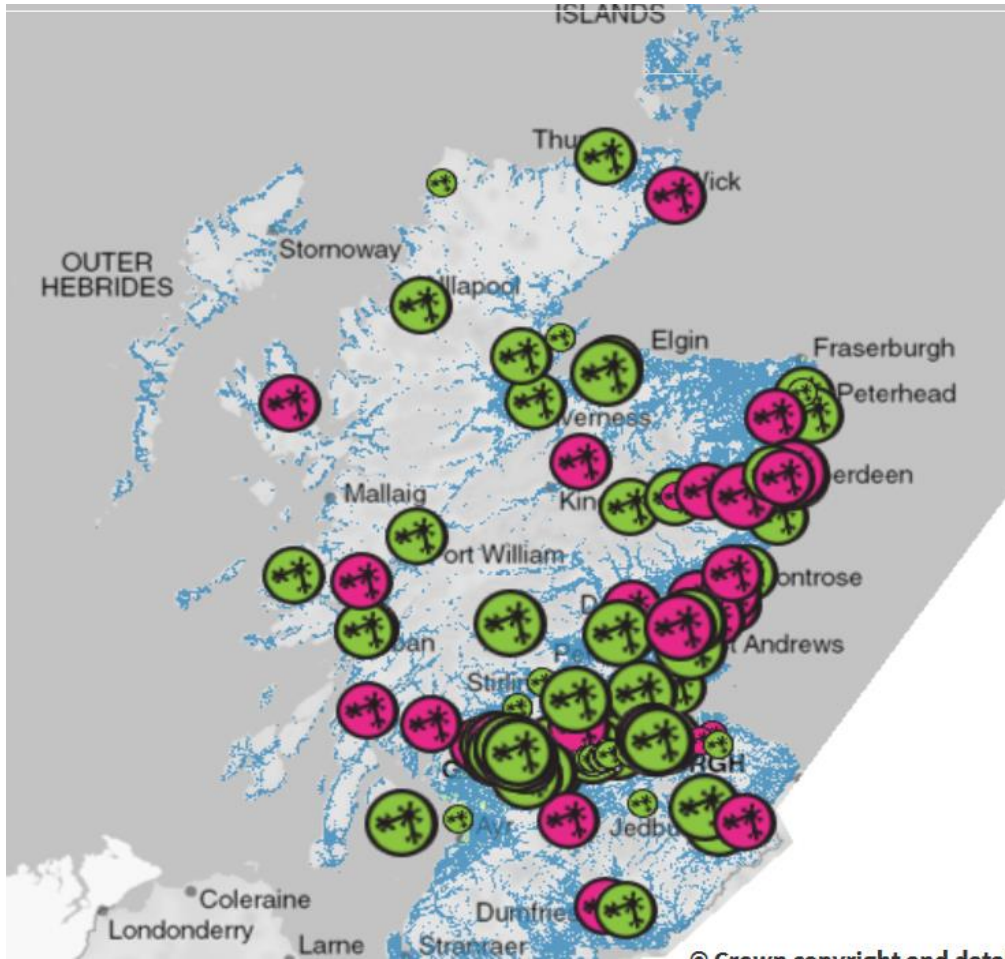




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Scotland and District Heating

Policy:

- SEEP, RHI, District Heat Loan Fund, CARES, etc.

Uptake

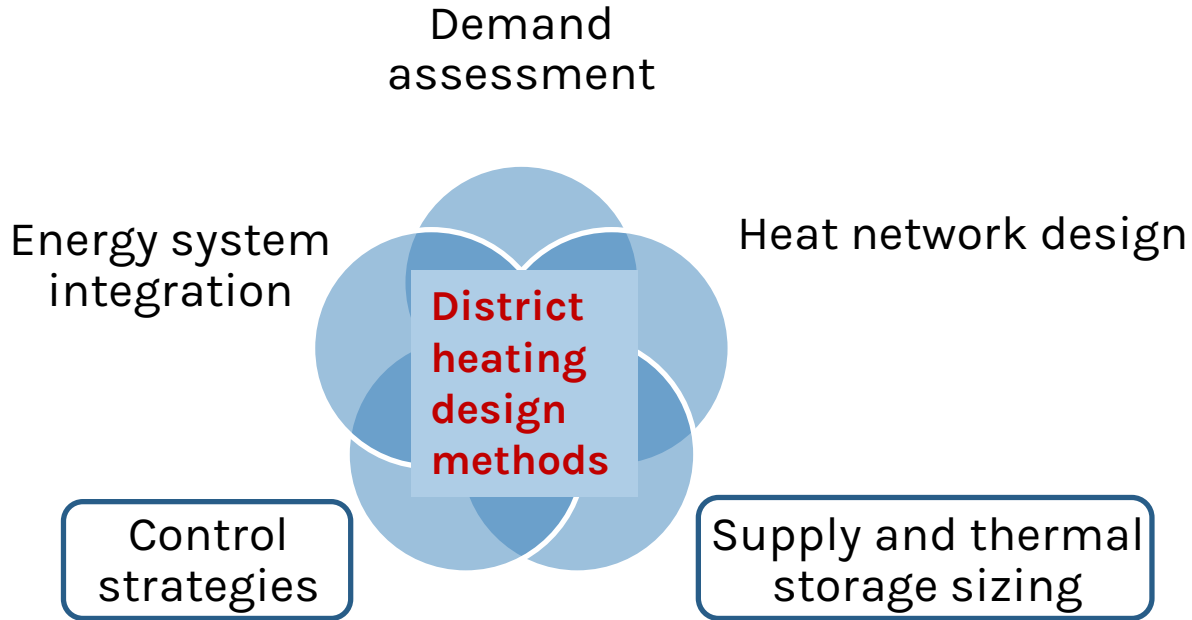
- Homes connected to district heating: 10,000 out of 2.4 million

Standards:

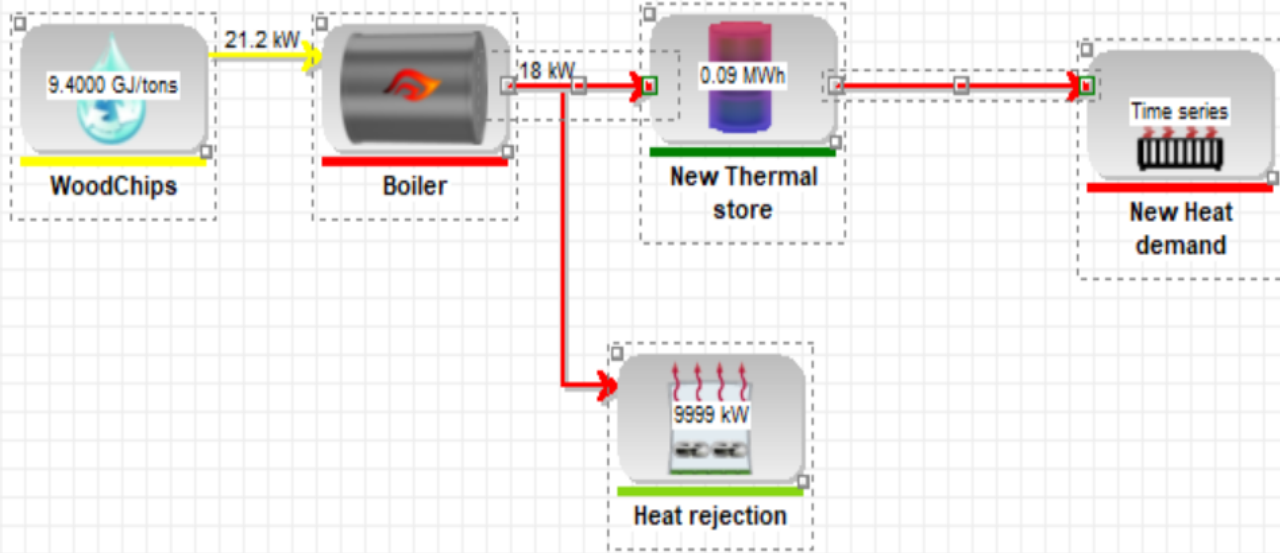
- CIBSE Heat Networks code of practice – design methods?



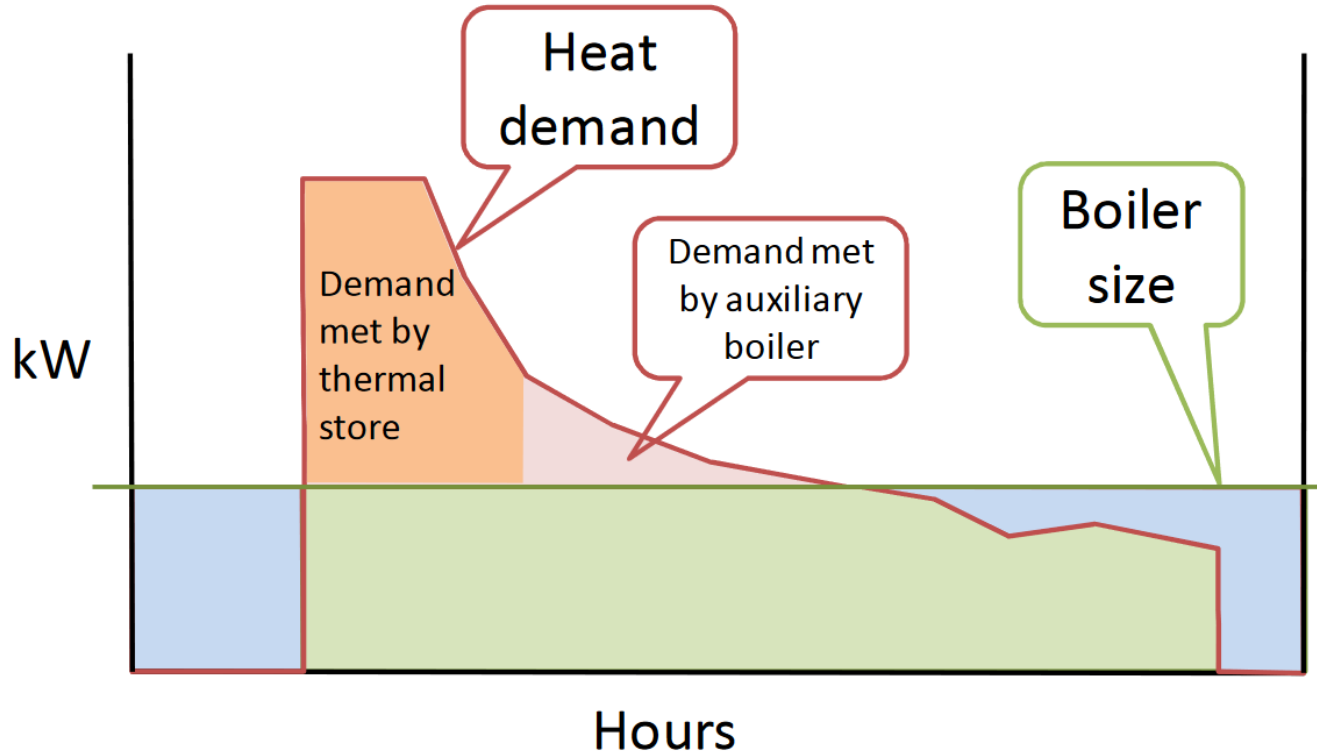
Design methods



Supply and thermal store sizing - EnergyPRO



Supply and thermal store sizing - Biomass sizing tool



Findhorn ecovillage

750kW Wind Turbines

25kW PV farm

Electric cars

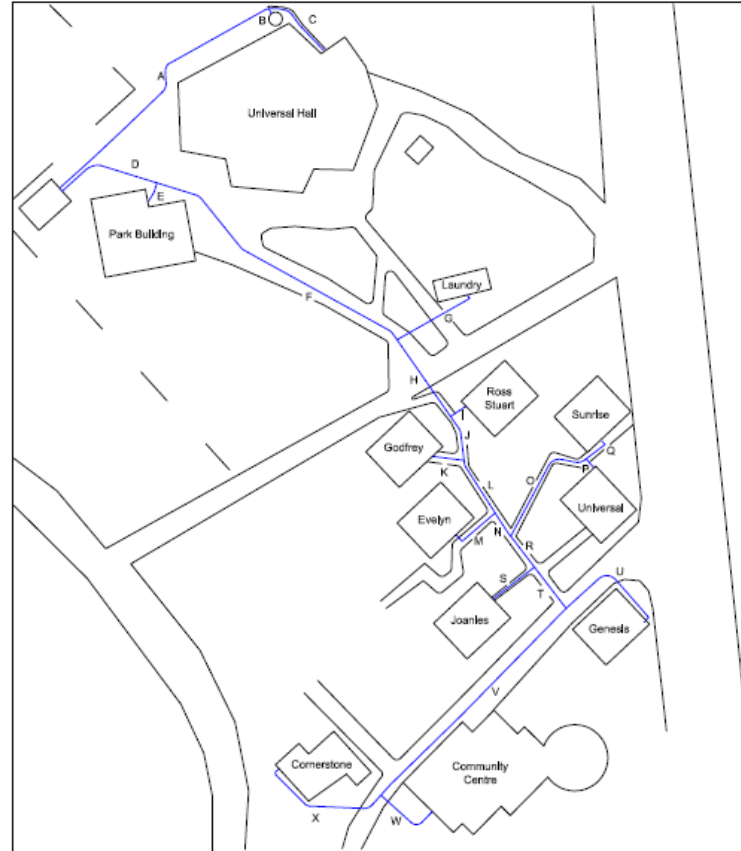
Energy efficient homes

ASHP + Solar thermal

2x Biomass DH schemes



199kW Biomass district heating scheme: 10 community buildings

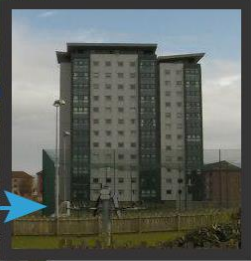
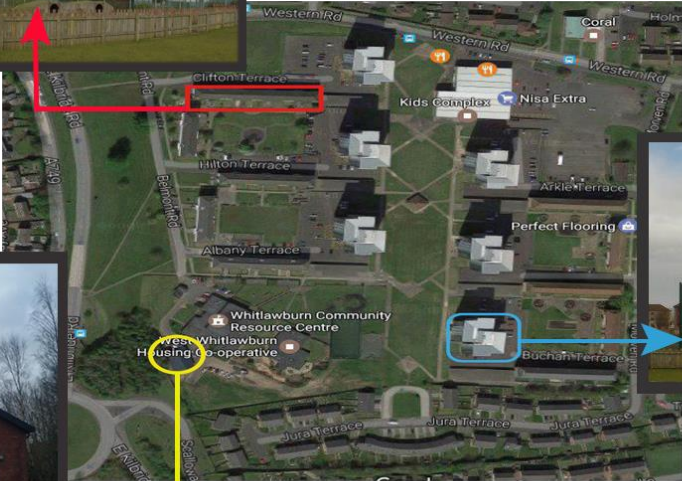


No thermal storage and extend district heating

- ▶ Currently 10 community buildings and no thermal storage
- ▶ Boiler can meet **90%** of the needs of the entire village (circa 100 buildings) with a **2,400L thermal store**
- ▶ Need build thermal store and to extend district heating network



West Whitlawburn Housing Co-operative



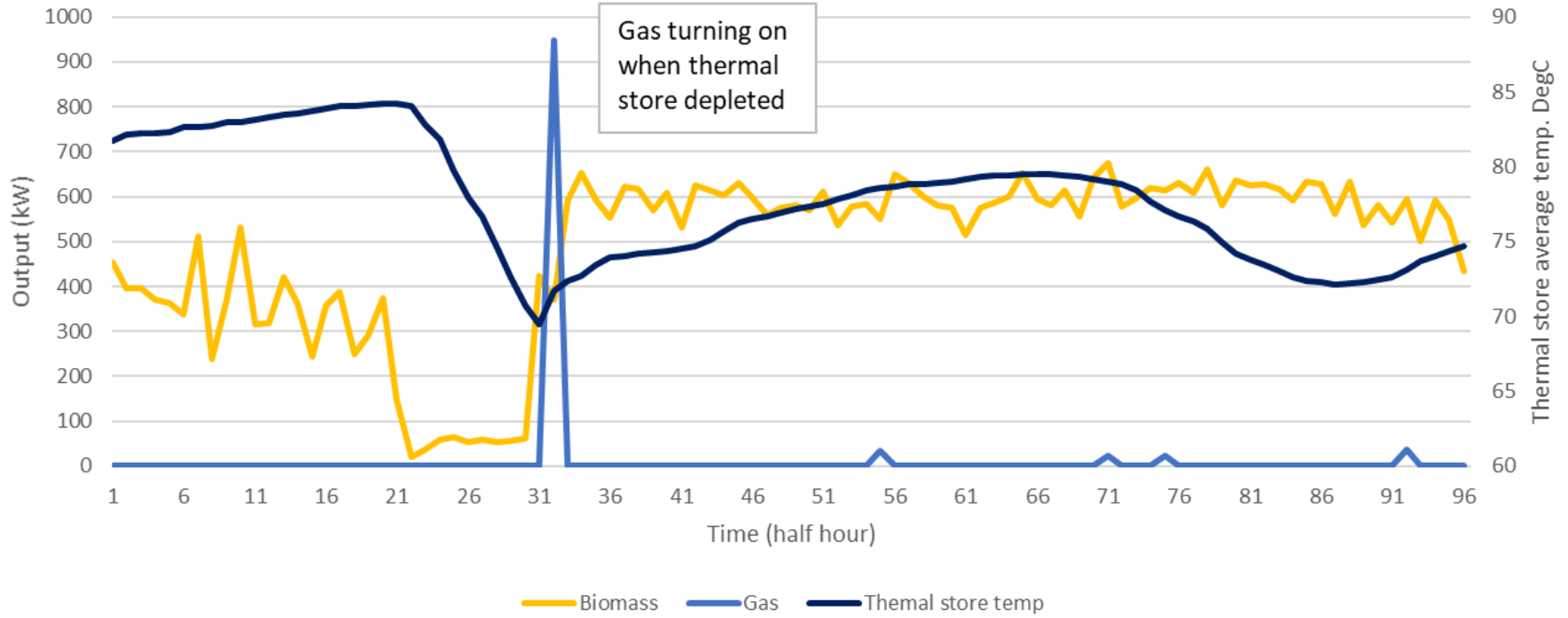
Current system

- ▶ Peak demand 1.2MW
- ▶ 720kW Biomass Boiler
- ▶ 50,000L thermal store
- ▶ 3x 1.3MW Gas boilers = 4MW = (extend DH?)
- ▶ Biomass currently meets around 77% of demand, this should be closer to 95%





Biomass output, Gas output, and Thermal Storage Avg. Temperature



Design trends in Scotland

- ▶ Surveyed 20 community biomass schemes
- ▶ Used biomass sizing tool to approximate design boiler and thermal store sizing
- ▶ Found oversized boilers, and undersized thermal stores



Design problems in Scotland

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Unleash potential of existing biomass systems



New tool to support heat pumps

- ▶ Biomass is not the only solution for heating
- ▶ Heat pumps + thermal stores with surplus wind
- ▶ Planning/concept level tool to increase awareness at feasibility stage
- ▶ Advanced controls required



Conclusion

- ▶ Design methods exist which need to be used to support industry standards
- ▶ Two case studies and design trends survey show design problems in Scotland
- ▶ New tool can help support use of heat pumps and thermal storage to utilise surplus wind in communities

