CASE STUDY:

Stage 4 Design Review

Reduced Domestic Hot Water Delivery Times

Network flow temperatures reduced by approximately 10%

Pump flow rate reduced by 53%

OVERVIEW

The client is a leading private developer in the UK. The development has several separate blocks and was the first of 12 sites to be regenerated as part of a joint venture between a local council and the private developer.

CHALLENGE

The private developer wanted to ensure the existing design was optimal for the project. Furthermore, the ADE CIBSE Heat Networks Code of Practice (CP1 2020) had just been released, the client intended to understand the true implications of the changes in approach and how best to integrate them.

FairHeat was engaged to perform a review of the consultant's design and identify potential modifications to the design, focusing on:

1

Identifying opportunities to reduce capital costs and operational risk.

2

Having a neutral or positive impact on performance (e.g., reduce heat network losses).

3

Complying with good practice with regards to current industry standards, particularly with regards to the minimum requirements set out within existing and future ADE CIBSE Heat Networks Code of Practice and other industry guidelines.

FAIRHEAT SOLUTION

FairHeat carried out a stage 4 design review and was able to identify the following key issues:

1

Boiler, pipe sizes and pump sizes were all extremely oversized due to:

- Oversizing of peak loads due to oversizing of Domestic Hot Water and space heating demands (not in compliance with CP1 2015)
- Inappropriate pipe sizing criteria (no life cycle assessment had been undertaken to size pipes – not in compliance with CP1 2015)
- Inappropriate levels of redundancy allowed within equipment sizing

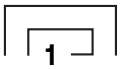
2

Network flow temperature could be reduced.

FairHeat took the following actions to rectify the issues:

- Reduced boiler sizing significantly, N+3 redundancy reduced to N+1.
- Reduced peak load flow rate.
- PICV minimum flow rate bypass removed at top of riser.
- Network pipe sizes were reduced by 1-3 pipe sizes, due to more appropriate Domestic Hot Water and space heating demands.
- Identified hot water delivery times were to exceed 45 seconds, presenting a risk to resident comfort, therefore recommended using manifold approach and smaller pipe sizes to reduce Domestic Hot Water delivery times.
- Identified a reduction in operating temperatures could be utilized.

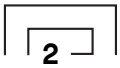
RESULTS



Reduced Boiler Sizing

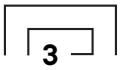
Peak load reduced by 64% and total boiler capacity reducing by 61%. For the client, this will result in the significant reduction of:

- System CAPEX
- Size and cost of gas connections, flue and ventilation
- Spatial footprint within plant room
- ongoing cost associated with gas connection standing charge
- maintenance operating costs.



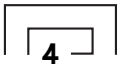
Reduced Peak Load Flow Rate

Due to the reduced peak load flow rate, pump flow rate was reduced by 53%, which reduces CAPEX and OPEX due to smaller more efficient pumps.



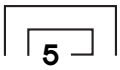
Removed PICV Minimum Flow Rate Bypass

Inclusion of bypass would have elevated network return temperatures, reduced system efficiency and increased risk of overheating. A combined side stream filtration unit and dosing pot to be placed across network pumps to provide minimum flow rate protection instead.



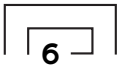
Reduced Network Pipe Sizes

This significantly reduced heat losses and helped mitigate the risk of overheating.



Reduced Domestic Hot Water Delivery Times

FairHeat identified hot water delivery times were to exceed 45 seconds, presenting a risk to resident comfort. FairHeat recommended using manifold approach and smaller pipe sizes to reduce Domestic Hot Water delivery times.



Reduced Network Flow Temperatures

Network flow temperatures were reduced from 65 to 60, which reduced the network heat losses and improved system efficiency.