THE WEAKEST LINK

Being able to see what you are looking at is becoming ever more relevant for heat networks, not least with the recent update to the Heat Networks Metering & Billing regulations which should encourage more retro fitting of heat meters in existing networks.

Metering individual dwelling consumptions is crucial for monitoring of overall energy usage and to encourage residents to be mindful of their consumptions. What is often still missing though is the real time visibility and the logging of instantaneous loads. To improve heat network performance two of the most important things are to be able to see what the HIUs are doing right now, and what the instantaneous peak load looked like (to prevent future networks from being over-sized).

This was highlighted to us during a recent review of an old project, where a combined return temperature from the heat network at the bulk meter was surprisingly high, especially as it's known that return temperatures from individual HIUs are significantly lower. This can indeed be a result of factors external to the HIU's, such as bypasses in the system, low loss headers or poor pump modulation, however having the capability of being able to gather a large number of data points from all individual HIUs Evinox decided to investigate this further.

The findings were rather astonishing. It was apparent that the total volume returned from the 797 HIUs was 18,811 litres per hour, and that the volume weighted aggregate return temperature from all units was at 43.6°C. What was evident from the data, shown in Table 1, was that whilst almost all the units were performing perfectly and as expected, the total return temperature was considerably affected by only four of HIUs misbehaving.

Had these four units not been causing issues, the volume weighted aggregate return temperature would have been 35.2°C, 8.4°C lower:

Due to Evinox's ability to measure, log and analyse the data captured in real time, these four units were fixed, leading to a substantial improvement, as demonstrated in Table 2. Being able to see the performance of each and every unit in that exact moment, rather than a collation of consumption readings, enabled the quick identification and rectification of the problem. Without this real time information, Evinox would have had to send engineers to site, wasting valuable time and resource, to essentially find a needle in a haystack. In this instance, engineers knew to fix specific issues with specific units, which in this case all were related to actuator heads having been removed from the PICV's.

This highlights the undeniable importance of connectivity to all consumer points on the heat network.

Higher mean operating temperatures will increase the heat loss from the pipe network, this in combination with low efficiency boilers can increase to the cost of energy to the resident. An example from another project, shows gas being purchased for the main plantroom at 4p / kWh, and having to be sold to the resident at 10p/kWh due to inefficiencies. The plant room lost 20% of the energy it consumed, whilst the pipework losses contributed to a further 53% of heat losses, working out at a total energy loss of 62%.

A well-functioning heat network is expected to have a boiler efficiency of 95% and pipework heat losses up to a maximum of 15%, and under this ideal scenario

Purchased energy (gas)	2846895	kWh
Plant room bulk meter reading	2291331	kWh
Energy delivered to end consumer	1086395	kWh
Gas purchase cost per kWh	£ 0.04	
Energy sell price per kWh	£ 0.10	

the selling price would have been half of that in the example above, i.e. 5p/kWh.

The updated Heat Network Metering & Billing guide will support the industry's mission to reduce energy consumptions and carbon emissions, whilst also reducing residents' costs. However, whilst collection of consumption is a great start, there is still a long way to go if meters are not remotely accessible and logging instantaneous data.

The added benefit of having connected HIUs, is the ability to carry out continuous commissioning remotely, where hot water, heating and keep warm settings can be fine-tuned during the handover period and beyond, tying in conveniently with Soft Landings.

As manufacturers and suppliers of Heat Interface Units (HIU's), Evinox Energy specialises in Communal and District Heating solutions, covering projects for both private and social housing schemes, and providing bespoke HIU's, metering and billing and service and maintenance.

For further information, please contact Evinox Energy on **01372 722277**, email them on **sales@evinox.co.uk**, or visit their website **https://www.evinoxenergy.co.uk/**

Table 1

Residential Units		Residential Units in Demand Mode				Units that are By-Passing	Units Not in Demand
		Overall	Hot Water	Heating	Keep Warm Mode		
VWAFT (°C)	66.0	65.2	64.5	66.2	60.9	68.4	
VWART (°C)	43.6	35.2	25.9	37.8	38.2	67.3	
Delta T (°C)	22.4	30.0	38.6	28.4	22.7	1.1	
Flow Rate (lph)	18,811	13,899	3,074	9,134	1,691	4,912	
Number of Units	797	182	10	156	16	4	611

Table 2

Residential Units		Residential Units in Demand Mode				Units that are By-Passing	Units Not in Demand
		Overall	Hot Water	Heating	Keep Warm Mode		
VWAFT (°C)	65.2	65.2	64.5	66.2	60.9	0.0	
VWART (°C)	35.2	35.2	25.9	37.8	38.2	0.0	
Delta T (°C)	30.0	30.0	38.6	28.4	22.7	0.0	
Flow Rate (lph)	13,899	13,899	3,074	9,134	1,691	0	
Number of Units	797	182	10	156	16	0	611