

## Case Study

The National Orthopaedic Hospital Cappagh saves time, money and valuable resources by sub-metering and monitoring of water systems

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### Background

The National Orthopaedic Hospital Cappagh is situated in Finglas, Dublin and is the largest public orthopaedic hospital in Ireland. Originally established in 1908, its 500+ staff now treat over 24,000 patients each year. As with many hospitals in Ireland that have evolved over time, much of the original water infrastructure is still in place with new additions added on over the years. Consequently, the water distribution network requires continual monitoring and maintenance.

As part of work supported by the HSE's Sustainable Infrastructure Office and driven by the onsite green team, a site survey was carried out to develop a water sub-metering plan for the site.

This identified a number of locations where existing meters were already in place (e.g. mains meter, main storage tank, boiler house) as well as other strategically accessible locations where new sub-meters were required.



As there is a significant on-site requirement for hot water and steam for the sterilisation of equipment it was decided to also include sub-meters on gas supply to the main calorifiers.

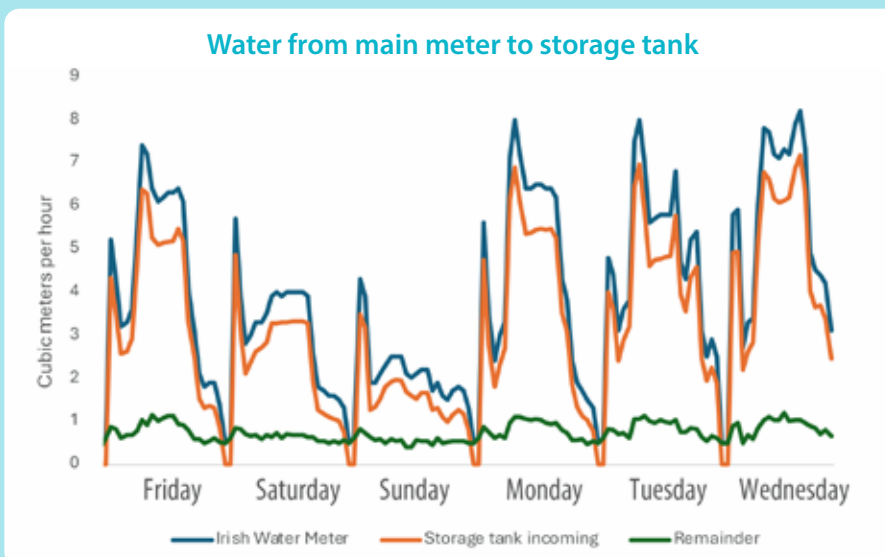
### What was done

Based on the site survey report, a tendering process was carried out for the installation of new sub-meters and a remote access online monitoring system. The sub-meters were sized accordingly and linked to the battery operated online monitoring system.

Once all water sub-meters and gas meters were linked up, the system was commissioned and an initial period of data analysis was carried out. As hospitals are fairly consistent in their use of water, this initial analysis period is important as it allows an understanding of the typical daily and weekly use profiles to be developed.

### Based on this, a number of initial findings were made:

- Difference in water use between the mains meter and the main storage tank – based on comparing the 2 meters, it appears that  $\sim 10\text{m}^3$  per day is being lost. If this is related to a leak it would equate to  $\sim 4,000\text{m}^3$  a year costing  $\sim \text{€}11,000$ . This is now being investigated.



**THERE IS A LONG DISTANCE BETWEEN THE MAINS METER AT THE FRONT GATE AND THE MAIN STORAGE TANK SO THIS IS NOW BEING INVESTIGATED FURTHER.**

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### High baseline gas use in main plant room

The basement plant room provides domestic hot water to a large portion of the hospital and space heating for a number of areas. The baseline gas use accounts for ~ 83% of the total gas use in this zone, while the increased gas use during peak times accounts for only 17%.

This suggests that a significant proportion of gas is used to maintain the temperature of the tanks and hot water ring main and points to high heat loss in the heat distribution system (the pipes). An alternative possibility is a leak in the system. However, as the water and gas consumption profiles are different this is unlikely to be the case.

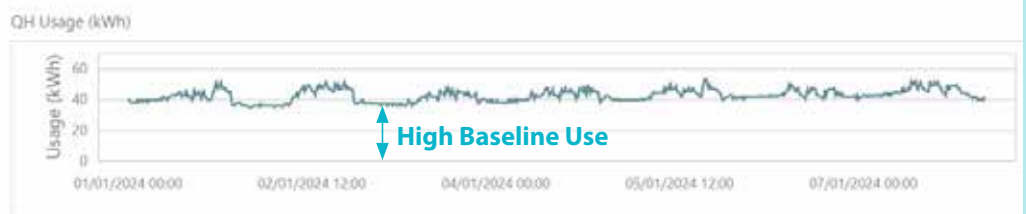


INSTANT HOT WATER HEATERS COULD REDUCE OVERALL ENERGY USE

### The benefits of gas and water metering

The combination of a natural gas meter and water meter for these boilers has provided an extra level of information that will ensure the efficiency of this plant room, and the hot water distribution system, can be maximised.

As a consequence, the project team are now exploring the feasibility of installing instant hot water heaters at strategic points of use and possibly decommissioning this boiler house completely. Initial projections estimate an 80% reduction in overall energy use could be achieved through this approach.



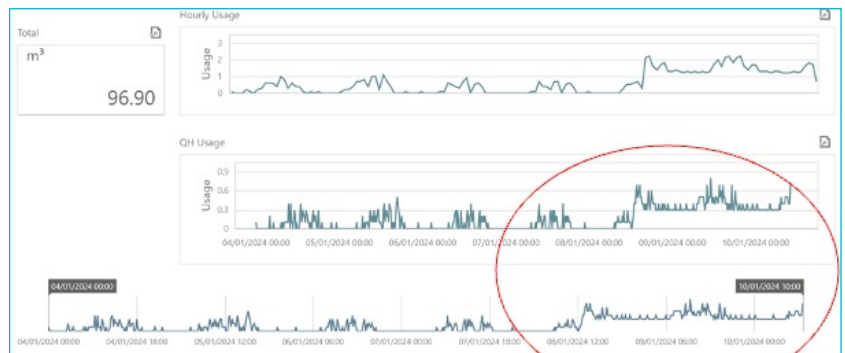
### Other benefits since metering installation

More recently, the system has been used to identify new issues that arose including:

#### Automatic legionella flushing

it was noted during January 2024 that natural gas use in the Basement Plant Room went from a normal daily pattern, to a “constant on” pattern. As this gas increase was accompanied by a similar increase in water consumption (see profile) it was assumed that there was either a new leak in the hot water system, or there is a hot water tap left constantly on. This change

resulted in a 26% daily increase in gas use and, if left to continue, would have cost €625 per week. Upon investigation it was found that one of the automatic legionella flushing valves got “stuck” and was continually flushing.



### Key take aways



**Strategic sub-metering is an essential tool** for maintenance departments to have in place. It will save time, money and of course valuable finite resources.



**Linking gas and water use up on the same system is advisable** as, due to the carbon impact associated with hot water, close monitoring of hot water provision can contribute to the HSE's decarbonisation and water reduction targets.