

Water Use in Irish Hospitals

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The cost of water

- HSE is one of the largest water users in the state spending over €8m per annum on water supply and waste water treatment
- Varies throughout the country
 - Wicklow €3.04
 - Kildare €1.49
 - Average ~ €2.50
- Cost compared with other countries
 - Germany €5.34
 - Denmark €6.19
 - France €3.60
 - Belgium €4.03
 - UK €6.72
- Where are the costs of water going?
 - UP!
- This is important as water has traditionally been the poor relation
- Potential water projects must be costed – cost benefits will improve



Origin of this work

- Little information in Ireland regarding sectoral water use benchmarks
- Benchmarks are an essential starting point when it comes to improving water efficiency within a sector
- No Irish benchmarks for water use in the healthcare sector
- Historic UK values were used, but few, if any, Irish hospitals were actually benchmarking their water use and comparing with these UK values

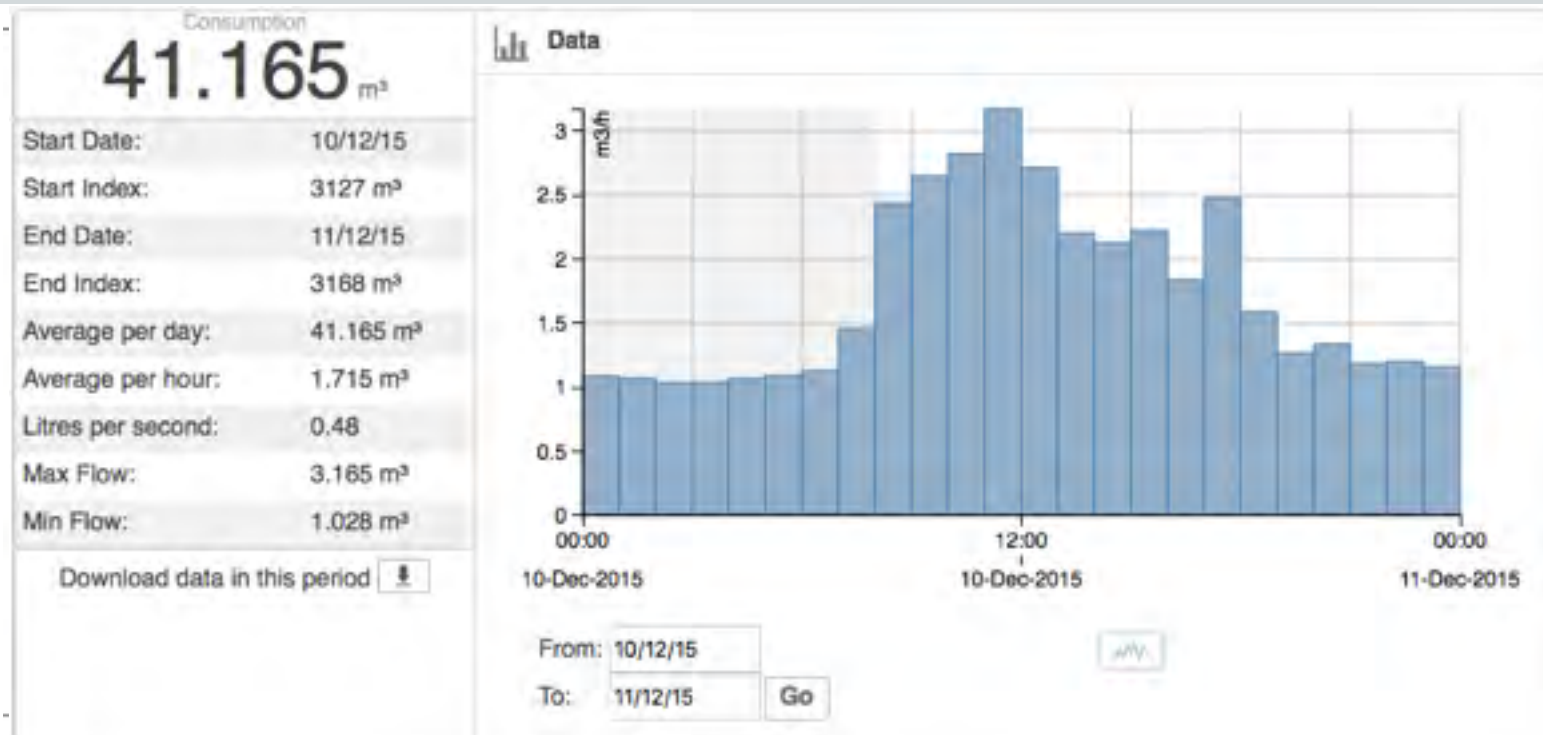
Trial in Cork County

- Preliminary water benchmarking exercise for hospitals in Cork City and County because:
 - The availability of historic data through the Council's online facility for commercial accounts (www.meterreads.ie)
 - Local contacts available through the National Health Sustainability Office
 - Proximity to the hospitals for follow up on-site visits
 - Local access essential to gain understanding of how different services, site layouts, distribution systems and occupancy levels impact on overall water use

Some Key Findings

- Initially went to each hospital and asked for account numbers
- Some sites had multiple meters – way more than needed (e.g. 11)
- Many sites were manually taking meter readings but not doing anything with the data
- Bills were generally paid without extracting consumption data
- Gather water data directly from local authority and get bed days info from hospital or Estates manager

Some Key Results



[illegible]

- South/ South West Hospital Group
- Ireland East Hospital Group
- Dublin North East Hospital Group
- Dublin Midlands Hospital Group
- Midwest Hospital Group
- West/ North West Hospital Group



GreenHealthcare



www.greenhealthcare.ie

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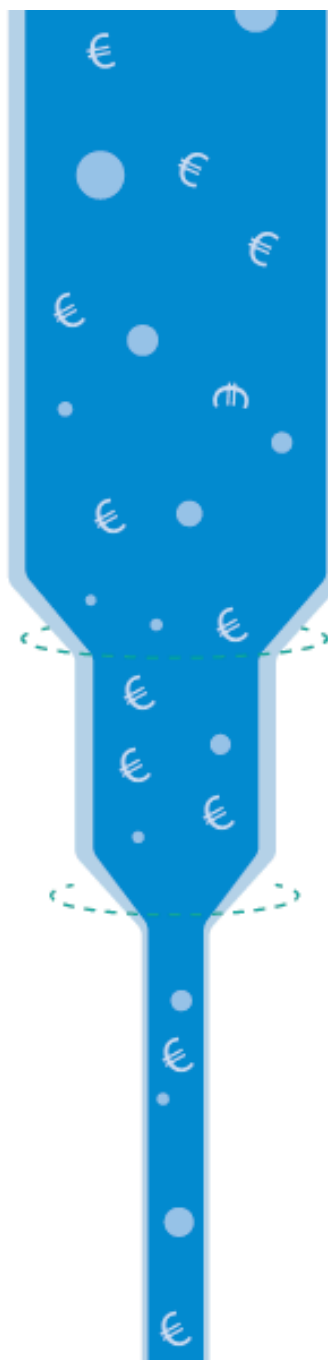
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| | |
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3. WATER THAT SHOULD BE USED

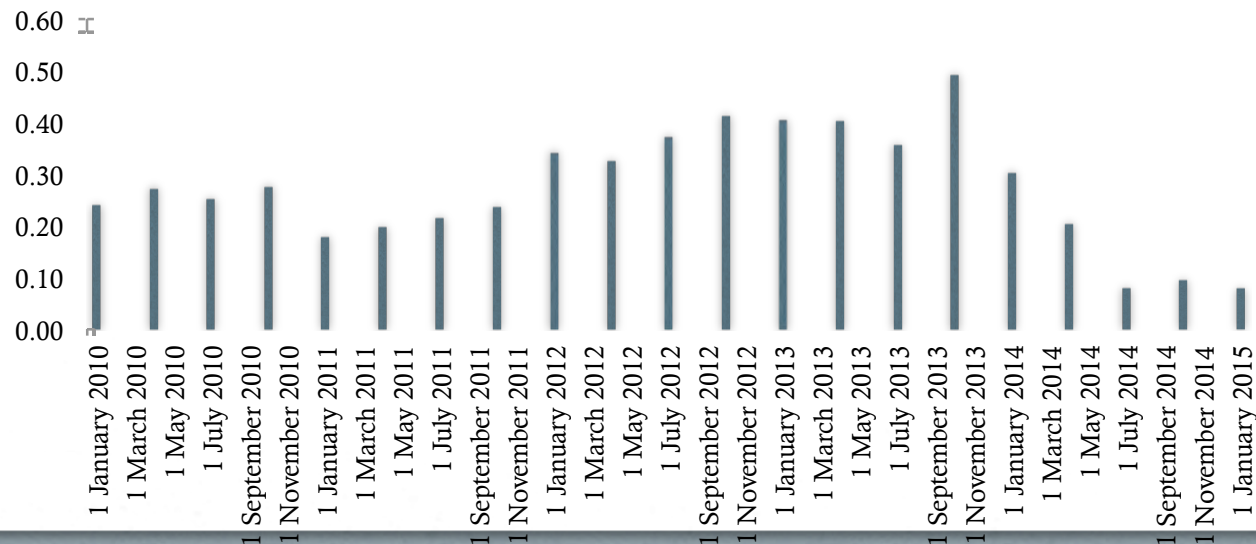
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What is the difference with these data?

| DATE | Time | Low Flow | High Flow | Low Flow | High Flow | Low Flow | High Flow |
|----------|-------|----------|-----------|----------|-----------|----------|-----------|
| 22-8-14 | 14:00 | 2760 | 357882 | 570 | 2 | 1 | 1 |
| 5-9-14 | 9:30 | 792 | 860452 | 252 | 2 | 1 | 1 |
| 14-9-14 | 12:00 | 1,317 | 860160 | 2340 | 5 | 1 | 1 |
| 31-10-14 | 14:00 | 2888 | 862500 | 247 | 1 | 1 | 1 |
| 7-11-14 | 14:00 | 3154 | 8629147 | 1032 | 1 | 1 | 1 |
| 28-11-14 | 14:00 | 3562 | 863779 | 50 | 1 | 1 | 1 |
| 5-12-14 | 14:00 | 4185 | 863529 | 300 | 3 | 1 | 1 |
| 21-12-14 | 12:00 | 5062 | 864129 | 1,617 | 2 | 1 | 1 |
| 16-1-14 | 14:00 | 5703 | 865746 | 2,483 | 3 | 1 | 1 |
| 6-2-14 | 14:00 | 6545 | 868729 | — | 1 | 1 | 1 |
| 13-2-14 | 12:45 | 6823 | 866180 | 1,109 | 4 | 1 | 1 |
| 13-3-14 | 12:30 | 7958 | 867289 | 1,591 | 2 | 1 | 1 |
| 27-3-14 | 15:00 | 8586 | 868880 | 343 | 2 | 1 | 1 |
| 17-4-14 | 14:00 | 91497 | 869123 | 2284 | 4 | 1 | 1 |
| 22-5-14 | 15:00 | 10892 | 871407 | — | — | — | — |

| | Serial No | Read Date | Reading | Method | m3/Day |
|-----|-----------|-------------------|---------|--------|--------|
| 127 | | | | | |
| 128 | 27092716 | 11 October 2007 | 1 | m3 | |
| 129 | 27092716 | 11 March 2008 | 2569 | m3 | 16,896 |
| 130 | 27092716 | 7 May 2008 | 4733 | m3 | 37,965 |
| 131 | 27092716 | 10 September 2008 | 9504 | m3 | 37,866 |
| 132 | 27092716 | 11 November 2008 | 11845 | m3 | 37,758 |
| 133 | 27092716 | 26 January 2009 | 14962 | m3 | 41,013 |
| 134 | 27092716 | 8 June 2009 | 20866 | m3 | 45,293 |
| 135 | 27092716 | 31 July 2009 | 23363 | m3 | 44,840 |
| 136 | 27092716 | 25 August 2009 | 24365 | m3 | 41,28 |
| 137 | 27092716 | 23 September 2009 | 25607 | m3 | 41,793 |
| 138 | 27092716 | 29 October 2009 | 27011 | m3 | 39 |
| 139 | 27092716 | 25 November 2009 | 28097 | m3 | 40,222 |
| 140 | 27092716 | 21 December 2009 | 29182 | m3 | 41,731 |
| 141 | 27092716 | 27 January 2010 | 30616 | m3 | 44,162 |
| 142 | 27092716 | 27 February 2010 | 32439 | m3 | 52,366 |
| 143 | 27092716 | 24 March 2010 | 33384 | m3 | 37,8 |
| 144 | 27092716 | 26 April 2010 | 34908 | m3 | 37,091 |
| 145 | 27092716 | 24 May 2010 | 36164 | m3 | 55,571 |
| 146 | 27092716 | 22 June 2010 | 37760 | m3 | 55,034 |
| 147 | 27092716 | 20 July 2010 | 39251 | m3 | 53,25 |
| 148 | 27092716 | 26 August 2010 | 41232 | m3 | 53,541 |
| 149 | 27092716 | 22 September 2010 | 42675 | m3 | 53,444 |
| 150 | 27092716 | 27 October 2010 | 44170 | m3 | 42,714 |
| 151 | 27092716 | 24 November 2010 | 45233 | m3 | 37,964 |
| 152 | 27092716 | 23 December 2010 | 46827 | m3 | 54,966 |



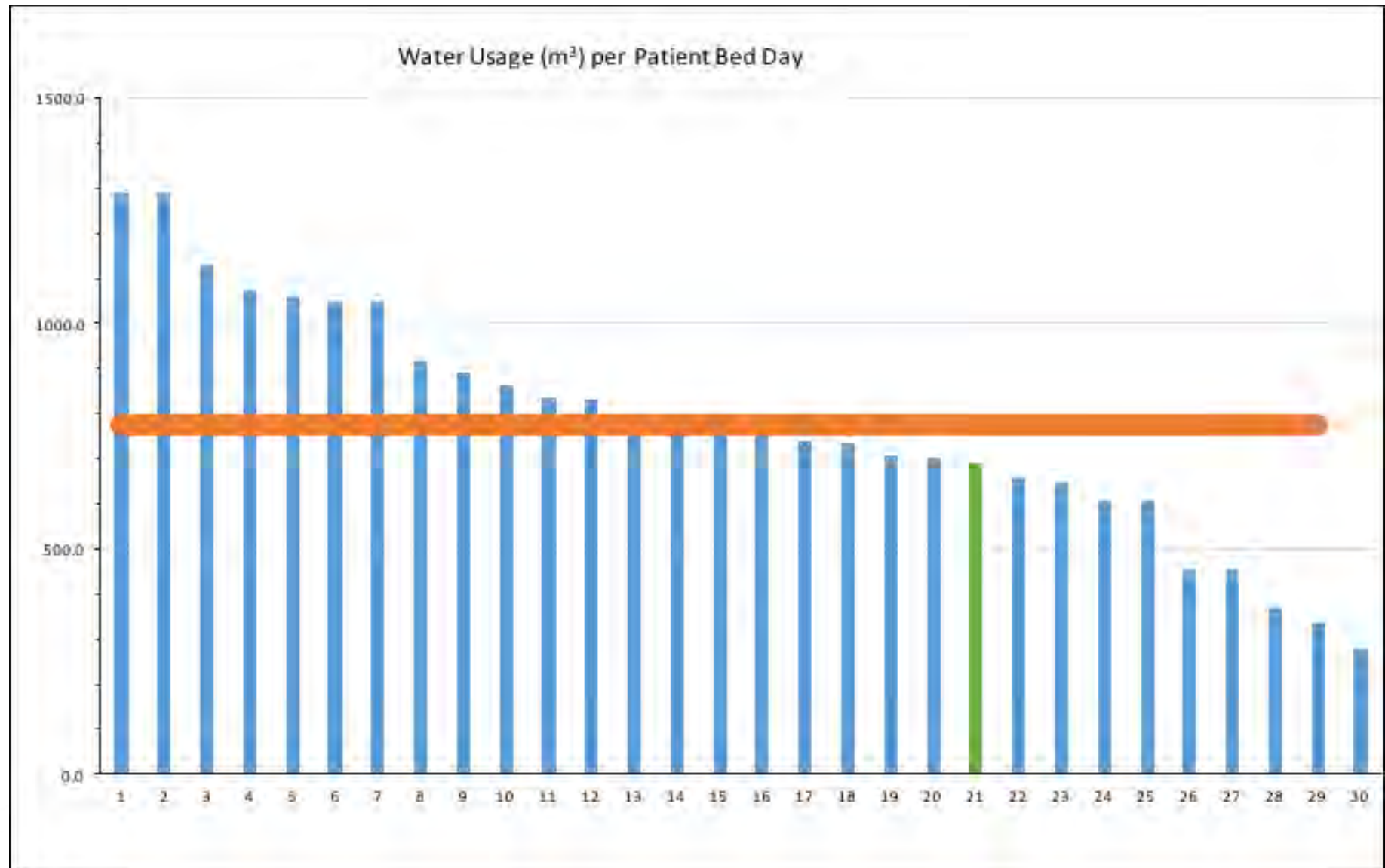


It is important to put the
information you record into an
easy to read, useful format.

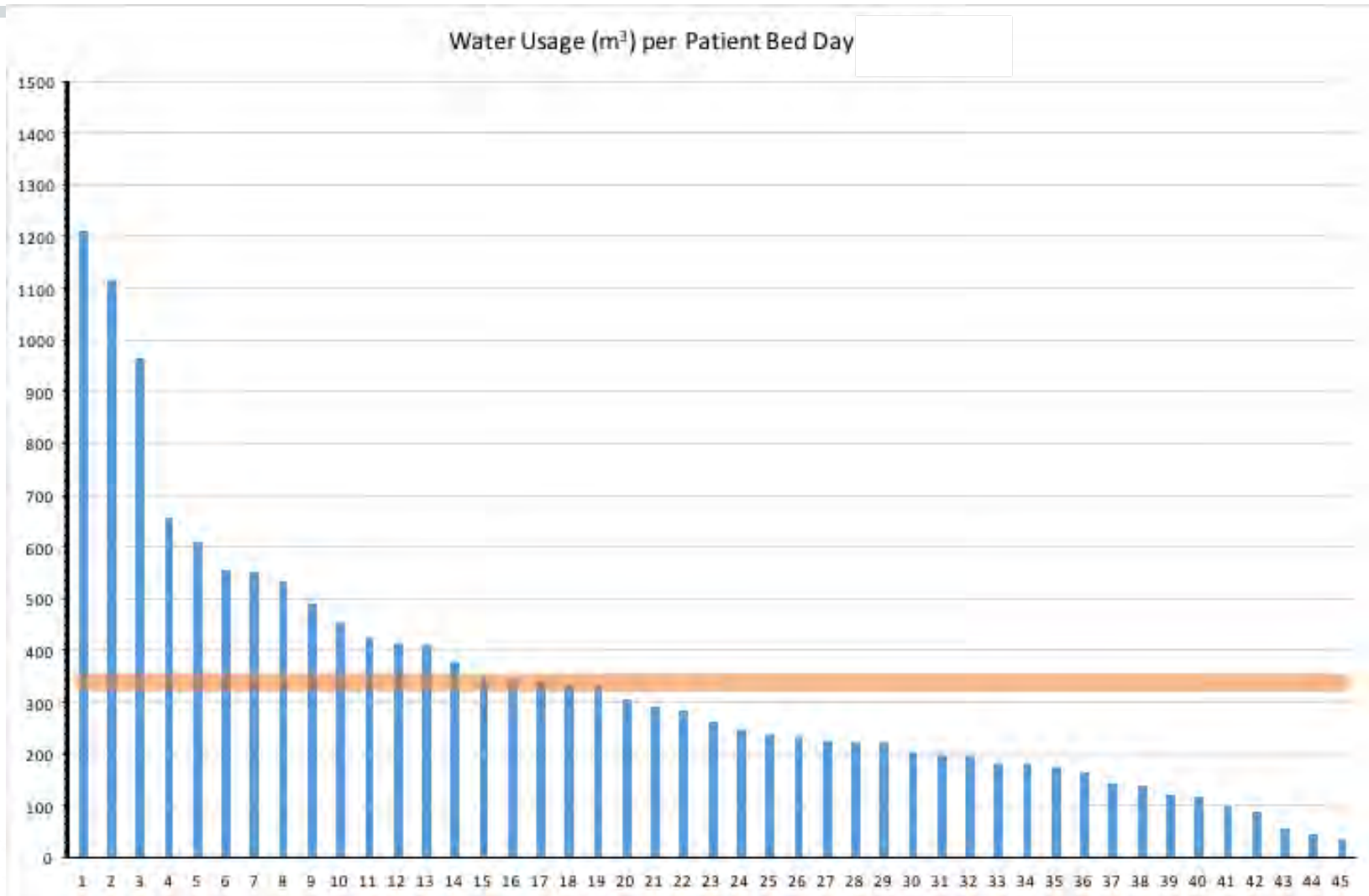
Benchmarks

- Once you are monitoring water use you can benchmark your hospitals water use (litres used per patient bed day)
- This can be used to compare your hospital with others
- While every hospital is different in terms of size, services and on site activity, benchmarking can provide an excellent initial indicator of performance
- Green Healthcare are collating national benchmarks for Acute hospitals and Community hospitals

Acute Hospitals Benchmarks



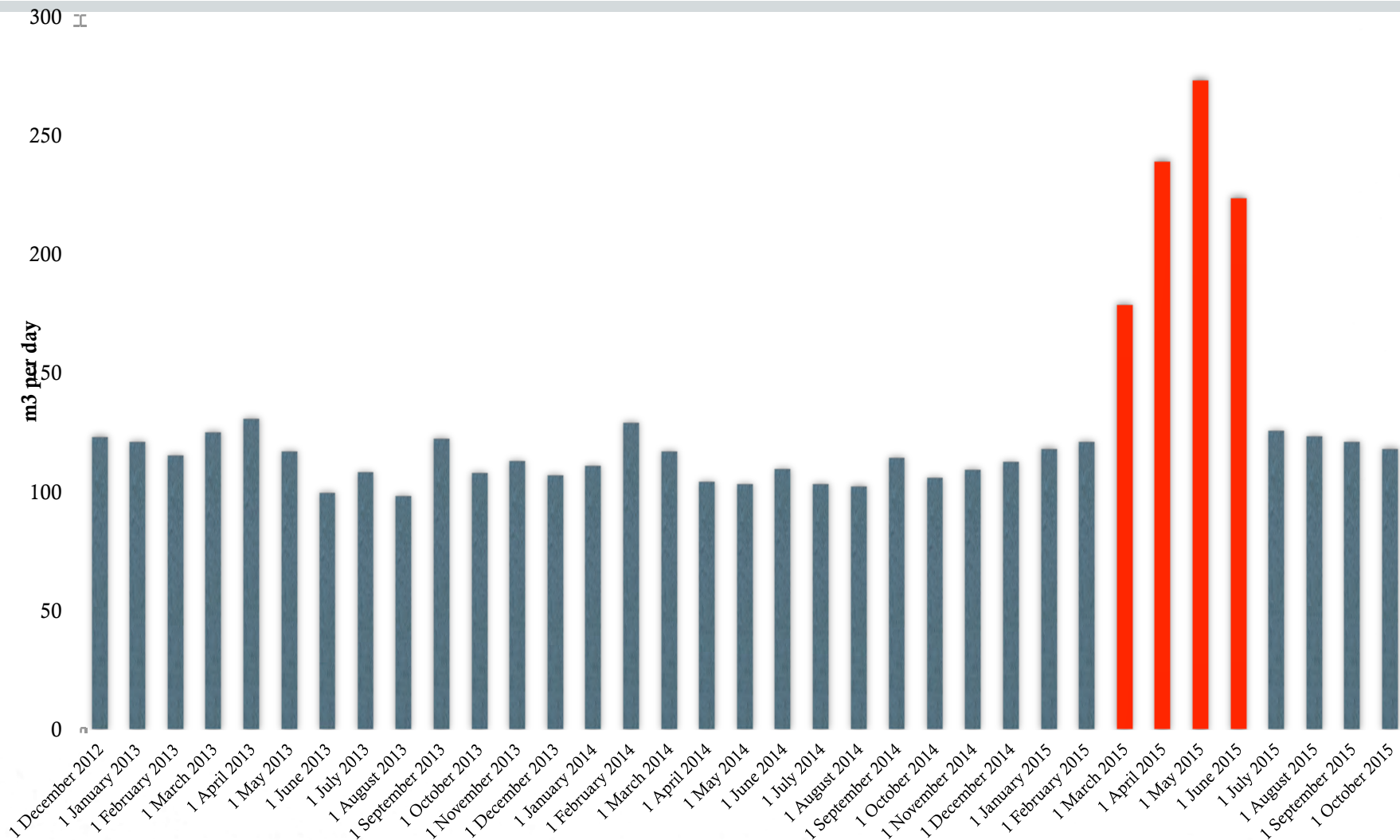
PCCC Hospitals Benchmark



Leak Detection

- Aim is to make sure you are using all the water you pay for
- Unlike solid waste and energy, wasted water is often not visible which makes it more difficult
- Once a leak occurs, it won't get smaller or fix itself
- Leaks are a waste but also impact water quality, pipe distribution systems, boilers, RO and possibly the site infrastructure
- Can cost a lot over time, but also in the short term....

What was the cost of this leak?



Leak Detection



Historical Data



Online Data Logging



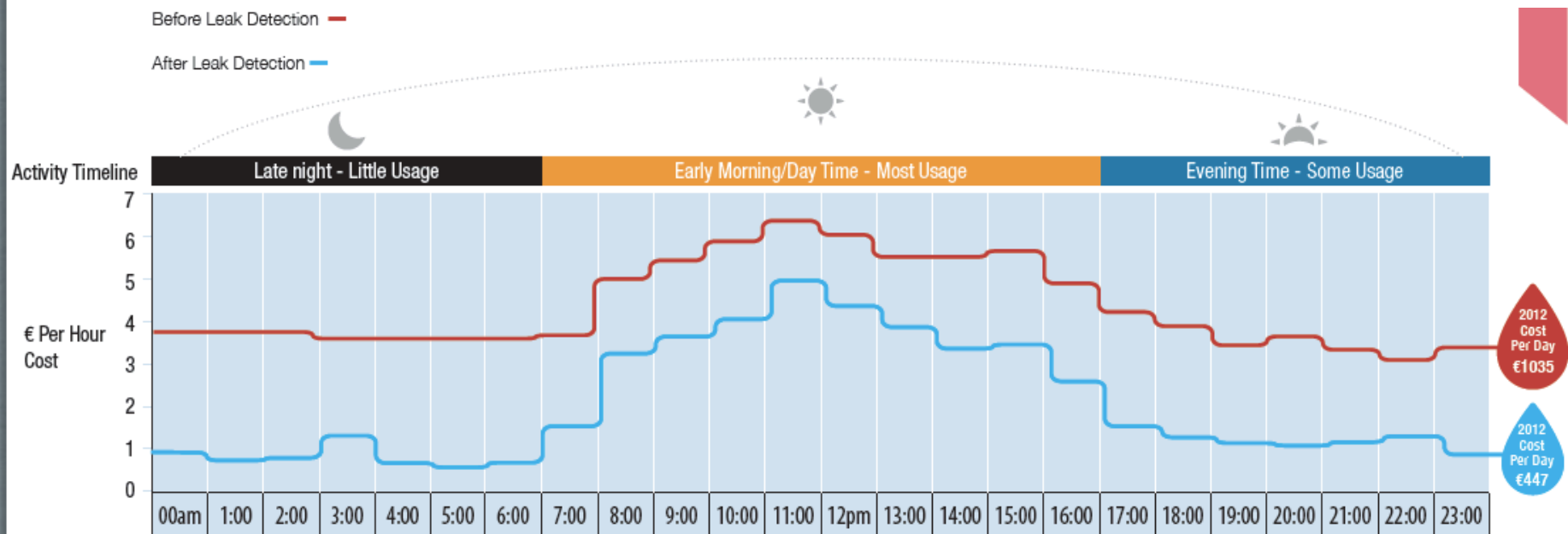
Background water use



Leak detection companies

Leak Detection Case Study

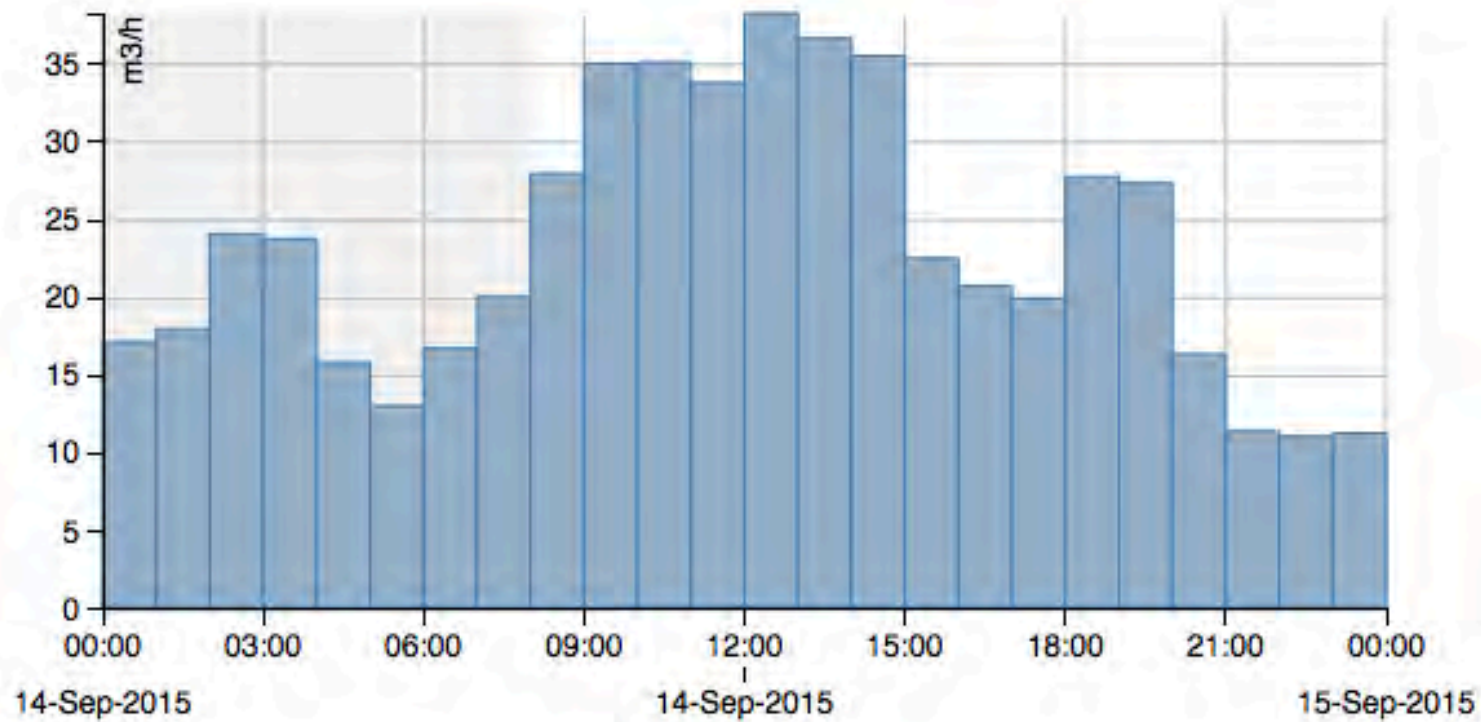
Connolly Hospital saved over €183,000 through leak detection



2. The Water Used

- The Beauty of Monitoring
- Great to have but useless if you don't use it!





From: 14/09/15

To: 15/09/15

Go



Zoom out



Alarms

| Ref | Value |
|-------|---------|
| alarm | 650.000 |

[View Alarms](#)

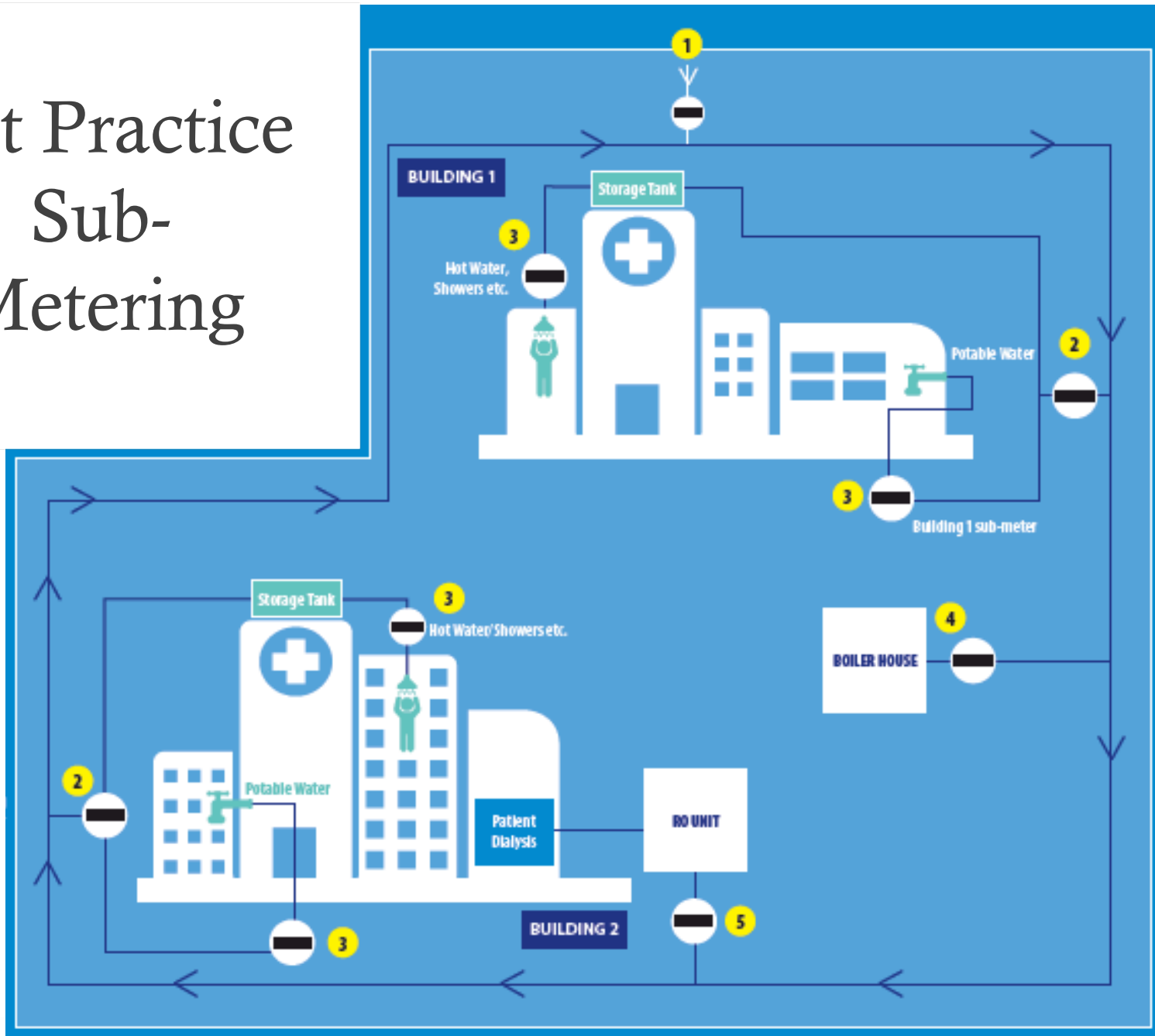
Sub-Metering

- Distribution network in most Irish hospitals is old, complex, and underground.
- Sluice valves commonly used for isolating areas (e.g. in case of emergency leaks) but sub-meters not fitted
- Some hospitals have sub meters but they don't cover whole site and individual areas cannot be monitored
- Strategic sub-metering should be considered in all acute hospitals and any large Community hospital campus
- Ensure these are planned to cover the whole site and main areas of use

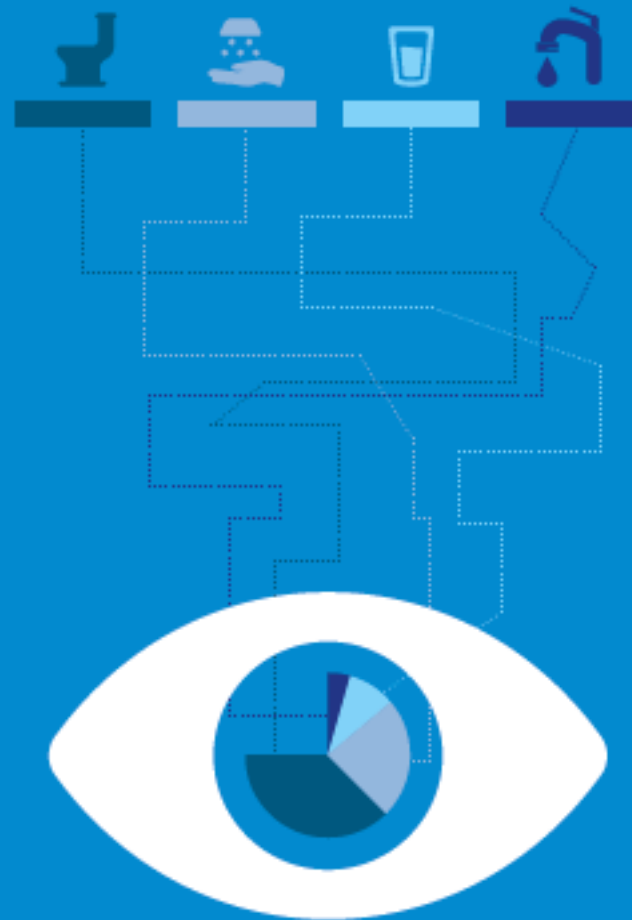
Holy water on a different rate??



Best Practice Sub- Metering



Survey of Fixtures and Fittings



A fixtures and fittings survey will help
Identify cost savings for a hospital.

Recent Hospital Survey

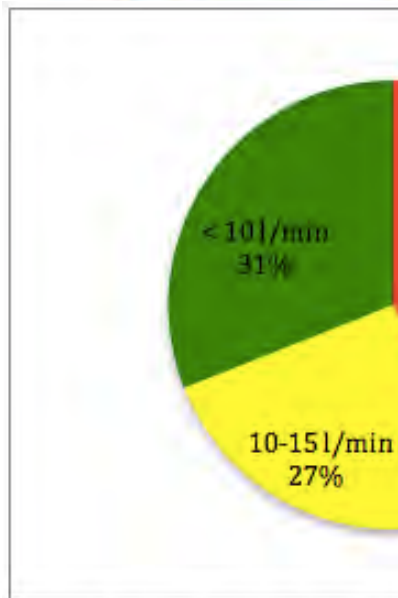


Figure 2: Distribu

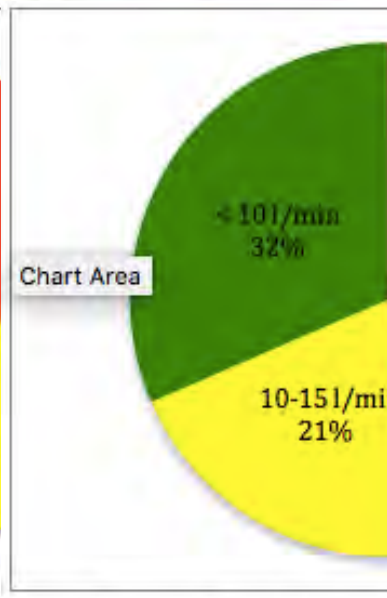


Figure 3: Distribu

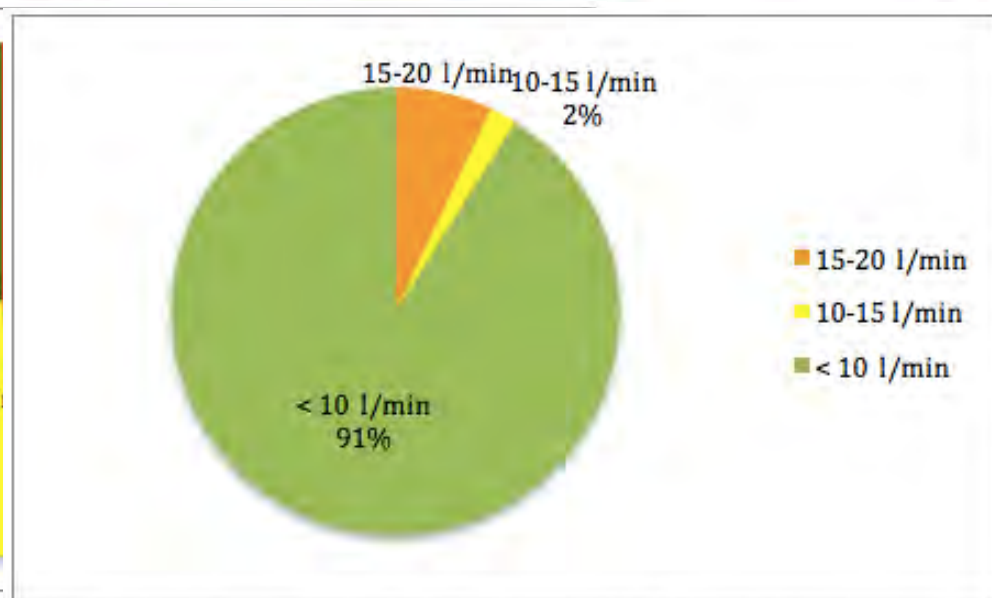


Figure 4: Distribution of flowrates for **MIXER** taps

3. The Water you should Use

- Hospitals present a unique environment in which water is supplied and used
- Important when making changes that infection control are involved and onboard
- Many advances in fixtures and fittings but the cost of retrofitting must be reasonable
- Effective and costed Case Studies very important for this
- But first, what are the best options?

Domestic Type Uses



Other Users



The cost of legionella flushing

The cost benefit

The diagram below shows the cost difference between 2 hot water taps that are flushed once a week, for 3 minutes, as part of a legionella prevention flushing schedule. For more on legionella flushing, refer to the Health Protection Surveillance Centre Guidelines for the Prevention and Control of Infection from Water Systems in Healthcare Facilities (2015).

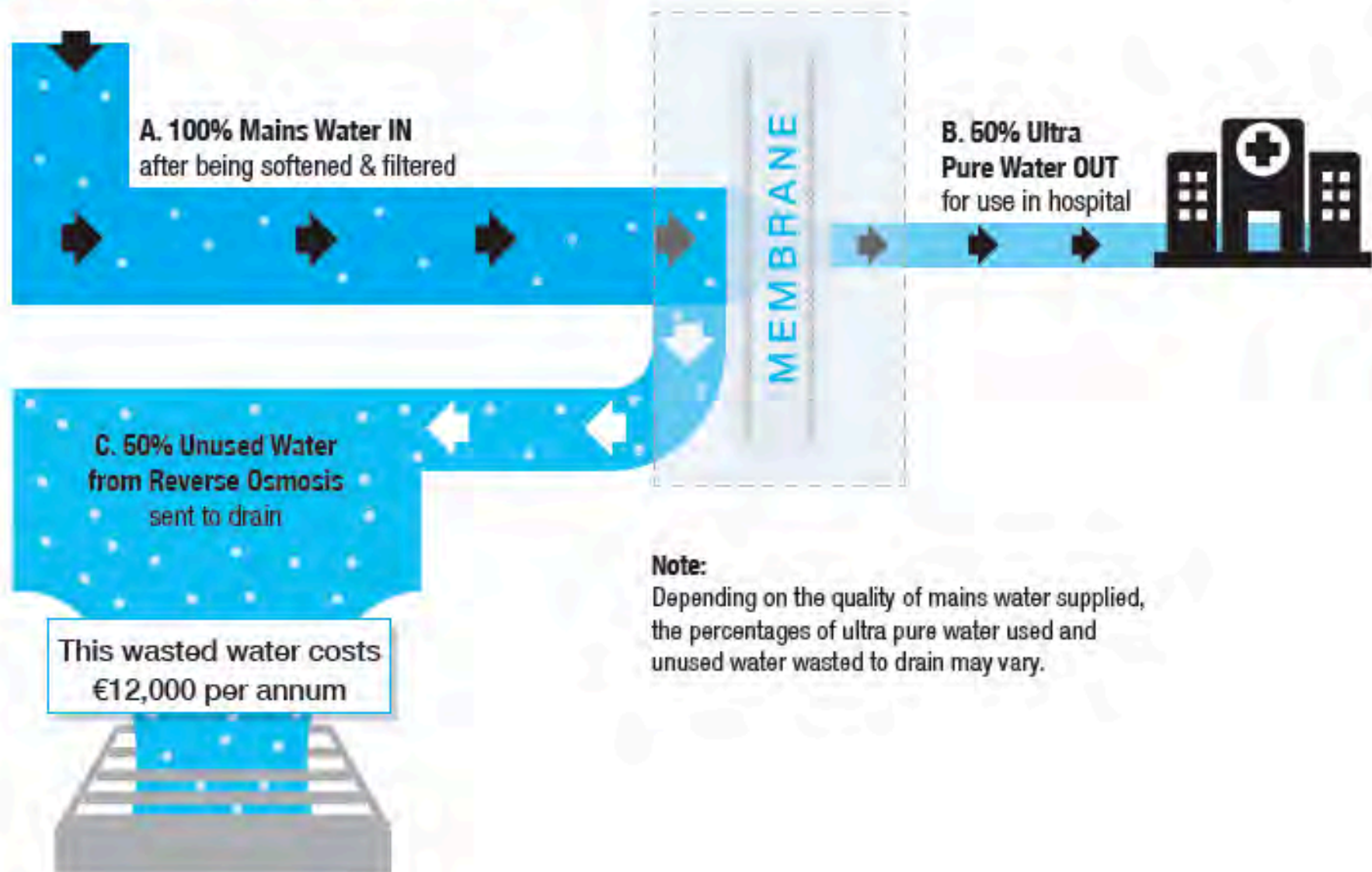
The cost difference annually between a 5 litre/min and 20 litre/min hot water tap is approx €12. Scaled up for 100 taps this is almost €1,200 a year.



What to do if you have RO Units?

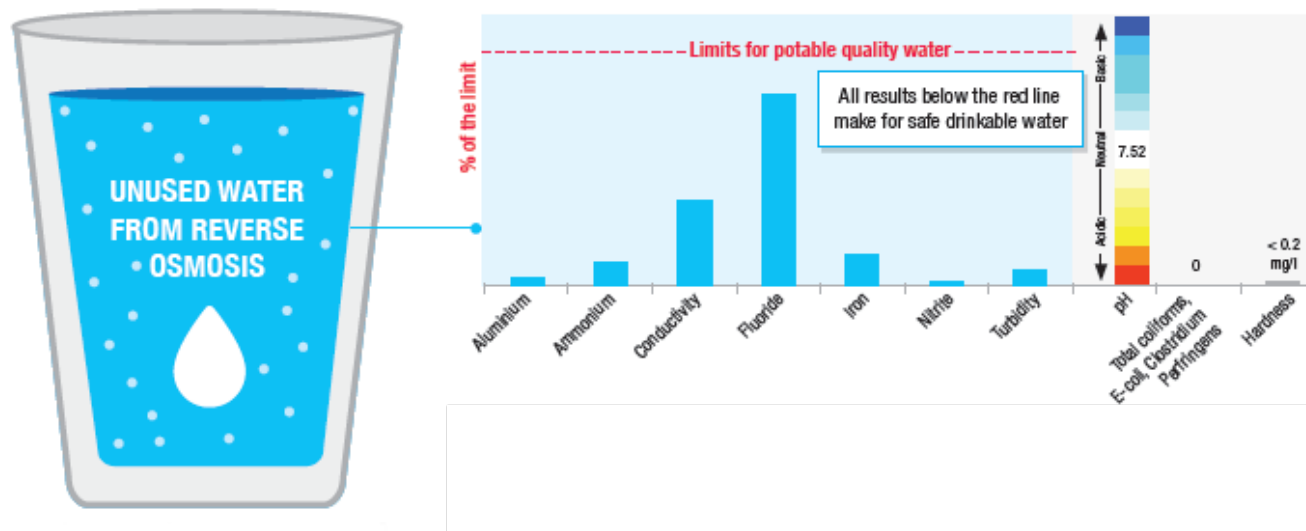
1. Can the system be improved?
 - This can be the cheapest option
 - If this works then cost benefit of reusing the water may not add up
2. Assess the flows involved
 - Metered measurements
 - Manual measurements (bucket and stopwatch)
 - Loggers or temporary meters

Water lost by reverse osmosis



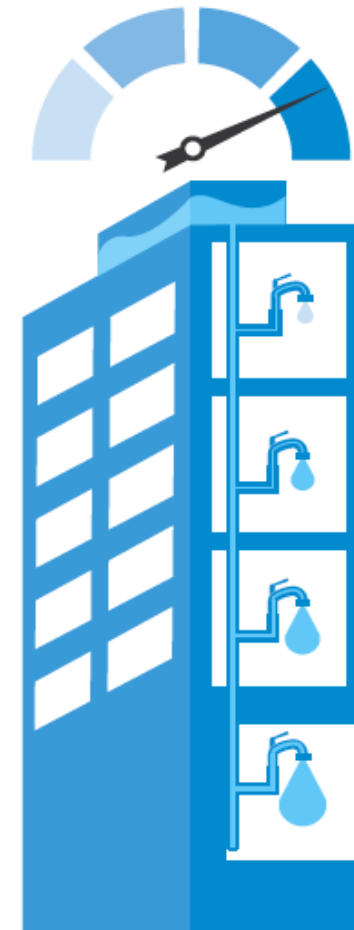
3. What can this water be used for?

- Sluice system
- Toilets
- Boiler water feed
- Is it potable? Fed into the main tank
 - (engage with infection control)



Don't forget about Pressure

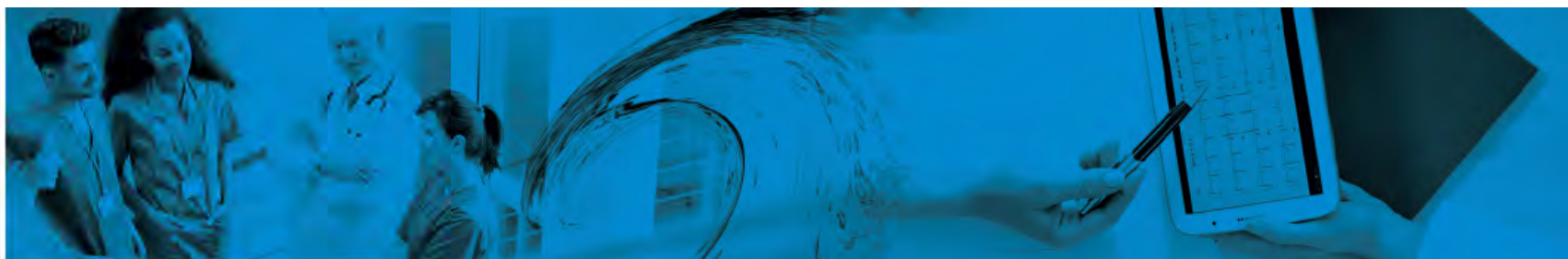
- Pressure can have an impact on flow rates
- Especially important in multi story buildings where pressure varies
- Aim should be to have a consistent supply pressure throughout the hospital
- Pressure reducers can be a very cost-efficient and effective way to control your existing fixtures



Water Network Drawings



Water efficiency action checklist



Water efficiency action checklist

- ☒ Do you **monitor** your water use on a regular basis? (minimum of monthly)

Start by examining your bills. If these are only issued quarterly then read your meter manually at least monthly.

- ☒ Do you present water use data in a **graphical format**?

If gathering manual readings, or water consumption data (m³) from your bills, set up a spreadsheet that automatically graphs water use data as it is inputted.

- ☒ Have you calculated your **water use benchmark** and compared it with other similar hospitals (Acute or Community Health Hospitals)?

Calculate your benchmark by comparing your total annual water use with the number of patient bed-days provided by your hospital.

- ☒ Have you checked your site for **leaks**?

Even if your level of water use is consistent, or your benchmark compares favourably with others, there may still be undetected leaks in your hospital.

- ☒ Have you used an **online data logger** to check your daily water use profile?

Online loggers can be fitted permanently or for a short period and provide a profile of when, and how much, water is used. This can help identify background water use (leaks) or unexplained high use trends.

- ☒ Have you installed **sub-meters** in appropriate locations on your site?

While the data from your mains meter will give information on the total water used by your hospital, sub-meters help track the main buildings/areas within the site.

- ☒ Has a survey of the main **fixtures and fittings** been carried out?

These surveys will help identify any fixtures, fittings, buildings or areas where unusually high volumes of water are used. Sometimes certain taps will have high flow rates, in other cases specific floors may have consistently high flows.

- ☒ Have you compared your hospital with the national **best practice benchmarks** or generated specific internal indicators?

By comparing with best practice benchmarks, or continually comparing specific internal indicators, you can set improvement targets for your hospital while also ensuring high efficiency standards are maintained.

- ☒ Have you assessed your main fixtures and fittings relative to **best practice flow rates**?

There are established best practice flow rate for the main fixtures and fittings used in hospitals (taps, showers, toilets and urinals). If yours are higher than these then you are using, and paying for, more water than you need.

- ☒ Have you examined the **supply pressure** of water throughout your hospital?

A consistent supply pressure throughout your hospital ensures a consistent level of service and also ensures that water use by fixtures and fittings is relatively consistent. In-line flow restrictors are an effective way to reduce high pressure supply areas.

- ☒ If you have **reverse osmosis** on site have you checked it for internal recycling or external reuse (usually from dialysis only) of discharged water?

RO is a very important part of modern hospitals but RO units can waste significant volumes of good quality water. Depending on the type used there are internal and external reuse options that will reduce overall water use without impacting on the quality of ultra pure water supplied.

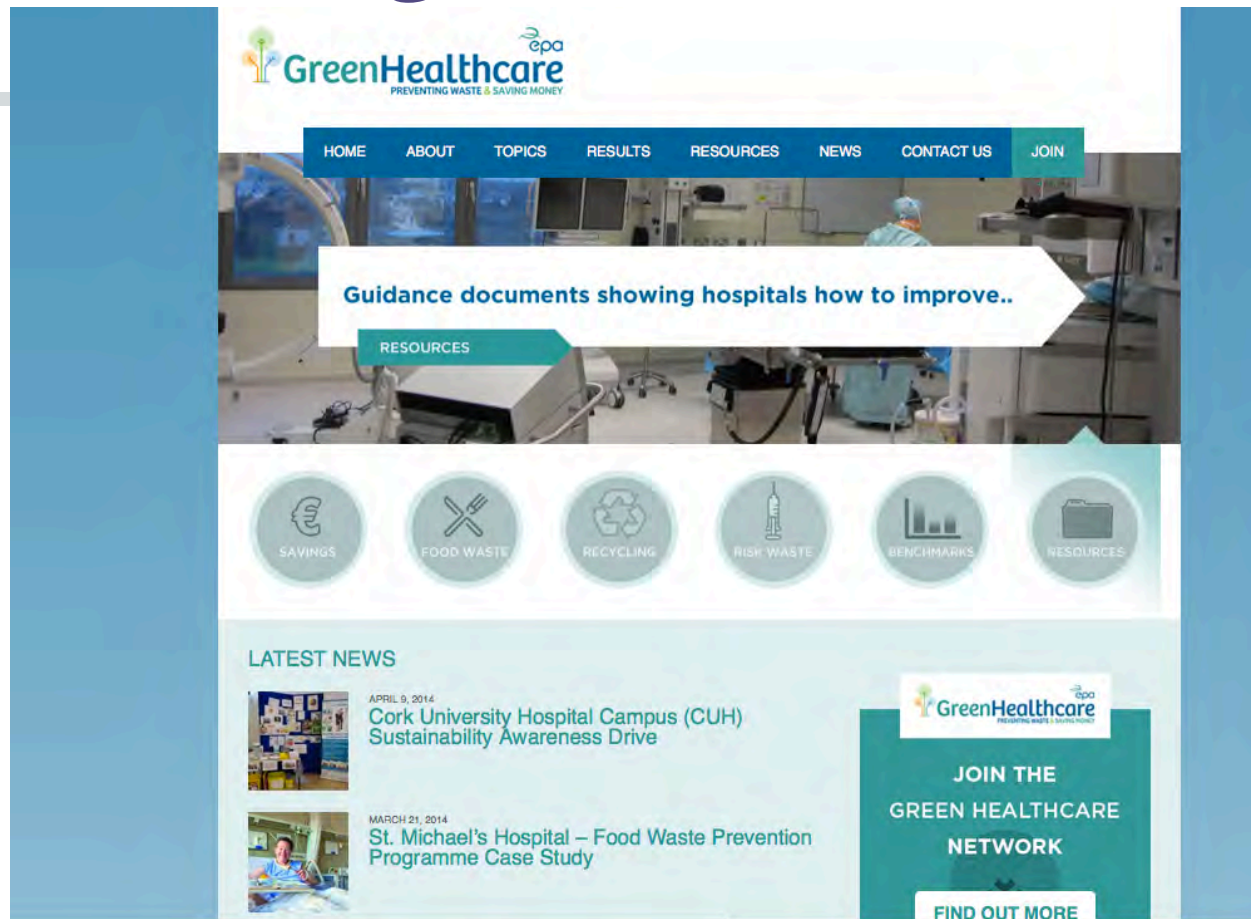
- ☒ Are there any other **large consumers** that should be examined in your hospital?

Every hospital is different so you may have other areas where large volumes of water are used (e.g. kitchens, ambulance washing, fire hydrant flushing). It is important to firstly identify these and, once quantified, identify ways to reduce the water volumes used.



Whenever any changes are being considered make sure to consult and involve your maintenance department and plumbers beforehand.

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www.hse.ie/sustainability