



Water and electricity: A complex combination

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Since 2000 Wessex Water’s electricity costs have increased by 160% to £23m per annum, and are predicted to rise another 70% by 2020. Accurately forecasting this cost is essential for many companies, but has become increasingly important for the water industry. We have to keep costs within our regulatory prices and reduce TOTEX (total expenditure; the sum of both capital and operational costs) between 2015 and 2020, but also forecast usage taking into account increasingly diverse weather, from droughts to floods in a matter of months.

We initially focused on improving electricity billing and data quality, as well as staff engagement, to get a better handle on our electricity data. Imagine the difficulty in checking 2,500 electricity supplies and their costs when it is hard enough to understand your bill at home! As an example, I saved Wessex Water almost £1million from a previous supplier because of inaccurate billing.

Whilst this magnitude of saving was fantastic for Wessex, it does of course lead to the question as to how the bills were so wrong in the first place. After lengthy analysis, I identified some key problems in the bills that could largely be resolved by taking more frequent meter reads, such as meters being billed for 10x too much consumption by misreading decimals, and meters being over estimated which resulted in them being billed as ‘clocking’ when they had used minimal electricity (i.e. being billed for 103,000kWh as the supplier believed the register had gone back to zero due to high usage, when it had in fact used only 3,000kWh)

By starting a meter reading program and giving guidance to staff on taking reads, we have managed to ensure that our consumption data now truly represents what we have used. The graphs in figure 1 below show the quality of our data before and after the meter reading project and cleansing of bills had taken place. The first graph shows a very erratic monthly consumption, with some months suggesting negative values. The second shows the cleansed data – much smoother, and we can see the impact that a wet winter had on our consumption. It is remarkable that you can see this impact on a group of sites that may be read once or twice a year; a testament to the investment in data quality that we’ve made.

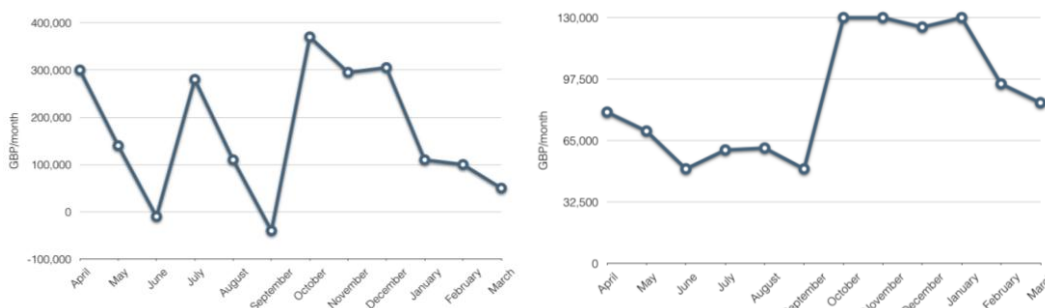


Figure 1 – Estimated monthly electricity cost before (left-hand graph) and after (right) the data cleansing and meter reading project had taken place.

The meter-reading program also demonstrated to staff how a big difference can be made to our energy bill through small interventions. We followed this up with engagement programs such as an energy bonus, the ‘Golden Gigawatt’ award and energy away days to highlight the importance of energy saving to staff, as shown in the pictures in figure 2.



Figure 2 – From right to left, the Golden Gigawatt award; ‘Monergy’; the energy league champions.

As a result of this investment in data quality and the levels of staff engagement we now have in energy, I can now forecast the cost of our water supply side of the business using statistical analysis. I use historical supply data combined with predicted outputs to model our consumption based on a variety of weather scenarios. Staff engagement was key to this process, as the managers must have confidence in the numbers that are forecast to ensure they can encourage their teams to drive down their energy cost compared to budgets. Figure 3 shows a summary of the process; create an equation that estimates the energy usage per unit of water, and apply this to forecast flows.

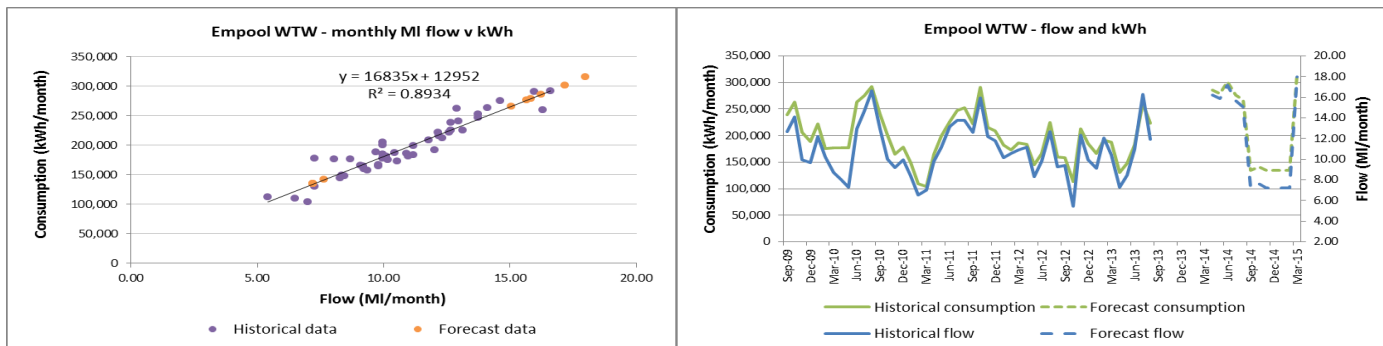


Figure 3 – Modeling historical flow v kWh and forecasting future use

But our energy journey cannot stop there; we need to continue the level of engagement we have year round by ensuring staff have access to the energy data they need, when they need it. To achieve this we are implementing interactive dashboards as shown below in figure 4, which will be crucial to increase the awareness and use of energy data companywide and highlight areas for energy saving, as well as encouraging site ownership.

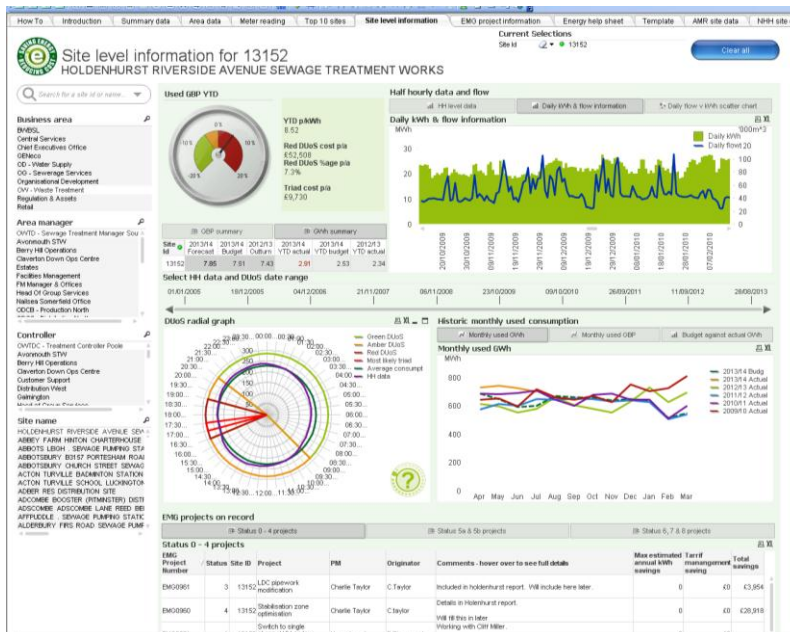


Figure 4 – Interactive energy dashboards