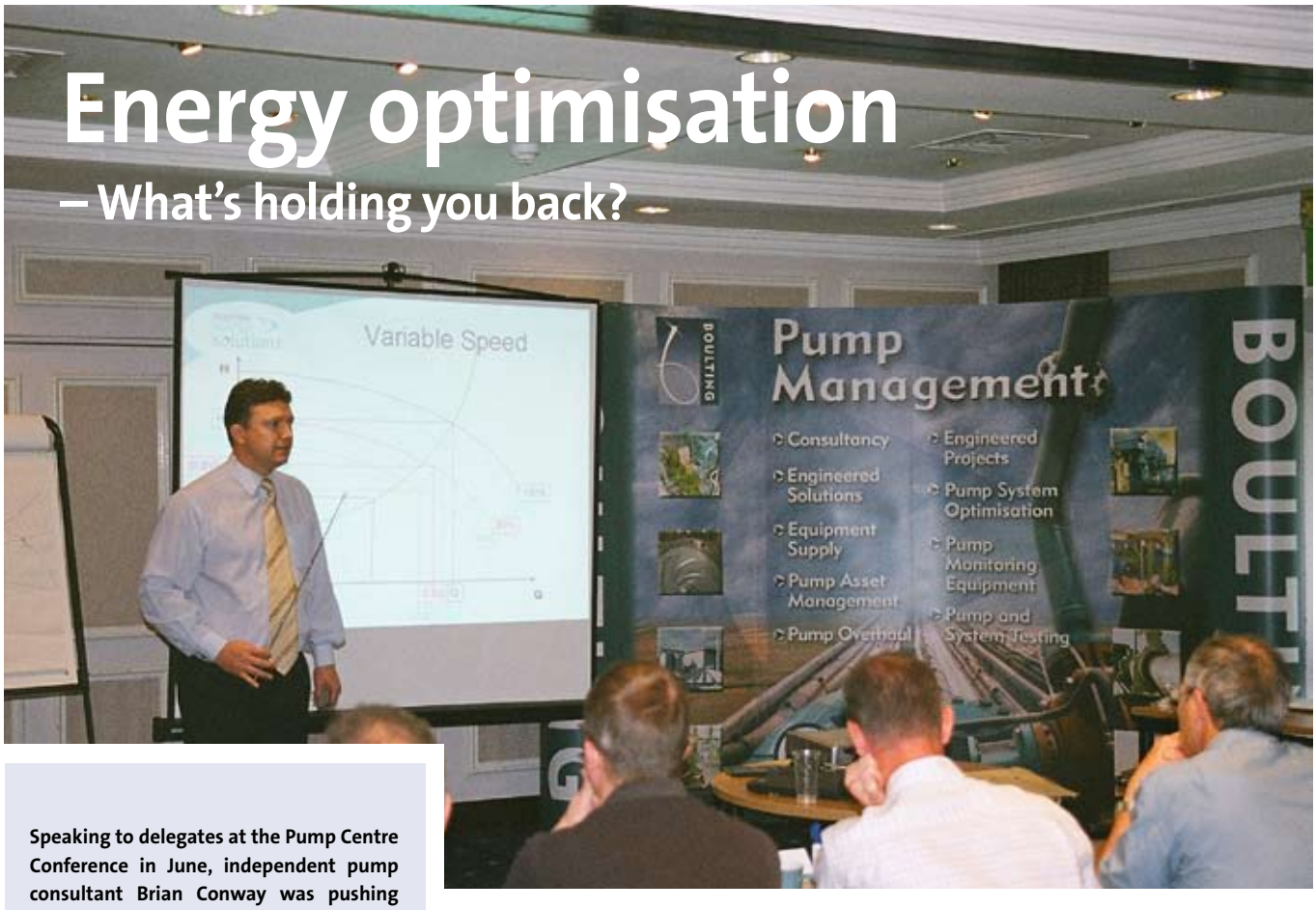
Energy optimisation
– What's holding you back?



Speaking to delegates at the Pump Centre Conference in June, independent pump consultant Brian Conway was pushing a clear message: "It is never too early to think about energy optimisation, and it is never too late. All of us here have a responsibility for making it happen."

In his thought-provoking technical paper "Pump and System Optimisation", Mr Conway urged delegates from the British utility companies and the pump industry to take their share of responsibility for ensuring more sustainable energy consumption.

A huge additional burden

Mr Conway's message is borne out of both concern and frustration. Concern at the unnecessary over-consumption of energy. And frustration that this would be so simple to avoid.

"It is a huge additional burden on the energy generating system". As he pointed out to delegates almost 70 billion kWh were consumed by pump systems in the UK in 2007. This amounted to £5½ billion*. Using examples from energy optimisation projects, Mr Conway showed, the potential for saving 10% energy consumption in peak demand periods and as much as 90% in low demand periods. This was further put into perspective by a return on investment of 3.5 years.

And according to Mr Conway, while everyone present in the conference room could play a part in optimising energy consumption, the incentives to do so were not what they could be. Perhaps the main barriers to increased energy efficiency are the incentives in place that influence decision-making processes. This applied at the political, corporate, executive, management and individual level, he added.

Counter-productive incentives

There are countless decisions made in the system design process. "The short time taken to make all the many decisions in developing a system will have consequences for the next 20 years," he continues. Yet the incentives in place encourage a short-term mindset that is counter productive in terms of energy efficiency. Mr Conway points to such mechanisms as shareholder value in a financial environment that operates with a short horizon. He also points to the incentives to encourage savings on capital investments.

Using system velocity as an example, he explains how industry regulators can contribute to increased energy efficiency. "There's no incentive for the end-user or the contractor to put in a low velocity system where it's suitable. So you may put in a 10-km rising main pipe line, and within the specification you can run it at between 0.8 m/sec velocity and 1.8 m/sec."

However, in terms of friction loss the difference between the two is a factor of 3.6. "So you're using 3.6 times as much power to deliver the same amount of liquid, but it's still within the specifications," he explains.

Because a parameter like maximum velocity is relatively clear cut, Mr Conway thinks it feasible for water industry regulators to insist on a lower maximum velocity. In so doing, they can have a significant influence on overall energy consumption.

Creative design required

Even without further regulation designers have a number of opportunities to use more efficient methods that can also accommodate future increases in demand.

While acknowledging the value of variable speed drives in systems with friction and fluctuating demand, Mr Conway also highlighted step change as a means to increase efficiency. "In a water treatment works where it's generally all static head and no friction. if you are low on capacity you bring in a second pump, and then a third pump. And that is the most efficient way of doing it."

The temptation to over-dimension a pumping system to accommodate future increases in demand can also be tackled more creativity than commonly seen. "What you may do at the beginning is you may put in a manifold that's blanked off so it's all there. To do that there's very little capital cost but you've covered for the eventualities, should they be required."

**Based on 20% of total 2007 UK electricity consumed by Pump Systems*
Source: Government Dept BERR – Energy Statistics 'Electricity Supply, Availability and Consumption 1970 -2007'
Energy Cost based on £0.08/kWh

Profile:

Brian Conway is on the Members Council of the Pump Centre in UK. He is director of Pump Management, providing technical and commercial expertise in relation to pumps, mechanical seals, associated pump equipment and pump systems. He has provided specialist consultancy and training to major utility and oil companies in the UK and internationally. Pump Management is a specialist division of a £100m engineering design and construction firm, Boulting Group plc.