SA Water Innovation: Microbial Granules in Nutrient Removal

"Are we ready to enter a brave new world where innovation is the norm not the exception?" For John Ringham, Chief Executive of SA Water in Adelaide, Australia, this is the question when confronted with the demands of contemporary problems facing the global water sector. Figure 7 shows a visual comparison of business-as-usual and the brave new world of innovation in quadrant 4.

Recent research driven innovations taking place at SA Water's wastewater treatment plants were motivated by a contemporary global concern namely that of reducing energy consumption.

"Our problem was nutrient removal at a wastewater treatment plant and the fact that the process of nutrient removal is energy intensive. It's also time intensive" Ringham explains. "What we had was a sequential reactor that the time to get through the sequence was limiting the hydraulic capacity of the plant and we had growth in the catchment feeding the plant."

Technical engineers confronted with the problem came up with a capital solution – the construction of an additional AUD 6 million reactor. Thinking outside the box, SA Water sought alternative solutions to increase plant capacity and reduce energy consumption in a more cost effective manner. These efforts were not in vain as a solution was found through the simple modification of the plant's nutrient removal operations.

The addition of microbial granules allowed the utility company to accelerate formation and settling of flocs through converting it to granules, leading to rapid biomass settling. As a result, sedimentation time was also reduced which resulted in increasing the overall capacity of the plant. This innovative modification had the added benefit of extending the asset life.

The acceleration of the flocs settlement time was the result of the development of a granular sludge technology. Through reducing the settlement time by around 20%, hydraulic capacity was increased by a corresponding 20%, taking the process time down to 190 minutes as opposed to the original 240 minute mark. The resulting increase in hydraulic capacity translates to an increase in the amount of water treated (4000–5000 m^3/d).

Another benefit of this innovation was the fact that this solution proved not only easy to retrofit, as it is applicable to all existing Sequential Batch Reactors (SBRs), but extremely cost effective in tackling the original problem. Retrofitting cost just AUD 1 million – a fraction of the price of the capital solution inspired by the conventional thinking of technical engineers.

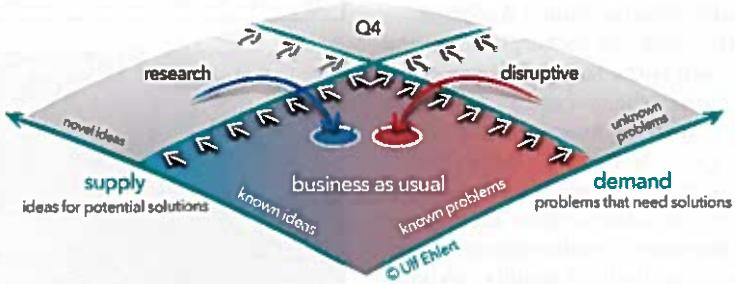
Currently undergoing a full-scale trial at Pt Pirie, South Australia, this innovation has real potential to drastically improve both cost and energy efficiency of the nutrient recovery process of wastewater treatment, with a broad scope for application both within Australia and beyond.

Trial at Pt Pirie, South Australia

Source: John Ringham, Presentation, 2016

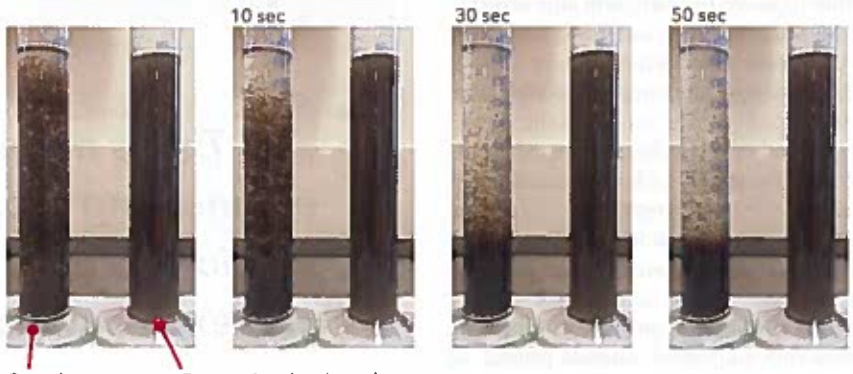
> *"Are we ready to enter a brave new world where innovation is the norm not the exception?*

FIG 7: VISUALISING INNOVATION: MOVING AWAY FROM BUSINESS AS USUAL



Source: John Ringham, Presentation, 2016 / www.understandinginnovation.wordpress.com

FIG 8: GRANULAR SLUDGE VERSUS CONVENTIONAL FLOC SETTLING PERFORMANCE



Source: John Ringham, Presentation, 2016