

REDUCING THE ENERGY INTENSITY AND CARBON EMISSIONS OF WASTEWATER TREATMENT

PROJECT FACTSHEET



KEY POINTS

- Modern wastewater treatment operations are energy-hungry and carbon emissions intensive
- Significant potential exists to further optimise wastewater treatment performance through energy benchmarking
- This project is developing a suite of new energy benchmarks to enable the Australian water industry to optimise its wastewater operations for energy and carbon outcomes

THE OPPORTUNITY / CHALLENGE

Wastewater treatment plays an essential role in safeguarding public and environmental health within the built environment. However, wastewater treatment operations are among the most energy-intensive activities carried out in our cities, with high levels of associated greenhouse gas (GHG) emissions.

This renders current wastewater practices unsustainable and optimisation of wastewater treatment plants (WWTPs) is needed to reduce the impact of operations and to enable the industry to achieve strategic energy and carbon neutrality goals. Energy benchmarking (Figure 1) offers a way to identify underperformance in energy efficiency and prioritise future optimisation efforts.



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Pioneering work by the South Australian water utility SA Water in WWTP energy benchmarking during 2010–2013 led to a broader recognition in the sector of the potential energy, carbon and cost savings from more efficient wastewater treatment operations.

This pioneering work, however, applied existing European methods and benchmarks without adaptation to suit Australian conditions, which in many cases affects the relevance and scale of identified efficiency opportunities.

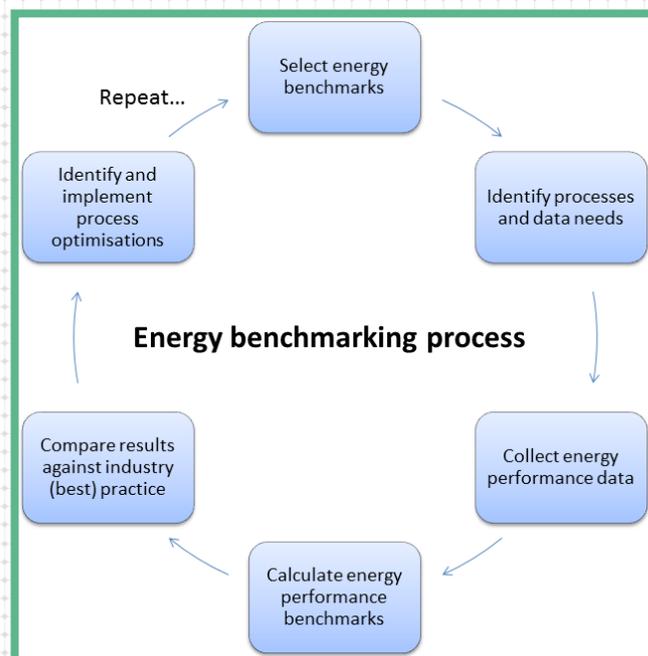


Figure 1. Schematic overview of energy benchmarking approach

OUR RESEARCH

Recognising the important differences in Australia in how wastewater treatment processes perform, the regulated treatment targets, and the nature of the wastewater itself which can affect the energy use performance of WWTPs, we are developing new locally-relevant energy benchmarks for use by the Australian water sector.

OUTCOMES

1. Review of energy benchmarking methodology

An initial part of the project has involved a comprehensive, critical review of European energy benchmarking methodology for communication to the water industry (inter)nationally. This review delivers for the first time a complete understanding of how European (German) energy benchmarking methods have been developed and applied, unlocking a valuable—but previously inaccessible—knowledge base to an international audience.

2. Development of energy performance benchmarks

Another project area has involved the use of a comprehensive national WWTP electricity use dataset, collected as part of a national water industry benchmarking assessment coordinated by the Water Services Association of Australia, to develop a suite of locally-relevant, Australian energy performance benchmarks for a range of key wastewater treatment processes (Figure 2). Once complete, this suite of new Australian energy benchmarks will allow water industry members for the first time to benchmark their energy use performance against their industry's own performance metrics, helping to unlock energy and GHG emissions savings from wastewater treatment operations.

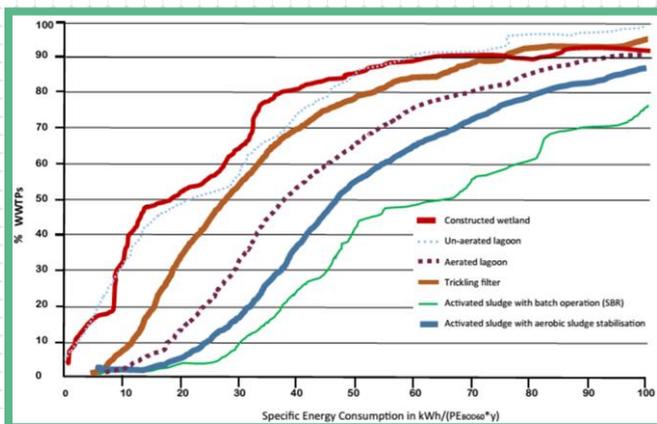


Figure 2. Frequency distribution of energy performance data to benchmark key Australian wastewater treatment processes.

3. Cost, energy and GHGs of recycled water operations

A third component of the research is investigating the cost, energy and GHG intensity of disinfection processes for the treatment and provision of recycled water. We are using case study data from full-scale wastewater treatment and water recycling facilities in South Australia to benchmark the relative performance of conventional disinfection using chlorination against more advanced ultraviolet (UV) disinfection technology across these three criteria. Preliminary outcomes from the disinfection case study work are providing information to water industry partners on the relative cost (capital and operational), energy use and GHG emissions performance of chlorine versus UV disinfection. This information will help inform future recycled water treatment strategies at the utility level and

enable utilities to better interlink recycled water service provision with carbon and energy objectives.



HOW YOU CAN BENEFIT

Australian water industry members will benefit from having access to new and comprehensive information on energy benchmarking methodology. We will provide access to:

1. A suite of locally-relevant energy performance benchmarks to help utilities optimise their WWTPs for energy and carbon emissions savings
2. New insights regarding the economic and environmental performance of recycled water disinfection practices to inform treatment strategy.

NEXT STEPS

The project will run until early 2019, augmented by a new Utilisation Project in 2018 to operationalise the research outputs into a new energy benchmarking tool for the Australian water industry.

PROJECT TEAM

This is a collaborative project between the University of South Australia (UniSA), University of New South Wales (UNSW), SA Water and Sydney Water.

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