Green Oxygen for Wastewater Treatment

Project Overview

We're exploring how oxygen can transform wastewater treatment plants and support the development of Australia's hydrogen industry.

In aerobic wastewater treatment, aeration is the most critical element of the treatment system. The Green Oxygen for Wastewater Treatment project aims to demonstrate the practical use of oxygen produced as a byproduct of renewable hydrogen production, for more efficient wastewater treatment.

Next door to our Northern Water Plant, Viva Energy Australia is producing oxygen as a byproduct of hydrogen production from electrolysis. Oxygen is seen as a potentially valuable resource to Wastewater Treatment Plants as it can increase the efficiency of energy intensive aerobic treatment processes and improve reactor performance, delaying the need for expensive treatment plant upgrades.

We currently use air, which is only 21% oxygen and 79% nitrogen, so more gas is required for the process. This in turn means more energy to pump it into the wastewater.

About the process

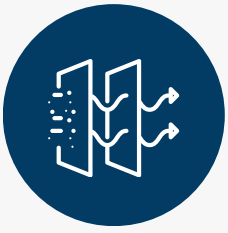
In wastewater treatment, air is added to mix the sewage and provide the oxygen needed for the hardworking microorganisms to eat and digest the waste. The byproducts of this step of the process are water, carbon dioxide (and other greenhouse gases like nitrous oxide) and biomass sludge (biosolids).

Enriching the air supplied to the wastewater with oxygen means the microorganisms have access to more oxygen without the need to pump large volumes of air into the wastewater. This means less energy is required and the wastewater treatment process is more energy efficient. Oxygen enriched air is not traditionally used in wastewater treatment as it is usually too expensive to obtain in high quantities.

This project aims to make the biological treatment stage more efficient using oxygen byproduct from electrolysis for aeration.

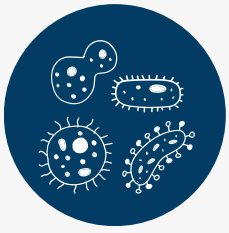
Wastewater treatment steps

STEP 1
Pre-treatment screening



Screens are used to remove plastics and other solid objects from the liquid

STEP 2
Biological treatment



Microorganisms break down the sewage and like us, need oxygen to survive

STEP 3
Filtration and disinfection



Specialised filtration processes are used, including ultrafiltration and reverse osmosis

Barwon Water

Why is Barwon Water doing this project?

Renewable hydrogen is emerging as a valuable part of Australia's green energy transition and offers the potential as a clean, safe and reliable fuel source. Oxygen, which is a byproduct of renewable hydrogen production (via electrolysis) has the potential to transform wastewater treatment for water utilities.

This project will explore a viable price for oxygen for wastewater treatment – providing a unique opportunity to partially subsidise hydrogen production with the sale of oxygen and increase its commercial viability for industries.

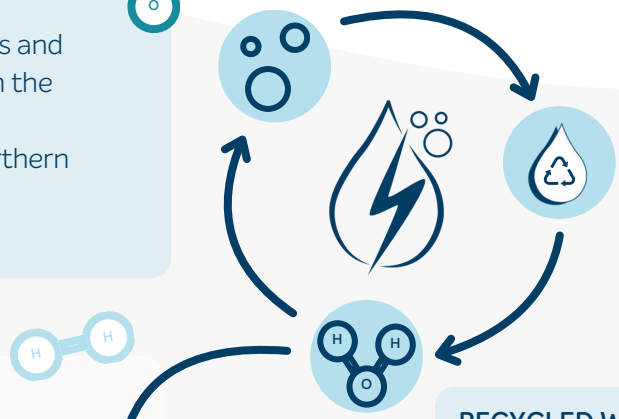
What are the features of the project?

We'll use oxygen produced by a 2.5MW electrolyser at Viva Energy Hub located next door to our Northern Water Plant. The oxygen, which would otherwise be vented as a waste product, will be used to enrich air supplied to Northern Water Plant's aeration process.

OXYGEN FOR WASTEWATER TREATMENT

Barwon Water captures, dries and compresses the oxygen from the Viva Energy electrolyser and transfers it across to the Northern Water Plant.

Barwon Water



WASTEWATER TREATED

Oxygen is then used to enrich the air used in the wastewater treatment process which generates recycled water.

Barwon Water

VIVA ENERGY HUB

Viva Energy is able to offer hydrogen refuelling and electric vehicle recharging for heavy transport vehicles powered by renewable energy.

VIVA ENERGY HUB

RECYCLED WATER FOR HYDROGEN / OXYGEN PRODUCTION

Recycled Water is used by Viva Energy's 2.5MW electrolyser where the hydrogen and oxygen molecules in water are split into hydrogen gas and oxygen gas.

VIVA ENERGY HUB

Expected project benefits

The project aims to demonstrate the following benefits:

- Reduced energy consumption for wastewater treatment
- Reduced biosolids production to lower biosolids management costs
- Reduce nitrous oxide emissions
- Improved biological performance to prolong upgrades
- Improved recycled water quality

Barwon Water

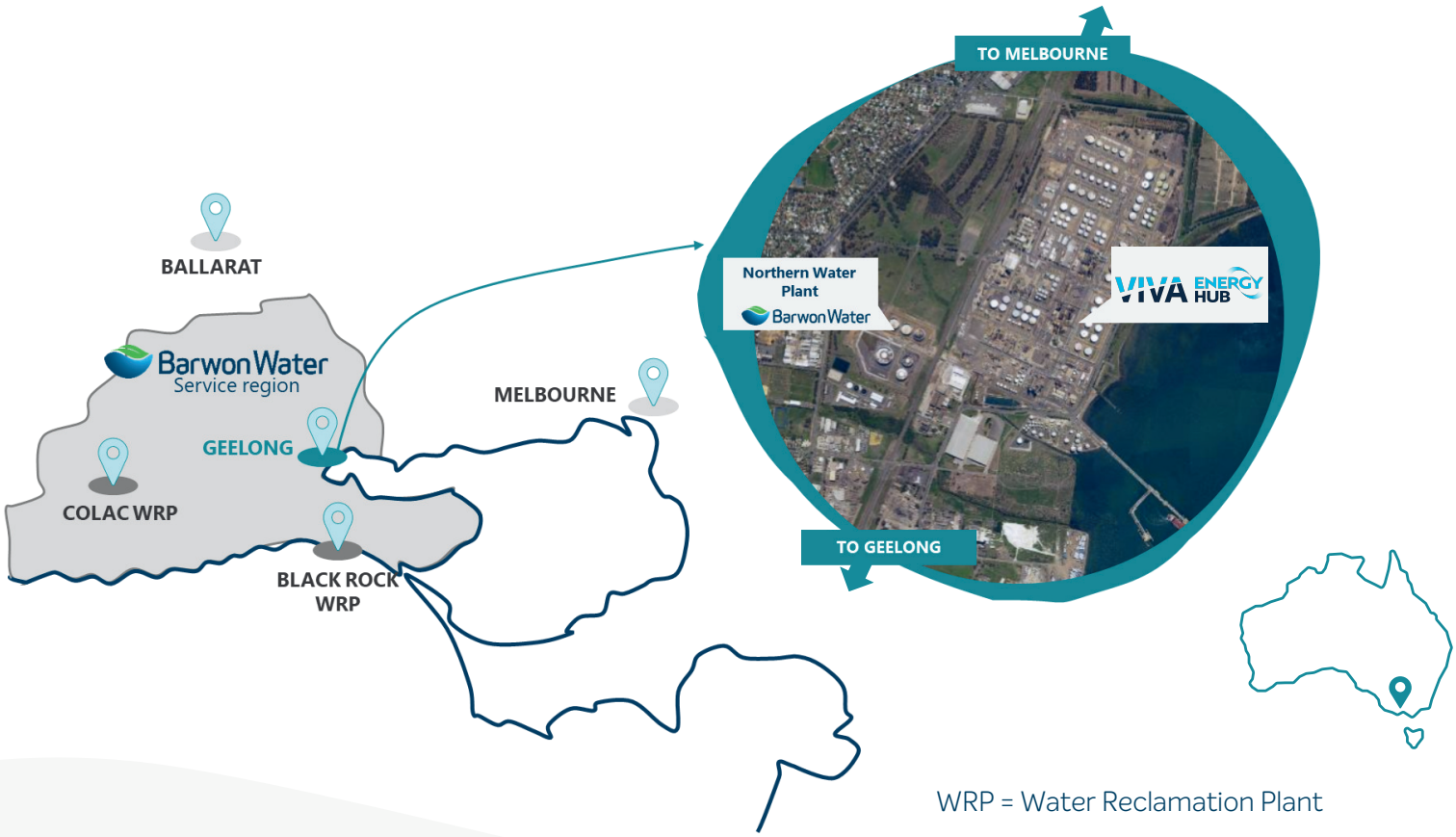
Project location

The oxygen project will be situated at our Northern Water Reclamation Plant, next door to the hydrogen project and electrolyser located and operated on Viva Energy's land.

Project cost

Total project costs include:

- ARENA $3 million
- Total Project Cost ~$5.2 million



WRP = Water Reclamation Plant

Fast facts

2026/27
Project operational

37,454 ML
Annual wastewater treated in Geelong (up 8.2% from last year)

1.5%
Australia's total emissions from wastewater

>8,000 kg/day
Oxygen produced by Viva Energy Hub sufficient for wastewater treatment

90%
Total by volume wastewater treated using aeration at Barwon Water

50–70%
Total wastewater treatment plant energy required for aeration

Green Oxygen for Wastewater Treatment

Barwon Water

The project received a grant from the Australian Renewable Energy Agency (ARENA) as part of ARENA's Advancing Renewables Program. The views expressed here are not necessarily the views of the Australian Government, and does not accept responsibility for any information or advice contained here.