



Bioenergy: Powering our Energy Master Plan

Renewable Gas Symposium

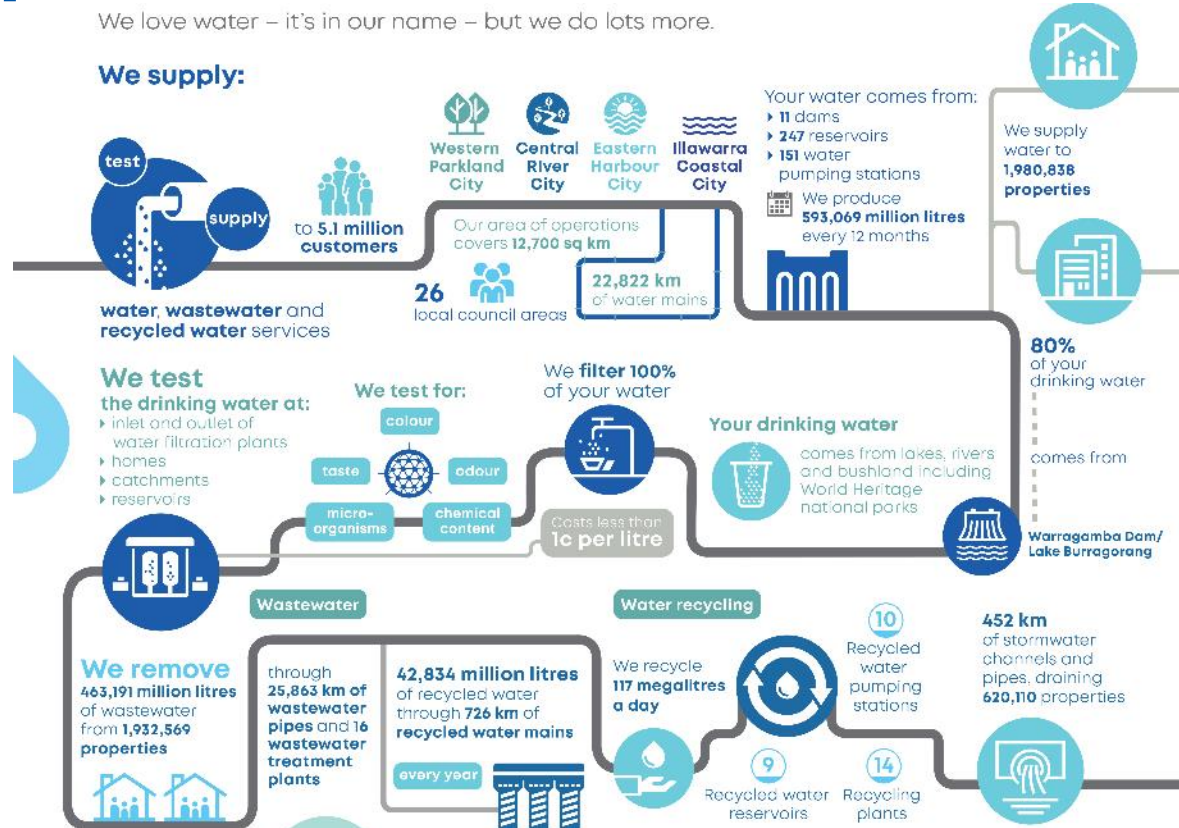
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6 June 2019

We're Australia's largest water and wastewater provider

We love water – it's in our name – but we do lots more.

We supply:

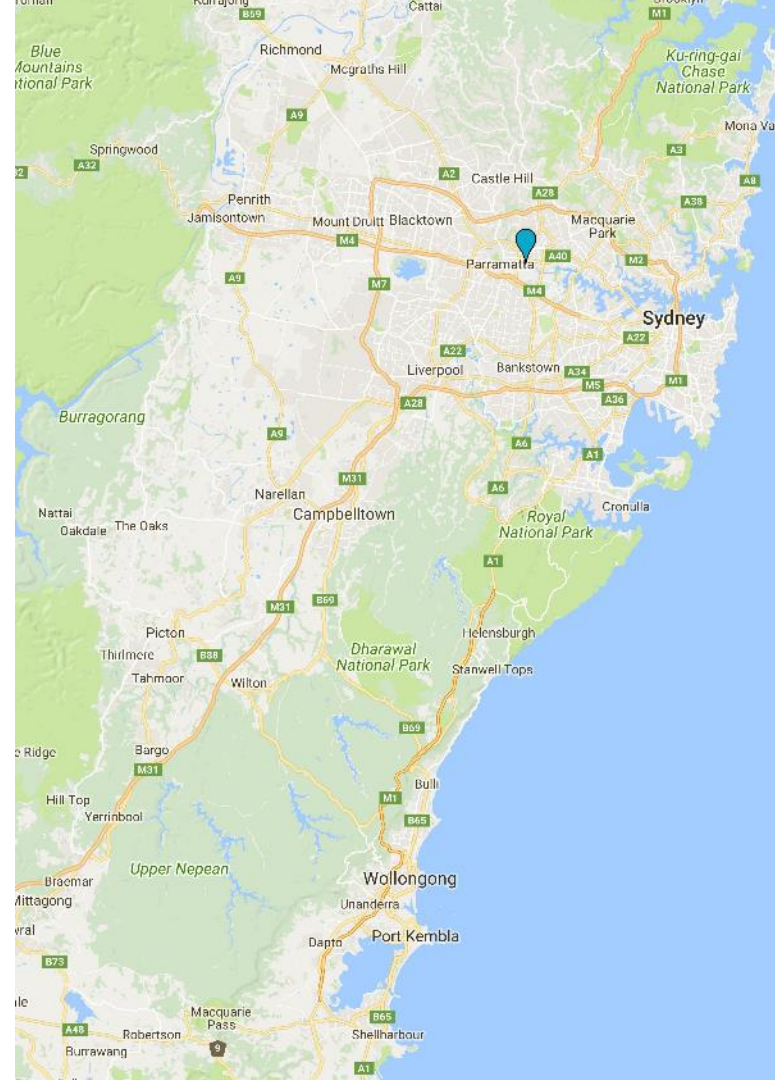


Sydney WATER

Pop quiz!

How many commercial anaerobic digestion facilities exist in Sydney?

A: 1 (Earthpower)



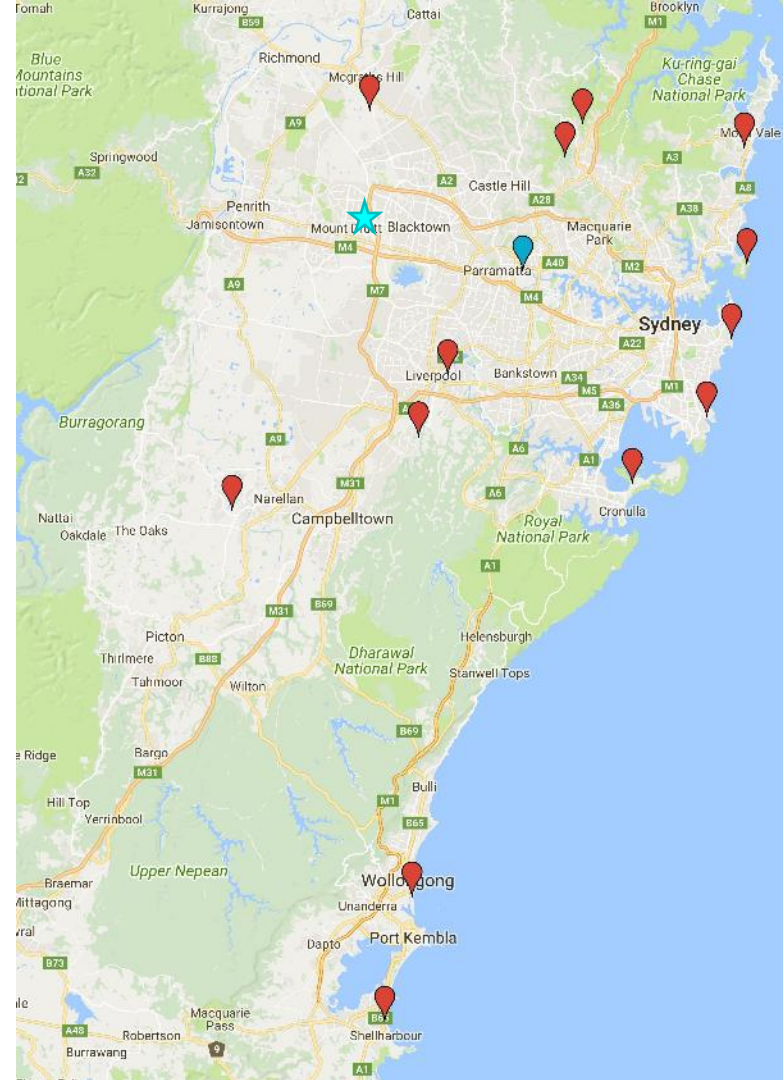
Pop quiz!

How many commercial anaerobic digestion facilities exist in Sydney?

A: 1 (Earthpower)

OR

B: 14 (Soon to be 15)



Renewable generation



Hydro

- Pressure reductions and gravity flows
- 3 generators in the water and wastewater system
- 6 MW Installed capacity – 16 GWh in 2017-18



Solar

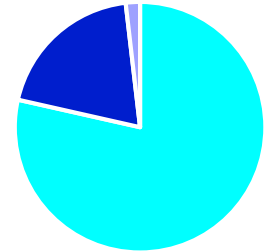
- Solar PV at multiple sites
- 160 kW produced 145 MWh in 2017-18



Biogas

- Generation using biogas from wastewater treatment
- 8 wastewater treatment plants
- 10MW installed capacity – 64 GWh in 2017-18

Renewable Energy Generation

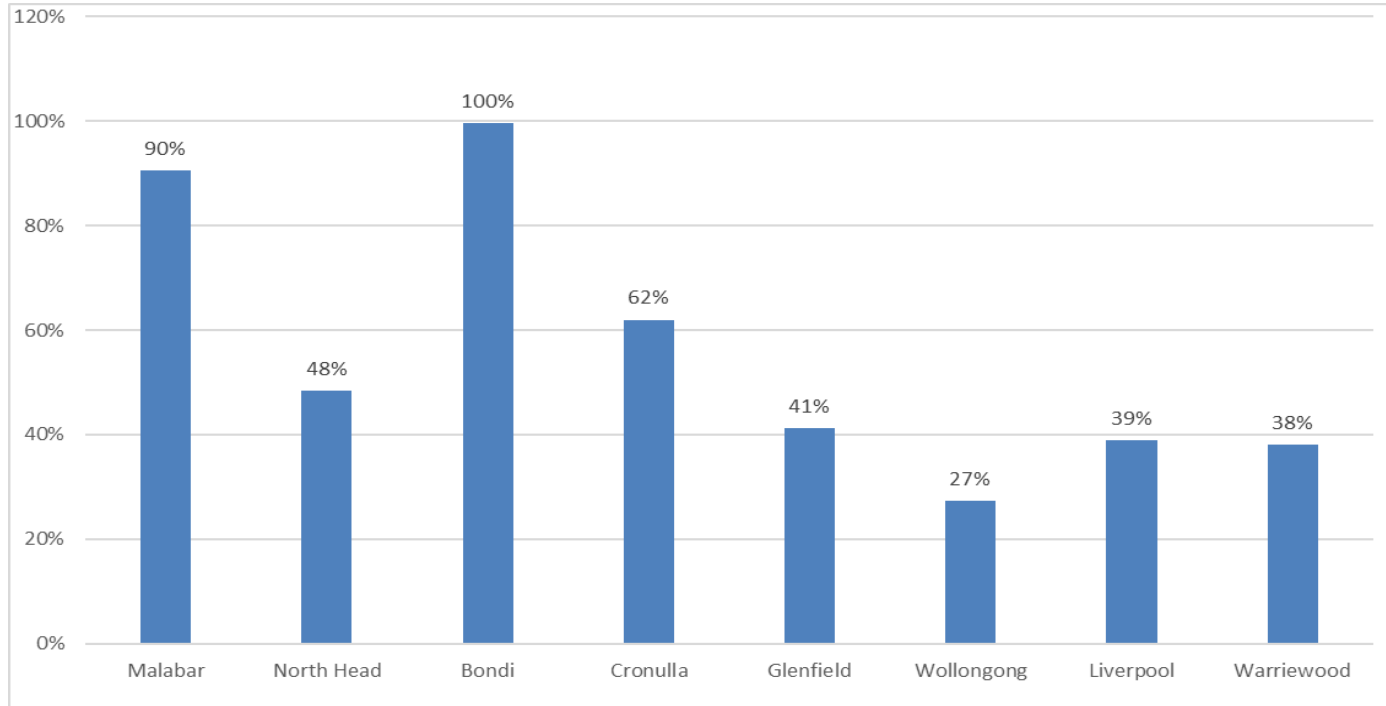


■ Biogas ■ Hydro ■ Solar*10

Energy value \$12-\$15m per year

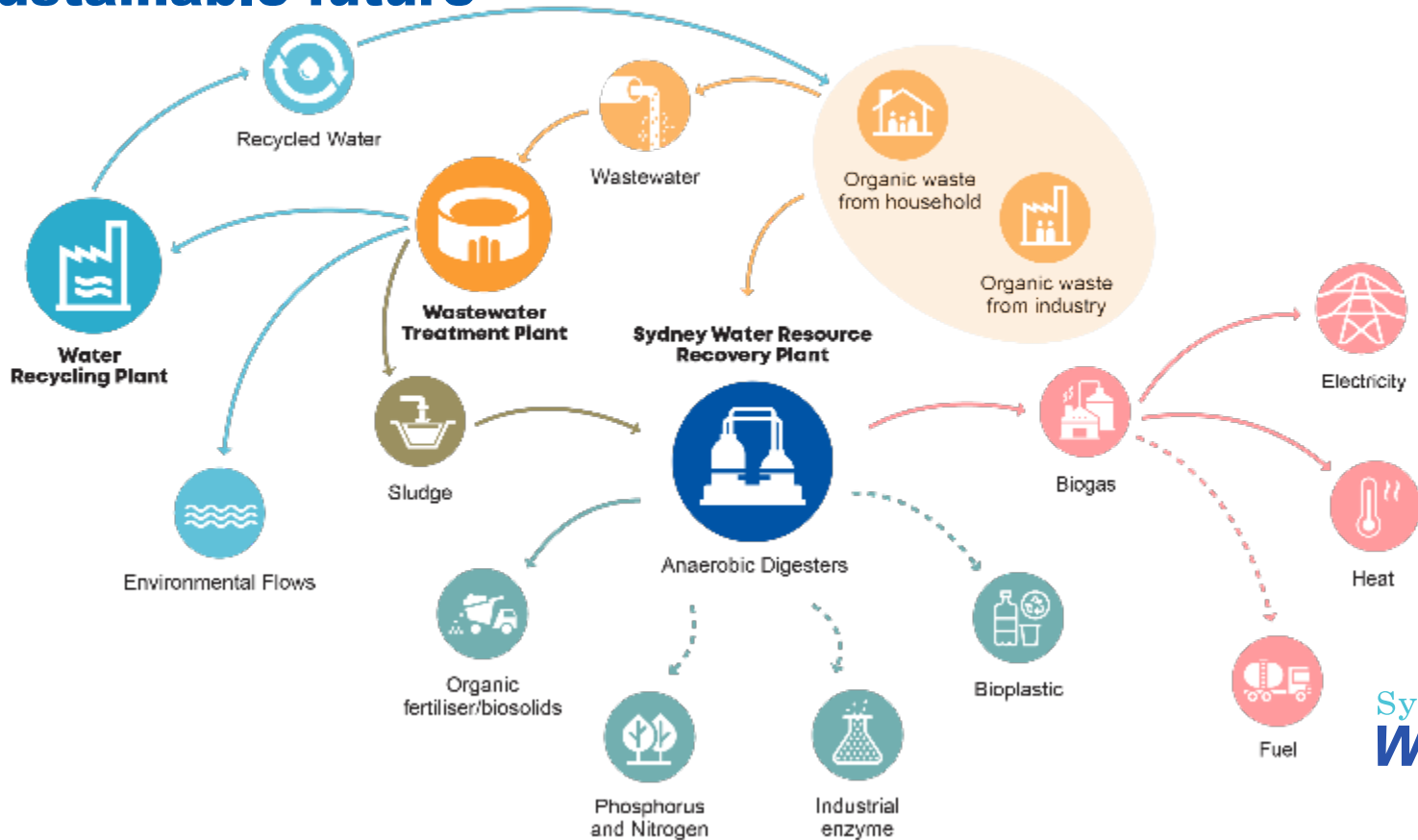
Wastewater treatment plants are local energy generators

Energy generated as a % of total site demand (2017-18)



Enough power for 10,000 homes

Water will play a pivotal role in Sydney's sustainable future



By 2030, we aim to generate an extra 4MW of our energy from food waste

Double energy self generation

4.5MW generation from sewage sludge

4.0MW from food waste

13.5MW solar

Drivers:

Reduce the impact energy on customer bills

Be a high productivity business

Contribute to the state targets for carbon emissions and waste reduction

Energy Master Plan on a Page

Notes:
1. Energy includes electricity, gas, heat, fuels.
2. Electricity is the dominant energy source for Sydney Water.

Planning Vision (with supporting objectives and aspirational goals)







"To be world class in the use and generation of energy to reduce the impact of energy on customer bills, cut waste, eliminate greenhouse gas emissions and decouple from the volatile energy market."

<p>Minimise energy exposure</p> <p>Reduce exposure to large electricity price increases Have a more reliable energy supply</p> <p>60% of our electricity costs not exposed to the short-term electricity market by 2030, increasing to 80% by 2050. All key processes not exposed to grid outages by 2030.</p>	<p>Maximise energy productivity</p> <p>World-class energy using and generating water utility Actively manage our energy demand to respond to market opportunities and maintain grid stability</p> <p>Maintain grid-sourced electricity demand below 1999 levels to 2030 Self-generate 35% of our electricity by 2030</p>	<p>Contribute to a decarbonised future</p> <p>Reduce our carbon emissions to help meet NSW Government target of net-zero emissions by 2050 Leverage opportunities from a decarbonising energy grid</p> <p>Net-zero carbon emission sources provide 75% of our electricity demand by 2030 and 100% by 2050</p>
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Position statements

<p>Energy resource recovery</p> <p>Sydney Water will:</p> <ul style="list-style-type: none"> Maximise energy recovery potential for all forms of energy, where cost effective Accept externally-sourced wastes to increase energy production Consider alternatives to on-site electricity generation when recovering energy 	<p>Self-generated renewable electricity</p> <p>Sydney Water will:</p> <ul style="list-style-type: none"> Maximise renewable electricity generation potential of our assets, where cost effective Maximise economic benefit of our generation Leverage renewable electricity to improve energy security in our system. 	<p>Energy efficiency</p> <p>Sydney Water will:</p> <ul style="list-style-type: none"> Efficiently use all energy we purchase or generate Optimise total energy demand and time of use to increase energy productivity Embed energy efficiency focus into planning, design, operations and maintenance. 	<p>Electricity purchasing</p> <p>Sydney Water will:</p> <ul style="list-style-type: none"> Limit exposure to electricity price volatility Preference cost-effective, low carbon sources Leverage purchasing power as a large energy user to achieve better purchasing outcomes Maximise income from green certificates Generate income by participating in demand response to support grid stability.
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Planning needs

<p>Food waste digestion</p> <p>Assess feasibility of co-digestion at all (current or potential) anaerobic sites</p> <p> +\$5/tonne fee</p>	<p>Cogeneration and Hydro</p> <p>Assess feasibility of expanding cogeneration and hydro capacity at existing and new facilities</p> <p> + 4.5 MW</p>	<p>Solar and wind</p> <p>Assess feasibility of installing large scale solar or wind on Sydney Water assets / land</p> <p> 13.5 MW</p>	<p>Energy efficiency in design and operations</p> <p>Assess ability of achieving best practice energy design and operational benchmarks</p> <p> - 37 GWh/yr</p>	<p>Power purchase agreement (PPA)</p> <p>Secure PPA with renewable energy generator to hedge electricity prices</p> <p> 130 GWh/yr</p>	<p>Demand response</p> <p>Assess ability for demand response for high energy consuming assets</p> <p> + \$14k/MWh + \$130k/MWh</p>
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Procedures/Guidelines

<p>Maximising energy productivity</p> <p>Productivity guidelines for planners and designers of infrastructure</p>	<p>Codigestion waste selection</p> <p>A model to estimate resource impacts for different wastes</p>	<p>Viability of energy projects</p> <p>Method to determine viability based on forecast electricity prices</p>
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Decision frameworks

Electricity procurement strategy

Purchasing method for grid-sourced electricity

Knowledge improvement

International best practice benchmarks

Design benchmarks to drive best practice design and operations

Energy technology roadmap

Guidance on application of best practice technologies

Energy storage

Guidance on application for cost minimisation/improved reliability

Mechanisms for energy export

Quantity commercial options for cost minimising-value of exports

Energy Management System

ISO50001 compliant to drive improved data, reporting and assessment

Alternate uses of biogas

R&D on the economics of biomethane export

Food waste co-digestion at Cronulla

- Receives up to 20 tonnes of pulped fruit and vegetable waste and beverage waste per day since 2016
- Over 4500 tonnes processed to date
- Increase in biogas and electricity generation
- OEH funding
- NSW Green Globe Highly Commended
- Next steps
 - Broader business plan in development
 - More sites and greater volumes



Fruit shop manager Tony Manno liquefies waste onsite to be collected by Sydney Water.

Image: ABC News: Nick Dole

Turning beer into power at Shellharbour

Shellharbour mini-digester research facility

- Collaboration with University of Wollongong, funded by the Australian Research Council
- 2 x 1000 litre digesters
- Test various organic materials in a controlled environment
- Tested beer, soft drinks, wine, fruit juice, food waste and FOG
- Developed a model to estimate outcomes from new waste streams



*Former Minister for Energy and Utilities Don Harwin
Image: Georgia Matts, Illawarra Mercury*

Biogas export

- Proposal to trial the production of biomethane from biogas
- How do the economics of biogas to grid compare to biogas to cogeneration? Now? Future?
- Diversifying options for turning biogas into value
- Many commercial examples overseas but none in Australia
- Engaging with potential partners
- Pending application to ARENA



Biogas storage at Wollongong Water Recycling Plant



**Sydney Water is already taking a lead
in valuing waste as a resource.**

**We are looking for partners to work
with us to build a resilient future for
Sydney.**





Questions?

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Sydney
WATER