SA WATER
SOUTH AUSTRALIA

Bolivar wastewater treatment plant energy use case study

Sustainable approach turns waste to energy, reduces carbon food print

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WATER SERVICES
ASSOCIATION OF AUSTRALIA

Bolivar Waste Water Treatment Plant, South Australia's largest, processes 60% of metropolitan Adelaide's raw sewage. Upgrades, expected to be operational from mid 2013, will use otherwise-wasted biogas produced during the treatment process to generate 85% of the plant's annual electricity requirements. Converting to use solely natural gas and installing new reciprocating engines will cut electricity purchased from 30 to 5 gigawatt hours per year, and save $1.3 million nett annually. The green, sustainable project will not only give the plant more Alternatives and improved reliability of electricity supply, it will reduce greenhouse emissions, create $0.9 million worth of additional Renewable Energy Certificates, and earn $0.7 million in electricity market revenue each year.

CONTINUING PURSUIT OF EFFICIENCY AND WAYS TO HARNESS WASTE

SA Water has been investigating ways to further reuse products generated by the wastewater treatment process. Several options for utilizing all the plant biogas have been under investigation since 2004. A new project is underway to harness biogas (digester gas) produced at Bolivar as a means to produce electricity.

The project includes upgrades and works including:

- Installation of new reciprocating engines to create more electricity from biogas;
- Building a chemical dosing plant to reduce the formation of hydrogen sulphide which is a by-product of biogas production;
- Connecting natural gas;
- Converting the existing gas turbine to run solely on natural gas; and make further electrical modifications throughout the site to utilise all electricity.

The project seeks to:

- Use all available biogas as efficiently as possible;
- Maximise security of energy supply to the Bolivar WWTP;
- Minimise the overall cost of electricity for SA Water; and
- Reduce greenhouse gas emissions.

ECONOMIES OF SCALE

The Bolivar Waste Water Treatment plant (WWTP) is South Australia’s largest wastewater treatment plant. Built in 1965, the plant now processes 60% of metropolitan Adelaide's raw wastewater (sewage) and treats approximately 135 million litres of residential and industrial water per day. Three different treatment plants are located on the Bolivar site:

- The Bolivar wastewater treatment plant treats sewage from most of Adelaide north of the River Torrens. Up to 30% of this wastewater is recycled after further treatment at the Bolivar DAFF plant (see below);
- The Bolivar High Salinity wastewater treatment plant which treats sewage from the north-western suburbs. This sewage is relatively saline and not suitable for reuse for irrigation.
- The Bolivar DAFF (dissolved air flotation & filtration) plant which treats wastewater from the Bolivar WWTP through a tertiary process of filtration and disinfection, so that it is suitable for recycling at the Virginia market gardens and dual reticulation at Mawson Lakes (with additional chlorination).

The estimated cost of this project is $25.9 million and will result in nett annual operating savings of $1.3 million. Additionally, electricity market revenue of $0.7 million per annum will be earned and around $0.9 million worth of additional Renewable Energy Certificates RECs) created each year. The project will also result in a significant reduction in greenhouse gas emissions from the Bolivar site, by more than 11,000 tonnes CO2e per annum. It will also increase reliability and security of energy supply to the Bolivar operations by introducing a new energy source (natural gas) to

firm up generation capability in the event of the loss of ETSA supplies.

A COOPERATIVE APPROACH WORKING WITH GOVERNMENT AND SUPPLIERS

Several organisations have been involved during the project's gestation period. The final concept was developed using a combination of a local energy consultant and an Early Contractor Involvement process. After going to the Australian market in 2010, a final option was developed and approved to proceed by Cabinet in 2011.

The project was submitted to the State Government's Public Works Committee and tabled in parliament on 9 June 2011.

A contract was awarded to Clarke Energy (Australia) Pty Ltd to carry out the major portion of the works. In particular they will be supplying the new generator sets. The new engines are expected to be commissioned in mid 2013.

GOOD NEWS FOR SA WATER, GOVERNMENT, AND THE COMMUNITY

The upgrade to the energy will not only improve facilities, it will reduce greenhouse gas emissions, lower SA Water's carbon footprint and reduce the amount of electricity purchased from the electricity providers from 30 gigawatt hours to 5 gigawat hours per year. The upgrade will also give the wastewater treatment plant greater power supply alternatives and improve the reliability and supply of electricity. It is hoped that in the future 85% of the Plant's annual electricity requirements will be generated through the reuse of this biogas – a product that would have otherwise been wasted.

The Bolivar upgrade provides a number of benefits for SA Water and the community it serves by creating a greener, more sustainable approach to waste management and energy consumption.

For SA Water this innovative project will reduce the amount of electricity we need to purchase from electricity suppliers, while reducing our carbon footprint. While the full realization of cost savings in the face of a carbon price have not been confirmed, a sensitivity analysis based on one carbon price scenario was conducted and this added $4.3 million in economic value to the project.

The upgrade will improve the facilities that treat the waste of up to 1.3 million people across metropolitan Adelaide and will support the State's Strategic Plan to reduce greenhouse gas emissions, and support the development of sustainable and renewable energy solutions in the future.

MONITORING FOR ASSURED SUCCESS

The Bolivar upgrade project is in the early delivery phase, and provides a number of benefits for SA Water and the community it serves by creating a greener, more sustainable approach to waste management and energy consumption.

The project will be evaluated against its objectives, and the achievement of outcomes. These are the consumption of all biogas, nett average annual savings as planned, increased security and reliability of the energy supply to the Bolivar operations, and reductions in greenhouse gas emissions.

SA WATER

SA Water is the water utility wholly owned by the government of South Australia. It delivers water and sewerage services to almost 1.5 million people across the State.