

# South Australian Water - Public Report 2011

This report provides a summary of SA Water's activities and achievements through the Energy Efficiency Opportunities (EEO) program during the first five year assessment cycle (July 2006 to June 2011).

We are committed to the responsible strategic management of energy whilst maintaining corporate objectives including security of supply and water quality. A key element of our Energy Management Policy is the participation and compliance with the Assessment Framework mandated in the Energy Efficiency Opportunities Act 2006.

The opportunities identified and implemented through the EEO program have significantly contributed to our energy and carbon reduction targets. The total energy consumed by our organisation during the last financial year (2010-2011) was 1 381 649 Giga Joules<sup>1</sup> (GJ) which is a 15% reduction compared to the previous year.



Since we first registered for the EEO program in 2007, energy assessments have been completed in accordance with the five year Assessment and Reporting Framework. In line with this framework, comprehensive energy assessments were completed on our operational activities that consumed greater than 80% of the organisations total energy consumption.

Three key activities were assessed through a methodology of representative sampling at selected sites and processes which allowed for the expansion of selected opportunities into other relevant operations. These three key activities consumed 85% of our total energy use in the baseline year 2005-6:

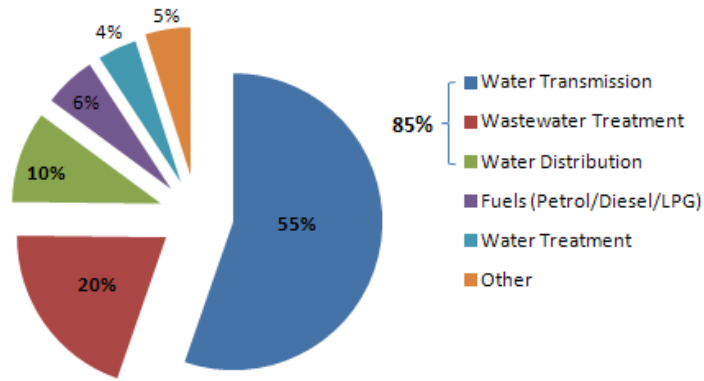
1. *Water Transmission*
2. *Wastewater Treatment, Recycling & Disposal*
3. *Water Distribution*

*“The optimisation of energy use remains at the forefront of our operations. The work undertaken in accordance with the comprehensive EEO framework, especially the improved focus and prioritisation of energy projects, has enhanced SA Water’s energy management program”*

Andrew Jackson  
Manager Energy Strategy, SA Water

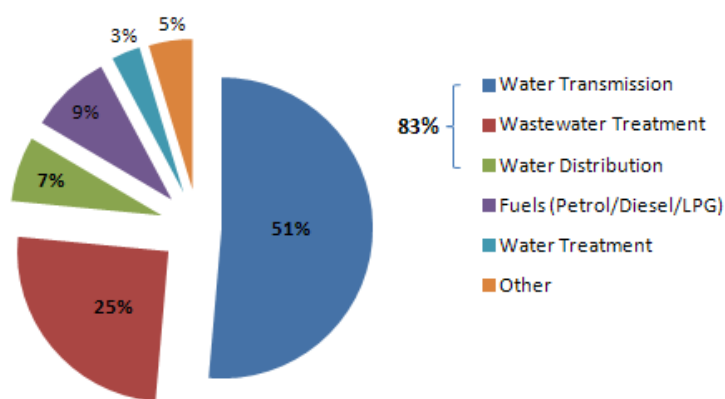
<sup>1</sup> 1 Giga Joule = 1 Joule x 10<sup>12</sup> or 278 kWh

Energy Use 2005-06 (baseline year)

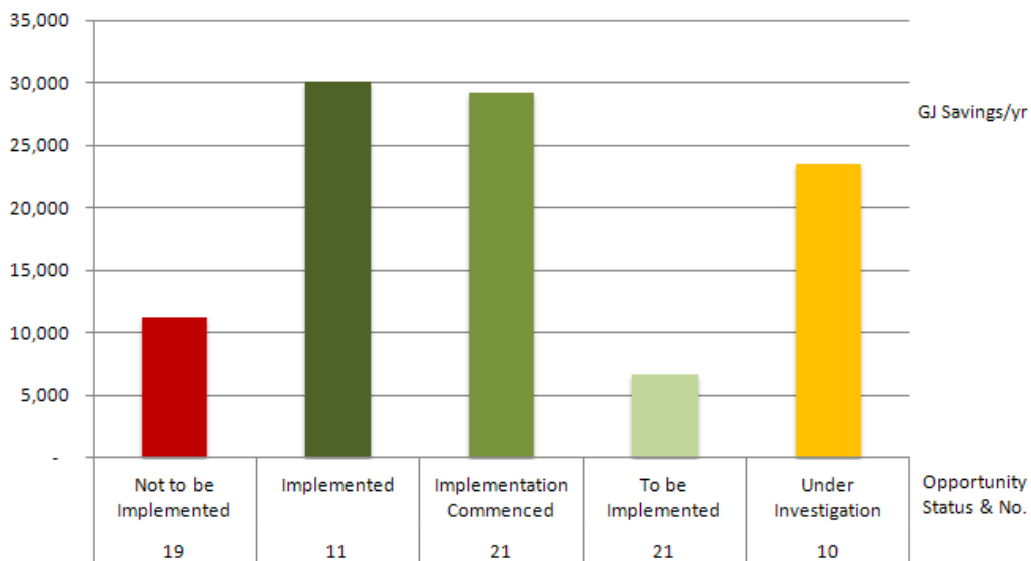


The chart above shows the energy usage in the baseline year 2005-06 highlighting the three key activities making up 85% of the total energy use. The chart below shows the energy used by the three activities in 2010-11 reduced to 83%.

Energy Use 2010-11



The three representative assessments identified eighty-two energy efficiency opportunities having the potential to reduce energy consumption by approximately 100 000 GJ per annum. A total of eleven opportunities have been implemented which will reduce our energy consumption by approximately 30 000 GJ per annum. A further twenty one opportunities have commenced and another twenty one are programmed to be implemented. Additionally, ten opportunities are currently under investigation and nineteen opportunities will not be implemented due to financial, technical or other risks. A summary of the numbers and our business response to each opportunity is identified in the chart pictured below.



We have demonstrated commitment to the six Key Elements of the EEO Assessment Framework, as detailed in Schedule 7 of the regulations, throughout the three assessments:

#### People:

- We have a dedicated Energy Management Team responsible for formulating, implementing and leading the energy program
- A broad cross section of employees with direct influence on energy use involved in the assessment process.
- Energy efficiency experts, analysts and engineers, with proven experience and knowledge of the water industry, were utilised to assist in developing and conducting detailed energy assessments

#### Information, data & analysis:

- Our Energy Information Management System (EIMS) was developed to improve the accuracy of data collection, providing a central data repository and allowing detailed energy analysis
- Our demand management system enables our staff to proactively manage our water transmission regimes whilst optimising energy consumption and costs

#### Leadership:

- Our corporate strategic plan includes specific targets in relation to greenhouse gas emission reductions
- Our Energy Management Steering Committee includes members of the Senior Management Team and key stakeholders along with a senior management sponsor of the energy program
- Requirements of the EEO program are formally recognised within our Energy Management Policy which includes energy reduction targets. The assessment objectives are aligned with business priorities, environmental performance, water quality and operational improvements

#### Opportunity Identification & Evaluation:

- Opportunity identification workshops were held with key stakeholders where initial ideas were short-listed for detailed technical and financial evaluation
- Detailed evaluations and modelling of energy and financial benefits undertaken to  $\pm 30\%$  level of accuracy, categorised according to feasibility, payback periods and marginal abatement costs criteria
- In a number of circumstances pilot schemes and trials were conducted to determine if full implementation was warranted

#### Decision Making:

- Regular energy reports and presentations to senior management enabled informed decision making whilst ensuring alignment with business project planning and maintenance programmes
- Key stakeholders from across the organisation were engaged to develop action plans and the expansion of energy efficiency opportunities
- A named owner/project manager was assigned to deliver each energy efficiency opportunity

#### Communicating Outcomes:

- The EEO Public and Government reports have been reviewed by the SA Water Board and submitted throughout the first five year assessment cycle
- Regular updates and reports are provided to our business units, senior management team and the SA Water Board for the appraisal of our energy program
- Ongoing identification of the potential for implementing energy reduction measures into other areas of the organisation via workshops and awareness campaigns



## Water Transmission - Assessment Update

Our water transmission system includes four major pipelines supplying water from the Murray River to various parts of South Australia. A total of fourteen pumping stations exist along these major pipelines to provide the transfer of bulk water.

Three separate pumping stations were assessed in detail as part of the representative assessment approach between July 2007 and June 2008. The total amount of energy used in the financial year 2010-11 for our water transmission activities was 525 276 GJ.

Energy efficiency opportunities identified in the water transmission assessment - Update									
Status of opportunities identified to an accuracy of better than or equal to $\pm 30\%$		Total Number of opportunities	Estimated energy savings per annum by payback period (GJ)						Total estimated energy savings per annum (GJ)
			0 – < 2 years		2 – $\leq$ 4 years		> 4 years		
			No of Opps	GJ	No of Opps	GJ	No of Opps	GJ	
Business Response	Implemented	2	1	0			1	19 000	19 000
	Implementation Commenced	4					4	6 400	6 400
	To be Implemented	2	1	1 814			1	0	1 814
	Under Investigation	1					1	0	0
	Not to be Implemented	2					2	1 015	1 015
Outcomes of assessment	Total Identified	11	2	1 814			9	26 415	28 229
Status of opportunities identified to an accuracy of worse than $\pm 30\%$									
Business Response	Implemented	4	1	0			3	0	0
	Implementation Commenced								
	To be Implemented								
	Under Investigation	1					1	23 400	23,400
	Not to be Implemented	8					8	0	0
Outcomes of assessment	Total Identified	13	1				12	23 400	23 400
Total outcomes of assessment									
	Total Identified	24	3	1 814			21	49 816	51 629

A total of twenty-four opportunities with a potential energy saving of 51 629 GJ per annum were identified. Our water demand reduction or rebate scheme was implemented, resulting in energy savings of approximately 19 000 GJ per annum. Another project to upgrade our demand management system is expected to reduce energy consumption by about 6 400 GJ per annum. We are currently investigating the potential for installing renewable energy technologies including additional hydro generation.



## Wastewater Treatment, Recycling & Disposal – Assessment Update

Our wastewater treatment, recycling and disposal system consists of twenty-three wastewater treatment plants throughout South Australia, with five in the metropolitan area and eighteen in country areas. A long term contract to manage and operate our metropolitan water, wastewater plants and networks was awarded to the Allwater Joint Venture in 2011. The gas produced during the anaerobic water treatment process contains a significant amount of methane. At our larger metropolitan waste water treatment plants, this methane is used to heat the digesting sludge to maintain the efficiency of the process. The gas fuel is also used to generate electricity at these waste water treatment plants, with the waste heat used to maintain the digestion process. The electricity produced is used within the plant therefore reducing our use of non-renewable energy sources.

The total energy used in the last financial year 2010-11 for our wastewater treatment, recycling and disposal activities was 443 136 GJ. The representative assessment process conducted between July 2008 and June 2009 selected eight sample sites which captured the majority of treatment technologies utilised in our operations. This allowed opportunities to be investigated for implementation at other sites and in other processes.

Energy efficiency opportunities identified in the wastewater treatment assessment - Update									
Status of opportunities identified to an accuracy of better than or equal to $\pm 30\%$		Total Number of opportunities	Estimated energy savings per annum by payback period (GJ)						Total estimated energy savings per annum (GJ)
			0 – < 2 years		2 – 4 years		> 4 years		
			No of Opps	GJ	No of Opps	GJ	No of Opps	GJ	
Business Response	Implemented	3	2	11 063			1	3	11 066
	Implementation Commenced	12	3	68	1	158	8	22 631	22,857
	To be Implemented	2	1	4 669	1	141			4 810
	Under Investigation	2					2	0	0
	Not to be Implemented	8	2	17			6	10,199	10 216
Outcomes of assessment	Total Identified	27	8	15 817	2	299	17	32 833	48 949
Status of opportunities identified to an accuracy of worse than $\pm 30\%$									
Business Response	Implemented	2					2	0	0
	Implementation Commenced	4					4	0	0
	To be Implemented	1					1	0	0
	Under Investigation	1					1	0	0
	Not to be Implemented								
Outcomes of assessment	Total Identified	8					8		0
Total outcomes of assessment									
	Total Identified	35	8	15 817	2	299	25	32 833	48 949

A total of thirty-five opportunities were identified with the potential to reduce energy by 48 949 GJ per annum. A number of opportunities have been grouped into a \$25.8M capital project, which commenced in 2011, to optimise the energy used at our Bolivar Wastewater Treatment Plant. Other opportunities have been implemented, for example the inclusion of energy performance indicators within major operation and maintenance contracts, sub metering schemes and process improvements. Energy savings of 38 733 GJ per annum are expected to be realised by completing the opportunities from this assessment. Some opportunities do not provide direct energy savings however they have lead to process efficiency improvements with financial benefits.



## Water Distribution – New Assessment Completed July 2011

Our water distribution system includes water pumping and dosing stations, bore fields, cathodic protection, pressure regulating valves, energy dissipators and water storage.

A representative sample of forty-three sites was selected from over 700 sites in our water distribution system and detailed assessments were conducted on twenty eight pumping stations, two bores, a bore field with seventeen wells, three cathodic protection sites, eight sites including storage and pressure regulating valves and one dosing station.

The energy assessment of our water distribution activities was undertaken during the period between July 2010 and June 2011. The total energy consumed in the financial year 2010-11 for our water distribution activities was 122 447 GJ.

Detailed assessments of twenty-three opportunities were completed, these included system efficiency, energy recovery and renewable energy projects. In addition to this, many other enabling activities were identified that are highly replicable into other water distribution sites.

Energy efficiency opportunities identified in the water distribution assessment - New									
Status of opportunities identified to an accuracy of better than or equal to $\pm 30\%$		Total Number of opportunities	Estimated energy savings per annum by payback period (GJ)						Total estimated energy savings per annum (GJ)
			0 – < 2 years		2 – $\leq$ 4 years		> 4 years		
			No of Opps	GJ	No of Opps	GJ	No of Opps	GJ	
Business Response	Implemented								
	Implementation Commenced	1					1	0	0
	To be Implemented	16	16	10					10
	Under Investigation	5	1	95	2	0	2	0	95
	Not to be Implemented	1					1	0	0
Outcomes of assessment	Total Identified	23	17	105	2		4	0	105

All opportunities were assessed to an accuracy of  $\pm 30\%$  or better.

Our senior management team have endorsed the outcomes of the water distribution assessment and we will continue to implement the opportunities and extend them into other relevant sites.



# Opportunity Highlights

## Integrated Demand Management System Upgrade



We are required to effectively manage a network of bulk water transfer pipelines that accounts for a large portion of the organisation's total electrical energy consumption. Our Integrated Demand Management System (IDMS) is a decision support tool used by pipeline operators and systems engineers to simulate, optimise, plan and directly control pumping operations on these pipelines.

The IDMS upgrade opportunity was identified during the water transmission energy assessment and the project commenced in late 2009. The upgrade of the IDMS is expected to reduce the total energy consumption used by the four major pipelines by greater than 3% per annum. Improved forecasting, planning, optimising and scheduling of our bulk water transfers will reduce energy consumption and costs. This ensures that the pumping arrangements meet the water demand, River Murray licence compliance rules, target reservoir levels and electrical energy consumption rate limits.

The IDMS upgrade allows for the optimisation of pumping schedules in accordance with variable electricity tariffs. Additionally, the option exists to optimise pumping to either minimum energy cost or minimum energy consumption, or a weighted combination of the two.

*“The IDMS upgrade is likely to result in significantly better energy cost savings than originally anticipated”*

Steve McMichael,  
Project Manager, SA Water

## Bolivar Energy Use Optimisation Project



The Bolivar Waste Water Treatment Plant receives about 60% of all of Adelaide's wastewater and treats approximately 135 million litres of residential and industrial wastewater per day.

A number of opportunities were identified during the wastewater treatment, recycling and disposal assessment and their implementation commenced under a major capital project in 2011. The innovative upgrade to the energy plant at the Bolivar Wastewater Treatment Plant will see approximately 85% of the power used at the plant generated on site through wastewater gases.

The \$25.8 million project will improve the power supply at Adelaide's largest wastewater treatment plant by converting all of the available wastewater gases into electricity to be used on site. The project will more than triple the amount of electricity produced at the plant by utilising the existing energy source. The plant already produces about 10 GWh of electricity from biogas each year, which is produced when the waste which enters the plant is broken down. By upgrading the plant's electricity generation capabilities approximately 35 GWh of electricity will be produced per annum.

The energy optimisation project will reduce greenhouse gas emissions and lower SA Water's carbon footprint by reducing the amount of electricity imported from the grid from 30 GWh to 5 GWh per annum. The project will realise a reduction of harmful greenhouse gas emissions of carbon dioxide by more than 11 000 tonnes per annum. The upgrade will include engineering works to install 6MW of new reciprocating engines and a new chemical dosing plant will be built to reduce the formation of hydrogen sulphide. A dedicated natural gas connection to the site will supply the existing gas turbine and will supplement the reciprocating engines when economical.



Government  
of South Australia



## Co-Digestion

An opportunity to evaluate the benefits of co-digestion to reduce sewer loads and generate methane for electricity generation was identified during the wastewater treatment, recycling and disposal assessment.

The co-digestion of industrial high strength waste streams with the sludge from municipal wastewater treatment plants presented the opportunity to maximise the efficiency of anaerobic digesters. The project aimed to generate methane for electricity production, re-direct problematic trade waste streams and reduce the impact of trade waste disposal into operations. A successful bench scale trial provided positive results using several trade waste materials.

The experimental results for the co-substrate salty whey showed the potential for energy savings. It was found that redirecting two tankers of salty whey per week from the wastewater stream to the sludge stream, increases the amount of bio gas available for use in generating electricity on site, therefore reducing the electricity demand from the grid for the plant. The opportunity has been promoted to a wider audience due to its great potential for implementation at other waste water treatment facilities at SA Water and beyond.



## Water Demand Management

An opportunity to reduce energy consumption through water demand management schemes was identified during the water transmission assessment, implemented in 2007 and completed in 2011. The rebate scheme encouraged South Australian households to achieve greater water savings inside and outside the home. More than 209 000 rebates, worth \$39.9 million have been granted on water efficient products.

Rebates on efficient technologies such as water saving showerheads, dual flush toilets, hot water recirculators, pool covers and Smart Approved Watermark garden products have reduced the demand for water across the State. The water demand management scheme consequently resulted in an energy reduction of approximately 19 000 GJ per annum.



---

## Declaration

The information included in this report has been reviewed and noted by the board of directors and is to the best of my knowledge, correct and in accordance with the *Energy Efficiency Opportunities Act 2006* and *Energy Efficiency Opportunities Regulations 2006*.

**Lewis W. Owens**  
Chairman, SA Water