



## Project Summary

### Organization:

South Australia Water

### Solution:

Water and Wastewater

### Location:

Adelaide, South Australia

### Project Objective:

- Predict demand and optimization of water across the network
- Improve analytical and decision-making capabilities regarding new infrastructure and reduce operational costs
- Converge IT and operational data for short and long term planning

### Products used:

Amulet

## Fast Facts

- The Adelaide area is comprised of sixteen water supply zones, six major water treatment plants, and nine reservoirs.
- There are 26,000 kilometers of water mains in the state, of which 8,900 kilometers are in metropolitan Adelaide.
- A 25-year historical database of weather was used to predict long-term planning.

## ROI

- Predict short-term hourly and daily demand levels and long-term capital planning in seconds
- Saved AUD \$3 million in energy costs in the 2013-2014 financial year
- Further AUD \$400,000 saved in network expenditure over six months
- Reduced reaction times

# South Australia Water Saves AUD 3 Million in Energy Costs Using Bentley Software

## Amulet Provides Invaluable Forecast Data to Water Authority Regarding Water Usage and Movement

### Transforming the Way Water Is Distributed

South Australia is the driest state in the driest inhabited continent on earth. In fact, only 4 percent of the province receives more than 500 millimeters of rain each year. The River Murray, which flows for over 2,500 kilometers, is South Australia's only major river.

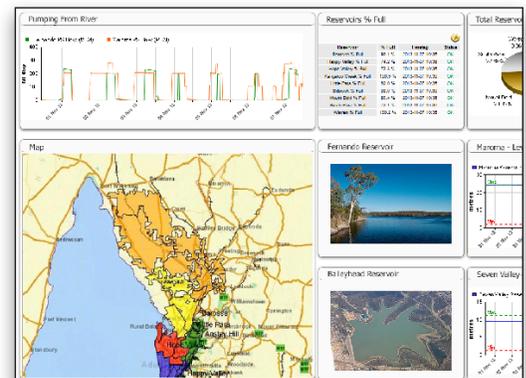
Adelaide and the surrounding area can experience prolonged periods of drought, the last of which prompted the building of a high capacity desalination plant and a north-south interconnecting pipeline within South Australia that, for the first time, allowed South Australia Water (SA Water) to distribute water almost anywhere in its network at any time in previously unachievable ways. What it couldn't achieve successfully was predicting demand and optimizing water movement accordingly.

This new desalination plant and the ongoing investment in telemetry equipment caused SA Water to look for more benefits, including increased analytical and decision-making capabilities to enhance the management of its network and optimize water usage. Bentley's Amulet was chosen as the commercial operational intelligence platform. It consisted of three separate systems (rolled out in stages), and provided SA Water with the ability to combine IT and operational data to predict water usage, distribution, and electricity usage. Three separate decision support tools were deployed in stages: the Demand Forecasting tool, the Distribution Optimization tool, and the Energy Portfolio Management (EPM) system. These combined systems saved SA Water AUD 3 million in energy related costs by predicting tariff increases and moving water accordingly.

### IT-OT Convergence to Maximize Performance

One of the main objectives for SA Water was pulling information from both the operational side and the information technology side in real time. Bringing them together has resulted in huge benefits, including improving performance, enhancing the understanding of interrelationships, and enabling better decision making.

Amulet was selected for the role of operational intelligence platform for its real-time ability to connect and capture data from a wide variety of sources, perform complicated calculations and analysis, and for its impressive range of visualization components.



*Operational data from the network is combined in real time with climate, energy, cost, and population data and displayed on dashboards.*

Data collected from the operational side was previously stored in SCADA systems and fed to an OSIsoft PI system, which was then accessed through Amulet. Real-time monitored sensor data is transmitted from the reservoirs, water treatment plants, valves, flow meters, and pumps spread across the extensive pipeline network. To maximize optimization, multiple sources of data from internal and third-party information systems was combined to aid predictions for the Demand Forecasting tool.

### The Value of Forecasting Demand and Usage

The Demand Forecasting tool is a model that predicts demand in network zones at different time frames specified by the user. It predicts short- and long-term demand – from hourly and daily forecasts up to annual strategic long-term capital forecasts. To make smarter predictions against actual water levels, more data from IT needed to be made available,

*“The Amulet tools have enabled us to develop operational analytics, dashboards, and reports, which help us effectively plan, monitor and control our integrated water supply system.”*

*— Steve McMichael,  
Manager Network  
& Production Planning,  
South Australia Water*

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especially when considering the many variables SA Water had to take into account, such as:

- population distribution and growth;
- operational activity;
- temperature and rainfall data (weather data streams from Bureau of Meteorology includes current and short term forecasts, as well as 25-year historical database for long-term planning);
- water restrictions, usage, and demand patterns; and
- weather patterns and events.

Amulet’s powerful calculation and analytics engine combined all data from these sources and provided detailed predictions on demand, helping operators to plan for every eventuality. As well as a predictive tool, the Demand Forecasting tool continuously monitors current conditions across the network, as near to real time, on the Network Status Display dashboard, embedded within the Amulet system. This allows operators to respond to problems as soon as they arise.

### **Making Sure Demand Meets Supply**

The next phase in the development was to integrate the Demand Optimization tool. This tool is used to optimize the availability and the movement of clean water around the network to demand areas in a timely and cost-efficient manner. It calculates how to deliver the water by calculating costs, determining what pumping stations to use, what pumps are needed, and so on. The Demand Optimization tool specifically designed third-party products to extract the data from Amulet to produce the sophisticated optimization analytics. These analytics are required to take the output of the Demand Forecasting tool to develop a live hydraulic model that determines water pressures and flows throughout the network.

### **Load Shedding Leads to Reduced Costs**

By identifying how much water to move, where it is to be distributed, and what valves and pumps need to be used across the network, the next logical step for SA Water was to determine the most cost-efficient time to carry out the movements. As with the Demand Optimization tool, the Energy Portfolio Management system also relied on the forecasts to maximize its analytics and gain more benefits. The system was used to predict and track electricity prices and determine when it should turn off pumps, shed load, and avoid high prices.

SA Water changed from purchasing its electricity supply from a fixed price to a fluctuating price based on the spot market. In

order to make the most of the potential savings involved, SA Water used Amulet to look at the spot market, predict prices, and allow SA Water to set pumping schedules accordingly for transferring water across the network. Using Amulet’s Data Collection Framework to initially pull in forecast data published from the Australian Energy Market Operator (AEMO), SA Water applies risk-based calculations to the data and extends it further into a long-term forecast. The data is then sent back to other systems to help SA Water produce its pumping schedules. Alarms and reports also help manage pricing.

### **Benefits Achieved**

Integrating the decision support tools into a comprehensive suite represents a “world’s first” in terms of realizing the benefits of actively optimizing water supply and reliability to Adelaide’s customers. The hydraulic model allows SA Water to cut response times by 90 percent by quickly identifying problems (e.g., a broken water main), and apply a workaround solution. Direct benefits attributed to these tools include:

- Reduction in the number of repair and shutdown issues escalated to significant or major events
- Reduction in the overall risk of major water supply shut down events
- Improved water security
- Realization of full asset capacity to allow for capital deferral benefits
- Supporting continuous improvement in the areas of:
  - o Customer complaints
  - o Timeliness of response to customer complaints
  - o Water infrastructure reliability
  - o Timeliness of water service restoration



*One of the many connected reservoirs across the SA Water network.*