

Solving Climate-Related Supply Problems One Drop at a Time



As the principal supplier of water, wastewater and drainage services to Western Australia, Water Corporation works to find sustainable solutions that make the most of limited resources under the stress of climate change.

Industry: Power & Utilities

Location: Australia - New Zealand

Use Cases: Resource Optimization

Website: watercorporation.com.au

Results

- Problems that took Water Corporation 1,200 seconds to solve with a free solver took as little as two seconds with Gurobi.
- Using Gurobi, an entire year of water planning can be completed in as little as 15 minutes.

With Gurobi, Water Corporation makes the most of limited resources to keep up with customer demand and comply with new regulations.

Due to reduced rainfall and increasing demand, Western Australia has had to rethink the way it plans its water use.

As the principal supplier of water to the region, Water Corporation must find ways to make do with a mix of groundwater, surface water, and desalination, while environmental restrictions and license limitations make usage even more complicated.

This leaves Water Corporation with a fundamental question: How can they best use their available resources to supply water under the stress of climate change?

Getting the answer wrong could have very real impacts on the environment, as well as public health.

Fortunately, with the power of mathematical optimization, Water Corporation has found a solution that not only satisfies customer demand, but also increases transparency and efficiency across their organization.

Finding Solutions That Satisfy Tight Constraints

As Amanda McGillivray, Senior Engineer - Groundwater, explains, there are many constraints that Water Corporation must account for in their day-to-day operations. These include:

- Licence limits on the aggregate amount of water they can take from the ground
- Requirements for moving license allocation between wells
- Water quality, which varies across wellfields
- The environmental sensitivity classification of each well
- A mix of health and aesthetic requirements

“We also have to meet customer demand, which varies throughout the year. For example, water consumption tends to be higher in summer than in winter,” says Phillip Meng, Lead Optimization Developer at Water Corporation.

“ We turned to Gurobi. And once we started, we saw that what took 1200 seconds with the open-source solver took just two seconds with Gurobi.”

Michael Canci

*Principal Data Product Owner,
Advanced Analytics, Water Corporation*



“ Our work with Gurobi has really opened people’s eyes to what is possible, and that’s led to a whole bunch of fronts that we’re currently exploring.”

Peter Condon

Advanced Analytics Manager, Water Corporation



At first, the teams were working in Excel spreadsheets to plan out the allocation of their resources. This process was sustainable for a while, but soon proved to be too time-consuming. In part, this was due to a more tightly constrained system, so getting a feasible solution was difficult, let alone optimal.

“As soon as one asset failed, we’d have to complete the whole plan all over again, which could take anywhere from hours to days. It just wasn’t feasible, unless we could have a team working full-time on it,” says McGillivray.

That’s when Water Corporation decided to try mathematical optimization. However, they found that free solvers were unable to get the job done.

“[The open-source solvers] either couldn’t solve the problem for the duration of the water year or it was limited in how many constraints it could address, and runtimes were so high that it wouldn’t have been usable,” says Michael Canci, Principal Data Product Owner, Advanced Analytics. “That’s when we turned to Gurobi. And once we started, we saw that what took 1200 seconds with the open-source solver took just two seconds with Gurobi.”

Gurobi Brings Speed and Precision to Water’s Toughest Problems

In addition to the solver’s speed, Water Corporation has also benefitted from Gurobi’s world-class support.

“The documentation and support have been really good, especially when it

comes to the advanced heuristics. We found it really easy to use and develop, and the experts at Gurobi are able to tell us if we’re doing things the right way and help us fine-tune our models,” says Meng.

In fact, since fine-tuning their models, they are now able to plan out an entire year of water production scheduling in as little as 15 minutes.

These innovative achievements are also what contributed to Meng’s nomination for the Young Water Professional of the Year Award, which he received in October 2022. The award is distributed by the Australian Water Association in recognition of “inspiring leadership and innovative research, programs and infrastructure projects.”

Inspiring New Possibilities

Greater recognition and transparency have also been seen throughout the organization, which has Water Corporation looking toward the future.

“Our work with Gurobi has really opened people’s eyes to what is possible, and that’s led to a whole bunch of fronts that we’re currently exploring. For example, it’s opening up the opportunity for us to reduce our energy costs by being smarter about how we operate,” says Peter Condon, Advanced Analytics Manager. “More broadly, it’s driving questions throughout the business about what else we can optimize, so I think it’s been really positive in the way that it’s blazing the trail for everyone else.”

Water Corporation is no stranger to the challenges posed by climate change. As the principal supplier of water to Western Australia, they must find innovative ways to keep up with demand while meeting regulations and working with resource limitations brought on by reduced rainfall.

With Gurobi, they’ve been able to achieve all this and more by optimally allocating resources and increasing transparency across their organization. They’ve replaced time-consuming manual processes with a powerful solver that can provide the best solution within seconds, while also inspiring new possibilities throughout the business.

Experience Gurobi for Yourself

Our 30-day evaluation license includes:

- Free benchmarking services
- Free model tuning services
- Free access to our world-class technical guidance and support
- Two free hours of one-on-one consulting services

Visit gurobi.com/free-trial to get started!

Academics: You may qualify for a free, full-featured Gurobi license. Explore our academic program at gurobi.com/academia.