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Yarra Valley Water's contribution to MELBOURNE 4.0

Water is in many ways the lifeblood of the world's most liveable city, nourishing the cool green spaces, gardens, waterways, and sports grounds that underpin Melbourne's world-wide appeal. But we are entering a period of unprecedented challenges and opportunities. By 2050, our city will be home to 8 million people. Droughts, heat waves and other extreme weather conditions are predicted to increase, and the volume of water flowing into Melbourne's reservoirs could reduce significantly by the end of the century. Meanwhile, the affordability of utility services is a growing concern for many Melburnians.

It's clear that the city's utilities can't keep doing things the same old way. To continue delivering our essential services and contributing to a liveable, productive city, we need to become digital businesses that embrace the extraordinary opportunities of data analytics, artificial intelligence and the Internet of Things.

With this in mind, Yarra Valley Water is developing technology enabled strategies to shape our services over the next decade, and beyond. These strategies will transform 18,000km of water and sewerage mains into a smart, digitally integrated network. Technology will help us to reinvent our service offering, broadening our role in waste disposal and provision of renewable energy, as well as helping to vastly reduce customer effort through sophisticated mobile enabled self-service offerings designed around customer needs.

Digital metering

The heart of our intelligent network is an array of interconnected sensors.

Currently, customer water meters are only read every three months, giving us just four data measurements a year – ineffective for analysing day-to-day water usage.

But thanks to recent advances in sensor technologies and the 'Internet of Things', we could soon make the shift to digital water meters, providing near real time information about customer water usage. By correlating this information with flow and pressure readings from our mains, we will be able to identify and fix leaks more efficiently. Meanwhile, customers will get a far more detailed profile of their water use, letting them plan and manage their usage to avoid bill shock.

Real-time analytics

The digital meters will eventually be linked with thousands of additional sensors measuring everything from manhole cover movement to the chemical composition of sewer gas.

By harnessing the processing power of the cloud to perform real-time analysis, Yarra Valley Water can turn these millions of sensor readings into integrated knowledge about the state of our entire water and sewerage network. Drawing on the latest in machine learning, analytics will allow us to better predict water usage patterns and identify problems such as leaks and bursts before they occur. New predictive analytic capability will also make network maintenance investment far more efficient by targeting those assets that the data tells us are under stress and proactively intervening before they fail.

Embracing automation

Although great advances have been made in the last ten years, much of our water and sewerage infrastructure still requires a degree of manual control – in many instances someone has to physically be on site to turn on a pump or open a pressure valve. But in the coming years, we'll be automating as much of our network as possible, freeing up our most important asset – our people – to work on more satisfying high value work that delivers greater value to our community.

While some critical systems will require human interaction via remote control, many day-to-day processes can be entirely turned over to digital decision-making algorithms. The result will be a more efficient and consistent water network, as well as reduced safety risks for our staff.

Trenchless technologies

Utilities are increasingly using 'trenchless' technologies as an alternative to disruptive open cut solutions to install new pipes or maintain existing assets. These advances - which include replacing pipes in situ, greater use of robotics, and image recognition - provide environmental and safety benefits and contribute to a more productive Melbourne by vastly reducing disruption particularly in densely populated urban areas including business districts.

Creating energy from food waste
Of course, all this technology needs electricity to keep it running, which is why Yarra Valley Water has entered the renewable energy business.

Opening in June 2017, our first waste-to-energy plant is located next to the Aurora sewage treatment plant in Melbourne's northern growth corridor. The only facility of its type in Australia, the plant produces clean bioenergy from organic food waste that would normally be sent to landfill.

As well as fully powering the adjacent sewage plant, the waste-to-energy facility will produce enough additional renewable energy to power 1500 homes. This excess energy will be sold back to the grid, reducing Melbourne's carbon emissions as well as the cost of sewerage services for our customers.

From sewers to silicon
Melbourne is changing fast, but so are the ways we deliver our services. And to cater for an extra 3.5 million people over the next 35 years, all of our city's utilities will have to adapt. We need to broaden our focus from pipes and pumping stations to become customer centred intelligent digital organisations – companies that use disruptive, innovative technologies to make the best decisions for Melbourne's people, businesses and environment.