USING AGENT BASED MODELLING TO IDENTIFY EFFECTIVE WATER CONSERVATION POLICIES

PROJECT FACTSHEET

LOW CARBON LIVING CRC

KEY POINTS

- **Water companies require tools to help them evaluate the likely success of proposed water conservation efforts.**
- **Agent-Based Modelling (ABM) provides an opportunity to use state of the art behavioural science to model the outcomes of a range of potential policy initiatives.**
- **We are developing an ABM to help understand how water-users make decisions around water conservation. This will improve the ability to develop and target programs, and help inform investment decisions.**

THE OPPORTUNITY / CHALLENGE

Customer behaviour and the development and adoption of water efficient appliances are the two biggest uncertainties in estimating the future long-term demand for water.

Community members consistently highlight that they value investment in cost-effective water conservation programs. Understanding how we can promote the adoption of water efficient behaviours and technologies will help water companies invest in economical programs that customers want and respond to.

OUR RESEARCH

We are developing and piloting an ABM approach to better understand the decisions made by community members when they are presented with a range of water conservation products and services, or are selecting water using appliances and fixtures such as washing machines and taps.
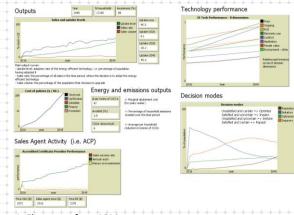
CRC for Low Carbon Living

We are a national research and innovation hub supported by the Commonwealth Government's Cooperative Research Centres programme that seeks to enable a globally competitive low carbon built environment sector.

With a focus on collaborative innovation, we bring together practitioners from industry and government with leading Australian researchers to develop new social, technological and policy tools for facilitating the development of low carbon products and services to reduce greenhouse gas emissions in the built environment. For more information visit www. lowcarbonlivingcrc.com.au/

Our ABM aims to predict the actions of different segments of the community when interacting with each other and things around them. The model will explore the future uptake of water efficient technologies and water using behaviours in customers' homes and businesses. It will capture the decisions that customers make, as well as understanding how and why they make them.

The output of our model will provide holistic evidence to water companies to support their delivery of water conservation initiatives. This, in turn, can increase urban resilience to water supply shortages, improve planning capabilities, reduce greenhouse gas emissions, and reduce the cost of water supply.

Figure 1: Elements of our ABM

RESEARCH QUESTIONS

We will address the following research questions:

- What influences consumer behaviour in changing patterns of water usage under a range of scenarios?
- What incentives motivate early adopters to implement new technology solutions?
- How can uptake be accelerated using non-financial interventions?
- What is the influence of drought conditions and awareness on customer behaviour?
- What groups will make changes that lead to the desired water savings?
- What are the links between water use and energy consumption
- How can water conservation programs lead to energy and carbon reductions?

INTERVENTIONS EXPLORED

We will develop our model using two of Sydney Water's water conservation programs:

WaterFix

The residential WaterFix program allows customers to choose the type of plumbing service they need to improve water efficiency in the home, providing customers with a choice of services to suit their needs. This service includes replacing showerheads, toilets and taps, and repairing leaks by a qualified plumber.

The program has been successful since its inception in 1999, and will provide a significant amount of data on customer preferences and decision-making for our ABM.

Rainwater tank service and maintenance

This project aims to increase the use of existing rainwater tanks by providing repair and maintenance services for customers.

Residential rainwater tanks provide an opportunity to reduce the demand for drinking water on a day-to-day basis. Water from rainwater tanks can be used to water gardens, flush toilets and do clothes washing. However, Sydney Water research has found that many tanks perform below expectations in terms of energy efficiency and in their ability to reliably provide water.

OUTCOMES

Our model seeks to embed into business processes a holistic, customer-driven approach to the evaluation of water conservation programs. It will have utility in relation to the design and development of programs (Figure 2) to funding and acknowledging broader community benefits. It will support the following functions:

- Develop and design of new water conservation related products and services.
- Assess potential opportunities to revisit old and existing programs.
- Provide evidence to support a more holistic evaluation of water conservation programs
- Inform the estimation of the future water demand

By assisting water organisations understand how customers may respond to stimuli that could change their water using behaviour, we expect that our research will contribute to:

- Proactive management of future water demands by embedding water conservation in day-to-day business
- Increased resilience to droughts and other supply shortages through water conservation
- Combatting ineffective spending on water conservation projects for crisis management
- Improving long-term demand forecasting
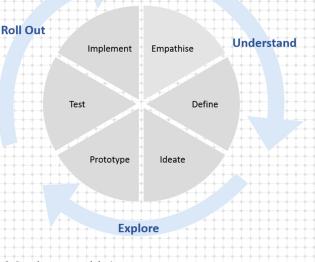- Avoiding expenditure on additional supply options through the management of peak and average demands.

Figure 2: Development and design process

TIMELINE

The pilot project was initiated in 2017 will be completed in 2018.

PROJECT TEAM

This is a collaborative project between CSIRO and Sydney Water as part of the Low Carbon Living Cooperative Research Council (CRC), which builds on world-leading research in the energy efficiency sector.

Project leader: Magnus Moglia, CSIRO Land and Water

Team: Stephen Cook and Sorada Tapsuwan (CSIRO), Marcia Dawson, Jonathan Dixon, Bronwyn Cameron, Andre Boerema (Sydney Water).

AUTHOR(S)

Magnus Moglia, Project Leader, CSIRO Land and Water & **Marcia Dawson**, **Jonathan Dixon**, **Bronwyn Cameron** , Sydney Water

FURTHER INFORMATION

For more information about this project, please contact:
CRC For Low Carbon Living
E: s.summerhayes@unsw.edu.au
T: +61 2 9385 0394   W: lowcarbonlivingcrc.com.au