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**CAWTHRON MARLBOROUGH
ENVIRONMENT
AWARDS
2023**

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JUDGES' REPORT

BUSINESS INNOVATION

WATERFORCE SOLAR-POWERED PUMPS

INTERVIEWED

Grant Clifford

DATE

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JUDGES

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INTRODUCTION

Irrigation and water management company WaterForce has developed a solar-powered water pump system for remote locations such as high country farms and baches down the Sounds.

Just one solar panel can provide enough electricity to run a pump for a domestic 5000 L water tank.

Interest is increasing as the technology becomes more affordable and clients want solar-powered pumps as a way to reduce their carbon footprint and their power bills.



Marlborough's high sunshine hours is another incentive to convert to solar power, and WaterForce is seeing demand grow for solar pumping systems that work off the grid.

GENERAL INFORMATION

WaterForce is an irrigation and water management company with 15 branches throughout New Zealand. The staff of nine based in Blenheim provide services to vineyards, farmers, aquaculture and domestic users.

Their work with solar water pumps is relatively new and was a response to requests from clients. Project manager Grant Clifford says it was important to wait until the solar panels and controller units were reliable and more affordable.

The judges were shown a domestic solar pump in Hawkesbury, where the owners were concerned about their carbon footprint and wanted a system that was not reliant on power from the national grid.

A single solar panel generates electricity to pump water from an underground chamber to tanks up the hill beside the house (a lift height of 43 metres). WaterForce installed an underground progressive cavity pump that runs between 700 RPM and 3300 RPM – this range allows it to adapt to lower sunlight conditions.

The pump operates only when the sun is shining and extracts up to 7000 L of water a day in summer and 3500 L a day in winter. There is an automatic cut-off once the tank is full, which saves the pump from running unnecessarily.

The house has a header tank on the roof and a 5000 L storage tank, which is enough to last the household for a week if no solar generation is available.

The 370 W system was installed in 2022 and cost \$11K for panels, controller, pump and installation. It is expected to pay for itself in about 12 years and is guaranteed for 20 years. There is also the option of adding a battery to store excess power. Grant says the pump needs no maintenance and rain keeps the panel clean.

The solar panel is made in China and has a 20-25 year lifespan. The Lorentz controller, which is made in Germany, converts the power to DC to run the pump. WaterForce took time and care to source the Lorentz controller and pump system - they needed to be confident of the product before promoting it, and have been pleased with the results.

The system is monitored with a mobile phone app that shows how much power has been generated and the amount of water pumped. The data is stored and builds up a picture of performance over time.

In all WaterForce projects, the size and number of panels are carefully calculated to provide the right balance of generated power (and volume pumped) against cost. Projects so far range in cost from \$6.5K-\$80K and involve water lift heights up to 212 metres.

Muller Station in the Marlborough high country has installed solar to replace a petrol-driven water pump for stock troughs. This removes the reliance on petrol for the pump and saves the farmer driving 15 minutes to start it. The solar pump automatically switches on when the trough water level drops and switches off when the troughs are full. From the farmer's point of view, it is a question of convenience and reliability as well as operating more sustainably.

WaterForce has other farming clients in the Top of the South using solar systems to run pivot irrigators and supply water to remote huts. They are also working with a Kaikoura farmer to come up with a solar-powered dairy effluent pond stirrer.



The company has installed two sets of three panels at Leefield Station to pump water to header tanks high up on the back country. This is a more advanced system with the panels rotating with the sun to maximise power production.

Grant says there is a lot of potential for vineyards to install solar pumps to fill up vineyard dams on elevated sites.

There are environmental and financial benefits for landowners who use solar pumps:

- Reduction in carbon emissions.
- Ability to fill troughs to keep stock out of streams.
- Reducing the reliance on fossil fuels to run remote pumps.
- Providing access to remote springs or streams to get safe drinking water for stock and people.
- Saving money on electricity, petrol and diesel.
- Potential to store electricity by adding a battery pack or configuring the system to sell surplus back to the grid.

Despite these benefits, it is still early days for installing solar pumps in Marlborough. In 2022 this work made up about 5% of WaterForce's business, but with increasing electricity prices and demand it is an area that could grow significantly.

THE JUDGES WERE IMPRESSED BY:

- The simplicity and effectiveness of the system and the ability to tailor a solution to the individual client.
- The technology is versatile and scaleable and can be applied to a wide range of users.
- Grant's broad knowledge and ability to problem-solve. He has a passion for what he is doing and he relates well with farmers and other clients.
- The range of clients and progress in the short time that WaterForce has been providing solar pumps. This is technology for our times and deserves to grow exponentially.
- WaterForce is clear on its target market – providing water services – and is sticking to what it does well rather than expand to broader solar energy installations.

PROBLEMS AND HOW THEY HAVE BEEN TACKLED

The lack of Government incentives to install solar compared with other countries. The up-front cost can be off-putting and the price paid for power going back into the grid is still too low to be a key selling point. However, with greater worldwide production the cost of the components is expected to continue to fall. And the increasing number of users in Marlborough may help encourage others to see this as a worthwhile investment.

- Supply chain issues and getting product from overseas. This is a global problem since Covid but has been partly eased by WaterForce increasing the warehousing of product in NZ, rather than relying on just-in-time delivery.



- Power is only generated when the sun shines and batteries for storage are not very affordable yet. Sales may depend on showing clients the future financial and environmental benefits, operational resilience, and savings over time.
- Climate change and more extreme weather. Gale force winds and massive hailstones are threats to a solar panel system and may be partly mitigated by careful site selection and a quality support structure. Some farmers are keen to build their own framing to support the panels but this voids the warranty.
- Site access can be difficult in more remote locations. Landowners are encouraged to clear tracks so vehicles can access the site for construction and any future repairs/maintenance.

SUMMARY

WaterForce's solar water pump is an efficient and reliable system that reduces the use of fossil fuels and provides resilience for landowners who do not want to rely on the national grid.

Marlborough's high sunshine hours makes solar water pump technology a strong option, especially for more remote areas.

Interest is increasing as the technology becomes more affordable and clients see reductions in their carbon footprint and their power bills.

SUGGESTIONS

- WaterForce is enabling innovation to grow on the sidelines but at this stage only four staff out of about 200 nationally are involved with solar pumps. Work with Head Office to raise the profile of the solar electric pump service. Highlight the benefits to clients and the benefits to the environment - the Awards video and judges' report may help with this.
- Develop a plan for Grant and Sam to train others and expand this side of the business.
- Consider linking with a biodiversity planting project that needs irrigation to establish, for example the Smart + Connected Forestry Group's Matariki plantings on the Wither Hills (another entrant in these Awards). Negotiate a reduced rate in return for WaterForce signage and promotion.
- Share the Awards video with Lorentz. A visit by Grant to the Lorentz factory would build the relationship and provide the opportunity to share experience and help sell the Lorentz system to NZ clients.
- If you get the Kaikoura dairy farmer over the line with the effluent stirrer and have proven results in electricity savings, get Dairy NZ and Fonterra on board to tell farmers about the technology. WaterForce could host a workshop at the Kaikoura property showing the system in action.
- Tell the positive story of the benefits of solar water pumps. Spread the word through the Farming and Winegrowing media. Contact: Jo Grigg, Country-Wide journalist in Marlborough, tempello@xtra.co.nz. Ph 027 275 4031 www.nzfarmlife.co.nz. Contact: Sophie Preece, editor of WinePress, sophie@sophieprece.co.nz. Ph 027 308 4455.
- You may be interested in finding out more about maximising land use under solar panels: <https://nzfarmlife.co.nz/solar-vision-2/>