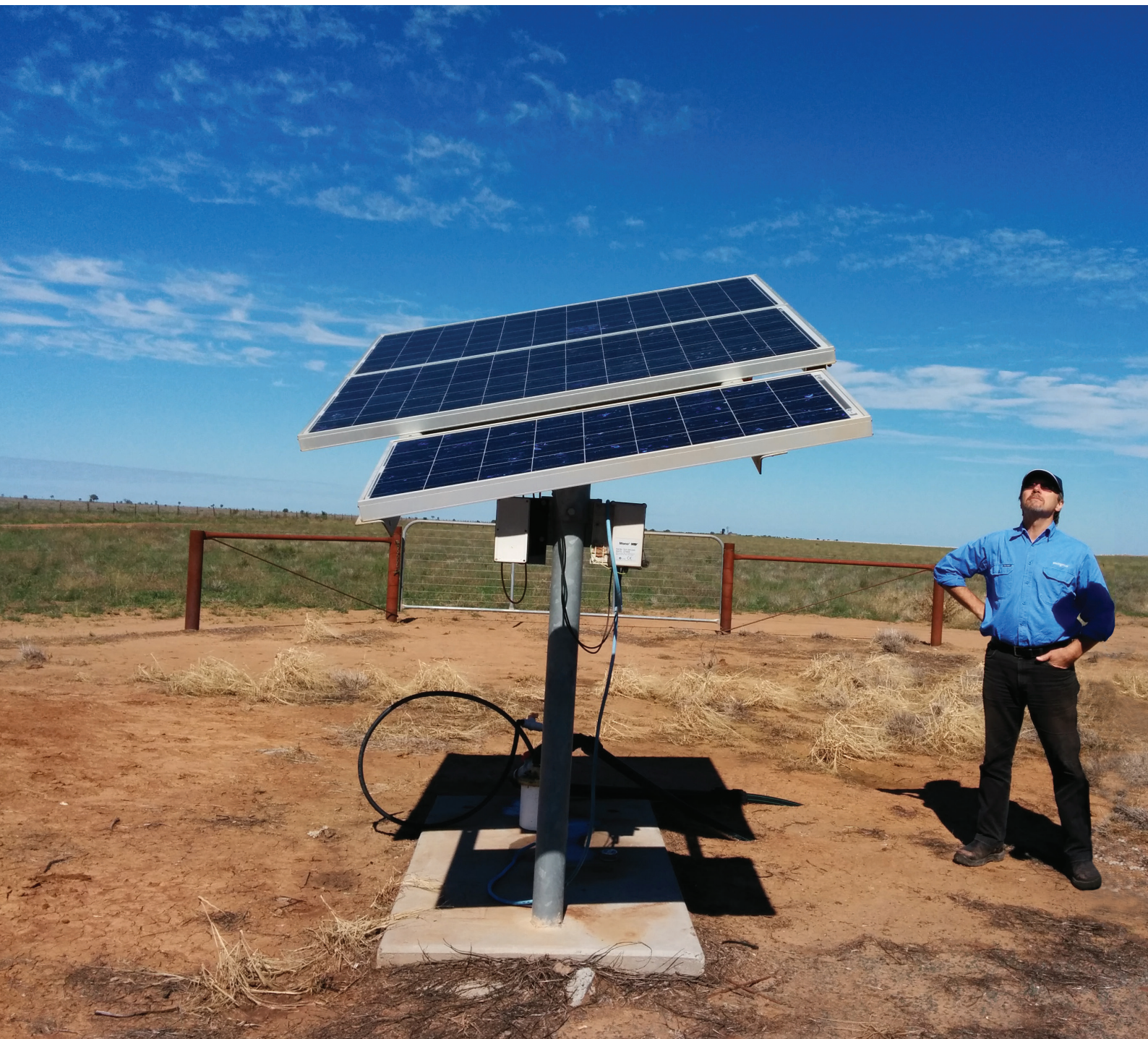


Solar Powered Pumping

Stock and domestic solutions



Office of
Environment
& Heritage



Reducing pumping costs

Solar Photovoltaics (PV) is an ideal power source for stock and domestic pumping, providing free electricity once installed and requiring little or no maintenance.

On most Australian farms pumps are used to fill the storage tanks that supply stock watering points and farm houses.

These pumps can be expensive to run and are often in locations that make maintenance difficult.

Solar pumping is undertaken during daylight hours with water storage tanks providing a buffer against fluctuations in solar energy.

Where mains electricity connection is not feasible, such as in isolated paddocks, solar power offers an affordable and low maintenance alternative to diesel generators and traditional windmill solutions.

Even where mains electricity is available, investment in solar can be a good financial decision. Stock and domestic water use is generally continuous throughout the year. This ensures full use of the generation capacity of the solar system, with energy savings rapidly paying back the installation costs.

Domestic solutions can be commissioned solely for water pumping or may be specified to supply total domestic electricity as part of an integrated system.

Cost will vary with size and site specific factors but small scale solutions can be installed for as little as \$4000 with a small array and pump.



Solar for the farm house

Solar power is ideal for pumping domestic water to header tanks, either as a free standing solution or as part of general power supply to the home. Solar power can significantly reduce domestic electricity bills by reducing daytime power usage.

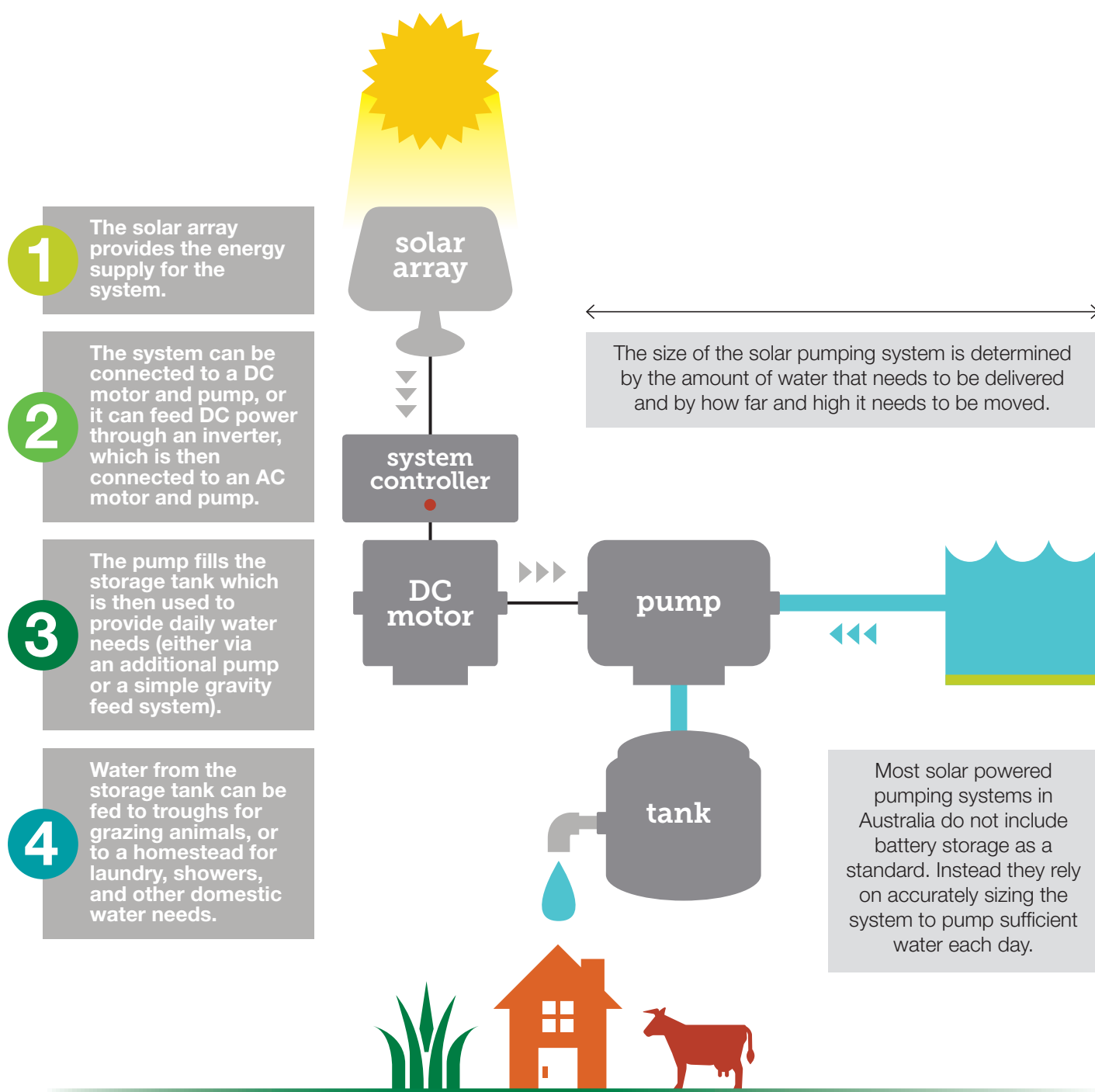


Tanks are a key component

When installing a solar pumping solution consider updating your water tanks.

How solar pumping systems work

A typical solar powered stock or domestic pumping system includes a solar array that converts sunlight into electricity, a system controller and an electric pump that moves the water from a source to its delivery point, typically a storage tank.



Feasibility, sizing and design

A correctly specified and installed solar pumping solution can provide long and trouble free service.

The specification process involves analysing the volume and reliability of water supply required, the capacity of water storage tanks, and the capacity and power needs of required pumps. Seek quotations from suppliers who have delivered similar projects and who have the ability to calculate power needs based on dynamic pumping head.

We recommend that you:

- Commission a general energy efficiency assessment for the farm – this will provide valuable baseline information and helpful recommendations
- Clarify your priorities – for example, is increasing reliability of supply more important than reducing energy costs? How flexible are your daily water requirements?
- Confirm the physical characteristics of your water source and pumping infrastructure (e.g. well depth, vertical and horizontal distance to storage) and ensure that your supplier uses this information
- Assess or estimate the quantity and cost of energy used by the current system
- Check that existing pumps are correctly sized and properly maintained
- Confirm that existing water tanks can store sufficient water to buffer against solar energy fluctuations (you may need to increase storage capacity)
- Analyse pay back period and return on investment with consideration to the above. Do not simply rely on figures provided by suppliers.



Discuss your needs with potential suppliers on site

It is essential that your installer fully understands your operational priorities for the system and can quantify how the system will deliver what you require in terms of water supply, not just energy.



Consider the entire system

Power capacity must be matched to the tanks, pumps and entire system.

Case study

Wayne Dunford and his son, Phillip, are cattle producers with properties in North West NSW running Santa and Droughtmaster cross cattle joined to Angus bulls.



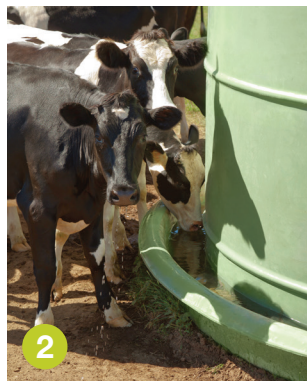
“Solar pumping has enabled us to develop a major new watering system for one of our properties.

The project involved de-silting and linking two existing deep dams and installing two solar-powered pumps, one at each dam, supplying five 22,000 litre header tanks with troughs and four 25,000 litre cup and saucer tanks. The dams, tanks and watering points are linked by a network of 17 kilometres of buried poly pipe.

The system allows us to reliably supply cattle with cleaner water as well as to have more watering points per paddock which spreads grazing pressure and minimises distance walking to water. In the summer months cattle will drink 50 litres plus per animal per day so reliable water supply is critical.

Solar power was the only feasible solution. Grid power is ten kilometres away at nearest point and diesel pumps were out of the question due to maintenance and cost of fuel.

The dams are fenced to preserve the integrity of the walls and the solar panels are protected by steel panels. It is an impressively cost effective solution that has increased the productivity and value of the property.”



Photographs

- 1 One of the Dunford's two solar arrays.** Fenced to prevent damage by cattle, the array is mounted on an automated tracker to maximise capture of solar energy at all times of day.
- 2 The “cup and saucer” tanks** provide clean, cooler water on demand. The trough rings the bottom perimeter of the tank. Photo by Rapidplas.
- 3 The pumps (orange buoy)** float on the dams and are purpose built to be powered by solar energy. They include automatic shut-off to avoid damage from dry pumping. The current dams are approximately 8,000 cubic metres and more than six metres deep to help control evaporation loss. The Dunford's plan to enlarge these dams to 15,000 cubic metres, at which time they will scale up the solar power supply.

“ We have improved water reliability, quality and access – solar power made it feasible ”

Why go solar?

Going solar can be an important step towards increasing the resilience and sustainability of your farm business.

Solar PV has many possible applications in agriculture including powering intensive production facilities and small and large scale water pumping. The technology is scalable, proven, well understood and widely adopted across Australia and internationally.

Solar systems for stock and domestic pumping require involve relatively low capital outlay and are a great way to explore the potential of on farm energy generation.

The benefits of solar for stock or domestic pumping include:

- Reduced bills for mains electricity or diesel
- Reduced need for inspection in isolated locations
- Fewer breakdowns and less maintenance. Aside from tracking systems, solar generators have no moving parts and are generally very reliable
- Fewer power lines and poles if replacing mains electricity
- Freedom from noise, fumes and fuelling runs when replacing diesel
- Scalability – panels can be added to increase output
- Flexibility – solar power can be integrated with mains electricity supply if desired
- Protection from rising energy costs – sunshine is free. Generating energy on farm reduces exposure to rising electricity, gas and diesel prices.



Sunshine is free

Solar panels can perform efficiently for several decades. Payback periods may be as short as five years.

Is solar right for your farm?

Solar is a great option for stock or domestic pumping if the following apply:



You have windmills or diesel generators that need upgrading



Mains electricity is too expensive or not available



You are tired of fuel runs and maintaining diesel generators

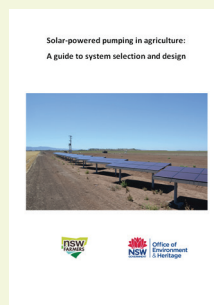


You have existing header tanks with several days of storage capacity



You prefer a silent, clean, sustainable energy solution.

Want to find out more?



NSW Farmers has produced a comprehensive guide to solar PV pumping systems in Australian agriculture with support from the NSW Office of Environment and Heritage.

Follow this link to order or download the guide: aginnovators.org.au/initiatives/energy/information-papers/solar-pv-pumping-systems

Check out the resources below and start researching suppliers.

aginnovators.org.au

The web portal, **aginnovators.org.au** contains extensive information relevant to farm energy, including solar PV. See: aginnovators.org.au/initiatives/energy

Water and energy

<http://goo.gl/mVZ2bq>

Solar photovoltaic energy on farm

<http://goo.gl/B5yU7c>

DPI pumping factsheets

How efficient is your pump?

<http://goo.gl/IQcTIF>

Is your diesel pump costing you money?

<http://goo.gl/nMMYPo>

How much does it cost to pump?

<http://goo.gl/LJVI0P>

OEH Resources

Solar Energy

environment.nsw.gov.au/households/solar-energy.htm

Finance guide

environment.nsw.gov.au/business/project-financing.htm

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While all care has been taken to ensure this publication is free from omission and error, no responsibility can be taken for the use of this information in the design or installation of any solar electric system.

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Cover photo: A solar array mounted on a tracker, installed to power pumps at a stock watering point in Western NSW. Credit NSW Farmers. © NSW Farmers.

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