

Grid Connected Solar Pumping Systems

A checklist for solar irrigation quotes



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This checklist is for anyone interested in installing a grid connected solar pumping system.

The system uses solar energy when the sun is shining and grid-supplied power during other times. Significant energy savings can be achieved with this solution.

Use this Checklist as a reference to ensure you've done the basic ground work, checked warranties, asked the right questions and can compare quotes from solar pumping businesses on a like for like basis.

BEFORE you seek quotes for a solar pumping system:

1

Check your existing irrigation system's energy and water efficiency. Can you make savings?

Less water and less energy required = lower costs and better payback on solar

If your pump is old or not fit for purpose a new pump could be cost effective over time. Optimising the amount of water pumped around your farm can lower demand and energy costs. Ask your local pump/irrigation expert or energy consultant to assess your system against current industry standards. To find out more go to: www.dpi.nsw.gov.au and search "pump efficiency" or download WATERpak for cotton, grain and legume producers from cottoninfo.com.au

2

Understand your usage – water, energy and costs.

- Review your electricity bills, meter readings, interval data, tariffs and demand charges with an expert to be sure you're getting the best deal. Ask your electricity retailer for 15 minute interval data to understand your power usage. Alternatively, ask your energy consultant or solar provider if they can assist with data logging.
- Measure energy use across your farm to set benchmarks for greater efficiency. Calculate a baseline whether it be total energy cost per season or \$/Ha or \$/ML pumped.
- Consider installing a Variable Speed Drive (VSD) and check your Power Factor Correction (PFC).
A VSD uses electronic controls to vary the frequency and voltage supplied to the motor, which regulates the motor speed and, in turn, adjusts the pump's output. Lowering the speed of a motor by 20% can produce energy savings up to 50%. Make sure the VSD is compatible with your solar system controllers. Not all pumps will benefit from a VSD, so check the costs and benefits before installing. To find out more visit aginnovators.org.au/initiatives/energy/information-papers/variable-speed-drives-pumps or go to aginnovators.org.au and search "variable speed drives".
- Check if you qualify for the NSW Energy Saving Scheme before you implement changes - www.ess.nsw.gov.au
- Is it feasible to shift your current pumping tasks to daytime?



Remember that peak demand charges will still apply if your pumping requirements are not flexible enough to cope with power fluctuations on cloudy days; unless you install a battery and control systems to manage fluctuations.



It is recommended that growers calculate their own simple pay back and annual electricity savings from quotes provided. Use your own cost analysis to compare with that estimated by the solar irrigation supplier.

3

Contact your network distributor early.

NSW irrigators can contact Essential Energy Technical Enquiries ph. 132391 option 4. The network distributor carries out preliminary assessments on proposed generation connections, and will advise if upgrades to power lines and/or transformers are required. Upgrade costs are usually the responsibility of the proponent/farm. Grid export limits may apply depending on grid capacity at the connection point. For more info on connections in rural NSW go to: www.essentialenergy.com.au/content/connecting-to-the-network1



**Essential Energy
Technical Enquiries
Phone 132 391**

4

Talk to your retailer about feed-in tariffs if you plan to export solar power into the grid and let them know the size of your proposed system. Feed-in tariffs can vary significantly between retailers and export limits may apply.

5

Can your solar energy be used elsewhere on farm when you are not pumping?

Many broadacre irrigators have seasonal pumping requirements. Utilising solar power for trickle pumping into a reservoir over the year may be an option.

A solar PV system will provide a better return on investment if use of its generated power is maximised over the entire year.



Site considerations:

6

Do you have a suitable shade free site? A fixed 100kW array may require 1200 – 1500m².



Make sure there is adequate spacing between panels to prevent shading.

Will the footprint for the system cause any impact on vegetation? Have you spoken with Local Land Services and are there any biodiversity conservation values that may be impacted?

Are there any Aboriginal cultural heritage values that may be impacted on your site?

Is council approval required?

Useful resources

Visit aginnovators.org.au for a full suite of solar pumping resources, including guides to solar powered pumping and a technical guide to system selection and design

www.aginnovators.org.au/project/solar-powered-pumping-initiative

Visit CottonInfo.com.au for info on energy efficiency and solar for irrigators

The Solar PV for chicken industry tool is relevant for grid connected irrigators. Download the "Solar PV assessment tool" from www.agrifutures.com.au



Find your Supplier

Supplier Proposal Checklist

Ask the supplier to provide a detailed report that includes everything required for your system, including utilisation of existing infrastructure. Be sure to get more than one quote to test the market and seek out the best product for your business.



Water

- The amount of water that will be delivered across daily and monthly periods which meets your irrigation requirements.
How was this calculated and what assumptions were made?
- The amount of water the system will deliver from solar power only and then from other sources.
This should be an average based on historical data. Understand the supplier's information source and assumptions.



Cost

- The model, size and breakdown of costs for the following:
 - Pump
 - Motor
 - Variable speed drive
 - Maximum Power Point Tracker (MPPT) controller
 - Smart controllers to optimise output
 - Solar array – size of system (kW), type of panels and mounting system. Ensure panels are Tier 1 rated.
 - Inverter
 - An option for telemetry and remote monitoring system and ongoing cost.
 - Wiring/cabbling
 - On site control housing and footings
 - Fencing to exclude stock, wildlife and people
 - Travel, freight and accommodation
 - Installation and commissioning

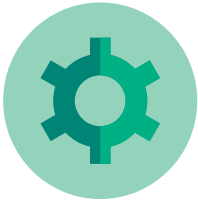
Total Costs: ?

Has the supplier provided an estimate of simple payback, IRR, NPV?*

Does payback include peak demand charge reduction?

Does payback include inverter replacement, operating and maintenance costs and loss of efficiency over time?

* IRR = Internal Rate of Return and NPV = Net Present Value



Operational

Has information been provided for the following operational items:

- Estimated first year output in kWh (Clean Energy Council method) of the system.
This figure will allow you to compare different types of panels and their output.
- The irradiation figure (Watts/m²) the supplier is basing the calculations on.
- Max Solar Panel Rating (kW) and estimated daily kWh during pumping season.
- Average solar hours per day during pumping times.
- Estimated annual forward payment for LGCs (Large-scale Generation Certificates) for systems greater than 100kW, for at least five years.
- Upfront solar rebate for Small-scale Technology Certificates (STCs) if solar system is less than 100kW.
- If the solar system or controller fails, is there a bypass mode that can enable pumping to resume using electricity only? Who will fix it and within what time frame? What are your options in times of critical water need?
- How much existing infrastructure can be utilised?
- Maintenance regime and operational checks. How can I maintain highest efficiency in the system over time?
- How long will the system take to install and when will it be operational?



Warranties and Quality Assurance

- Check the supplier/solar installer is a Clean Energy Council (CEC) accredited installer at www.solaraccreditation.com.au.

The CEC certifies and trains installers to ensure your system meets industry best practice standards and all relevant Australian Standards.

Make sure that the work is not going to be sub-contracted to a non-accredited installer. For larger or more complex projects above 100kW in NSW, a Level 3 Accredited Service Provider (ASP) is recommended – find an ASP at www.resourcesandenergy.nsw.gov.au

- Does the supplier specialise in solar pumping systems?
- What is the expected lifespan and warranty on the solar system, installation and pump equipment? Check inverters have a minimum 10 year warranty.
- Will the system be installed according to manufacturer's warranty and specifications?
- What is the manufacturer guaranteeing vs installer? Who has what responsibility for each warranty case? What is the responsibility of the customer?
- Do the main project components have a reputable presence in Australia?
- Does the company have a presence in Australia for support and warranty issues? What is the process of invoking a warranty if the manufacturer is from overseas? Will the supplier own the process?
- Does the supplier have indemnity insurance?



Other

Does the report include:

- Technical drawings of the site layout for solar arrays
- A plan to register and claim for Large Scale Generation Certificates (LGC)/ Small-scale Technology Certificate (STC) rebates.
- Information on safety signs, and regulatory safety requirements

Further considerations

when reviewing quotes

1

Maintenance, support and monitoring system

– What are the ongoing maintenance requirements with regard to warranty and the maintenance of the project? Cost of sensors, metering and monitoring, remote start/stop capabilities?

3

Do your due diligence – How long has the business been around? Do they have a good reputation and a track record? Do you trust them?



Solar pumping systems are significant investments.

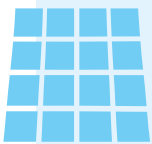
It is important that your chosen supplier demonstrates experience installing solar for irrigation systems.

Some suppliers can provide expertise in whole of system solar irrigation solutions, providing a single point of contact for any breakdown and maintenance questions.

Can your supplier demonstrate successfully completed projects? A good supplier will welcome the opportunity to take you to see a completed project and allow you to meet previous clients.

2

Check assumptions – The output of solar panels will deteriorate over their lifetime. This can impact the projected future savings and running costs of a pumping system.



Typically solar panel output falls by an average of 0.8% per year.

Check the NASA website to find out the average daily solar radiation (kWh/m²/d) for your location. Enter the longitude and latitude for your site at <https://eosweb.larc.nasa.gov/sse/RETScreen>.

Check and compare the performance of solar panels here: www.solarquotes.com.au/panels/comparison/chart/

4

Do your own solar rebate calculation – for systems under 100kW, a small-scale technology certificate (STC) rebate is available as an up-front payment at the time of installation.

Large-scale technology certificate (LGC) payments are available for systems greater than 100kW; providing the installation has been certified as a power generation plant, and has a certified power meter installed.

LGCs are paid annually with up to date prices available at websites such as <http://greenmarkets.com.au/resources/lgc-market-prices>

LGCs will only be calculated on energy displaced as well as energy exported to the grid. Remember that export limits may be applied. For example, if the pump is only used six months a year, the LGCs will only be calculated for the six months the pump is operating.



LGCs can be accumulated up to 2030 but the price will fluctuate over time.

Brokers can register and manage your LGCs. Some brokers will guarantee a price for the first five years and then use the spot price going forward. Visit www.rec-registry.gov.au for more information.

5

Ask about the expected losses in the existing system, and the proposed system. A motor drawing 50kW of power at the pump will likely need 65kW or more of power at its generation point to get the power to the actual pump. These transmission losses can be minimised through pump efficiency, but cannot be avoided altogether.

6

Is the system battery ready?

Does it make sense to incorporate storage now or later? Can battery storage be used to minimise peak demand charges?



7

Feed in tariffs, network tariffs, and export limits can be subject to change hence growers/irrigators should consider this when deciding about hybrid 'switching' equipment.

8

Do you want to build, own and operate or lease?

Some companies offer power purchase agreements, though they may require year round purchase of energy. Check with your financial advisor for the best option for you.

