

# Solar Diesel Hybrid Pumping Systems

A checklist for solar irrigation quotes



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A checklist for reviewing solar irrigation quotes

This checklist is for anyone considering a solar diesel hybrid pumping system.

The system uses solar energy when the sun is shining and then switches to diesel at 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 pump'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](http://www.dpi.nsw.gov.au) and search "pump efficiency" or download WATERpak for cotton, grain and legume producers from [cottoninfo.com.au](http://cottoninfo.com.au)

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**Understand your usage – water, energy and costs.**

- Measure energy (cost of diesel) and labour inputs across your farm to set benchmarks for improved efficiency. Calculate a baseline such as total energy cost per season or \$/Ha or \$/ML pumped. Use your own cost analysis to compare with that estimated by the solar irrigation supplier.
- Consider installing a Variable Speed Drive (VSD). 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 diesel hybrid system controllers. Not all pumps will benefit from a VSD, so check the costs and benefits before installing. To find out more about VSDs visit [aginnovators.org.au/initiatives/energy/information-papers/variable-speed-drives-pumps](http://aginnovators.org.au/initiatives/energy/information-papers/variable-speed-drives-pumps) or go to [aginnovators.org.au](http://aginnovators.org.au) and search "variable speed drives".
- Is it feasible to shift your current pumping tasks to daytime?



3

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

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

Many broadacre irrigators have seasonal pumping requirements. Utilising solar power for other purposes or trickle pumping into a reservoir over the year may be an option when not irrigating.

### Site considerations:

4

Do you have a suitable shade free site? A fixed 100kW array may require 1200 – 1500m<sup>2</sup>.



**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 on your site? Will they be impacted?

Is council approval required?



## Useful resources

Visit [aginnovators.org.au](http://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](http://www.aginnovators.org.au/project/solar-powered-pumping-initiative)

Visit [CottonInfo.com.au](http://CottonInfo.com.au) for energy efficiency and solar information for irrigators



# 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 energy sources.

*This should be an average based on historical data. Understand the supplier's information source and their assumptions.*

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**How much existing infrastructure can be utilised?**

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### Cost

- The model, size and breakdown of costs for the following:
  - Pump
  - Motor
  - Variable Speed Drive (VSD)
  - Genset (if required)
  - Drive
  - Smart system controllers to optimise output
  - Solar array including size of system, type of panel and mounting system – ensure panels are Tier 1 rated.
  - Wiring/cabling
  - Footings, on-site control housing
  - An option for telemetry and remote monitoring system. Is mobile coverage required? What are the ongoing costs?
  - Fencing to exclude stock, wildlife and people
  - Travel, freight and accommodation
  - Installation and commissioning

**Total Costs: \$?**

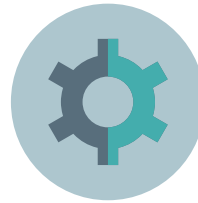


**What is the estimated daily kWh output during pumping season?**

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

**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/m<sup>2</sup>) the supplier is basing the calculations on?
- Maximum Solar Panel Rating (kW) and estimated daily kWh output during pumping season.
- Average solar hours per day during pumping times.
- Estimated forward annual solar payment for Large-scale Generation Certificates (LGCs) for systems larger than 100kW, for at least five years.
- Upfront solar rebate for Small-scale Technology Certificate (STCs) for systems smaller than 100kW.
- If the solar system or controller fails, is there a bypass mode that can enable pumping to resume using diesel only?
- If the system fails, who has the expertise and parts to fix it and how far away are they? What are your options in times of critical water needs?
- Is it cost-effective to integrate battery storage?
- 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](http://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.

- 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 LGCs/ STC rebate.
- Safety signs, and regulatory safety requirements, lighting and walkways if needed.

# Further considerations

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, fuel use monitor and remote start/stop capabilities.

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.



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

Check the NASA website to find out the average daily solar radiation (kWh/m<sup>2</sup>/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/](http://www.solarquotes.com.au/panels/comparison/chart/)

What are the delivery and installation assumptions? For example, is the supplier providing the total solution, or would you prefer to use a local company for the solar array?

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.

4

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

Large-scale generation certificate (LGC) payments are available for systems >100kW if 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>

The LGCs will only be calculated based on energy displaced. 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, often they guarantee a price for the first five years and then use the spot price going forward. To find out more visit [www.rec-registry.gov.au](http://www.rec-registry.gov.au)

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**Ask about the expected losses in the existing system and proposed system.** A motor drawing 50kW of power at the pump will likely need around 65kW or more (sometimes double the rating of the pump) 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.

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### Is the system battery ready?

Does it make economic sense to incorporate storage, now or later? Can you use batteries to supply intermittent power to prolong the life of your generator?



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

Some companies offer power purchase agreements for supply, though this may require year-round purchase. Check with your financial advisor for the best option.

