



Tumuruu

Introduction



Summary

Australian Solar Enterprises (ASE) was founded in 2021 by two passionate individuals who want to help Queensland achieve its climate goals. The founders are supported by a highly qualified and experienced group of consulting partners with a combined 100+ years in development approvals and the renewables industry. ASE have identified the Tumuruu project on a site near Blackbutt QLD and current the development process is being undertaken to secure the Development and Grid approvals to allow the project to be constructed.

The team is focused on ensuring that the Tumuruu Solar development is world class and will provide value to our stakeholders. ASE understand that development can create impacts on surrounding areas, and we will work with the community to ensure impacts are mitigated wherever possible, and benefits are shared among the community, the surrounding area, Queensland and the nation through renewable energy generation.

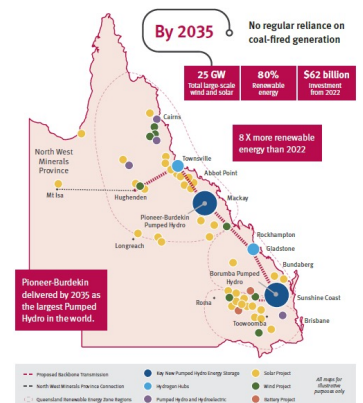
Our approach is to design and deliver a large-scale project that moves the renewable sector forward to help meet the Australian climate targets. We are proposing a low-profile, high density solar solution that will limit visual impact and conserve agricultural land whilst delivering benefits to the community.

Our current solar design has the benefit of:

- Less development impacts than traditional solar farms:
- Compact substructure and ultra-low profile (approx. one metre)
- 72% less CO2 compared to conventional substructures
- Fewer materials, which will reduce supply, logistics and installation time by up to 40% compared to conventional alternatives
- Local spending: Around ten percent of the project cost will be injected into the local community during the year-long construction period, through catering, accommodation and supplies.
- Local jobs: we estimate the construction period will support up to 100 roles over twelve - eighteen months with 6-10 jobs during ongoing operations. Residents will have the opportunity to work on the project
- ASE has committed to a community benefits scheme for the project, which would see a financial commitment contributed annually for the lifetime of the project. The community benefit scheme would be managed and administered by a committee of local community members.

What we are addressing

- At least 25Gw of new renewable energy needed for the QLD Energy & Job Plan; **Tumuruu is 400Mw**
- Three energy zones; **Tumuruu is located within the Southern QREZ**, ~2 hours from Brisbane CBD
- All publicly owned coal-fired power stations to shut and operating as clean energy hubs by 2035, including Tarong. Tumuruu is 20km East of Tarong – reduces coal dependency and **helps fill gap in electricity supply to Brisbane and creates both construction and operational employment opportunities**
- Process to connect 3-5 years power to grid; **Tumuruu could be operating by 2025**
- Around 1500km of new high voltage backbone transmission to move more power around the state. **The Tumuruu site has existing infrastructure – less capital expense by QLD Government, no infrastructure community impact, secured site.**



Stay up to date with project developments and sign up to our project newsletter



Want more information?

Call us on 0422 794 072, head to our website <https://www.tumuruusolar.com.au/>

Or send us an email tumuruu@planc.com.au



~400MW

Expected connection size

750kt+ CO2

Annual Carbon Abatement

\$200M+

Australian Jobs & Supply

Local Economic Benefit

\$70M
Regional construction spend

\$4.1M
Annual regional spend

17
Operational ongoing jobs

\$4.8M
Community funding over life of the project

100+
Construction jobs

Community Engagements

3850
Unique website visits

147
Letters, phone calls, face to face comms

39
Feedback received



Issues heard

Visual

Noise

Storm water

Night light

Traffic



What we have done

- ✓ Solar panels at 1 metre high
- ✓ Inverters relocated away from boundaries
- ✓ Footprint redesigned to avoid storm water catchments
- ✓ No B-double trucks & relocation of front gate; buses being considered for transport
- ✓ No floodlights - will use infrared security cameras

Timeline

SITE IDENTIFICATION (2021-22)

Comprehensive analysis of wind and solar resources, environmental and engineering constraints, and proximity to electricity grid, services and infrastructure.
Site identification for the solar and wind farm, and execution of landholder agreements.

PLANNING AND APPROVALS

All renewable projects are required to prepare a comprehensive submittal to ensure the project achieves an appropriate balance between environmental, social and economic considerations and is in the public interest.

Solar Farm and BESS Approval Steps

Community Engagement – Commenced November 2021
Development Assessment submitted – January 2023
Information Request Received – February 2023
Information packet Submission – Planned May 2023
Public Notification Period – Planned late May 2023
Development Approval Decision – Planned July 2023

CONSTRUCTION

Expected late 2024
12 – 18 months with up to peak of 120 roles
Work managed by an Australian owned installer with strong experience and links with regional Australia

RECOMMISSIONING OR DECOMMISSIONING

The project life is approximately 30 years. At this time feasibility studies and landholder consultation would be undertaken to determine if the project is to be recommissioned (rebuilt with latest technology at the time) or decommissioned.

PRE-FEASIBILITY STUDY (2022-2023)

Determined a feasible solar resource with adequate grid capacity to support the project.
Once the site is selected, a preliminary financial model is developed to understand if the development is legally and economically feasible.

GRID CONNECTION

Managed via Powerlink with detailed studies undertaken by consultants to ensure project will operate within the Powerlink requirements. Process runs co-current to Planning Approval
Expected April 2024

COMMISSIONING AND OPERATION

Undertaking all required engineering and electrical due diligence and connecting the project to the electricity grid to feed energy into the Australian Electricity Market.
Tumuruu - expected 2025

Operations will require 6 – 10 roles with support of local businesses to maintain site etc. Tumuruu to provide 635GWh of green electricity into the Powerlink wholesale network.

← We are here

Noise

As outlined in the [Queensland Solar Farm Guidelines](#), solar farms typically generate minimal noise, with any noise generated generally coming from inverters, transformers and tracking motors. Because of this, solar farms are unlikely to disturb local residents or communities. The solar project site sits within a rural setting, subject to regular background noise impacts including farming equipment, and road traffic from Bowman and Franks Rd adjacent to project's proposed location. Construction vehicles and machinery during the construction phase would be most relevant in contributing to noise and vibration impacts from the solar project. However, this noise would only be temporary, as it is during the construction phase.

An operational noise assessment will be included as part of the Development Assessment to assess potential noise impacts for affected residents.

Efforts have been made following initial site design to move noise emitters further away from the project boundary which will help address any ongoing noise from the project.

Technology



Tumuruu will utilise the latest technology across the project. This ensures reliability, reduced hazards and the ability to select technology with low noise footprints. For the inverters this means assessing the capability of noise reduction kits.

For the ground mount (what the panels are fixed to) Tumuruu will utilise a high density fixed tilt system. This means no moving parts unlike trackers and will reduce ongoing operating noise.

Visual

Scope



The Visual assessment identifies various viewsheds surrounding the project and rates the level of impact. The solar project would also be marginally visible by commuters along Bowman Rd. Generally these views would be considered of limited duration for passing motorists. The proposed location of the project's solar farm offers significant natural tree screening assets which will assist in reducing visual impacts.

The visual assessment also provides a detailed landscape design that would feature native species that will support buffering of any impact view sheds.

This landscape has been informed by an external consultant and to ensure landscape species and native characteristics are identified.

Visual Assessment & buffering



The visual impact assessment will involve an assessment of specific receivers or viewpoints. Viewpoints will be determined based on distance from the project and relative height difference. The level of potential visual impact will be determined based on several factors and a rating from very low to high will be assigned in accordance with the guidelines. Mitigation measures will be developed for impacted receivers and viewpoints, with avoidance being required for impacts assigned a high rating.

Glint and Glare



All solar panels are designed to absorb light as much light as possible, rather than reflect it. The Tumuruu solar project is proposed to be fitted with tracking panels that can be adjusted to avoid or minimise any potential for glare.

A glint and glare assessment is being undertaken for the solar project to model and assess these impacts to ensure any potential significant impact is avoided or mitigated appropriately.

Community Benefits

According to the NSW Farmers Association's Renewable Energy Landholder Guide, renewable energy projects can have significant social and economic benefits to the host communities.

The impact of renewable projects on social and economic factors has been outlined in several studies both in Australia and Internationally, which include the below:

Social Benefits:



- environmental benefits from reduced CO2 emissions
- creation of deeper social connections to community
- community development and liveability
- education and training of contractors and local residents

Economic Benefits:



- allow the local community to share in the benefits of the project
- boost of jobs and skills in the area increasing local employment
- improvements in local infrastructure
- energy & income security are not impacted by weather with landholders drought proofed
- increase in property value

Several studies have been completed in both Australia and overseas exploring the impact of renewable energy projects on property value. It was concluded that property markets and regional economies greatly improved in value. The key drivers for these increases include:

- population growth, meaning higher property demand
- increased job opportunities
- higher average incomes, leading to growth in local business spend
- lower unemployment rates in region
- reduced rental vacancy rates and rent increases

All these are driving forces behind growth and prosperity from renewable projects, leading to a positive impact on property prices and the economic value of the communities they operate in as a whole.

Community Benefits Scheme:



ASE has committed to a community benefits scheme for the project, which would see a financial commitment contributed annually for the lifetime of the project. The community benefit scheme would be managed and administered by a committee of local community members. The monies accumulated in the scheme would be used to fund local community projects or infrastructure. The proponent is committing to the below contribution each year for the lifetime on the project. The final contribution total will be dependent on the finalised registered capacity of the project:

COMMUNITY BENEFIT SCHEME

Tumuruu	(MWac) Planned	Contribution \$/MWac	Total \$/yr
Solar and Battery	400	\$250	\$100,000



Decommissioning

Decommissioning refers to the process of ceasing operations and removing infrastructure at the end of the project's operating life. The Development Approval from the South Burnett Regional Council for Tumuruu is likely to require Tumuruu to be decommissioned at the end of their operational life and land to be returned to its original condition.

It involves dismantling and removing solar panels, structures and ancillary infrastructure (cables, inverters, fencing) from the site and recycling, reusing or disposing materials and waste products, and returning the site to its pre-existing use and land and soil capability class. It also involves disconnecting the development from the electricity network.

The proponent of any solar energy project should be responsible for decommissioning and rehabilitation, and this should be reflected in an agreement with the host landholder.

Tumuruu already has this agreement in place for the proposed site.

As outlined in the [Queensland Solar Farm Guidelines](#) and industry best practice by large scale solar developments must identify the decommissioning and rehabilitation activities that will take place and address all relevant issues for decommissioning and rehabilitation in the project planning. This includes dust and noise impacts from earthworks and potential traffic movements.

The development assessment submitted for Tumuruu will include a description of the proposed decommissioning activities, addressing all relevant issues for decommissioning and rehabilitation. The consent authority, due to the noted relatively simple construction and straightforward decommissioning process, is then expected to impose outcomes-based conditions of consent to ensure that the decommissioning principles are met.

Mitigation Strategies

The visual assessments for large-scale solar projects will also include proposed mitigation strategies, which will be determined by the level of defined visual impacts. The most common mitigation strategy is a vegetated buffer on the outer perimeter of the project.

The Tumuruu team will work closely with stakeholders to ensure they understand the location and detail of the solar footprint, so effective mitigation strategies can be implemented.



LANDSCAPING



VEGETATION SCREENING

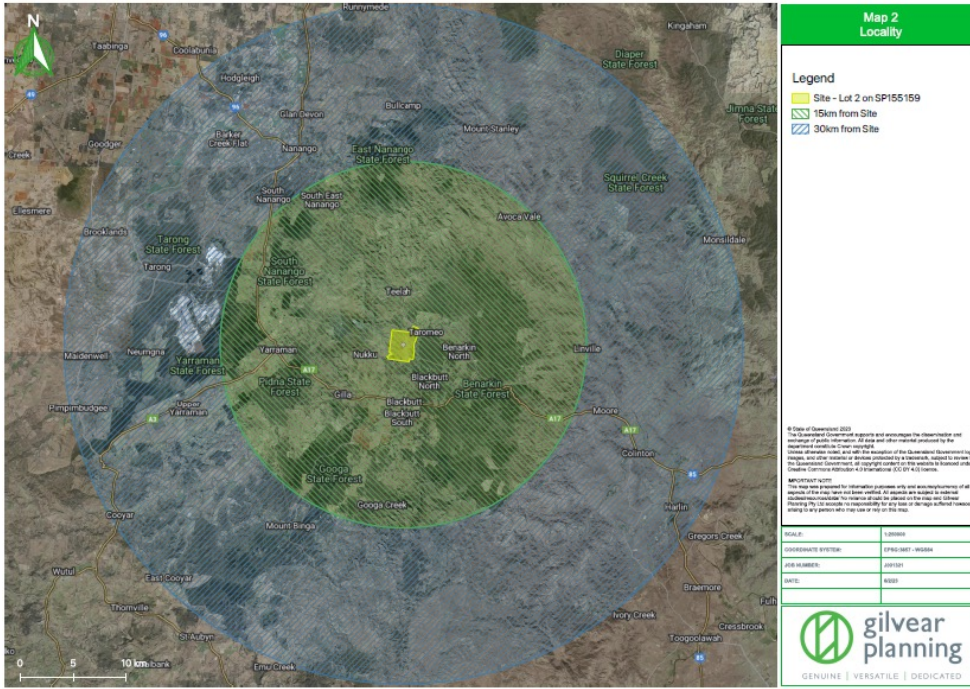


COMMUNITY ENGAGEMENT

The NSW Climate and Energy Action report highlighted that solar farms can offer a range of social and economic benefits to the community. Solar farms are shown to drive growth and investment in Regional areas, reduce greenhouse gas emissions, improve energy security and create new economic stimulation for long-term community sustainability.

Location

Tumuruu is located on rural land approximately 4km to the north of the Township of Blackbutt, Queensland. The site is bounded by Harper Road to the north, rural properties to the north-west, east, and south and an unnamed road reserve to the west. There are several known easements over the property.



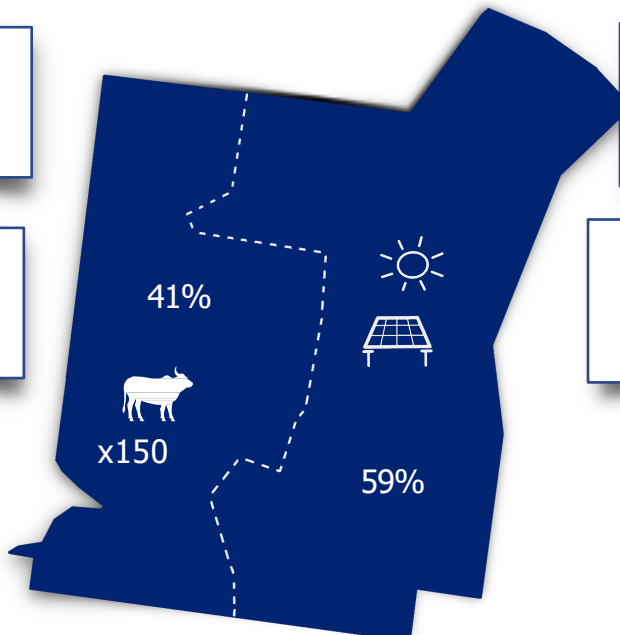
The Site

Tumuruu is the creation of a solar farm consisting of PV arrays, HV switch yard, battery storage, set-down and site office areas. The proposed development will be situated in a lease area approximately 397.7 Ha in size.

672ha; Utilising 59% with ongoing farming

Underperforming asset

Favourable topography



On-site grid infrastructure

Within Southern Queensland Energy Zone

Cleared land

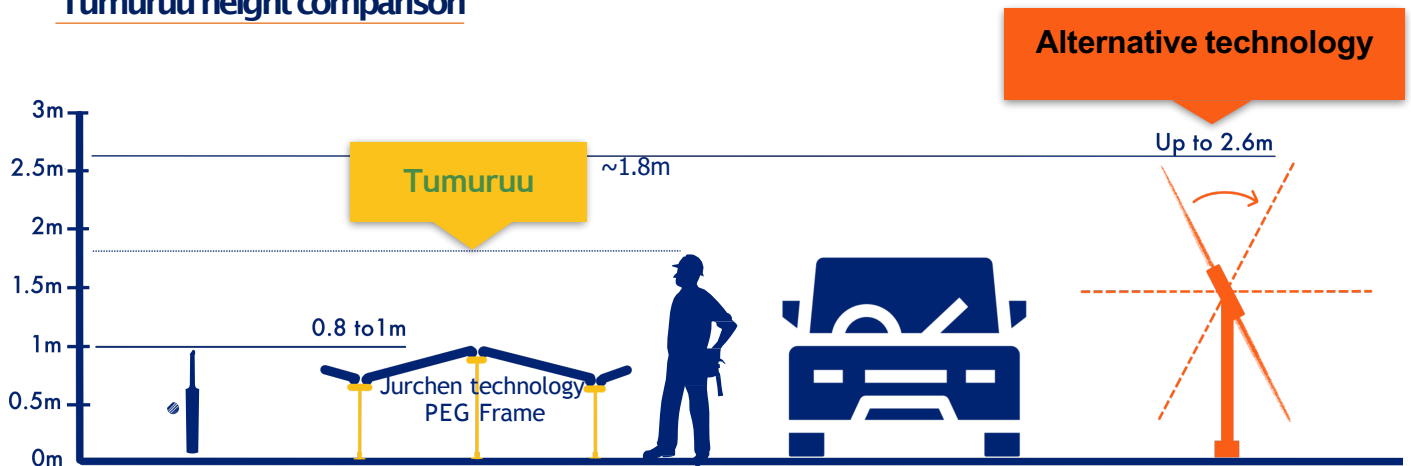
Panel Height & Installation

To respond to changing technologies available for solar photovoltaic panels and in the absence of detailed soil testing, the exact design and mounting options will be determined as part of the detailed engineering process, prior to construction. Currently, Jurchen PEG mounting solution is proposed, with initial site assessments confirming the appropriateness for this technology.

The mounting system is relatively simple and is comprised of a ground and top plate and a PEG rod (0.8m to 1.0m in height) and does not require any foundations or concrete support as it is self-stabilising. Accordingly, no heavy machinery is required for installation, there is no underground cable trenching required, no concrete foundations and lower labour skills are sufficient for installation and simpler Workplace Health and Safety Procedures are required on site (no working at heights etc.) which results in a more efficient construction process.

Given the technology there is the opportunity to maintain grass cover across the site which helps to suppress dust and storm water run off as the ground under the PEG array is somewhat moister than the ground outside the PEG array which improves absorption.

Tumuruu height comparison



Examples of other on grass installation



Solar FAQs

Q How big is the project?

The project, as currently planned, will be approximately 370MW connected to the Powerlink network supplying power to Queensland. The project will cover around 400HA of the 700HA site at 341 Bowman Rd.



Q What will be done to protect the amenity for neighbours?

The design intention is to reduce visual impacts to surrounding residents. A lightweight and compact substructure which means an ultra-low profile (approx. one metre at the highest point). Vegetated buffers will be planted to maintain a pleasant outlook for neighbouring residents.

Operational noise will be inaudible to surrounding residents when the solar farm is up and running. Maintenance can be carried out with hand drills, meaning that no heavy machinery is required.

Q Why has the site for the Tumuruu Solar Project been selected?

The Tumuruu site has been selected as it offers an ideal mix of on-site infrastructure and available land close to Brisbane with a topography that is suited to solar. The site offers a cleared space that since 2017 the site has been extensively cleared of trees, particularly within the project envelope. There has been some invasive species regrowth that will be removed during construction. Since the 1960s the property has been completely cleared four times to allow agricultural activities. There has been some regrowth of lantana however the site remains predominately open. Works will be undertaken to ensure that the site is cleared of all regrowth and select earthworks. With the solar ground mounting technology selected the site can remain predominately grassed and ground covers will be selected that will improve the soil conditions during operating years. In the construction period there will be the need for some earthworks and the grass will need to be shortened to allow effective installation. Whilst the project is operating the land can not be used for grazing under the panels. Efforts have been made to find a solution that requires no cement footing and limited in ground cabling that will ensure the land can be returned to agricultural purposes in the future. Agricultural studies undertaken has identified the land as Class C and past farming cropping endeavours have been abandoned. The remainder of the site - about 40% will be retained as rural and likely will be used for cattle.

Q How are noise impacts from the solar farm assessed?

Noise modelling will predict the noise levels from construction, operation and traffic of the Tumuruu Solar Project and compare with the allowable limits set by council and state government.

In relation to the Tumuruu Solar Project detailed modelling is currently being undertaken, with the results to be included in a Council information request. Modelling is undertaken for noise sources, noting that construction would be restricted to the following standard construction hours:

- Monday to Friday: 7 am to 6 pm;
- Saturday: 8 am to 1 pm; and
- No work on Sundays or public holidays.

Q How will visual impact be assessed for the solar farm?

The visual assessment will be undertaken by recognised experts for visual impact assessments for renewable energy developments.

The visual impact assessment for the Tumuruu Solar Project will be undertaken in accordance with standard industry practice

The solar visual impact assessments will include a combination of:

Zone of visual influence – to determine the potential locations and dwellings in the area which may be able to see the solar farm.

Public viewpoint analysis – assessment of potential impacts from public locations.

Detailed dwelling assessments – where desktop analysis, modelling and site visits identifies dwellings they may have visual impacts. This may include undertaking photomontages at specific dwellings.

Assessment of impact significance – assessing the sensitivity (e.g. dwellings have high sensitivity) and the visual effect (how much of the solar development can be seen) to calculate the overall potential visual impact.

Glint and glare assessment – assessing glint and glare from public roads and dwellings surrounding the solar development.

Mitigation measures – proposed mitigation measures to reduce visual impacts if determined to be required based on the level of impact assessment (e.g. visual screening).

Solar FAQs (continued)

Q Will the project impact the value of my property?

A There have been several studies undertaken both in Australia and overseas in regard to land and property values and renewable energy projects. A study completed by Preston Rowe Paterson in 2013 looked into the impact of wind farms on surrounding land values.

The NSW Farmers Association has also developed the Renewable Energy Landholder Guide, which includes a section on land values. The guides includes the following commentary:

"A 2016 review considered the potential impact of wind farm developments on nearby property values. The review used the best available data and traditional valuation sales analysis techniques, to compare the change in values around wind farms over time and qualitative information from a review of the international literature on the impact of wind farms on property values."

The review concluded as follows:

"Based on the outcome of these research techniques, it is our expert opinion that windfarms may not significantly impact rural properties used for agricultural purposes. The literature review of Australian and international studies on the impact of wind farms on property values revealed that the majority of published reports conclude that there is no impact or a limited definable impact of wind farms on property values."

Q How close is the proposed project to Blackbutt?

A The nearest point of the property boundary associated with the Tumuruu solar project is approximately 3km from the Hotel Radnor. There are 11 dwellings with 1km of the project site.

The Development Assessment submission and subsequent information requested by Council have assessed impacts on all dwellings (e.g. water, visual, noise).

Q What happens if project ownership is transferred or sold?

A The Tumuruu is the flagship project of Australian Solar Enterprises Pty Ltd (ASE).

ASE is committed to developing, constructing, and operating renewable energy projects across Australia. However, in the event project ownership is transferred, all land agreements have been structured so that any incoming owner will be legally bound by the same terms including those established for decommissioning and rehabilitation. Furthermore, the development consent conditions expected to be imposed for the project will be applied to the development directly, not the development company.

Consequently, any existing or future asset owners will be bound by the same conditions of consent for the life of the project.

Q How is the project team engaging with the local community?

A The Tumuruu team have been engaging with the Blackbutt community and surrounds since late 2022. As well as regular engagement with neighbours to the project, the Tumuruu team has also proactively engaged with local community groups, including the Blackbutt Delights and Rural Fire Brigade. The project team have also been engaging with local business, Council and suppliers from the wider region, who are keen to learn about what opportunities this project may bring to the region.

In addition to providing updates to the community through our monthly newsletter, factsheets and website. As the project progresses we remain open to discussion and feedback and encourage all members of the community to reach out to us with any questions either via email or call 0422 794 072. We can also arrange face to face discussions where necessary.

Q How is Tumuruu proposing to engage with project neighbours?

A Tumuruu aims to minimise impact to project neighbours through impact avoidance, optimised design and the adoption of mitigation strategies where necessary. We have commenced consultation with a number of neighbours to the Tumuruu solar project to provide updates on the planning assessment process and seek feedback. This consultation will continue prior to, during and post development approval.

Q How will the project impact water flows onsite?

A As required on all renewable energy developments, post-development water flows must be equivalent to pre-development flows in terms of both water quality, path and volume. Extensive hydrology models will be developed for the site to inform the design process to ensure these objectives are achieved after construction.



How do solar farms work?

Although there are a number of solar technologies that capture the sun's energy in various ways, the guidelines specifically relate to solar farms comprising large-scale commercial (typically greater than five megawatts) photovoltaic (PV) solar arrays. These solar farms are of a similar technology to the solar panels that many households have on their roofs across Queensland.

Solar farms consist of a collection of PV solar arrays and ancillary infrastructure that produces electricity on a commercial or utility scale. The exact make-up of a solar farm can vary for each project depending on the constraints of the site, the chosen technology and the desired end-use of the electrical output. A typical large-scale solar farm is illustrated below.

Solar panels

PV solar arrays are made up of solar panels attached to a mounting structure. Each solar panel contains a number of PV solar cells that convert sunlight into electric current using semi-conductive materials. This is known as the photovoltaic effect.

Land

A solar farm requires approximately two to three hectares of land per one megawatt of power generation.

Ideal sites have a relatively flat topography, suitable geological conditions, a low risk of flooding, and lower ecological and agricultural value.

Solar panels

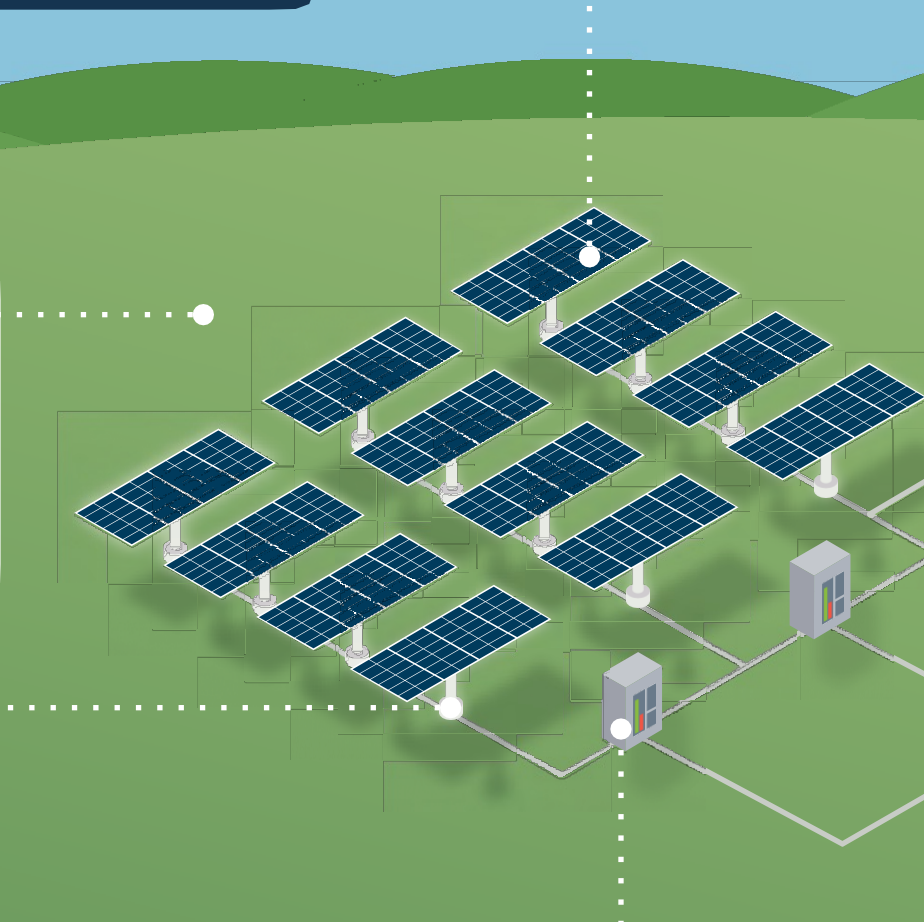
Australian solar farms generally use the following technology types: fixed arrays, dual-axis trackers and single-axis trackers.

- Fixed arrays are set at a calculated position to provide an optimal output. The panels are orientated in a position favouring the morning, midday or afternoon sun.
- Dual-axis trackers are mounted on a system that tracks the sun across the sky, as the elevation changes throughout the year. Dual-axis trackers require larger spacing than fixed arrays to reduce inter-shading.
- Single-axis trackers follow the sun as it crosses the sky in one direction, but do not adjust for seasonality. This system achieves more output than fixed arrays, and may use less land than dual-axis trackers.

Inverter system

The electric current produced by the solar panels is typically direct current (DC), which is also the type of electricity held in battery storage. The inverter transforms DC to alternating current (AC) before connecting into the electricity grid.

The number of inverters depends on the size of the solar farm and the inverter rating. In most cases, multiple inverters are placed throughout the solar farm. These are often contained within a shipping container and delivered to site as one unit.



Source: Queensland Solar Farm Guidelines

Energy generation

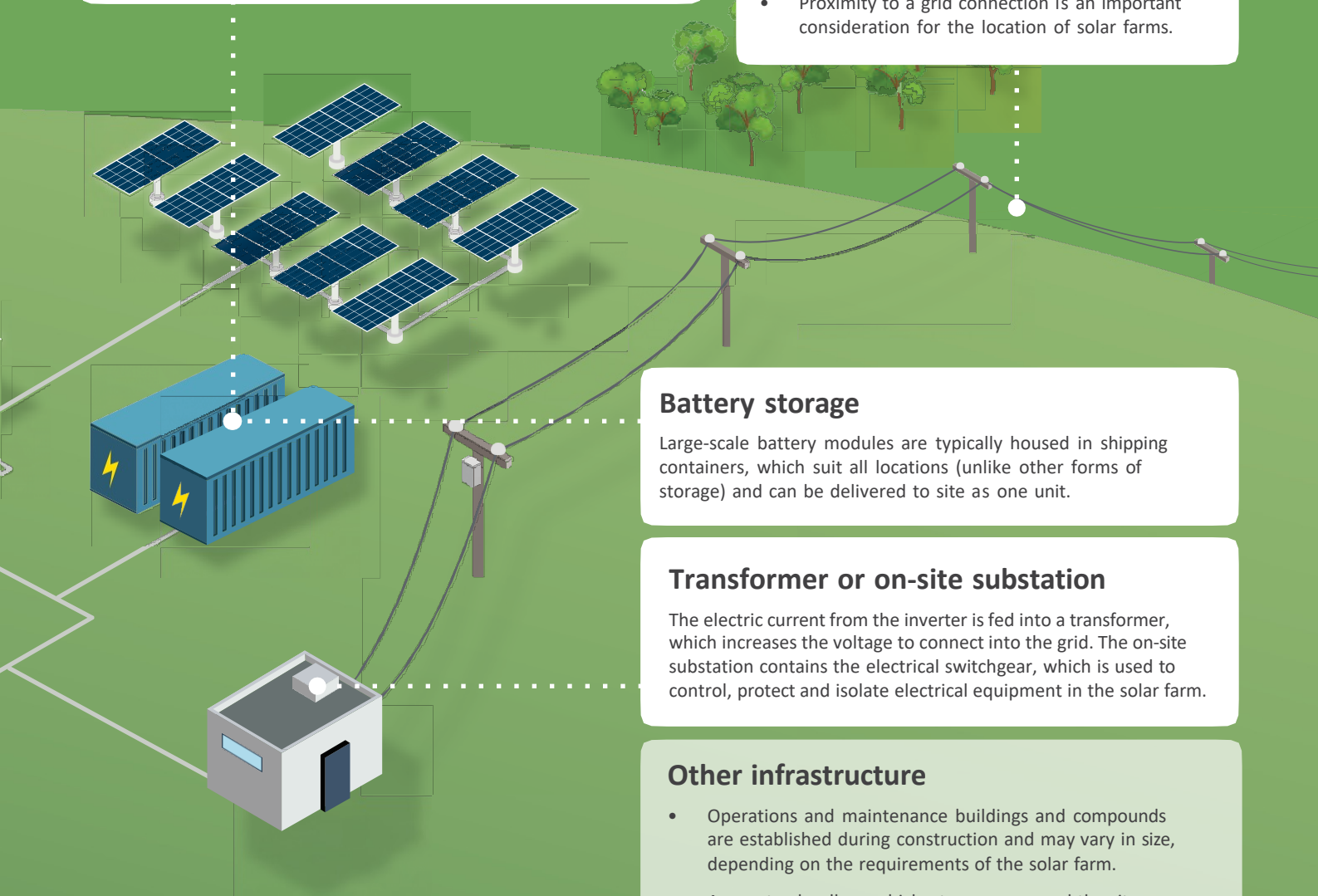
The final output of the solar farm will vary depending on the strength of solar irradiance present at the area.

Energy storage

- Electricity produced by a solar farm must be consumed as it is generated, unless it can be converted into other forms of stored energy.
- Large-scale battery storage is a relatively new technology. As technology evolves, battery storage design and operation is likely to change and may become more economical and efficient to use as part of large-scale solar farm development.

Substation or transmission

- Solar farms can be connected to the grid via a local substation or overhead transmission line infrastructure.
- The grid connection will need to be located in a section of the network with available capacity to export the electricity to the National Electricity Market.
- Proximity to a grid connection is an important consideration for the location of solar farms.



Battery storage

Large-scale battery modules are typically housed in shipping containers, which suit all locations (unlike other forms of storage) and can be delivered to site as one unit.

Transformer or on-site substation

The electric current from the inverter is fed into a transformer, which increases the voltage to connect into the grid. The on-site substation contains the electrical switchgear, which is used to control, protect and isolate electrical equipment in the solar farm.

Other infrastructure

- Operations and maintenance buildings and compounds are established during construction and may vary in size, depending on the requirements of the solar farm.
- Access tracks allow vehicles to move around the site, undertake construction and conduct maintenance activities.
- Internal electrical reticulation, typically laid in trenches, connects the solar panels.
- Sites typically include security fencing and vegetation screening on the perimeter.

Source: Queensland Solar Farm Guidelines

Solar FAQs (continued)

Q Will existing land management practices including farming continue on the project site?

A Absolutely. Renewable energy developments such as large scale solar can work in harmony with existing agricultural activities. Grazing livestock such as cattle and/or sheep has been proven time and again for solar farms in Australia. In fact, grazing is a key part of the operation and maintenance strategies for land and weed management.

Q How are bushfire hazards being managed for the project?

A The bushfire risk during construction and decommissioning is considered manageable with on-site water (dams) and the use of an Emergency Response Plan. During operations there will be an asset protection zone of 10 metres around the perimeter of the project and all buildings. There will remain water onsite and ongoing engagement with the rural fire brigade will support preparedness.

Expression of interest: Employment



Do you enjoy outdoor work?
 Can you or are you willing to learn how to use these tools?
 If you are school age, we will have opportunities during school holiday periods as well!
 If the above sounds like you, register your interest with the QR code and help Queensland reach its energy target!



Expression of interest: Local Businesses



Construction

- Fencing/Security
- Earthworks
- Landscaping
- Catering
- Accommodation
- Cleaning

Operations

- Fencing/Security
- Earthworks
- Landscaping
- Maintenance

30yr opportunity

