

# The Wild West of PV in Australia



The Good, The Bad, and The Ugly

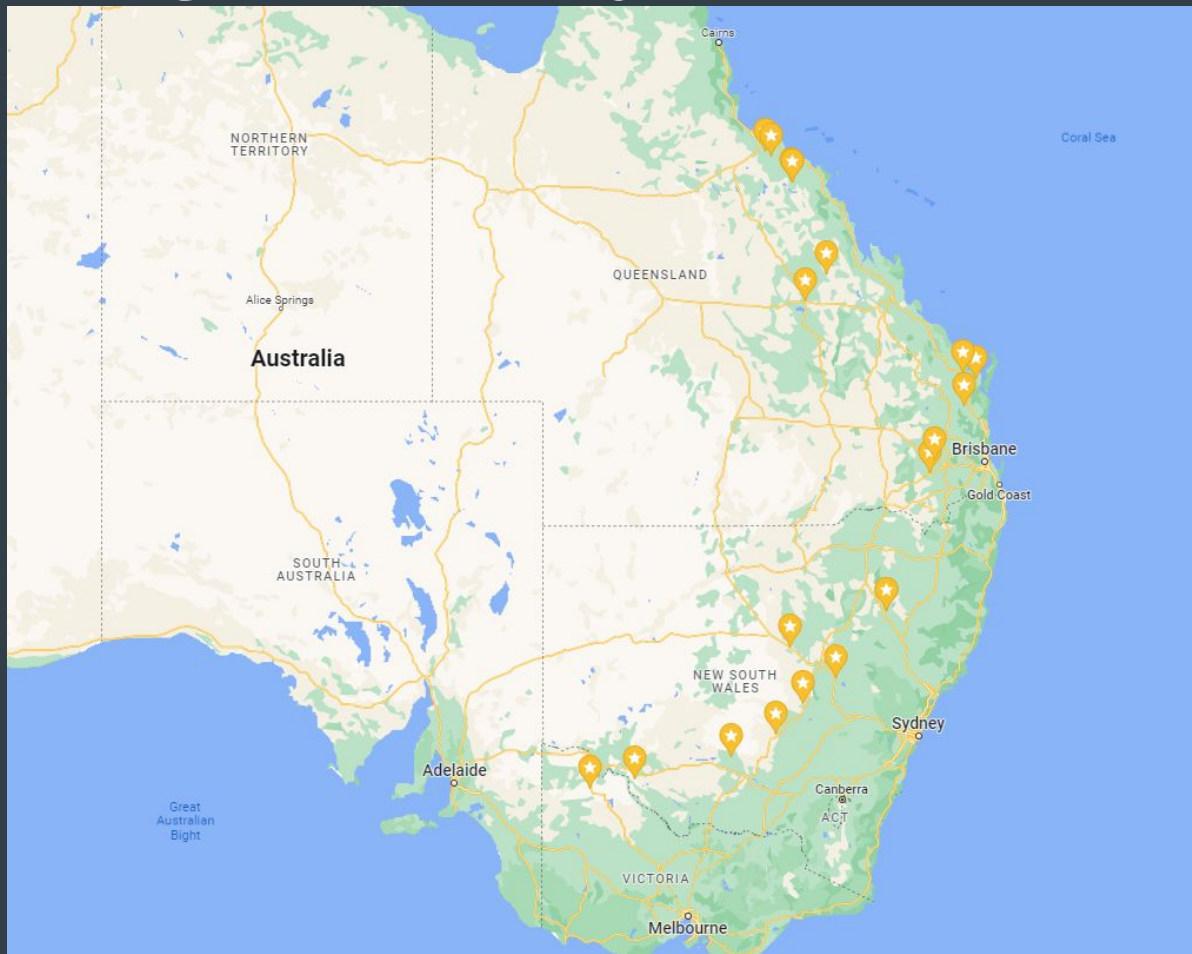
## Background History



**NEWCREST**  
MINING LIMITED

Heavy Diesel  
Mechanic for 9  
Years, working  
with PJJ and  
then Newcrest  
Mining at  
Orange NSW's  
Cadia Gold  
Mine

# Background History



## Solar Industry since 2016

*Parkes Solar Farm*- 66MWDC

*Griffith Solar Farm*- 36MWDC

*Hamilton Solar Farm*- 138MWDC

*Hayman Solar Farm*- 50MWDC

*Daydream Solar Farm*- 150MWDC

*Clare Solar Farm*- 128MWDC

*Emerald Solar Farm*- 72MWDC

*Haughton Solar Farm*- 132MWDC

*Oakey II Solar Farm*- 55MWDC

*Childers Solar Farm*- 120MWDC

*Susan River Solar Farm*- 95MWDC

*Middlemount Solar Farm*- 34MWDC

*Kiamal Solar Farm*- 256MWDC

*Yarranlea Solar Farm*- 103MWDC

*Sunraysia Solar Farm*- 255MWDC

*Nevertire Solar Farm*- 132MWDC

*Wellington South Solar Farm*- 200MWDC

*Gunnedah Solar Farm*- 146MWDC

*Woolooga Solar Farm*- 214MWDC

*West Wyalong Solar Farm*- 107MWDC

**Total- 2,489MWDC**

# Background History

## Subcontractor works including:

- Site supervision of the 175 million dollar 98mW Susan River solar farm installation including the mechanical pier/post installation team along with the tracking and module installation team.
- Testing of multiple post types to verify drivability, lateral and axial tolerances for viability of potential solar farm location at Haymen/Daydream, Sunraysia, Susan River, Childers, Oakey Stage II, Middlemount, Nevertire, Pittsworth, and Kiamal Solar Farm.
- Analysis and reporting of data retrieved via test piling and pull tests.
- Piling operator trainer.
- Rectification of driven posts.
- Quality assurance checks and data analysis on driven posts.
- Pile Driving rig operator.
- Supervisor of piling crew for the 66mw Parkes Solar Farm utilising the Array tracking system
- Training and up-skilling of new staff in piling rigs
- Maintenance and upkeep of Vermeer's PD10, Turchi and Orteco HD1000 piling rigs

## EPC works including:

- Work to make sure contractors' terms are fulfilled and disputes are resolved.
- Supervise workers, managers, and civil subcontractors to ensure their work follows plans and is on schedule.
- Analyzed the drawings related to the mechanical package from Engineering and subcontractors.
- Provided technical support and advise to procurement and contract team for the subcontract agreement of this mechanical package of works.
- Oversee and supervise field personnel and mechanical subcontractors; managing and supervising Production and Quality of mechanical Subcontractors and self-performance's civil workforce, making sure they comply with scheduled works and contract's requirements
- Ensured all work is completed in line with the project schedule;
- Ensured that relevant HSE, Quality and contractual requirements are applied and adhered to
- Developed and effectively communicate the Project Plan and schedule to workgroups;
- Ensured the quality of work meets the required standards and conduct with QA/QC inspectors work audits on job completion;
- Resolved any site issues, with direct interface with the client, through coordination meetings or discussions;
- Promoted leadership and teamwork within the workgroups;
- Managed and monitor the implementation of all health, safety and environmental management obligations and systems at the site
- Prepared weekly production reports and issues/risks;
- Ensured works are delivered as per contract agreements;
- Utilization of Australian and International Standards for the creation of procedures for the mechanical, electrical, and civil build.
- Development of app for large scale quality data capture for mechanical, electrical, and civil install and quality assurance/checks.
- UAV deployment with capture, and analysis of large scale solar farm aerial data.
- Creation and maintenance of ITC and ITP forms for mechanical, electrical, and civil build.
- Document handling and organization, including NCR's, KPIs, MDR's, and Final Quality Documentation.





# Utility Scale Solar Farm Photos



Gunnedah Solar Farm (146MWDC)



Woolooga Solar Farm (214MWDC)



Nevertire Solar Farm (132MWDC)



Parkes Solar Farm (66MWDC)



Hamilton Solar Farm (138MWDC)



West Wyalong Solar Farm (107MWDC)

# Detailed version of Good, Bad, and Ugly- Potential risks involved and timeline requirements

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## The Good

- **Currently known industry standard-** For the last 6-7 years within the current solar booming climate of construction, Single Axis Trackers (SAT's) have been the industry standard for solar farms. A turn away from fixed structure was due to the ever cheaper prices of modules as well as the incentives from the government, along with the increase in output of solar energy from tracking the sun on East to West basis, has driven companies such as NEXTracker and ATI (among others) to build a steady stream of orders across the country. Within the systems nowadays, there is no major benefit between systems for average output. It comes down to price of the system, the design options between the systems (row lengths, 1P v 2P options, structural obstructions ie ATI and their drivelines) as well as current relationships and supply agreements between developers/EPC's and supplies that dictate which system gets used on any particular farm.
- **Documentation of QA is of higher stands than previous years-** From humble beginnings of basic checklists that aren't verified, to a now standardised ITC/ITP reports, AS-Build documentation, Lateral/Axial/Compression testing, Survey data points and cross reference to actual build locations. The standard in which quality is quantified and verified for owner engineers and lenders to pay against has only risen substantially over the years and has now become a heavy staple of requirements for any milestone or progress payments for all trades and EPC's.
- **Mechanical and electrical subcontractors understanding of their scope of works-** There are only a few mechanical and electrical companies within the Australian utility scale solar industry that have lasted longer than 2-3 years. With bad scope of work understandings (note a further explanation below), and the idea that subcontractors bid low and variation high in order to survive all but been removed from the industry. The survivors of the industry have now become themselves staples within their given discipline (not civil missing from this point, see further below for explanation)
- **Client and lenders ease of mind for current standards and works delivered on site-** The Australian solar industry is small and is even smaller once you go to utility scale projects. The owner engineers and lenders have generally stayed within the industry (albeit under a different company name in cases) so the standard of requirements for progress payments have stabilised to a general understanding that both EPC's and subcontractors adhere to in order to proceed on site.
- **Main two 1P Single Axis Trackers companies have long standing relations with engineering firms around the country and have developed on a magnitude of sites with a wide range of ground, wind, and hydro conditions-** NEXTracker (NXT) and ATI have become the main 2 players in the industry when it comes to choice of tracking systems (apart from PVH systems that are generally exclusive to GRS but have themselves a sizable chunk within the industry but is tied with a specific EPC in order to use). Both ATI and NXT utilise SMEC for a great deal of their engineering works and between the two, have researched, developed, and implemented their systems in an array of ground, wind, and slope conditions that can now cover any solar farm combination, giving them both a clear advantage on choice when it comes to the more difficult locations to build in.

# Detailed version of Good, Bad, and Ugly- Potential risks involved and timeline requirements

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## The Bad

- **Bad/lack of interface with CM's and solar designers-** With the requirement to quickly come up with at least the 30% design of mechanical, electrical, and civil for any given site in order to begin building, there tends to be the disconnect between the construction managers on site and the designers. This is generally due to timeline conflict between EPC contract being awarded, and the developer already having the design of the farm worked on in the background. With the current disconnect, there has been a slew of occasions where the design of a given farm has interrupted the schedule of works, had created additional, uncosted, variations that continue to blow out current schedules (see below for additional explanations).
- **Scheduling of works blown out and lied about resolutions regularly-** With occasions where the above point of the disconnect between designer and CM's come into play, it's the Project Manager (PM) that help develop, and is the figurehead of discussions about schedules, payments, and extensions for the project. During this time, the PM is always showcasing best case scenarios for the Developer/Owner Engineers (D/OE) in order to distill confidence in times of site issues. The problem there is the PM tends to also be disconnected with Site Manager (SM) who's role includes giving the PM the information and timeline requirements of any given works on site. When this sort of disconnect happens, the PM tends to give false timelines and schedules to the D/OE's which may save face temporarily, but later places the EPC in the realm of untrustworthy and in turn creates even greater difficulty when it comes to milestone and progress payments, as well as any chance of working with the D/OE on extensions or alterations across the farm.
- **Unskilled labour across all fronts-** Interestingly enough, COVID-19 was one of the best things to happen for this particular point. With backpackers being the general labourforce on these farms, and the visa requirements of only 88 days of rural work to extend visa stays, there has always been the change out of experience constantly in this part of the industry. With COVID-19 locking down the country but construction work still in full force, the knowledge and experience of the average backpacker increased dramatically and for a time, Australia has some of the hardest and most knowledgeable backpackers in the world. Now with borders back open, the industry is back with the revolving door system of general labour on site (barring majority of Civil, and only parts of Mechanical and Electrical tasks being education/certification based)
- **Civil companies not understanding scope for works for solar farms-** With the general mobilisation of any given Civil contractor for a solar farm being as large as it is, you don't tend to find many dedicated "solar" civil companies within Australia. There are a few current exceptions (Goldwards being one for example) that have lasted, with many other companies in the past trying their hand at the task with very poor results. The issue here tends to be the safety and documentation side of works that the breakdown of these companies (ego also plays a very large part in this case and many others throughout the industry, see Point 1 in Ugly-Utility for further explanation).
- **Module manufacturers not placing more information on the module pallets that are long term solutions ie paperwork for barcode and module watt class-** Over the years, module manufacturers have given the consumer of utility scale farms the bare minimum when it comes to their pallet packaging. There has been a couple that have made upgrades over the years (namely the pallets underneath the modules themselves) in order to handle multiple movements and to withstand a certain amount of weathering from temporary site storage. The biggest and current issue is the means in which the module pallets are marked (or lack thereof) for the wattage, current rating, and barcodes/carton numbers for that particular box. The current standard is the have a single piece of A4 paper in a plastic sleeve attached by a few staples on the side of the pallet as its only means of referencing apart from opening the pallet themselves and determine the modules information via a barcode. This current method is a giant waste of time (operator having to get in and out of their machine per box to ensure they're picking up the right pallet for any given block, or having a labourer before any movement adding a spraypaint mark for ease of identification for the operator before they move it), and resources (either additional labour for identification or spray paint for marking). After a rain event (or several which tends to be the case), these pallets without additional resources of plastic wrap (another cost of labour and resources for the EPC or Subby) deteriorate in a fashion that becomes difficult, to the point of impossible, the relocate to the allotted locations, resulting in pallets falling over and being damaged.

# Detailed version of Good, Bad, and Ugly- Potential risks involved and timeline requirements

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## The Ugly

- **Ego driven-** Having solar be as infant in comparison to the rest of the construction industry, it's safe to say that a great deal of CM's and SM's came from the existing industries. With the need for some form of construction experience, it tend to come from the older generation of CM's and SM's in order to cover as many basis's as possible. In doing so, it created a level of ego that has driven and pushed forward a particular way of dealing with subcontractors, clients, and internal staff that has allowed for inaccurate, poorly executed, and selfless actions on a site. This attitude has been seen time and time again within the levels or subcontractors, and EPC's. It has been a very poignant reason for the change of companies for a large amount of people in the industry. With the sorts of attitudes and decision making within these companies continuing, it's very difficult to keep the trained and experienced staff and breed a level of loyalty for the company itself. It's a large reason why many companies within the utility scale solar industry has gone broke, or into voluntary administration.
- **A site manager that favours one discipline over another resulting in poor sequence of works-** Having a SM that comes from a particular field (let's use electrical as an example) being the one in charge of a site tends to allow for extremely biased decision making that mainly benefits the electricians on a site and allows for longer lead times or additional costs on other disciplines.
- **Many young engineers with backing of more powerful people trying to recreate the wheel-** There is always the requirement of engineers on a site and a great way to upskill and give experience (whilst keeping overheads on labour down) is the hiring of post-graduate students. There have been many cases where this inexperience can lead to "justification of position" by suggesting and designing procedures with the thought process of making is cheaper/faster/safer. Whilst the practice should be applauded and continue, there are many cases where a procedure had been experimented on in the past and the site staff will give examples and reason not to proceed. What can and does happen is someone of a level of power and influence within the sites staff will back and proceed, even when justification to not proceed is given (see point 1 on ego) which allows for waste of time and money to a project.
- **Scope of works under developed-** Even though the industry is slowly coming out of infancy, we are still seeing gaps in scopes of work. The revolving door of subcontractors and EPCs in the country doesn't lend to previous lessons learnt from the staff, even if they've come from another company and experience of site requirements and scopes (see Point 1 on Ego and Point 1 on Bad-Utility).
- **Subcontractors not following EPC-** There are a few subcontractors in the utility scale industry that have been in the industry for long enough that they understand the revolving door issue of EPC's on a site. They capitalise on this situation by taking charge of their own scopes on an EPC level, working to whatever level of safety and procedure and schedule they wish because they understand that the "Carrot and the Stick" are not mutually exclusive for them and they can proceed by whatever needs they desire.
- **Owner of subcontract companies in cahoots with EPC PM-** There have been many subcontractors that understand that in order to bypass any major decision on a site and take away any power (the carrot and the stick) from the site staff is to work the corporate staff that can ultimately undermine and overall any sound decisions on a site. I don't need to explain how this can affect not just production, but safety and schedules.



# THE 6P'S

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PROPER PREPARATION PREVENTS PISS POOR PERFORMANCE

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**QUESTIONS?**