

# SOLAR ENERGY ROBOTICS:

Supporting the Green Energy  
Transition to Net Zero

## MINE SITE CASE STUDY



# Background

Mining companies in Australia are rapidly transitioning to renewable energy sources to achieve net-zero emissions. Australia's desert regions have some of the highest solar energy, but heavy dust levels in these arid regions reduces the life expectancy and the efficiency of the panels.

**Solar Energy Robotics (SER)** are a specialist technology division of **Innovative Energy Solutions (IES)** providing Australian autonomous robotic products for the solar energy industry. The **Autonomous Solar Cleaning Robot (ASCR)** has been specially designed as a safer and more reliable solution to autonomously clean small solar arrays on remote mine sites in harsh arid environments.

Solar Energy Robotics (SER)'s corporate mining client that are based in the Pilbara (the 'client'), relies on their solar panel system to power the communication system managing the autonomous fleet of vehicles.

**With dust being such a major issue in Northwest WA and even more so on mine sites, manual cleaning of the solar panels was required to keep the communications systems operating reliably to mitigate mine production losses.**

***This case study explores the implementation of the SER autonomous cleaning robot and its impact on the site's production efficiency, worker satisfaction, safety, and financial performance.***

# Dust is a Problem

An investigation of this client's mine site operations found that their solar panels were being fouled with heavy dust much quicker than anticipated. Typically, the panels [on the mine site] require cleaning every 4-6 weeks, but the panels located in the pit and adjacent busy haulage roads can require much more frequent cleaning.

**"At some sites the panels were completely covered after 2-3 days without cleaning. You could come back in the afternoon and there would be a covering of dust from the trucks."**

This was reducing power level production and battery storage by as much as 40% per month.



**The build-up of dust on panels can have a notable impact on efficiency and dependability, potentially resulting in communication system malfunctions and decreased mine production output.**



Manually cleaning solar panels poses HSE risks, including intense sun exposure, temperatures exceeding 45°C, as well as physical exhaustion and bodily strain from repetitive and demanding movements.

**"It's a dusty and hot with a high risk of manual strains from the repetitive work in the worst site conditions."**

**"By relying solely on a reactive maintenance program for the critical power supply, the mine site was left vulnerable to production risks. Implementing a daily preventative maintenance program to remove dust was deemed crucial in order to effectively reduce the risk to mine production. "**

**Due to the large scale of operations, even a slight reduction in productivity could mean losing out on profitability.**

## Risk to Mine Production

Dust on solar panels can substantially reduce their energy output and reliability, which poses a significant risk to mine site operations.

For this SER corporate mining client, their solar panels were responsible for powering the remote communication systems necessary for operating their autonomous fleet of vehicles.

When the communications systems weren't performing effectively, the efficiency of the autonomous fleet was compromised.

However, there was an even more significant risk for the client to consider.

Should the solar panels not produce sufficient power output to properly charge the battery, the backup generator would have to kick in to provide additional power.

However, relying solely on this backup diesel generator as a power source to mitigate potential communication system failures was not a reliable plan.

**Should the backup generator also fail, it would cause the mine site to lose all communications, leading to a potential shutdown of operations and significant losses.**

This was a risk that could not be ignored.

# Solution : Autonomous Solar Cleaning Robotics

Recognising the potential risks of reduced performance from their solar panels, the Pilbara mining company engaged Solar Energy Robotics to install Autonomous Solar Cleaning Robotics (ASCR) units to keep their solar panels operating efficiently.

The ASCR enabled the client to implement the recommended daily Preventative Maintenance program for cleaning purposes, while also eliminating the potential HSE risks associated with manual cleaning.

**The autonomous cleaners are mine-site ready and operate independently with an inbuilt self-charging battery and remote communication system ensuring there was no possibility of causing a fault to the site communication system.**

**They are the only solar panel cleaning solution available on the market that did not require water.**



**"It's a great system because it's a dry clean. An efficient clean using alternative wet methods can use 1-2 litres of water per panel and using water on hot panels during the day can cause cracking and damage to the panels."**

The robotic cleaners could also be customised to various settings, including when and how often to clean the panels.

This was the solution this client had been looking for.

# A Safer Way to Clean Solar Panels



Before the SER solution, the client had to send two technicians into the field to clean the solar panels, sometimes as often as every 2-3 days.

These technicians would clean row upon row of solar panels using a double-sided 4m long broom, which could take several hours to complete in hot and remote locations. As a result, there were several health and safety risks associated with the work, including the risk of dehydration and musculoskeletal strain caused by repeatedly reaching up to clean the panels.

**"It's a horrible job [Thankfully], the solar panel cleaner just takes all that away from it. It's one less thing that we need to worry about eliminating the risk to our team and the solar assets."**

Removing workers from this challenging environment was a major win for the mine site. It allowed these technicians to focus on other crucial tasks, including important projects within their respective departments.

In addition to improving worker productivity, the implementation of the autonomous solar cleaner had a significant positive impact on the mental health of the technicians responsible for solar panel maintenance.

"When you consider mental health and keeping a positive mind-set in the business - would you want to go and clean dusty panels one after another in 45°C [heat]? I don't think so."

**Working in these remote and hot environments drastically heightens the HSE risks associated with manual cleaning, most importantly this includes heat-related illnesses that can lead to death. The autonomous cleaners eliminates these risks to the workers.**

# Systems Improvements

*The first robotic cleaners installed at the Client's Pilbara mine site have been in operation for over four years and are programmed to clean the solar panels multiple times per day. Over a two-year period, they have carried out an impressive 32,000 cleans and are still in operation.*

The implementation of the Preventative Maintenance program using the ASCR has yielded significant cost savings, with a 59% reduction in expenses compared to weekly manual cleaning.

Also, this program has led to improvements in the reliability of the solar power supply, including a 38% increase in power generation and a 12% reduction in battery charge time. There have been no communication losses resulting in mine production losses and the power mitigation backup generator has not been required to activate.

**Most important, the cleaners have eliminated the HSE risk associated with manually cleaning the panels and improved overall worker satisfaction.**

The improvement has had a significant impact on the profitability of the mine site.

**“When you consider that the mine produces ten's million tonnes a year, then any improvement in production is a big return on investment [for the cleaners].”**

Following the success of the autonomous robotic cleaners at this Pilbara mine site, the client is installing cleaning units across the other sites to eliminate safety risk, increase mine site productivity and keep the critical communications network safe and reliable.

“The success of the autonomous robotic cleaners at the [Client's] mine site is a testament to the potential of innovative technologies to transform the mining industry. As the industry continues to evolve, solutions like the autonomous robotic cleaners will play an increasingly important role in maximising mine site efficiency, productivity, and profitability.”

# Contact Solar Energy Robotics

Solar Energy Robotics (SER) are a proudly Australian-owned and operated industry leader in solar panel robotic cleaners.

**Our purpose is to optimise production of renewable solar energy to accelerate the global energy transition to clean and green energy. We develop autonomous robotic technology that makes the investment in the renewable energy the best value option for energy production for mine sites.**



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