

# Case study: Smart solar and battery solution helps regional school power up



Clean Energy Knowledge Sharing Initiative



## Summary

Chrysalis School for Rudolf Steiner Education wanted to install additional air-conditioning units in its classrooms to enhance the wellbeing of students and teachers. Achieving this with grid power would have required an expensive upgrade to its grid connection.

The school engaged energy consulting company Enesol to look at possible alternatives. Enesol found that a smart solar and battery system was a more cost-effective solution and offered numerous environmental benefits. Chrysalis and Enesol decided to install a 10-kilowatt solar system, a 10-kilowatt-hour battery and a smart energy management system. The solution made a grid connection upgrade unnecessary, lowering project costs for the school.

## Fast facts



**Network connection upgrade estimate**

\$120,000



**Smart battery and control system**

\$20,000



**Savings to school**

\$100,000



**Carbon emissions avoided**

14 tonnes per year

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## Background

Located in the scenic Thora Valley, near the town of Bellingen in regional New South Wales, Chrysalis School had been experiencing extreme weather conditions. Due to a lack of air conditioning, the school had to close on severely hot days.

For the wellbeing of students and staff, Chrysalis decided to install air-conditioning units in nine classrooms. However, it was only able to install five because the school's power supply had reached its maximum capacity.

Chrysalis engaged modern energy solutions company Enesol to consider alternative options and design a solution that matched the school's values and needs.

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## Journey

Looking at Chrysalis' requirements, Enesol found that boosting the school's grid connection to install additional air conditioners would have a high capital cost. It would also lead to higher operating costs for the school.

Prior to the project, Chrysalis had been generating energy from three small solar systems, but the school had no battery storage.

Enesol assessed how it could avoid a network connection upgrade by using battery storage, demand management and control systems. This required a detailed understanding of the design options, opportunities and constraints.

Chrysalis and Enesol decided to install a new battery storage system and additional solar panels to allow most of the school's electricity to be generated by on-site solar power. The battery system would boost the power

capacity of the school and provide a reliable power supply during grid blackouts, which are common during extreme weather events.

One challenge Enesol encountered during the project was finding a good installer experienced with the required demand management systems. Special control devices were necessary to facilitate reliable demand response, so that Chrysalis could meet peak demand from the solar and battery system, instead of from the grid.

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**“We wanted the technical solution to match the school's values and also minimise its ongoing energy costs.”**

Kersten Schmidt, Director and Principal Engineer at Enesol

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Challenge	Solution
The cost of a network connection upgrade was estimated at \$120,000.	A cost effective solar – battery and control system was installed which made a grid connection upgrade unnecessary.
The grid supply to the school didn't have sufficient capacity to support additional air-conditioning units.	The battery system with a smart energy management program helps meet peak demand. If the battery is unavailable, the air conditioners automatically reduce power or power down.
It was difficult to find an installer with the necessary expertise and local presence.	Enesol provided guidance and support to the installer throughout the project.

## Solution

With the help of a \$30,000 grant from the NSW Government, Enesol managed the installation of a 10-kilowatt solar system and a 10-kilowatt-hour battery storage system.

A smart energy management program was also introduced to monitor and control the integration of renewable energy. The program optimises the performance of air conditioners to ensure a stable power supply. By reducing the energy used by the air conditioners during peak periods, the program automatically limits the maximum power demand to ensure the electrical infrastructure can cope. This is done via a Demand Response Enabling Device feature that uses radio links from the control system to each new air conditioner.

The project resulted in a saving to Chrysalis of around \$100,000, by avoiding the cost of a grid connection upgrade.

The cooler classrooms provide a healthier learning and teaching environment for about 70 students and staff members. Chrysalis intends to also use the new smart battery and solar system to educate various class levels about reducing our carbon footprint, innovation and engineering.

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**“Using a renewable energy solution like solar is a good fit for our community.”**

Tim Fry, Business Operations Manager, Chrysalis School

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## Takeaway points

- The standard solution may not always be the best solution – consider alternatives early in the process.
- Get cost estimates for grid connection upgrades early to better evaluate options.
- Consider a holistic design – it can bring numerous benefits, such as decreased emissions and lower ongoing energy costs.
- Find experienced project partners to help guide the process.

## Outcomes

By choosing to install solar and battery systems on-site, Chrysalis expects to gain lower energy costs and a smaller carbon footprint. The school is likely to save approximately \$3,500 annually in electricity bills and cut its carbon dioxide emissions by 14 tonnes per year.

Chrysalis is also benefiting from backup power provided by the battery system. For example, during school holidays in December 2018, severe thunderstorms left the entire valley without electricity from the grid for days. But thanks to the capability of the newly installed battery, key parts of the school continued to have power, enabling staff members to keep working.

## Next steps

Chrysalis believes the project is a good example of how organisations can overcome energy challenges by harnessing renewable power. The use of battery storage, demand response and control systems to avoid network upgrades is replicable across schools, businesses and small communities facing similar challenges.

Chrysalis is looking to reduce its electricity costs and carbon footprint further by installing more solar panels across its Thora campus, with potential funding from grants or the school's energy bill savings.

The school has even started looking beyond its campus. It is considering providing energy services to its local community by establishing a micro-grid. This could provide security of supply to the community, reduce network strain and costs for the area, and lower carbon emissions.

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**It's important to choose a delivery partner that's not only experienced in solar and battery storage projects, but also has a good understanding of smart controls and system integration."**

Kersten Schmidt, Director and Principal Engineer at Enesol

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## Outcomes

By choosing to install solar and battery systems on-site, Chrysalis expects to gain lower energy costs and a smaller carbon footprint. The school is likely to save approximately \$3,500 annually in electricity bills and cut its carbon dioxide emissions by 14 tonnes per year.

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