

QUEENSLAND'S 2024 SOLAR SAVINGS

January 2025



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CONSERVATION
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SUMMARY

In 2024 rooftop solar kept Queensland's grid going. Solar panels on more than one million Queensland roofs generated 12.8% of the state's electricity needs. This is more than the entire gas fleet, and makes rooftop solar the third largest generator in Queensland, behind only Stanwell and Tarong coal-fired power stations.

Rooftop solar is now critical to our electricity system's operation. Without it, the rest of our electricity generators would not have been able to make enough electricity to keep the lights on. A significant 160 GWh of energy, the equivalent of more than 30,000 households' annual usage, could not have been met.

Not only that, but rooftop solar is saving Queenslanders money. In 2024, it brought down wholesale power prices in Queensland by \$300/MWh on average. Across a year, this is an average saving of \$1000 per household. Unlike one-time electricity rebates, rooftop solar provides long-term cost of living relief, not only for those who benefit from the electricity in their house, but for all Queenslanders.

According to the Australian Energy Market Operator (AEMO), rooftop solar is predicted to continue to grow by another 50% to 2030¹. This would make it the largest generator in Queensland, and only increase the cost savings and benefit to the grid.

Queenslanders have voted with their feet and wallets to install world-leading amounts of rooftop solar. However, it's not all rays of sunshine for the future of rooftop solar. If the Federal Coalition were to follow through with their nuclear scheme if elected, our modelling shows that the equivalent of 45,000 rooftop solar systems could have to be switched off every day to make space in the grid for just one nuclear reactor in Queensland².

Queensland's uptake of rooftop solar has delivered clear cost of living benefits and significantly reduced electricity emissions. Our state and federal governments must ignore the expensive distraction that is nuclear energy, and instead continue to support the uptake of rooftop solar, especially for renters and social housing tenants. We're also calling for further policy and financial support for households and businesses to invest in energy efficiency and battery storage, so Queenslanders can experience the full cost of living benefits of clean technology.

Helping households and businesses to generate their own affordable power around the clock is a smart investment to bring down the cost of living, further reduce electricity sector emissions, and improve grid reliability.

ROOFTOP SOLAR IN QUEENSLAND

UPTAKE

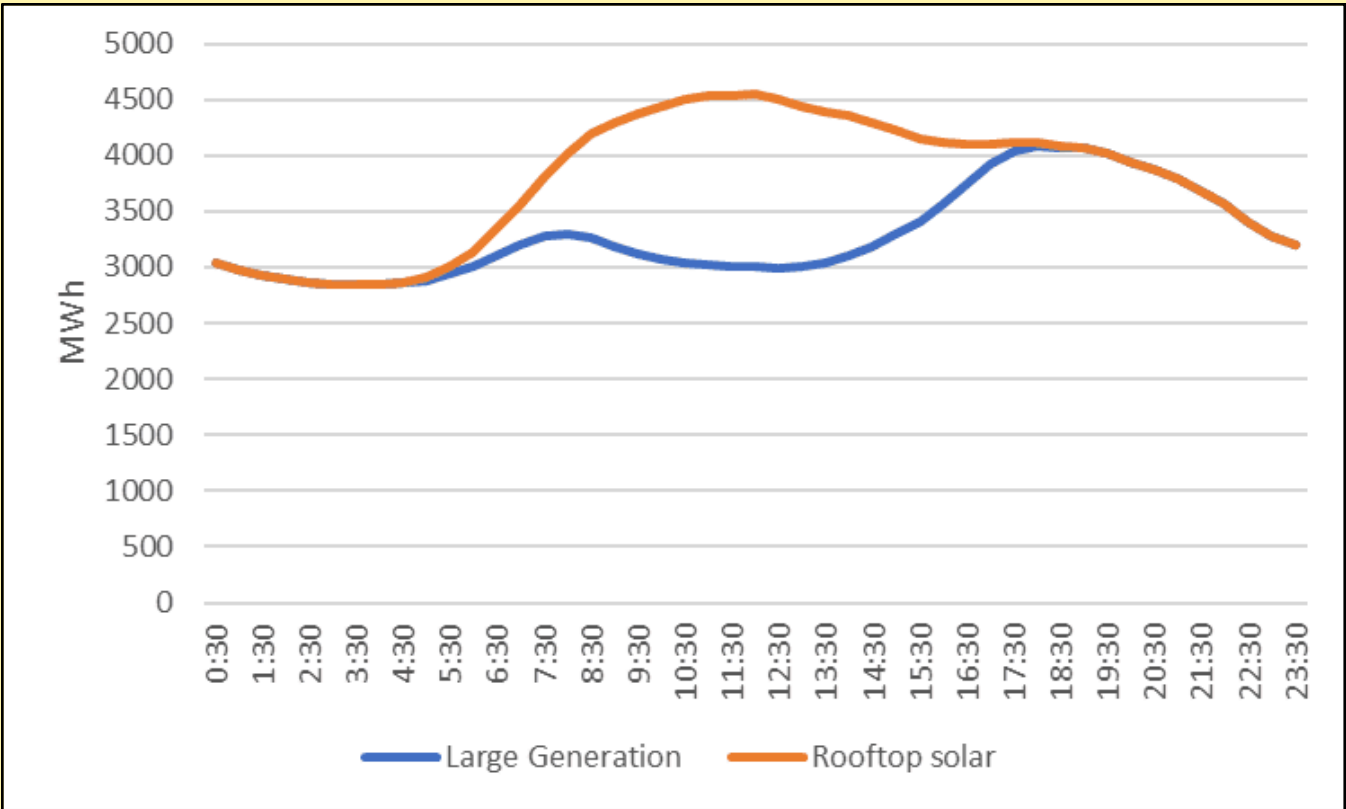
In late 2023, Queensland passed one million rooftop solar installations³. In 2024, Queenslanders kept adding solar to their roofs at nearly 6,200 roofs per month, meaning that there are now around 1,080,000 roofs with solar in Queensland. The proportion of households with solar grew by 4% to 46% in the 2024 Queensland Home Energy Survey, meaning next year could reach 50% of all Queensland households with solar. However, less than 20% of renters, or people in apartments, have solar, meaning there is still a long way to go to spread the benefits of solar to all households⁴.

CONTRIBUTION TO THE GRID

In 2024, these million plus solar systems generated 8,300 GWh or 12.8% of Queensland’s total energy⁵.

Rooftop solar is now vital to the operation of the grid. The peak demand on Queensland’s network in 2024 was recorded in January at 5pm. Peak demand is recorded late in the afternoon, after rooftop solar production has dropped off. Figure 1 shows that rooftop solar reduced daytime requirement from large-scale generation, pushing the peak demand later in the afternoon. Without rooftop solar meeting daytime demand, the middle of the day would have seen the highest demand, and it would have been nearly 15% higher than actual peak demand in 2024.

Figure 1: Average Generation from large-scale sources and rooftop solar in 2024.





There is now so much rooftop solar in the grid, that our large-scale generators would not be able to meet demand if it wasn't there. Without rooftop solar, there would have been 160 GWh of energy, the equivalent of 30,000 households' annual usage, that could not have been met.

IMPACT ON WHOLESALE PRICES

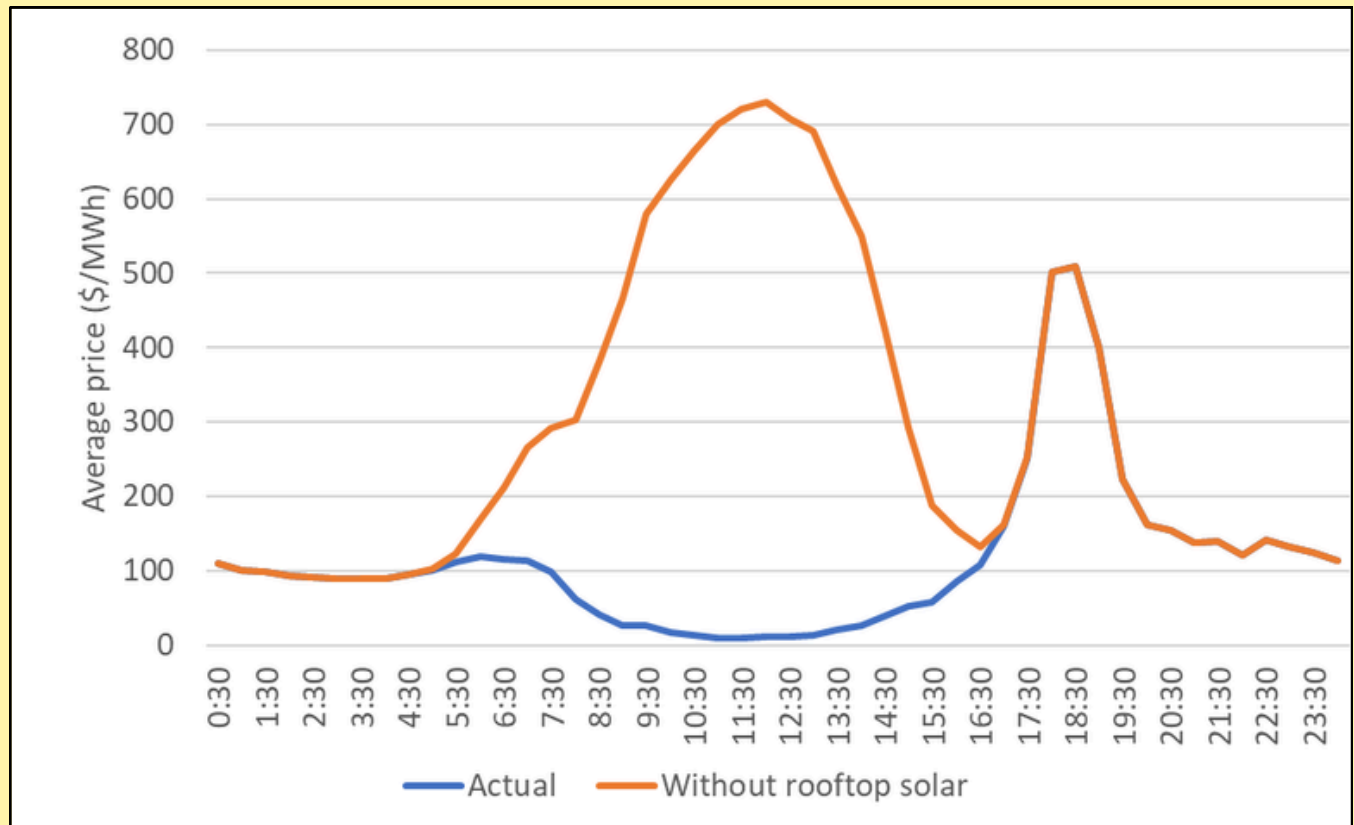
Rooftop solar reduces wholesale power prices by reducing demand and reducing the need for more expensive gas or diesel generators to run.

In 2024, the average price of wholesale electricity was \$111/MWh. This is higher than in 2023 (\$101/MWh) but significantly lower than the crisis points of 2022 (\$223/MWh)⁵. Prices were higher than in 2023 due to:

- Higher demand - in January 2024, the average Queensland demand was 12% higher than in 2023 due to higher temperatures, while in July/August, prices were pushed higher in Queensland and also southern states by colder temperatures.
- Unavailability of coal power - in November 2024, 3 GW of coal fired power stations around the NEM were unavailable during an unseasonable heat wave, pushing prices extremely high⁶ and supply challenges have persisted in December 2024 particularly in NSW which has a flow on effect on Queensland.

Without rooftop solar, prices would have been significantly higher, because demand would have been higher and reliance on outage prone coal-fired power stations even higher. By analysing the generation, price and availability of all Queensland generators every half hour of the year, we can estimate the wholesale price if rooftop solar had not been available, based on the monthly average prices of the remaining large-scale generators. Figure 2 shows the average price curve with a sharp peak in the evening. Without rooftop solar, an even higher peak would have been seen in the middle of the day. This would have increased prices to an average of more than \$300/MWh, a 270% increase in average wholesale prices.

Figure 2: 2024 average price throughout the day with and without rooftop solar.



An increase of wholesale price to \$303/MWh would have contributed an extra \$1000 to an average household bill, if it had been passed through by the retailer.

IMPACT OF NUCLEAR

Rooftop solar will keep growing in Queensland as more people take up the opportunity to reduce electricity costs. By 2040, the Australian Energy Market Operator expects rooftop solar in Queensland to double, to contribute around 18 TWh of electricity to the grid¹.

Nuclear power stations are not a useful complement to renewable energy, because they are too large and inflexible. If the energy system progresses as AEMO expects to 2040, a single nuclear power station in Queensland would mean an average of 45,000 solar households would have to turn off every day to allow the nuclear power station to run².

CONCLUSION

2024 again proved that rooftop solar is an integral part of Queensland's electricity system. Without rooftop solar, we simply could not have met all our electricity demand. We also would have paid nearly three times as much for wholesale electricity, which could have pushed average bills up by \$1000/year.

More than one million households have invested in rooftop solar but there are still many people who cannot access the benefits of rooftop solar, in particular renters and people on low income. We urge the state and federal governments to expand support for solar for renters and social housing tenants, while helping more Queenslanders access household energy efficiency upgrades and battery storage for 24/7 clean and affordable power.

METHODOLOGY

This report used market data to assess the potential impact of removing rooftop solar from Queensland's electricity system.

Three streams of half hourly market data were retrieved:

- Reported generation for each individual coal and gas unit, including Mt Stuart and Yarwun was retrieved, as well as aggregate generation from hydro, large-scale solar, wind and rooftop solar
- Reported availability of each generator
- Half hourly Queensland wholesale electricity price

From this, the average revenue for each generator in every month of the year was calculated as a proxy for the marginal costs of running that generator in that month.

For every half hour, the following process was carried out:

- Sorting generators with available unused capacity into price order
- Replacing rooftop solar generation with other sources, starting from the lowest priced generator
- Determining the new marginal generator
- If the marginal generator has changed, the wholesale price for that half hour is assumed to be set at the monthly average revenue of that generator
- If there is not enough available capacity to replace the rooftop solar, the price is still assumed to be the most expensive available generator but the missing energy is calculated
- Compiling a new price trace for each half hour

This can then be used to evaluate the average price per half hour throughout the year, and to calculate unserved energy if rooftop solar were not available.

REFERENCES

- [1] Australian Energy Market Operator (2024) *2025 Draft Inputs Assumptions and Scenarios Report*.
- [2] Queensland Conservation Council (2024) *Delayed Reaction: Why Queensland will never need nuclear*.
- [3] Australian PV Institute (2024) *PV Postcode Data*.
- [4] Energy Queensland and Powerlink (2024) *Queensland Household Energy Survey 2024*.
- [5] OpenElectricity (2024) *Energy: Queensland*.
- [6] Leading Edge Energy (2024) *November 2024 Electricity Market Review*.



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