MINISTRY OF EDUCATION
TE TĀHUHU O TE MĀTAURANGA

Briefing Note: Information for CNGP Ministers on Solar Panels in Schools

To:	Hon Jan Tinetti, Minister of Education		
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Purpose of Report

This paper provides information on solar panels in schools for Carbon Neutral Government Programme (CNGP) Ministers, as requested at the 9 November 2022 CNGP Ministers meeting.

Summary

- The Ministry does not specifically fund solar panels installation. Schools can use Ministry provided capital funding if all higher priority projects are funded first. Alternatively, schools can use non-Ministry funding sources such as entering into power purchasing agreements to cover the upfront costs.
- The high renewable share of electricity generation in New Zealand significantly decreases the emissions reduced by using solar panels at schools.
- Any potential energy and financial savings from the use of solar panels at schools is limited due to the overall profile of energy use at schools. Schools use the most energy in winter when solar generation is lowest and use less energy in summer when solar generation is highest.
- Solar panels on existing structures can pose weathertightness problems, damage roofs and risk voiding asset warranties.
- The Ministry is focussed on programmes that can achieve efficient and significant carbon reductions, particularly on those that remove fossil fuels and reduce energy consumption. For example, programmes such as the Coal Boiler Replacement Programme and Ngā Iti Kahurangi – Improving Classrooms in Small and Remote Schools.

Proactive Release

a **agree** that the Ministry of Education release this briefing in full once following the March CNGP Ministers meeting on.

Agree / Disagree

b **Note** this paper will be sent to the Carbon Neutral Government Programme Ministerial Group as part of the meeting pack

Noted

Scott Evans
Hautū, Te Puna Hanganga, Matihiko

Hon Jan Tinetti
Minister of Education

01/03/2023

04/03/2023

Background

1. In November 2022, the Ministry gave an update to CNGP Ministers on the Ministry's work to support the CNGP particularly for schools (METIS 1297282 refers).

2. During the meeting CNGP Ministers asked about solar panels at schools and requested more information for the March 2023 meeting.

Impact of Solar Panels

3. The Ministry does not hold specific data on solar panels energy or financial impact at schools. This information is held by School Boards as Independent Crown Entities. We do have some limited information on solar panels available through research we have undertaken.

Effectiveness of Solar Panels

4. There are several factors that impact the overall effectiveness of solar panels on roofs, particularly when compared to other solar installations. In the context of schools there are further factors which impact effectiveness.

Energy impact

5. The school energy consumption curve is almost the opposite of solar generation output. This is because school energy consumption is higher in winter than in summer. Schools are also typically closed on weekends and during holiday breaks. In particular, schools do not operate for most of the summer period when solar PV is at its most effective.

6. The impact of this misalignment could be reduced by using batteries. However, the cost of batteries and asset management implications of using batteries (e.g. maintenance, storage requirements) must be considered against the benefit batteries can provide.

7. Solar panel efficiency is reduced further by the design and age of buildings across the portfolio. A majority of the Ministry's 16,000 buildings were built decades ago. Decisions about the orientation, building design and roof pitch were not made with maximising solar exposure, and therefore improving solar panel efficiency, in mind.

Financial Impact

8. Solar panels can deliver financial benefits to schools through reducing the need to purchase electricity from the grid. However, if schools have to cover the cost of solar panels, then they should consider the length of the payback period, in particular if a school has used a power purchasing agreement.

9. The length of the payback period is increased by the misalignment of school energy consumption and solar generation output. Schools will still need to purchase electricity from the grid.

10. Schools are able to sell electricity back to the grid. However, this is typically around 8c per kWh for fixed price contracts, which is lower than the cost of purchasing electricity from the grid (especially when the fixed charges are included).

11. Some schools may earn closer to the market spot price through Time-of-Use contracts. However, the periods when schools would have excess electricity to sell

are typically outside of periods when demand across the grid peaks, and when prices are highest.

Emissions Impact

12. The high share of electricity generation from renewables decreases the emission reduction impact of solar panels which replace electricity from the grid.

13. Information from the carbon baselining exercise we took across 56 schools in 2021 highlighted the greater emissions reduction from replacing fossil fuels than from installing solar panels.

	School A	**School B**	**School C**
Intervention	Solar Panel Installation	Solar Panel Installation	Coal Boiler Replacement
Net reduction in emissions	2.5t CO2e	2t CO2e	5.7t CO2e
Percentage reduction in total annual school emissions	3%	3%	20%

14. We are also conscious of the whole-of-life emissions associated with solar panel use (and batteries), particularly the embodied emissions that come from the production and end-of-life processes of solar panels (and batteries). When embodied carbon is accounted for this significantly reduces the emissions reduction from school use of solar panels.

15. The Ministry is focussed on programmes that can achieve efficient and significant carbon reductions, particularly on those that remove fossil fuels and reduce energy consumption. This is being done through programmes such as the Coal Boiler Replacement Programme and Ngā Iti Kahurangi – Improving Classrooms in Small and Remote Schools, which is reducing energy consumption through the installation of LEDs in approximately 600 schools.

Resilience

16. Solar panels with batteries may improve the resilience of electricity supply in cases where power is lost. This can particularly be the case for some rural schools, which due to electricity network issues may lose power several times a year. In these situations, diesel generation is often used to provide electricity. This is currently the most reliable back-up available.

17. Batteries storing the energy generated from solar panels or other forms of on-site generation may provide a partial alternative to grid electricity for a period. However, this may only support the running or controlled shutdown of critical systems (e.g. self-suppled water, IT systems), and is unlikely to enable the continued operation of a school (depending on the length of the outage).

Current Approach to Solar Panels in Schools

18. The Ministry does not have a preferred solar panel provider and does not run a solar panel installation programme. We do provide information on our website to support schools who are considering solar panels. Schools may consider a range of factors when making this decision, including the financial, energy, and emissions impacts.

19. Currently, we know of 226 state schools that have solar panels, based on information provided to us by 1672 schools in mid-2022 to support CNGP reporting.

20. Schools Boards are required to seek Ministry agreement to any additions or alterations to Ministry-owned property, such as installing solar panels on roofs of buildings. We also require all solar panel installation to be carried out by a member of the Sustainable Electricity Association of New Zealand (SEANZ). It is essential that solar panels are installed by qualified professionals to minimise health and safety, maintenance and weathertightness issues.

Funding Solar Panels

Solar Panel Installation

Ministry funding sources

21. The Ministry does not specifically fund solar panel installation. Schools can use capital funding provided to them to support capital upgrades to install solar panels. However, installing solar panels is considered a discretionary project. All work related to health and safety, essential infrastructure, and internal classroom environments must be prioritised over discretionary projects.

22. In recent years, additional one-off capital funding has been made available to schools which they were able to use to install solar.

    a. The School Investment Package provided capital funding to every state school to spend on property upgrades. 31 solar projects were undertaken with this funding.

    b. Through Budget 2019 $5 million was provided for a Sustainability Contestable Fund to support schools to reduce their environmental impact and improve their operational efficiency. Through two contestable rounds 94 projects were approved, including 41 solar panel projects.

Other funding sources

23. Schools can also use Board funds to install solar panels. Board funds may come from fundraising or community grants. Schools must be aware of and capable of meeting the ongoing costs of the solar panels i.e. maintenance.

24. Some schools are financing the installation of solar panels by entering into power purchasing agreements, through which there is no or limited up-front cost for the panels.

25. The New Zealand Green Investment Fund (NZGIF) has provided support to one provider, solarZero, to enable solar panels at schools. The $8 million finance facility provided enables solarZero to cover the installation costs of solar panels at schools while returns are made over the term of the power purchasing agreements with schools.

26. NZGIF investment decisions are made on a commercial basis and therefore are highly unlikely to be available to individual customers such as schools.

Ongoing Solar Panel Costs

27. The ongoing maintenance costs and end-of-life costs must also be considered when installing solar panels.

28. If Ministry capital funding has been used to install solar panels, then schools can use their Ministry providedProperty Maintenance Grant to maintain the panels. However, if a Board has funded the solar panel installation, then the Board would be responsible for the maintenance costs.

Asset Management Considerations

29. Solar panels on existing structures can pose weathertightness problems, cause roofing issues, and risk voiding warranties. The Ministry is already working through a significant legacy of weathertightness and building envelope issues across the school portfolio.

30. Solar panels on roofs also create added costs when roofs require maintenance and/or replacement, particularly if the solar panels need to be temporarily removed.

31. There are also regular maintenance requirements (e.g. cleaning) to maximise function and the lifespan of solar panels, and these may require specialist contractors especially given the health and safety requirements related to working at height on roofs. This is an additional burden and cost to schools at a time when the Ministry is working to reduce the property burden on schools.