



BRIEFING

Modelling the effects of high rooftop solar and household battery uptake on the New Zealand electricity market and consumer bills

Date:	25 June 2026	Priority:	Low
Security classification:	In Confidence	Tracking number:	BRIEFING-REQ-0031054

Action sought		
	Action sought	Deadline
Hon Simeon Brown Minister for Energy	Note the contents of this briefing Note MBIE intends to publish the research in July 2026	10 July 2026

Contact for telephone discussion (if required)			
Name	Position	Telephone	1st contact
Tamara Linnhoff	Manager, Electricity Markets Policy	Privacy of natural persons	✓
Mark Pickup	Principal Policy Advisor, Electricity Markets Policy	Privacy of natural persons	
Neeraj Dutt	Senior Policy Advisor	-	

The following departments/agencies have been consulted

Minister's office to complete:

☐ Approved

☐ Declined

☐ Noted

☐ Needs change

☐ Seen

☐ Overtaken by Events

☐ See Minister's Notes

☐ Withdrawn

Comments



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Purpose

To inform you of modelling work carried out during 2025 by MBIE, in collaboration with Rewiring Aotearoa (**Rewiring**) on the modelling's assumptions and approach.

This work investigated the potential impacts of Rewiring's ambition for very high levels of rooftop solar and small-scale batteries on the electricity market, and assertions made about the benefits of rooftop solar for security of supply.

Some stakeholders are aware of and have requested (via OIA) these modelling reports. We plan to publish these reports and a short summary overview, in July.

Executive summary

MBIE commissioned modelling to assess the impacts of very high uptake of rooftop solar and small-scale batteries, following claims by Rewiring that such uptake would significantly reduce electricity prices and improve security of supply.

The modelling compared a base case of around **3.5GW** of rooftop solar by 2055 with two faster uptake pathways reaching Rewiring's ambitious target of **28GW** by 2055 - around seven times the base case and equivalent to solar on around 80 percent of homes, plus many farms and businesses.

The modelling finds that uptake to this high level could have material system-wide effects:

1. **Wholesale electricity markets:** Average spot prices could fall in the near term, benefiting consumers. However, market dynamics would change significantly, with increased wholesale price volatility and weaker incentives for new grid-scale generation. All other things equal and without intervention, this could raise longer-term costs and security-of-supply risk.
2. **Electricity networks:** Unmanaged solar exports would be expected to drive significant additional network investment to keep up with the extra power injections, increasing costs for an average household by \$200–\$300 per year. Importantly, these impacts could be substantially reduced through active management of solar, batteries and EV charging, including time of use (**ToU**) pricing to influence household decisions.
3. **Household energy bills:** The overall impact on bills is uncertain. This could be positive or negative, depending on solar demand growth rates, the timing of uptake, household technology choices, and the availability of cost-reflective retail and ToU tariffs. Solar and battery uptake that runs too far ahead of, or lags behind, demand growth could drive higher network costs and higher bills.

The key finding is that **very high levels of rooftop solar and batteries will only deliver net consumer benefits if supported by a highly "smart" electricity system**, including smart devices, active demand management and pricing that rewards flexibility. Without this, high uptake could risk increasing overall system costs.

The wholesale market modelling **tested Rewiring’s claim that rooftop solar could deliver the equivalent of an additional 15 days of hydro storage in dry years**. The modelling did not support this claim. It found that while higher solar output could lift lake levels ahead of winter, low winter solar generation would then increase reliance on hydro during winter, resulting in lower lake levels by mid-winter and continued security-of-supply risk.

The final stage of modelling examined how wholesale and network impacts might flow through to consumer bills for different types of households, facing different retail tariffs. Since completing the project, some issues have been identified with the initial consumer-bill modelling, that will have led the modelling to understate the value of solar to some consumers. We have been collaborating with Rewiring to understand and be transparent about these limitations. These issues do not affect the findings relating to wholesale or retail-level impacts, nor the central conclusion that if unmanaged, extremely high solar uptake could increase system costs.

Some stakeholders are aware of this work and have requested access to the modelling through OIA requests. **MBIE intends to publish the research reports in July 2026**, alongside a short summary overview (and mention of the above-noted limitations).

This research reinforces the importance of ongoing work across MBIE, EECA and the Electricity Authority to deliver a smarter electricity system that enables efficient solar uptake while protecting consumers from higher costs.

Recommended action

The Ministry of Business, Innovation and Employment recommends that you:

- | | | |
|---|---|--------------|
| a | Note the contents of this briefing | <i>Noted</i> |
| b | Note MBIE intends to publish the research in July 2026 | <i>Noted</i> |
| c | Signal if you wish to meet with us to discuss this research’s key findings | Yes/No |

privacy of natural persons

Tamara Linnhoff
Manager, Electricity Market Policy
Building, Resources and Markets, MBIE

25 / 06 / 2026

Hon Simeon Brown
Minister for Energy

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Research explored the effects of high solar uptake on wholesale markets, on network capital expenditure and on consumer bills

1. MBIE commissioned modelling to assess the impact on household energy costs of ambitious uptake scenarios for rooftop solar and small-scale battery uptake across households, farms, and businesses. Household energy costs comprise electricity bills, costs relating to rooftop solar and battery installations, and gas costs where these are present. The modelling also explored how different tariff structures, which change incentives around the timing of EV charging and solar export, could affect electricity bills.
2. The modelling comprises three parts, assessing the impact on wholesale electricity market, network capital expenditure and household energy bills. The modelling did not aim to produce an 'optimal' uptake rate that ensures optimal benefits to New Zealand consumers of faster uptake of rooftop solar and household batteries. Rather, we worked collaboratively with Rewiring Aotearoa to understand their aims for solar and battery uptake (these are the demand pathways the modelling tested), and also to fully understand Rewiring's assumptions behind claims made in their research.
3. This modelling contrasted a base case (around **3.5GW** by 2055)¹ with two faster uptake trajectories: moderate and fast uptake rates to achieve Rewiring's ambitious target of **28GW** for rooftop solar adoption by 2055 (including some with attached battery storage). Rewiring's **28GW** target is seven times higher than the base case and reflects solar installed on around 80 percent of all homes,² plus many farms and businesses.
4. The modelling found that very high levels of solar uptake (28GW by 2055) could:

1. Significantly affect the wholesale market:	+	2. Materially increase network capex, if unmanaged:	=	3. The impact on household energy costs is uncertain
• A lower spot price will benefit consumers. • Wholesale market dynamics would fundamentally change and would need to be managed (to avoid higher prices), to ensure continued incentives in grid-scale generation - as modelling shows rooftop solar wouldn't fully meet NZ's increasing demand so grid-scale power plants will still be needed longer term.		• Networks will need capital investment to accommodate daytime solar exports • But these costs could be substantially reduced by smart energy management		• The impact is complex and will depend on ○ New Zealand's electricity demand growth, uptake rates of solar and batteries; each household's solar, battery, EV, appliance and overall fuel specs and use. ○ To avoid costly network upgrades solar and battery uptake needs to track demand growth: if too far ahead or behind this will drive higher household bills. Smart tariffs will be critical.

Smart systems and management could significantly reduce costs

5. Modelling identified that without suitable storage control schemes, the rapid, unmanaged uptake of large PV systems would quickly lead to high power exports driving widespread network constraints. This will drive the need for extensive capital expenditure, or limits on solar that can be fed into the grid at certain times. This would drive costs to consumers: \$200 to \$300 per average household per year.
6. Widespread adoption of smart energy systems - to ensure consumers (or their panels, batteries and EVs automatically) can and do shift their demand and injection in response to dynamic pricing signals to the 'right' time periods - can help ensure high solar uptake does not drive the need for network investment.

¹ The 3.5GW by 2055 base case was modelled to be consistent with the Climate Change Commission's electrification pathway.

² Currently around 38% of homes in Australia have solar panels fitted, source - solarcalculator.com.au.

7. This highlights the importance of complementary policies to support a **smart electricity system** and so customers use the smart capabilities of their systems. This will be key to ensure very high levels of solar and battery uptake don't drive higher overall costs to consumers. Work underway across government to achieve this, is listed at paragraph 18.

Rewiring had asserted rooftop solar could 'save 15 days hydro storage'

8. Rewiring had made a specific claim in the media that 5,000 farms with mid-size solar systems could provide 30% more electricity to the grid, and an 11% increase in solar production during a dry year would allow for an additional 15 days of hydro storage.
9. As reported to the previous Minister for Energy, in October 2025 [BRIEFING-REQ-0018640], the wholesale market modelling considered Rewiring's claim relating to an additional 15 days of hydro. The modelling did not support this claim. It found that while higher solar output could lift lake levels ahead of winter, low winter solar generation would then increase reliance on hydro during winter, resulting in lower lake levels by July/August and continued security-of-supply risk.

Post-project, we continue to collaborate with Rewiring

10. The third stage of the project assessed the impact of modelled wholesale and network impacts on household bills. We engaged Sapere consultants to develop a flexible model that can be used in the future by EECA (and external groups like Rewiring) to investigate the potential effects of different retail tariff structures on consumers bills, for different households - with and without solar, batteries and EVs.
11. Post-project completion, the third stage modelling was tested again by Rewiring. This recent testing revealed some shortcomings in the model's approach, and assumptions used when applied to consumers bills. For example, the wholesale model did not vary a household's demand profile for higher electrification levels.
12. As a consequence, we agree with Rewiring that the findings relating to the potential impact on consumer bills that was reported has likely underestimated the value of solar to some consumers, in some circumstances.
13. We have worked with Rewiring and Sapere to address shortcomings, to ensure the model has the flexibility needed for future use. Rewiring continues to hold some concerns relating to this bill-impact modelling that we continue to work through. However, given this work has been requested under OIA (see below) - we consider it should be published soon. To ensure transparency once published, we have collaborated with Rewiring to develop an addendum to the third-stage report to address these limitations. We plan to continue collaborating as needed, to ensure the tool that has been built remains suitable to support this kind of analysis.
14. These third-stage modelling challenges do not affect the findings relating to wholesale or retail-level impacts, nor the central conclusion that if unmanaged, extremely high solar uptake could increase system costs.

SEANZ has modelled the impact of solar for a much lower uptake level

15. The Sustainable Energy Association of New Zealand (SEANZ) has itself released a number of reports that consider the value of increased solar penetration for consumers and the economy as a whole. Their November 2025 report "*New Zealand's big switch – unlocking renewable abundance*" concludes that looking backwards over the past 5 years, **3GW** of solar would have meant that no coal plants would have been dispatched, and **8GW** of solar would have resulted in no coal nor gas dispatch.

16. This modelling was for a much lower solar uptake than what was modelled to reflect the original **28GW** presented by Rewiring and MBIE has not tested the veracity of these claims, though we note they rely on a modelling approach that allows for much less complexity in the wholesale market than the work undertaken for stage 1 of the above-described analysis. For example, SEANZ's modelling does not factor in hydro variance and system dependencies.

Work is underway aimed at developing the smart system we need

17. EECA is supporting consumers to make informed decisions around rooftop solar, battery investment and other smart technologies by providing a range of tools and information. Other initiatives like the Solar on Farms programme (administered by EECA), support businesses to understand the practicality and impact of medium-scale solar.
18. We are also progressing smart EV charging regulations, recently agreed by Cabinet. There is further work underway across regulators to support a smarter electricity system:

Focus	Action	Entity	Timing
Smart device deployment	Changes to modernise the Energy Efficiency and Conservation Act	MBIE	Bill introduced in 2026 (TBC)
	Developing smart EV charging regulations and rules	MBIE / EECA	2026/27 (dependant on Bill)
	Flexibility, hot water and V2G trials	EECA	Ongoing
	Raising export limits on networks	EA	In force from May
Consumer behaviour change	Better export and demand-shifting rewards	EA	Decisions made, in force by July 2026
	Research, information and best practice for consumers	EECA	Ongoing
	Enabling multiple trading relationships	EA	Decisions mid-2026
Data	Improving network visibility	EA	Consultation closed June 2026
	Regulated Open Electricity - Consumer Data Right	MBIE	Cabinet approved late 2025, Regulations to be made mid-2026 Commencement in mid-2027
Reducing barriers to uptake	Ministry for Regulation Solar Review	MFR	We have received a first draft of the review and cabinet paper. MfR wishes to go to Cabinet in July
	Plugin Solar	MBIE	We are currently agreeing the best approach to amending settings to enable plugin solar, and will brief you on next steps in July

Next steps

19. Stakeholders have requested these reports via OIA. During 2025 we responded declining release and confirmed the reports would be published once complete and following discussion of the findings with the then Minister for Energy.
20. We briefed your predecessor on interim and final findings and had intended to discuss the final suite of analysis together with Rewiring. Due to other priorities the planned discussion was not held. Given stakeholder interest, having briefed you on this work, we plan to publish these reports in July 2026.
21. Should you wish, we can schedule an Energy Officials meeting agenda item to discuss this research's key findings.