MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

COVERSHEET

Minister	Hon Simon Watts	**Portfolio**	Energy
Title of Cabinet paper	Amendments to the *Electricity (Safety) Regulations 2010* to expand the permitted voltage range on low voltage electricity networks	**Date to be published**	16 June 2025

List of documents that have been proactively released		
Date	**Title**	**Author**
March 2025	Amendments to the *Electricity (Safety) Regulations 2010* to expand the permitted voltage range on low voltage electricity networks	Office of the Minister for Energy
25 March 2025	*Electricity (Safety) Regulations 2010:* Expanding the permitted voltage range on low voltage electricity networks EXP-25-MIN-0021 Minute	Cabinet Office

Information redacted **NO**

Any information redacted in this document is redacted in accordance with MBIE's policy on Proactive Release and is labelled with the reason for redaction. This may include information that would be redacted if this information was requested under Official Information Act 1982. Where this is the case, the reasons for withholding information are listed below. Where information has been withheld, no public interest has been identified that would outweigh the reasons for withholding it.

Office of the Minister for Energy

Cabinet Economic Policy Committee

Amendments to the *Electricity (Safety) Regulations 2010* to expand the permitted voltage range on low voltage electricity networks

Proposal

1 This paper seeks Cabinet's agreement to amend the *Electricity (Safety) Regulations 2010* (the Regulations) to expand the permitted voltage range for electricity supply on low voltage electricity networks.

Relation to government priorities

2 *Electrify NZ* sets out the Government's commitment to double renewable electricity generation by 2050. It is also a priority of this Government to ensure that New Zealand households and businesses can access affordable and secure electricity at internationally competitive prices.

3 The proposal in this paper will enable electricity networks to accommodate more distributed energy generation like rooftop solar and electric vehicle (EV) charging. This will help to reduce the need for network investment and costly infrastructure upgrades which are ultimately paid by end consumers. Making it easier for owners of rooftop solar systems to export more electricity back to the network will also provide them better options to manage their own electricity bills. This can also contribute to the resilience of the energy system and reduce emissions through decreased reliance on thermal electricity generation at peak times.

4 Ensuring electricity networks can accommodate increased EV charging will also support the Government's *Supercharging EV Infrastructure* work programme.

Background

5 Most households and businesses in New Zealand connect to electricity networks through low voltage distribution networks. Electricity distribution businesses (EDBs) deliver electricity to most households at 230 Volts. Regulation 28 of the Regulations requires electricity to be supplied on these networks within a range of +6% and -6% (+/-6%) except for momentary fluctuations.

6 For many years, New Zealand's appliance standards have been aligned with International Electrochemical Commission (IEC) standards, including that they are designed for voltage ranges of +10% and -10% (+/-10%).[1] This means, although in New Zealand the permitted voltage range is +/-6%, appliances that comply with the appliance standards should be able to tolerate a voltage range of +/-10% safely.[2]

[1] The IEC 60038 standard defines a set of standard voltages for use in low and high voltage range and the tolerance of +/-10% has been part of the standards since the late 1980s.

[2] While many countries have harmonised on a supply voltage range of 230 Volts +/-10%, Australia operates on a supply range of 230 volts +10% and -6%, except for Western Australia which currently has 240 Volts +/- 6%. This reflects

7 The increase in uptake of rooftop solar panels and EVs is expected to change the flow of electricity on low voltage networks. Increased amounts of solar generation during the day flowing into the electricity network coinciding with low household demand for electricity could lead to voltage exceeding the permitted upper voltage limit of +6% more often. Similarly, a large number of households charging EVs at home in the afternoon simultaneously could worsen the high demand typical at that time in winter. This could lead to voltage falling below the permitted lower voltage limit of -6% more often. EDBs would currently look to curtail this activity to stay within the permitted voltage range, or alternatively need to make further upgrades to their networks.

8 EDBs and solar generation advocates requested a review of the regulated voltage range. The rationale is that it could avoid or defer significant expenditure on electricity networks. It could also avoid or defer restrictions that EDBs might otherwise place on the operation of solar generation to maintain compliance with the permitted voltage range. Solar industry stakeholders consider this will increase the uptake of rooftop solar ownership as consumers may be able to export more electricity back to the grid in return for payment.

9 In October 2024, the Ministry of Business, Innovation and Employment (MBIE) undertook stakeholder consultation to expand the upper voltage range to +10% and sought views on whether the lower voltage range should remain at -6% or expanded to -10%. The consultation also sought evidence of any risks to household appliances, equipment and safety of the electricity supply to homes and businesses.

Analysis

I propose to expand the voltage range to +/-10%

10 I propose to amend the Regulations to expand the permitted voltage range for electricity supply on low voltage networks from the current range of +/-6% to +/-10%.

11 This would bring New Zealand's voltage range into alignment with relevant IEC standards and the voltage range that has been reflected in New Zealand regulated appliances standards for many years.

12 Making this change will have significant benefits for the electricity system and consumers. The change will allow electricity networks to accommodate more rooftop solar systems and EV chargers, and in turn ensure better utilisation of network capacity.

13 MBIE commissioned ANSA[3] to model the impact of voltage limits on rooftop solar uptake, in particular, the impact of increasing the regulated upper voltage limit from +6% to +10%. ANSA modelling suggested that at a national level, raising the upper voltage range to +10% could enable rooftop solar generation to increase by approximately 24 percent for commercial connections with 20 percent uptake, and 3

Australian history which is not relevant to New Zealand (all Australian states and territories (except for Western Australia) operated on a supply range of 240 Volts +/- 6%.)

[3] ANSA specialises in modelling and insights for grid connection. ANSA's report is published on MBIE's website with the voltage review discussion document, available at: https://www.mbie.govt.nz/have-your-say/proposals-to-expand-the-permitted-voltage-range-for-electrical-supply

percent for residential connections with 30 percent uptake. The combined increase is about 507 GWh more generation rising to 825 GWh if residential rooftop solar uptake rose to 50 percent.

14 The proposed change should deliver more value for rooftop solar system owners as their systems will be able to export more electricity back to the grid. This may also support resilience of the electricity system when peak demand is high. I note that the Energy Competition Taskforce has recently released proposals for a package of measures that will ensure owners of these systems receive appropriate payment from retailers and EDBs for injecting electricity to the network.

15 In the absence of expanding the voltage range, especially the upper voltage range, the Electricity Networks Aotearoa (ENA)[4] estimates the cost of increasing hosting capacity to achieve the same benefit would be between approximately $200,000 and $300,000 per low voltage feeder in an urban or suburban environment, using the traditional network enforcement techniques. These costs could reach into the high hundreds of millions across the whole electricity distribution system - costs which would be charged to consumers through the lines charge component of their electricity bills.

Consultation has strongly supported making this change and has not identified major risks from doing so

16 MBIE's consultation received 22 submissions from stakeholders including EDBs and representative groups from the solar and electricity industry. There was strong support by submitters for expanding the upper voltage range to +10%, agreeing with ANSA modelling. Submitters considered it to be a more cost-effective option which would support electrification and benefit security of supply, as it could enable low voltage networks to accommodate higher amounts of exported electricity from solar which would be constrained under the status quo.

17 Most submitters considered it would be beneficial to expand the lower voltage limit to -10%, allowing an increase in network capacity which could enable higher EV penetration in future. On balance, officials consider that expanding the lower voltage range to -10% now will bring New Zealand more into line with international standards and other countries, such as the United Kingdom, and will future proof the Regulations from an increase in EV ownership.

Implementation costs are expected to be minimal

18 For most households there is expected to be no change. Some consumers that own rooftop solar systems may incur costs to reconfigure inverter settings to accommodate the wider supply voltage. The Sustainable Energy Association New Zealand (SEANZ)[5] has provided information to officials and estimated that it would cost approximately $250 for an electrician call out to update the standard settings in an inverter which is a relatively simple task.

There may be some risks to legacy devices, however this is likely to be very low

[4] The ENA represents 29 EDBs in New Zealand.

[5] SEANZ is a body representing solar and battery energy storage systems across New Zealand.

19 Some submitters noted there could be risks to legacy or older devices (ie devices that do not conform to the IEC standards or modern New Zealand appliance standards) if networks were to operate at the edges of the increased range consistently. For example, some EDBs and the Electricity Engineers Association (EEA)[6] raised concerns that induction motors and pumping stations in commercial settings may perform poorly if voltage was regularly supplied close to the range of -10%. Other submissions raised risks of older consumer devices having reduced life span or overheating if voltages were consistently close to the new range of +10%.

20 MBIE officials met with the ENA, WorkSafe, the EEA and Fire and Emergency New Zealand (FENZ) to understand the size of these risks and determine if any mitigations are required. They consider there is limited risk from the changes because of the following reasons:

a. Changing the voltage range does not mean that electricity supply will always occur at the edges of the range. The ENA expects that EDBs will not materially change current supply settings as EDBs are already compliant with the permitted voltage range. Officials' understanding is that devices would need to receive voltage at the high end of the range for a long period of time for legacy devices to deteriorate. It is unlikely that supply will be delivered regularly at higher voltage.

b. The IEC standards and New Zealand appliance standards have already required devices to operate safely at +/-10% for some time.

c. Health New Zealand submitted that medical devices sold in New Zealand are designed and manufactured to the IEC standards and suppliers also confirmed to Health New Zealand that devices operate satisfactorily in the +/-10% voltage range when they are imported.

d. The Regulations allow EDBs to negotiate special arrangements with industrial and commercial electricity users for any devices with specific voltage needs outside the permitted voltage range.

e. While it should not be necessary, consumers can also invest in surge protectors if they are worried about a legacy device.

21 Officials will develop a communications plan with stakeholders in the electricity industry to ensure the changes are well signalled to the public and any risks are reduced.

Implementation

22 As per Cabinet guidance I expect these changes to the *Electricity (Safety) Regulations 2010* will come into force 28 days after notification in the *New Zealand Gazette*.

[6] EEA is a body of corporate and individual members from across all engineering disciplines and sectors of the electricity supply industry.

Cost-of-living Implications

23 The proposal in this paper will support mitigating upward pressures on electricity costs associated with the need to upgrade New Zealand's electricity distribution networks.

Financial Implications

24 There are no financial implications associated with this paper.

Legislative Implications

25 The changes proposed in this paper will require an amendment to *the Electricity (Safety) Regulations 2010* which are made under the *Electricity Act 1992*. The *Electricity (Safety) Regulations 2010* are already being amended to update 400 references to international standards cited in the Regulations. I propose that this amendment vehicle be used to promulgate the proposed changes to the voltage range in this paper as well.

Impact Analysis

Regulatory Impact Statement

26 The Ministry for Regulation has determined that this proposal is exempt from the requirement to provide a Regulatory Impact Statement on the grounds that it has no or only minor economic, social, or environmental impacts.

Climate Implications of Policy Assessment

27 The Climate Implications of Policy Assessment (CIPA) team has been consulted and confirms that the CIPA requirements do not apply to this policy proposal, as the emissions impact is indirect. This proposal allows for an expanded permitted voltage range for electricity supply, which could reduce emissions by enabling increased use of renewable energy sources such as rooftop solar panels.

Population Implications

28 There are no population implications associated with this paper.

Human Rights

29 The recommendations in this paper do not create any inconsistencies with the *New Zealand Bill of Rights Act 1990* or the *Human Rights Act 1993*.

Use of external Resources

30 No external resources have contributed to this Cabinet paper. The discussion paper was supported by a technical report prepared by an independent consultant, ANSA consultants.

Consultation

31 The Treasury and WorkSafe were consulted on this paper. The Department of the Prime Minister and Cabinet has been informed.

Communications

32 Subject to Cabinet's agreement, I intend to issue a press release and MBIE officials will develop a communications approach to ensure consumers are aware of the changes.

Proactive Release

33 I intend to proactively release this Cabinet paper subject to necessary redactions, within 30 business days of decisions being confirmed by Cabinet.

Recommendations

34 The Minister for Energy recommends that the Committee:

1 **note** that expanding the permitted voltage range on low voltage electricity networks:

1.1 will enable electricity networks to increase hosting capacity for rooftop solar generation and EV charging without the need for costly network infrastructure upgrades, reducing costs that are passed to consumers;

1.2 will in turn support consumers with rooftop solar systems to export higher volumes of electricity to the grid, enabling them to receive better value for these systems, and bolster the resilience of the electricity network;

1.3 would align New Zealand regulations with international standards and the approach taken in other countries;

2 **note** the proposed change is considered to be low risk given household appliances are already required to accommodate this range under international and domestic standards, and is supported by stakeholders;

3 **agree** to amend the relevant regulations in the *Electricity (Safety) Regulations 2010* to change the permitted voltage range from the current range of +/-6% to a new range of +/-10%;

4 **authorise** the Minister for Energy to issue drafting instructions to the Parliamentary Counsel Office to give effect to the recommendations in this paper;

5 **authorise** the Minister for Energy to make further decisions on minor and technical matters that are in line with the policy decisions in this paper where necessary.

Authorised for lodgement.

Hon Simon Watts

Minister for Energy