29 November 2024

Electricity Markets Policy Team
Building, Resources and Markets
Ministry of Business, Innovation & Employment
PO Box 1473
Wellington 6140

Wellington Electricity
Lines Limited

85 The Esplanade
Petone, PO Box 31049
Lower Hutt 5040
New Zealand

Tel: +64 4 915 6100
Fax: +64 4 915 6130

By email: electricitymarkets@mbie.govt.nz

To whom it may concern,

Proposals to expand the permitted voltage range for electrical supply

Wellington Electricity Lines Limited (WELL) appreciates the opportunity to provide a submission to MBIE in response to the above consultation. WELL is an electricity distribution business (EDB), managing the local distribution network across Wellington, the Hutt Valley and Porirua.

WELL supports **Option 2: Expand the upper limit to +10% and leave the lower limit at -6%**, aligning it with the supply voltage range in Australia. We have explained the reasons for this being our preferred option in our answers to the consultation questions, which are attached to this cover letter.

If you wish to discuss any of our answers, please email Ben Tuifao-Jenkinson, Economic Regulation & Pricing Specialist at ben.tuifaojenkinson@welectricity.co.nz.

Yours faithfully,

Greg Skelton
Chief Executive Officer

1. Responses to questions

The benefits of changing the voltage range	
1.	Would expanding the upper voltage limit from +6% to +10% help networks host more distributed generation like solar PV? Do you think this is likely to be more, less, or similar in cost to other options, like reconfiguring networks or installing additional infrastructure?
	Yes. Expanding the upper voltage limit from +6% to +10% could increase permitted hosting capacity by 15%[1] on our existing network, without having to invest in traditional 'wire' solutions (i.e. infrastructure upgrades). Such upgrades would be expensive, ultimately increasing the cost for all consumers including those who may not directly benefit. Without increasing the upper voltage limit, it is likely that accepted distributed generation (DG) applications will be subject to curtailment, with some rejected due to export congestion (specifically, voltage constraints) in line with the current upper voltage limit of +6%. By increasing the upper voltage limit, we would be able to accept more DG applications without the need for curtailment or immediate investment, creating a potential reduction in peak network demand through the increased use of DG, and a reduced impact on distributed generators. The proposed upper voltage limit increase is one of several regulatory changes that will help us continue to provide a safe and reliable electricity supply while maintaining affordable lines charges.
2.	Would expanding the lower voltage limit from -6% to -10% help networks host more distributed energy resources like electric vehicles? Do you think this likely to be more, less, or similar in cost to other options, like reconfiguring networks or installing additional infrastructure?
	No. We agree with ANSA's analysis that networks will primarily be limited from supplying the likes of electric vehicle (EV) chargers by thermal constraints before voltage constraints. Furthermore, we have identified two other potential issues that may arise if the lower voltage limit was to be decreased to -10%: 1) As the acceptable voltage level would be calculated or measured at the point of supply[2], there is a risk that the voltage could be lower at the point of consumption due to voltage drop (potentially risking appliance performance issues). 2) Consumers of large loads may, inadvertently or otherwise (for example, through the use of inductors, motors, or industrial equipment) cause greater power quality disturbances on our network than at present.

[1] *EV Connect Roadmap – Appendix E: Roadmap actions | Wellington Electricity* https://www.welectricity.co.nz/major-projects/innovation-projects/ev-connect/ (Accessed 29 November 2024).

[2] *Electricity (Safety) Regulations 2010 – 28: Voltage supply to installations | New Zealand Legislation* https://www.legislation.govt.nz/regulation/public/2010/0036/latest/whole.html#DLM2763653 (Accessed 29 November 2024).

3.	Beyond costs, do you think expanding the voltage range will have any wider benefits to the security or sustainability of the electricity system?
	Yes. Expanding the upper voltage limit from +6% to +10% will also allow EDBs to increase network transformer tap settings to help mitigate potential undervoltage issues caused by voltage drop during peak winter demand, which is expected to increase with the uptake of EVs. The change would prevent the need for the installation of more advanced equipment which is unlikely to be economical – again, with consumer price impacts in mind. The limit increase would also enhance an EDB's ability to 'backfeed' during a power outage, reducing the duration of supply interruptions.
4.	Are there any other benefits to expanding the voltage range that have not been mentioned?
	Not at present, other than as mentioned in answer to Q3.
The risks of changing the voltage range	
5.	Do you have reason to believe that any appliances you manufacture, sell, or use would be at significant risk of failing if the maximum permitted voltage increased from 244 V to 253 V? If so, what appliance(s), why do you think it could be affected, and what would the impact be?
	We do not believe that any equipment we use (including network assets) would be affected if the maximum permitted voltage increased from 244 V to 253 V. We assume that MBIE/Standards New Zealand, etc. will assess the potential impacts of the change on consumer appliances as part of this consultation.
6.	Do you have reason to believe that any appliances you manufacture, sell, or use would be significantly affected if the minimum voltage was allowed to fall from 216 V to 207 V? If so, what appliance(s), why do you think it could be affected, and what would the impact be?
	We do not believe that any equipment we use (including network assets) would be affected if the minimum voltage was allowed to fall from 216 V to 207 V. We assume that MBIE/Standards New Zealand, etc. will assess the potential impacts of the change on consumer appliances as part of this consultation.
7.	Are there any specialised appliances that are at higher risk of failing from wider standard voltage ranges, or where the impacts of failures would be particularly serious?
	Again, we would rely on MBIE/Standards New Zealand, etc. to assess this. Also see answer to Q9.
8.	Do you think an alternative approach should be taken to manage the demands of distributed energy resources on low voltage networks? If so, what approach and why would it be preferential to expanding voltage limits?

	As mentioned, we support the proposed approach (specifically, Option 2: Expand the upper limit to +10% and leave the lower limit at -6%). However, we also believe that requiring metering equipment providers to provide easier access to consumption and near real-time power quality data through a standardised protocol and terms will be required to effectively manage the demands of distributed energy resources (DER) on low voltage networks going forward. Currently, EDBs have no visibility of where non-exporting DER is connected and have no way of ensuring that this DER will operate within their network's operating conditions. We support the existing Electricity Authority and MBIE programmes to address the future of DER management[3] and emphasise the need for a joined-up approach between all regulators when considering such changes.
How changes to voltage regulations should be implemented	
9.	If voltage limits were expanded, do you believe those changes should be phased in? If so, how? If not, why do you think a phased approach is undesirable?
	No. In our view, a phased approach would only be desirable if uncertainty remained around the potential impact on any appliances; particularly medical equipment. However, we would expect that MBIE/Standards New Zealand, etc. would be confident, prior to any implementation, that any changes would not result in medical equipment being impacted.
10.	If voltage limits were expanded, are there any specific safeguards you believe should be introduced for 'higher-risk' appliances, if any?
	See answer to Q9.
11.	What costs would be involved in expanding the regulated voltage range? Who would face those costs?
	The main upfront cost involved in expanding the regulated voltage range would be the delivery of communications to consumers who are identified as being potentially affected – for example, solar PV providers, who we may need to educate around correct inverter settings to prevent unnecessary voltage-related 'callouts'. Consumers with medical equipment – for example, hospitals, medical centres, rest homes, and medically dependent consumers may also need to be contacted regarding potentially increased voltages supplying their medical equipment. However, we would not expect this to be required for the reason specified in the answer to Q9.

[3] Including, but not limited to:

a) the Electricity Authority's 'Delivering key distribution sector reform' work programme (October 2023), which includes three projects to improve access to data and information.
b) the Minister for Energy's proposal to amend the Energy Efficiency and Conservation Act 2000 "to enable demand flexibility capability requirements to be set for energy-using products, services and systems." (MBIE, November 2024).

	We do not foresee any other costs involved in expanding the regulated voltage range, except for: • one-off maintenance costs to adjust transformer tap settings, where desired (EDB cost); • possible replacement costs for old appliances needing to be replaced, per paragraph 32 of the discussion document (consumer/EECA(?) cost); and • cost to update the Electricity (Safety) Regulations 2010 and any other legislation or standards (New Zealand Government cost).
12.	Are there other regulations or standards that would need updating if regulated voltage ranges were changed? Please be specific where possible.
	No, other than as mentioned in answer to Q13.
Any further information	
13.	Is there anything which has not been covered by the previous questions that you believe we should consider?
	As mentioned in the answer to Q3, the proposed limit increase would allow us to manage increased demand from the likes of EV chargers by increasing network transformer tap settings. However, this combined with the potential for the permitted inverter limit to be increased (to align with the proposed change) could result in network voltages exceeding 253 V. To mitigate this, we propose separate limits for distributed generation exports at the point of injection, which EDBs could set for areas they identify as being at risk of this issue (and possibly manage through a distributed energy resource management system). Such limits could be built into the inverter standard (AS/NZS 4777.2:2020 Grid connection of energy systems via inverters, Part 2: Inverter requirements).