Executive Summary:

- Make the export limit 10kW **per phase**.
- Mandate battery storage for DG operating at 80% or higher of the per-phase export limit.
- **Do not reference a specific version of any standard**. Simply refer to the most recently published version of the standard.
- Promote batteries to shave mid-day peak and spread generation out.
- Promote “time of use” pricing to economically shape generation.

Rationale:

I am unable to encapsulate my thoughts about the 10kW export limit proposal in the proposed response format. Consequently, I will provide a free-form response instead.

I am a home solar enthusiast with no qualifications or training in distributed generation. This response focuses solely on the perspective of residential solar systems with regard to distributed generation.

Electrical infrastructure has to be amortised over long periods of time because of the cost. Plans should have long time frames as a consequence. I have decided to take a 20-year view of distributed generation to help measure the appropriateness of the 10kW export limit.

A good starting point would be to determine where home solar generation could be in 20 years.

I wanted to determine the 90th percentile for roof area for single-level residential dwellings in New Zealand to understand the potential generation limits in the future (the top 10% of homes).
I could not find an appropriate set of raw data.
Various NZ roofing sites suggest that larger average homes have roofs up to 250 m^2, while larger homes exceed 300 m^2. I am going to use 250m^2 for my 90th percentile.
https://www.roofingrepairstauranga.kiwi/ultimate-guide-on-how-much-does-a-new-roof-cost-in-nz/

I am going to allow for 30% of this area to be able to harvest solar energy reasonably. That is 75 m^2.

Cutting-edge “lab” solar panels have an energy density of 0.4 kW/m² . I expect that within 20 years, these will be readily available and “standard”.
https://www.energydawnice.com/solar-panel-output-per-square-meter/

This means there will be a **potential peak generation of 30kW** for a residential solar system 20 years from now.

Consequently, I don't believe a 10kW export limit "per connection" will be suitable for the long term. This will solve a problem "now", but does not guide the electrical distribution sector on the long-term goals when designing and building out their networks.

I have two proposed solutions for consideration:

- For single and 3-phase connections, change the export limit to be 10kW per **phase**, rather than per connection. I have no opinion on 2-phase connections. Perhaps the fast-track "consenting" process should exclude 2-phase connections due to the small number.
- If we are unable to adopt "per phase" limits, then I think we'll need to consider "peak shaving" distributed generation options. Specifically, mandate that large generation systems have a battery to provide some "elastic" response to generation and demand.

I have reflected on what Australia has experienced.
Australia promoted residential solar heavily, and now experiences issues with excessive generation during the day.
Battery storage should be promoted as part of the distributed generation mix to help shave off the midday peak and spread it out over a longer portion of the day.
It would also help with sudden dips in generation when groups of suburbs experience a sudden drop in generation from environmental factors, resulting in the local grid having to suddenly backfill a lot of missing generation. It would help improve local grid stability and resilience.
I think consideration should be given to mandating that larger residential solar systems (operating at 80% or higher of the per-phase export limit) must have a battery, as well as mandating a larger export limit.

Apart from the reasons given above for supporting an increase in the export limit, there are also economic reasons.
Retail pricing is composed of two major components: fixed and variable. Larger export limits reduce the payback period of a home solar system by reducing the fixed cost per kWh exported. Increasing the minimum export limit makes residential solar more economically attractive.

I have also considered the “dry year” problem that NZ regularly experiences. If we have:

- Larger residential export limits
- Batteries fitted to all residential systems operating at 80% of the export limit
- Time of use pricing

Then we can create an economic incentive for distributed generation to be built out to reduce the demand on our hydro lakes during those dry years.

>We propose to cite the latest version of the inverter installations standard as a minor and technical update

I have strong feelings on this one.
I look at the train wreck called “ASNZ 3000”, and the inability to use the newer version of the standard because legislation referenced the specific older version.
Please let us learn from this regulatory nightmare, and not reference a specific version.
Please only refer to the “latest published” version.