Australian Energy Market Commission: Consultation on the National Electricity Amendment

Governance of Distributed Energy Resources (DER) Technical Standards Rule 2022.

Enphase Energy Aust. Pty Ltd. Submission

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Authors	Ryan Turner, David Minchin & Aylmer Ambu
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1.0 Introduction

Enphase Energy would like to thank the Australian Energy Market Commission (AEMC) for the opportunity to provide feedback on the proposed governance of Distributed Energy Resources (DER) technical standards Rule 2022.

Australia is a recognised leader in the adoption of DER that has accelerated the change to Australia's energy mix, towards a renewable energy future. For over twenty years the renewable energy industry has supported the transition, from what was once considered a curiosity, to a commercially viable generation platform for Australia.

Renewable energy sources help meet part of, or in some regions exceed, the total energy demand. Consequently, grid stability issues have now emerged when favourable sun and wind conditions combine, with low energy demand. When household consumption is low, the power exported to the grid can change rapidly according to weather conditions, resulting in a dynamic energy source. With the load base changing, this now presents challenges to grid stability and the provision of generation capacity via the NEM or locally.

With grid stability now the focal point of the expansion of renewable energy on the NEM, services such as frequency response and control are critical to the success of DER. The widespread deployment of DER now opens the opportunity for its participation in grid stability via a DER technical standard to outline conformability functions. A minimum technical standard will ensure DER capacity continues to increase, as well as assist with the future of renewable energy security of the NEM and other marginal grids within Australia.

Although work is progressing on adopting technology standards and protocols, such as IEEE 2030.5, OpenADR and CSIP-AUS, it will be some time before these can be fully implemented. Enphase firmly believes that grid services, such as grid stability and dynamic connection agreements can be achieved within a much shorter timeframe with existing technology. This will enable DER to meet grid requirements on the residential scale without the lengthy standards implementation processes.

Enphase is actively involved with grid services globally, as well as in Australia through our dedicated grid services team. With the release of Ensemble[1], grid services participation is a key area of interest for our company. Enphase has maintained an active presence in the DER regulation industry, with many of its employees' active members of Standards Australia committees, the Clean Energy Council committees and other industry think tanks and forums.

Enphase believes the biggest challenge to improving DER technical standards is governance and compliance as this is frequently missing or inconsistent at a national (NEM) level.

[1] Enphase Ensemble™ is Enphase Energy's latest grid agnostic energy system that combines all elements of PV generation, energy storage and Enpower advanced gateway functions in the one system with IEEE 2030.5 compatibility. Refer Appendix C.1

2.0 DER Technical Standards Governance Options

The ESB has proposed four options to improve governance of technical standards:

Option 1: Maintain the status quo

Option 2: Modifications to the existing arrangements through targeted interventions such as additional resources

Option 3: Development of a new coordinating structure and process, and

Option 4: Wholesale reform including the centralisation of DER technical standards governance decision-making through a new body.

Enphase Energy sees developing a new group to coordinate the structure and process of DER technical standards governance (Option 3) as the best way forward. There are already groups in place that look after specific organisation and technical aspects however the workflow of each is sometimes duplicated or important steps are missed. No particular group currently has full oversight or the technical depth hence a top tier group should be created to coordinate all effort into one stream.

The DER Governance of Technical Standards Group would work with stakeholder groups and committees working in the DER industry. The structure of the group should follow that of a private company board with a balance of members who actively participate in these groups and independent persons who can make impartial decisions on matters. It is important that both Federal and State government organisations have effective representation

The DER Governance of Technical Standards Group would be responsible for:

- Creating the road map for DER governance and the road map for standards
- Providing gap analysis of current standards and work with respective groups to adapt or create new standards
- Directing the project assignment of “milestone” DER standards to Standards Australia
- Providing commercial analysis of proposed changes to DER governance and work with all parties to seek workable outcomes
- Propagating DER technical standards to all sections of the DER industry
- Providing consistent DER technical standards and compliance across the NEM
- Adjudicating on specific DER governance issues between member groups
- Working with Federal and State compliance operatives to improve delivery of governance.

The size of the group shall be capped, and tenure of members fixed with a transparent renewal process. Each member receives an honorarium or retainer with an engagement agreement. The group should meet on a regular basis (monthly). The governance workload is assigned to smaller sub-groups made up of key experts from within the group or co-opted from industry.

3.0 Answer to Questions in the DER Technical Standard Rule 2022 consultation paper

QUESTION 1: ASSESSMENT FRAMEWORK

1. *Do you agree with the proposed assessment framework?*

One issue that arises from the proposed assessment is the scope of what is considered and what is already covered in other standards and forums, such as Standards Australia, DIEP as well as various other committees and forums. For example, low voltage ride-through VDRT can help solve some grid stability issues and is incorporated in AS/NZS4777.2:2020. Whereas the controllability of DER and the interaction with the grid is covered in IEEE 2030.5 and the CSIP-AUS implementation guide.

Where would the DER minimum technical standard sit on this, and would it call out previous work and standards that have been developed to aid the transition into a renewable future? Will the DER technical standard be able to provide clarification of standards to customers, installation companies, retailers, and manufacturers?

Enphase's core value as a product is safety and grid stability, both rely on high quality products being deployed in Australia, which has not necessarily been the case thus far. We need to ensure more DER capacity is available, through DER controllability, to aid the grid stability. The product and installation compliance must be addressed to ensure the DER technical standards implementation is a success.

2. *Should the assessment framework include any additional considerations? If so, what are they and why?*

Enphase believes the assessment framework should also include product quality and compliance, to ensure the required grid stability and safety of all DER systems.
The amount of DC isolator fires within the media, as well as poor installation and product quality has negatively impacted the general populations view on DER.
We need to ensure product quality and installation compliance is at the forefront of the industry to increase consumer confidence, which in turn, will continue to increase the uptake of DER.

Enphase believes DNSP grid connection rules and AC coupled batteries should be standardised across the NEM, this will ensure we continue to encourage battery storage adoption. This will result in an increased in DER uptake, as well as increasing energy security and grid stability due to the addition of DER storage.

QUESTION 2: IDENTIFYING GOVERNANCE PROBLEMS

1. *Do you agree with the problems identified by the rule change request? Why?*

Enphase agrees that the inability to implement consistent technical standards across the

NEM causes a myriad of issues for customers, retailers, manufacturers, and installation companies.

A key example of this is the different rules that DNSP's place on grid connection requirements and AC batteries in particular. The DNSP requirements around AC coupled batteries show the lack of consistent DER technical standards across the NEM, with some allowing an AC coupled battery Inverter in addition to a PV inverter, while others class the Inverter capacity as the combined capacity (PV Inverter capacity + AC coupled Inverter capacity). Combining the PV inverter capacity and AC coupled battery inverter capacity leads to an unfair competitive advantage of DC hybrid Inverters, as well as lowering the overall uptake of batteries on the grid.

Battery storage has already proven to help grid stability; therefore, a standardisation of rules will result in further energy security being offered by DER systems. The vast majority of batteries sold in Australia are now AC coupled, so the inconsistency in rules is actively prohibiting battery adoption and negatively impacting the uptake of renewables and DER on the NEM.

2. *Do you agree with the rule change request on the causes of identified problems? Why?*

Enphase believes the lack of coordination and consistency across the NEM regarding technical connection standards is an issue as discussed above in Question 2, answer 1. If IEC or IEEE standards are directly adopted, most manufactures will be implementing the required changes to meet the requirements, hence it becomes easier for manufactures to be compliant in Australia. Any newly approved standards should then be called out on the NER to ensure they are adopted at the same time throughout the country.

Standards Australia is formed by volunteers that often have full-time demanding jobs, as well as the responsibility to create safety standards. Internationally this is not the case due to the standards process being a priority of importance and time sensitive, therefore deploying paid positions. While Standards Australia does a fantastic job with the resources it has available, the rapidly changing requirements for DER technical standards will require a centrally funded body to oversee the implementation of this. This oversight is required to ensure DER technical standards are adequate for allowing greater DER adoption on the NEM. This will be paramount as we move into the all-electric home, with less gas and an increased uptake of EV's, hence increased energy demand.

3. *To what extent has the Commission's recent rule change on DER technical standards resolved or likely resolve the identified governance issues?*

The recent AEMC rule change to create a definition of DER technical standards that incorporates AS/NZS 47777.2:2020 in the NER and that DER technical standards must be embedded into DNSP's model standing offers for grid connections, is highly supported by Enphase. However, further clarification on the governance of DER technical standards is required. While standards committees have the best of intentions, the prime objective of a standard sometimes gets lost during the process. Who is responsible for ensuring products are certified correctly to AS/NZS4777.2:2020? Who would decide on key interpretations of

standards and grid connection rules? Who is responsible for compliance of installation and commissioning?

Recent conversations with DNSPs have shown their intention to push all compliance obligations to DER installers and end customers, who are ill equipped to mitigate their liability and doing so would be cost prohibitive. Should every installer be required to pay for random sample testing of the products they are installing, or should this be done by a centralised and far more cost-effective body?

4. *When do longer term issues such as interoperability and cyber security need to be addressed? Can existing governance arrangements and the recent rule change address these issues in a timely manner or is further governance reform required?*

Enphase does not believe that cyber security and interoperability are long term issues that should be solved with a long-term plan, we believe that they are an issue today and thus need to be solved as soon as possible.

The change from the traditional centralised distributed electricity system towards a decentralised system brings new challenges and risks from cyber security that need urgent attention.

The AEMC is encouraged to support the accelerated adoption of new standards to ensure all connected DER, metering and control systems maintain a high level of security.

There are several IEC standards series published (or in TR draft) that have been developed by IEC SC/TC-8, TC-57 and ISA 99 workgroups, that can be AS/NZS harmonised. Standards relevant to the energy industry in Australia include:

- IEC 61850 series (+ 2020 amendments) provides guidance for power utility automation systems and defines the communication between intelligent electronic devices in such a system
- IEC 62351:2021 provides guidance on different security objectives including authentication of data transfer through digital signatures, ensuring only authenticated access, prevention of eavesdropping, prevention of playback and spoofing, and intrusion detection.
- ISA/IEC 62443 series provide a flexible framework to address and mitigate current and future security vulnerabilities in industrial automation and control systems (IACSs).

Interoperability and power system security concerns raised by AEMO and others, require a national forum and through the adoption of standards around DER security. For example:

- DEIP, Maturity Plan with the aid of the Australian Standards committee
- EL-054 – Demand response capabilities and supporting technologies for electrical products
- EL-064 – Decentralised electrical energy and grid integration of renewable energy systems

- EL-065 – Management of Network Assets in Power Systems.
- IEEE 2030.5 and CSIP – AUS implementation guide for DER controllability and grid interaction.

The updated AS/NZS 4777.2:2020 standard for DER inverters will improve power system security with the implementation of strict VDRT and Advanced Grid Functions (e.g. dynamic export limiting) requirements.

The higher accuracy resolution requirements for frequency, voltage, and power measurement will better align with grid stability requirements, once mandated on the 18th of December 2021.

Standards Australia's EL-064 committee for decentralised electrical energy and grid integration of renewable energy systems is working through IEC SC/TC8 on a range of standards that are currently under development, that will also become applicable soon.

5. *Are there any other governance problems not identified by the rule change request? If so, why does the AEMC need to consider these issues?*

Enphase believes governance should also include the low voltage supply network, to ensure the grid is running within legal supply limits of 230 V -6% to +10% (216.2 – 253 Vac) as per AS60036. Enphase can see from its own data that the grid is often still set at 240 Vac or greater, even with no solar being generated, it is not uncommon for our monitoring platform to read a site voltage of 240 – 255 Vac. With the grid running at a non-compliant voltage, current DER requirements that mandate the use of Volt-Var and Volt-Watt, result in lower system performance, which in turn will decrease the demand for DER due to decreased system performance. For further uptake of DER on the low voltage network, monitoring the voltage is required to ensure it complied with Australian Standards. DER can help achieve this visibility and controllability of the low voltage network by providing data on sites with DER monitoring installed, as well as DER controllability measures outlined in IEEE 2030.5 and the CSIP-AUS implementation guide.

The AEMC's previous publication on the final determination on DER Technical Standards stated, "The Commission considered the existing compliance and monitoring systems under the Clean Energy Council and the Clean Energy Regulator relating to the certification of products and installers of electricity generating systems should continue to be used by industry as they are complementary to the overall compliance arrangements. The Commission considers that this approach is consistent with achieving the NEO as this avoids imposing inefficient costs of a new potentially duplicative compliance system on electricity consumers". It is clear from the recent CER report on the rooftop solar PV sector that the CER will assume full responsibility for both certification requirements. As a result, the CEC's future involvement is not known at this time. Enphase therefore suggests that the AEMC work directly with the CER to differentiate between DER Technical Standards and DER safety standards. Both parties need to ensure who is responsible for each specific standard, as well as the compliance that relates to these standards. A compliance matrix for the DER industry should be created so the complexity around standards, regulation and compliance can be easily understood for consumers, retailers, and manufacturers alike.

QUESTION 3: ASSESSING THE MARKET IMPACT OF IDENTIFIED PROBLEMS

1. *Do you face any costs from governance arrangements in place prior to the commencement of the new DER technical standards rule change on 18 December 2021? Can you quantify these costs?*

There is always cost involved in developing new products and firmware to comply with standards, however Enphase prides itself on going above and beyond the minimum standards required. This is achieved through significant investment in research and development to ensure our products remain ahead of the market. If an OEM is unwilling to aggressively invest in research and development it will not achieve long term success, especially as we move to greater DER adoption and become a mainstream industry.

However, in order to optimise this cost and minimise eventual passthrough to end customers, the more similar local standards are to those used in other jurisdictions, for example IEC and IEE, the better. That way the compliance costs are borne once, then spread across sales in multiple markets.

2. *Alternatively, how would you be impacted if the Commission does not establish new governance arrangements for DER technical standards?*

The current governance framework is manifestly inadequate to support the inevitable high presence of DER devices on the grid and will inevitably result in knee jerk rules and regulations being introduced at a DNSP level to maintain grid quality and stable electricity supply. Those rules and regulations will result in slowed approvals of installations, increasing installation times for consumers and in turn reducing revenue for installers. As we have seen in some areas of Victoria recently, installers will have no way of knowing if the customer they are servicing has the ability to install DER equipment, and if that equipment will ultimately be approved for connection.

If the commission does not establish new governance for DER technical standards, then the industry will suffer from poor product quality and installations, which in turn will negatively impact the reputation of the industry from the public and potential consumers.

This is already starting to happen with the media around poor-quality installations and DC isolator fires. If nothing is done to combat this, then the industry will struggle with its anticipated continued growth and Australia will never reach a fully decarbonized future, with renewable energy and DER at the centre of its national energy mix.

3. *How certain are you about any forecast future costs?*

Forecasts for future costs are always uncertain in business, nobody could have predicted the impacts of COVID-19, supply chain issues or the semi-conductor shortage. However, where there is a demand for products, businesses will adapt and be created, to fill the demand.

Future costs can depend on a variety of different considerations, such as supply security and shipping capacity. Enphase believes that the industry will overcome these short-term

challenges and some normality will be seen in 2022.

We can be very certain of the costs involved. Duplicating work for compliance in every market, and especially between different Australian states, has a clear multiplier effect. Where once we do things one time only, we need to replicate and repeat over and over again.

The costs for solar installers are also clear. If they are unsure if a customer sales lead can actually connect solar, and if they can, whether there are additional costs, this directly impacts their lead conversion ratios, ultimately increasing the price paid by customers.

QUESTION 4: DER TECHNICAL STANDARDS IN THE RULES

1. *Should DER technical standards relevant to the NEM be included in the NER, or a subordinate instrument?*

DER Technical Standards should be published in the NER to provide greater transparency to consumers, retailers, and OEMs. The current process of each DNSP providing its own DER technical standards and requirements, results in the main-stream adoption of DER becoming difficult for consumers, retailers, and OEMs that operate within different regions of the country. As a result, consumers in some regions are unable to get the same access to DER capacity as others.

An example of this is the capacity limits and AC coupled battery limits that exists on some connection agreements from certain DNSP's, as outline in Question 2, answer 1. The DER technical standard should ensure that there is a level playing field for the NEM, as well as other marginal grids in Australia, to ensure consumers have access to the DER capacity required to reduce their electricity bills and carbon footprint.

We do however recognise that each DNSP will have some regionally specific settings. Provided the frameworks are common, customisation at a local level should be designed into this.

2. *How could any new governance arrangements interact with Standards Australia existing processes in a way which avoids duplication, while ensuring standards are developed in a timely manner?*

Communication and cooperation between the AEMO, AEMC, CER, Standards Australia and any other governing body are key to ensuring standards avoid duplication, and that standards are developed in a timely manner. Standards Australia should release their road map of updated and new standards while also highlighting known gaps in their coverage, this can then be passed on to other groups who can help bridge the gaps that currently exists in DER technical standards.

The other issue that can arise is interpretation in standards, an independent governing body is required to have the final say on Standards interpretation, as well as compliance issues.

We have seen manufacturer lobby groups previously undermine standards by pushing for a more lenient 'interpretation' of items that they found problematic.

3. *What would be the main benefits from including DER technical standards in the NER, NERR, or a subordinate instrument? Are there any risks?*

The main benefits of including DER technical standards in the NER or NEER is the ability to be able to enforce compliance to the standards. Compliance within the DER industry has always been an issue and varies by state, as can be seen by the difference in inspection requirements below:

- **For Victoria** following PV Installation work is prescribed electrical installation work in Victoria and hence subject to 100% inspection:
    - Adding panels to an existing solar grid connected PV where the open circuit voltage (Voc Array) exceeds ELV
    - Upgrading the inverter due to increase in generation capacity
    - Changing the type of inverter i.e. isolated to non-isolated
- **For Tasmania**, 100% of PV installations are required to be inspected by WorkSafe Tasmania prior to connection.
- **For ACT,** 100% of PV installations are required to be inspected by Access Canberra inspectors prior to connection.
- **For QLD,** there is no requirement for inspection and testing of each PV installation however the ESO may inspect a system after installation.
- **For WA**, Installation or modification of on-site power generation including PV installations is 'notifiable work' as defined in the Electricity Licensing Regulations 1991 and notices of work shall be submitted to the network operator as required by Regulations 51 and 52 in WA Electricity regulations. WA Network operators do attend an installation when it is connected, and an inspection of a PV installation may be conducted. There is not a current 100% inspections policy.
- **For SA,** there is no requirement for inspection and testing of each PV installation however eCOC data is scanned and OTR will inspect installations of interest after commissioning. SA Power Networks may conduct a test of the system to establish compliance at the time of connection or thereafter.

The risk presented on the above information is a difference in system compliance in different states, as well as who is responsible for the compliance and providing transparency and consistency across the NEM and Australia wide.

In addition to this, the speed at which the NER can be changed, whilst not instant, is significantly faster than that of Standards Australia. As uncontrolled and increased presence of DER continues to challenge conventional grid management rules, we need to ensure that new rules can be tested and implemented in months not years. We know that 3GW of rooftop solar is added each year, but we also added 52 MW of electric vehicle demand in the first 6 months of 2021. If we move to 10% market share, this will represent 1.2GW per annum of additional distributed demand. These are shifts of a speed and magnitude that were never considered by the Standards Australia process.

4. *Did the recent rule change on DER technical standards partly address problems identified by Dr Schott's rule change request?*

The recent rule change on DER technical standards significantly differs from the problems identified by Dr Schott's rule change request.

5. *If so, does the recent rule change on DER technical standards reduce the need to adopt the new governance arrangements proposed by the rule change request?*

The recent rule change on DER technical standards does not reduce the need to adopt new governance arrangements, as it did not address the problems of governance in relation to the DER technical standards.

QUESTION 5: WHO DEVELOPS AND MAINTAINS DER TECHNICAL STANDARDS

1. *Should a new committee be responsible for determining or advising on DER technical standards in the NEM?*

Enphase believes that it would be a good idea to form a new committee responsible for determining and/or advising on DER technical standards. The experience of Standards Australia and its committee members should be considered to form part of this group as well as retailers, OEM representative and industry experts. Paid committee coordinators will be required to ensure there is no significant delays to the DER technical standards. The new committee should lead the coordination and oversight of DER standards, as the governance is currently very convoluted and fragmented, to the point that many even within the industry do not know who is responsible for compliance.

2. *If so, how should members be appointed to the new committee?*

Members are required from a myriad of different backgrounds; from consumer groups, electricians who install DER equipment, union groups, retailers, distributors, OEMs, and industry technical experts.
A code of conduct which exists in Standards Australia and the CEC committees should be adopted for the new committee, to ensure full visibility of each member and no collusion occurs.

There should be a mix of appointed members, for example representatives of state electrical regulatory authorities and DNSPs, and elected members. Elected members should have a relatively short term of 2 years, in order to ensure they are still industry relevant. If they change jobs and are no longer representative of their company, market or industry, they should need to be re-elected.

Standards Australia has an issue with an aging demographic of its committee members, engaging younger professionals will ensure the transfer of knowledge is passed down to future generations.

3. *What knowledge and experience would be needed to develop and maintain DER technical standards in the NEM?*

Knowledge of the Australian Energy market, Australian and international standards committees, product capabilities, installation practices and consumers groups are required to develop and maintain DER technical standards. The committee should elect a chair from an expert panel. Knowledge of other markets and international equivalents would be highly desirable. There has been a tendency for stakeholders to see issues as uniquely Australian, which results in excessive time spent "re-inventing the wheel."

4. *Should membership of a new committee be paid or voluntary?*

As proven by Standards Australia, using volunteers can be a slow process due to their other commitments. Whilst the committee itself may have a wide and varied membership, it will inevitably driven by those with the most available time: Dedicated representatives from large multinationals and the ranks of the semi or fully retired.

International organizations that keep on top of DER standards utilise paid roles. Therefore, the new committee should be paid from an allocated budget to ensure all members are committed and delivering upon their commitments, this is not possible in a voluntary organization.

5. *Should the committee report to the Commission as proposed by the rule change request? Or should the new committee report to another entity? If so, who?*

The DER Technical Standards committee should report to the AEMC to certify any new standards and regulation. The DER Technical standards committee should be the oversight of all standards and regulations relating to DER. Whereas, the AEMC should not consider the technical aspects of the DER technical standards, but ensure the standards are verified to allow the industry to positively develop, rather than having an adverse effect due to compliance.

6. *How would the governance arrangements proposed by the rule change request interact with existing governance arrangements and the recent DER technical standards rule change? Are there any risks of duplication or divergence?*

Compliance of DER technical standards is currently a key issue in Australia. There is no consistency or national regulator, some states and territories do not even have a state-based regulator.
An authority needs to be established to govern the DER technical standards within the NER. This will ensure grid connection rules, controllability requirements and other regulations are consistent throughout Australia and will not vary state to state, this will be a desirable outcome for consumers, retailers, installers, and OEMs.

7. *Are the proposed governance arrangements likely to reduce how long it takes to develop and implement new DER technical standards for the NEM? If not, would any alternative approaches increase the pace of setting standards for the NEM?*

The Standards Australia process implementation can be prolonged due to the volunteer nature of its committee members. As shown in other regions of the world, if technical standards contributors were paid for their services and set deadline and goals to achieve, then the process timeline would be quicker. It would therefore depend on if the DER technical standards committee were to be a voluntary basis or if there were paid positions available. At a bare minimum key contributors and coordinators of the committee should be paid, with industry participation on a volunteer basis.

The new DER technical standards should consider all other decentralised DER regulation and compliance models in some states such as South Australia around controllability and CSIP-AUS implementation and compliance of 100% system inspections in Victoria. The DER technical standard should ensure all states and territories on the NEM are on a level playing field, as well as improving overall compliance.

8. *Is there a trade-off between how quickly new technical standards are developed and other NEM objectives such as the safety, security, and reliability of power supply?*

Enphase believes that DER technical standards will compliment other NEM objectives such as safety, security, and the reliability of power supply. Enphase believes system safety and compliance is a significant priority to any DER system.

Further details regarding energy and cyber security, as well as reliability of power supply have both been discussed in Question 2, answer 4 and are fundamental to any DER technical standard that is to be implemented. The reliability of power supply can be further improved by the implementation of IEEE 2030.5 to the CSIP-AUS implementation guide.

QUESTION 6: HOW PRESCRIPTIVE SHOULD NEW GOVERNANCE ARRANGEMENTS BE

1. *How much prescription should be included in the NER to implement the proposed new governance arrangements?*

Prescription and clarity along with enforcing compliance will be critical to the success of the new governance arrangements. The regulators and government bodies enforcing compliance need to be structured and well understood by everyone within the industry. A regulatory and compliance matrix of the DER industry should be included in the NER, to allow effective interpretation and implementation of the DER technical standard.

2. *Should the AEMC periodically review DER technical standards to determine if further regulatory intervention is needed? What level of prescription should be included in the NER to implement this option?*

Reviewing the progress and effectiveness of DER technical standards as well as compliance

rates will be critical to the success in implementation and the future of the DER industry. Prescription of compliance and enforcing compliance should be an area of key focus.

DER technology, as it increasingly software based, is evolving very very quickly. As a result, there will be increasing opportunities for DER technical standards to evolve rapidly also, introducing new ways for the grid to be optimised and controlled.

3. *Are there any solutions that can complement voluntary initiatives to address DER technical standards? For example, how could new governance arrangements in the NER support DEIP?*

The various voluntary initiatives should continue their key work for the DER technical standards industry and the new governance should enhance the work done by these initiatives. The DER technical standards should consult with key groups such as Standards Australia, the CEC directorate and working group members and the DEIP.

Overall, however, we believe that the electricity market and grid should not rely on working groups staffed by volunteers. This is critical infrastructure for our nation and thus should not be slowed by the availability or capabilities of volunteer resources.

4. *Is it feasible to amend the role of the Reliability Panel to cover DER technical standards? Would this be preferable to creating a new advisory committee on DER technical standards?*

The Reliability Panel serves a different function to developing technical standards and it is therefore not preferable to amend their role to cover DER technical standards.
DER technical standards include specialised technical regulation understanding and will require a committee of DER experts within their respective fields. It is important that the technical standards group have a high level of technical expertise to make informed decisions in an efficient and timely manner.

5. *Are there other alternative solutions to address the issues identified in the rule change request? What level of prescription in the NER is required to successfully implement these solutions?*

The DER technical standards and its governance committee should oversee and ensure that all functions of standards, regulation and compliance are working in harmony and are overseen by one responsible committee. The DER technical standards committee should have paid positions in key areas, to ensure that this is not another committee that will rely on volunteers, that already have full schedules in their day-to-day work.

The NER should provide prescription, when required, as well as investigate compliance framework to ensure the DER technical standards are met and will be successful.

A.1 About Enphase Energy

Enphase Australia Pty Ltd is a member company of Enphase Energy, Inc. based in Silicon Valley, California, USA.

NASDAQ listed and a member of the S&P500, Enphase is a provider of energy management hardware and software solutions. It is engaged in designing, developing, manufacturing, and selling microinverter systems for the solar photovoltaic and battery storage industry. Enphase invented semiconductor-based microinverters in 2008 to convert direct current (DC) electricity to alternating current (AC) electricity directly at the PV module (solar panel). Enphase is now the world's largest manufacturer of microinverters.

Enphase is now the residential market leader in the USA with ~52% of all systems (2021).

In Australia, Enphase is based in Melbourne with staff located in all mainland states. Enphase runs an online technical support centre in Melbourne linked into other global Enphase CS centres to provide 24/7 support. Enphase New Zealand is the global hardware design and testing hub for Enphase employing over 90 Engineers and technicians in Christchurch.

An Enphase AC coupled microinverter system differs from the classic DC coupled string inverter systems found in most installations. An Enphase PV system uses multiple panel level "AC Microinverters" parts rather than a single central DC inverter: Enphase microinverters at each solar panel, an Envoy gateway and Enlighten cloud-based software. For storage, an Enphase battery system can be installed to complete a single platform for PV generation and battery storage with full remote access and functions.

Enphase microinverters provide power conversion at the individual solar module level by a digital architecture that incorporates custom application specific integrated circuits (ASIC), specialized power electronics devices, and an embedded software subsystem. Envoy bi-directional communications gateway collects and sends data to Enlighten software. Enlighten cloud-based software provides the capabilities to remotely monitor, manage, and maintain an individual system or a fleet of systems.

AC coupled Enphase systems provide significant safety advantages over classic DC coupled systems. Rather than running dangerous high DC voltages (up to 1000 Volts) to a remote inverter that requires special protection from DC arcs that can lead to fire, Enphase directly converts low voltage DC to normal AC right at the panel. This eliminates troublesome DC Isolators that introduce safety and reliability concerns.

Enphase invented the rapid shutdown system that is now mandatory in the USA. This system enables first responders to shut the entire system from one switch in a meter board so they can conduct search and rescue safely without fear of contact from high voltage DC from an unstable roof.

B.1 Enphase Energy Australian Engineering and Technical Support

Andrew Mitchell – Product Line Manager

With 13 years of experience in the solar industry Andrew has managed projects and products that have delivered pioneering solutions from 300W portable power packs to multi megawatt micro grid solutions. His work throughout the APAC region has given allowed him to develop perspective from all stakeholders such as consumers, installers, designers, manufacturers, and network operators.

David Minchin – Standards & Homologation Engineer

"David is based in Adelaide and has over 35 years of experience in solar/storage/remote power systems in commercial, project management and engineering roles. He provides standards support and product homologation for Enphase Energy in the Asia/Pacific region. He is an active member of EL005 Storage, EL042 Alternative Energy and EL064 Microgrid Standards committees. Most recently David was engaged to formulate the test reports in the new AS/NZS4777.2 standard for new requirements including the VDRT test that is the subject of this consultation. Prior work includes managing Clean Energy Regulator (CER) inspections across Australia and engagement to perform CER special analysis."

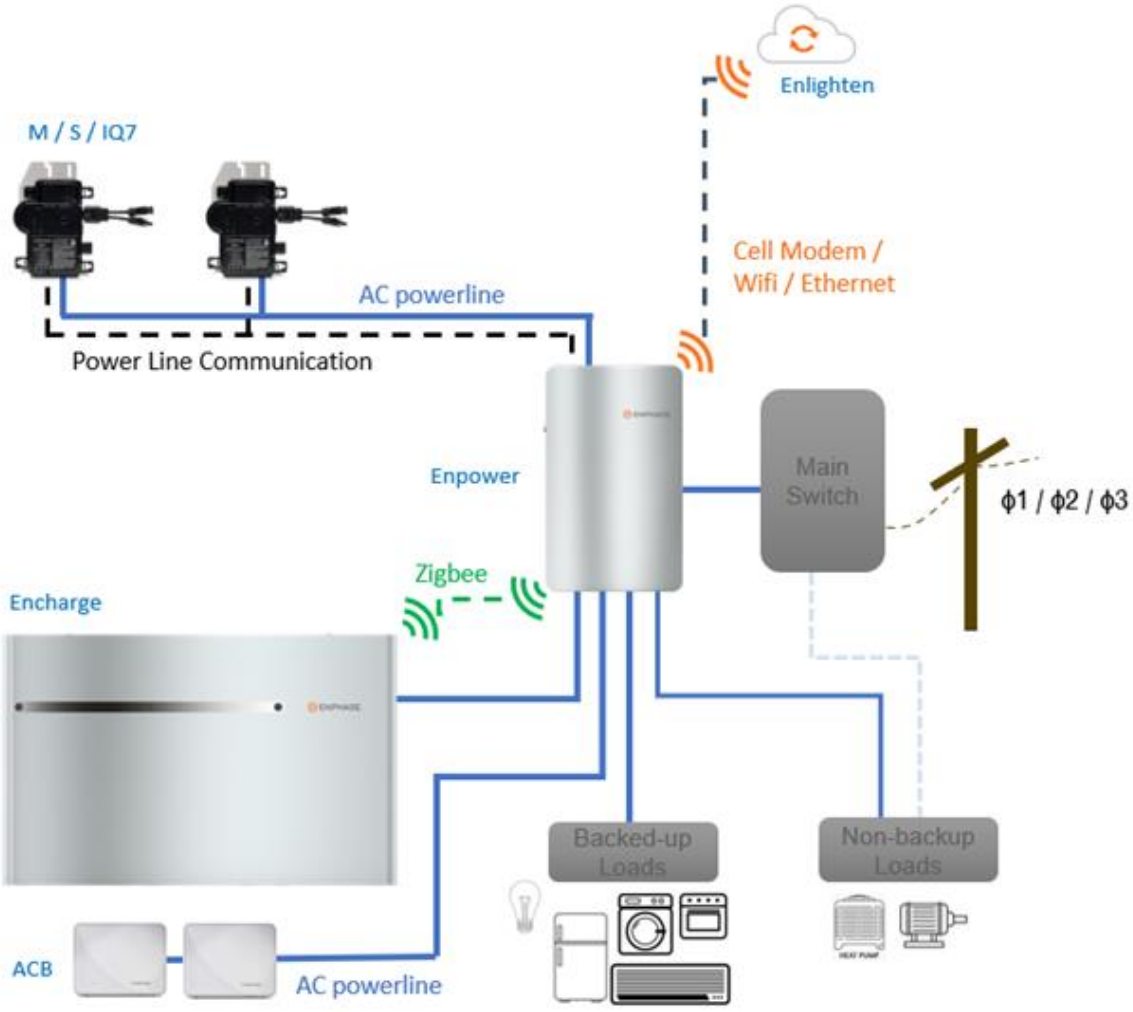
Ryan Turner – Field Applications Engineering Manager, APAC

"Ryan leads a team of engineers who provide pre and post installation support for all Enphase projects in the APAC region. He is a fully accredited CEC design engineer. Ryan specialises in supporting the larger, more complex commercial and industrial projects, as well as storage integration. Ryan is at the forefront of the Distributed Energy Resources industry, as an active member of the Standards Australia EL-062 Smart grids committee, as well as multiple CEC committees including the distributed energy directive, inverter working group and energy storage working group. Ryan has a master's degree in renewable energy as well as 5 years' experience in the Australian solar industry. Prior to Solar Ryan gained 5 years' experience working within the building energy and sustainability sector."

Wilf Johnston – General Manager, APAC

"Wilf has worked in the Australian solar industry for over 14 years, beginning with leadership of the engineering and commercial project team with SunPower Corporation, then later as the General Manager of Energy Matters and Flex. At Flex he introduced an innovative IOT platform focused on delivering energy insights and control to end customers. Wilf holds degrees in Engineering and Commerce from the University of Western Australia and has been a key contributor to industry associations including the Smart Energy Council. At the Clean Energy Council, Wilf was a founding member of both the Utility Solar Directorate and the Distributed Energy Leadership Forum, which provides policy direction to the organisation."

C.1 Enphase Ensemble™ Smart DER System



Enphase Ensemble™ is a complete DER system that combines PV generation, Battery storage, load scheduling and grid integration for small to medium size premises.

Central to the Enphase Ensemble™ is the Enpower™ Smart switch that sits between the grid and all DER consolidating all interconnection equipment into a single enclosure. This includes all control, switching, internet interface and metering of all connected ports on a single integrated platform. Enpower connects to the Enphase Enlighten cloud. Various API interfaces are available.

Enpower can also function as a microgrid interconnection device (MID) by automatically detecting and seamlessly transitioning the DER system from grid power to backup power in the event of a grid failure. This streamlines grid independent capabilities of PV and storage installations by providing a consistent, pre-wired solution for all applications.