AEMO INITIAL DISTRIBUTED ENERGY RESOURCE MINIMUM TECHNICAL STANDARDS – FOR CONSULTATION

ISSUES PAPER

Enphase Energy Aust. Pty Ltd. Submission

Project	AEMO - 2020
File name	Enphase Energy Response - AEMO Minimum Technical Standards Consultation Paper 24the August 2020
Revision	V1.00
Authors	David Minchin & Ryan Turner
Date	28/9/2020

Index

1.0 Introduction

Enphase Energy would like to thank the AEMO for the opportunity to provide feedback on the "Initial distributed energy resource minimum technical standards issues paper" published on the 24th of August 2020.

The rapidly changing architecture of the Australian Energy system presents new challenges to manage the safe and smart utilisation of new technology being deployed in DER. The creation and administration of standards that ensure a high standard of DER deployment that can work in unison with networks has never been more important. The ability for inverters to be able to operate as intended through network disturbances is a vital part of their operation to provide support to the network.

Enphase Energy work with standards and regulatory bodies to provide technology products for better DER integration using technologies such as software based micro inverters and online control systems. We have significant investment in Australia and New Zealand with over 100 employees in research, design, and product compliance testing. We present the following feedback on the question points raised in the AEMO issues paper.

2.0 Responses to the questions raised in the AEMO consultation paper

1. ***What are the costs and benefits of implementing enhanced testing for short duration undervoltage disturbance ride-through in the initial standard? (Noting that these would likely be superseded upon the publication of the AS/NZS 4777.2).***

   The AEMO voltage ride through procedure that has been deployed in South Australia (28/7/2020 VDRT test procedure) could be the minimum benchmark standard however we suggest that the full VDRT test that is proposed in AS/NZS4777.2:DR2020 be implemented.

   Whilst all current Enphase products have already passed the SA VDRT test (August 2020), our preference would be for all future product testing to be done to the full VDRT AS/NZS4777.2:DR2020 test. There would be no cost impact. The benefit would be a clear cut over to the final standard that would mitigate the potential for compliance creep with an intermediate "temporary" standard.

2. ***What are the implications of mandating in the initial standard for additional testing to confirm that inverters can meet the short duration voltage ride-through test procedure, including in relation to DNSP obligations to manage their network safety, power quality and reliability?***

   For Enphase there is no technical or economic implication for mandating a voltage ride through procedure (either option) in the initial standard.

3. ***To operate the power system securely, a level of certainty is required to ensure new installs can satisfactorily withstand a transmission level fault of this nature. Are there other cost-efficient solutions available that provide a high level of certainty in achieving this objective? What considerations need to be made for small DER businesses, manufacturers and consumers?***

   Enphase supports the accelerated adoption of AS/NZS 4777.2:DR2020 to ensure grid stability. The new AS/NZS4777.2: DR2020 standard is on a par with current international standards such as UL 1547:2018 and EN 50549-1 2018 for inverter technical compliance. Adopting the standard **is** the most cost-effective solution to achieve stability with transmission level faults.

4. ***Should this or a future version of the DER minimum technical standard incorporate AS/NZS4777.2 and/or the revised version, following its publication (expected to be in early 2021)? What are the benefits and risks in doing this?***

   When published, AS/NZS4777.2: DR2020 would have greater impact should it be included in the NER (National Electricity Rules). This would better engage DNSP's in Australia with a more clear and unified approach to DER connection. We see this as a vital component to improve grid stability at a more rapid rate.

5. ***What are the technical challenges faced by each industry sector in integrating DER?***

   The main challenge faced by OEM's integrating better technology for grid support into DER is mature inverter standards that have not been advanced to support this technology.

6. ***What interoperability functions are needed to help address the challenges and realise the value of DER?***

   As a bare minimum, all inverters should have an online portal for the control of various capabilities as well as accessible production and consumption metering data. This portal would also provide selected functions to users, DNSP's, aggregators, etc.

   For all Enphase systems, we can remotely run a report of all our systems as they are required to be connected to the Enlighten cloud-based monitoring portal. We can remotely change and verify every Inverter grid settings on our entire fleet of systems. We provide dashboard to engage users to make better decisions about energy usage and their role as a DER

7. ***What interoperability capabilities are available now for consideration in DER minimum technical standards? What capabilities will be required in the future?***

   For high level integration of DER, IEEE 2030.5 and/or OpenADR platforms. Alternatively, the Japanese JET GR0002-1-11 2019 standard Section 16.0 for remote access with Echonet HEMS integration (IEC 62394).

8. ***What are the priority interoperability capabilities to be taken forward in minimum standards over the next 2 years?***

   The AS/NZS4755 Demand response standard has lost relevance. The DER Visibility and Monitoring Best Practice Guide is the most relevant path for the short to medium term. For the operational aspects IEEE 2030.5 or a similar IEC 62394 based standard. HEMS (Home Energy Management Systems) should be viewed as a medium to longer term integration.

9. ***Should the DER Visibility and Monitoring Best Practice Guide developed by a sector of industry participants be utilised as a basis for review and inclusion in future minimum DER technical standards, and if not, what other options should be considered?***

   The DER Visibility and Monitoring Best Practice Guide should be included (initially as informative) in DER technical standards to provide a pathway for OEM's to develop technology to support.

10. ***What developments exist in communications, data and interoperability systems, for consideration in future DER minimum technical standards?***

    IEEE 2030.5 or a similar IEC 62394 based standard. HEMS (Home Energy Management Systems) should be viewed as a medium to longer term integration. The JET GR0002-1-11 Section 16.0 example.

11. ***Should the Australian Implementation Guide for IEEE 2030.5 currently under development by a sector of industry participants be utilised as a basis for review and inclusion in future minimum DER technical standards, and if not, what other options should be considered?***

    The Australian Implementation Guide for IEEE 2030.5 currently under development is one consideration. Enphase Energy (Headquartered in California) have compliance with IEEE 2030.5 and California Rule 21).

12. If an implementation date were to be set in the initial standard, what is an appropriate implementation date for the short duration voltage disturbance ride through requirements?

As our preference is to implement the full AS/NZS4777.2 DR2020 VDRT we see a 3 to 6-month period after the standard being published to be fair time to complete testing

13. What are the benefits and risks/costs of staging implementation of the initial standard across jurisdictions?

As a manufacturer, it makes more sense for all jurisdictions to be aligned to a single date.

14. Do you suggest any changes to the proposed test procedure? What and why

No changes required.

3.0 General Comments

Should the AEMO wish any clarifications or further information on our responses please contact our project officer as follows

Name: David Minchin
Title: Standards and Homologation Engineer
Email: dminchin@enphaseenergy.com
Phone: +61 409567318

A.1 About Enphase Energy

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

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, the USA is the largest market where Enphase is installed in ~41% of all systems (2019).

In Australia, Enphase is based in Melbourne with staff located in all mainland states. Enphase runs an online technical support centre in Melbourne that is linked into other global centres to provide 24/7 support. Enphase New Zealand is the global hardware design and testing hub for Enphase employing of 75 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 system consists of several parts rather than a single inverter: Enphase microinverters at each solar panel, an Envoy gateway and Enlighten cloud-based software. Optionally an Enphase battery system can be installed to form a single platform of solar and battery storage that can be controlled remotely.

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 600 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. 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 12 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 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 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. David also provides active support of IEC standards in Europe and the UK. Prior work includes managing Clean Energy Regulator (CER) inspections across Australia as well as residual risk analysis for the CER on SRES inspections. David has 30+ years of experience in solar/storage in both commercial and engineering roles.

Duncan Macgregor - APAC Product Trainer & Field Applications Engineer

As a CEC accredited solar designer installer, and active member of the renewable energy industry for over 18 years, Duncan Macgregor brings a wealth of industry knowledge to his role as Enphase Energy Product Trainer and Field Applications Engineer for the Asia-Pacific region. Duncan's in-depth field experience in design and installation supports the installation community in both large and small scale solar, and on and off grid battery storage systems.

Ryan Turner: Field Applications Engineer

Ryan provides 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. Prior work includes technical support/advisor for Fronius Australia and Building Energy consultant at Arup. Ryan also has an undergraduate degree in Mechanical Engineering and a master's degree in Renewable Energy and sustainability from the University of Nottingham, UK.

Wilf Johnston: General Manager APAC

Wilf has worked in the Australian solar industry for over 11 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.