

# Consultation on the Proposed New Low Voltage Ride-Through Requirements in South Australia

## Enphase Energy Aust. Pty Ltd. Submission

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## 1.0 Introduction

Enphase Energy would like to thank the South Australian Department of Energy and Mining for the opportunity to provide technical feedback on the proposed adoption of remote connection and disconnection to the power grid in South Australia.

South Australia is globally recognised as a leader in the adoption of alternative energy as the focal point of its energy plan accelerates towards a net 100% generation capacity. The bipartisan support of this development for nearly 20 years has seen the transition from what was once considered a curiosity to a commercially viable generation platform.

It is appreciated that Alternative Energy generation can now regularly make or exceed 100% of SA's consumption under favourable sun and wind conditions. Over 500 MW of solar generation can be available at peak periods. Under such conditions, the effect of any disturbance on the grid can be amplified should some PV systems trip on that disturbance. The current AS/NZS4777.2:2015 requirements for inverters is to trip at 180 Volts between 1 and 2 seconds implies the ability to ride through a fault (FRT) however this is not called out in Appendix G testing requirements. This has led to many inverters not designed with FRT capability being approved for sale in Australia.

Enphase Energy are in full agreement with the proposal to mandate certification to the proposed AEMO VDRT test for all PV installations in South Australia.

## 2.0 Enphase Full Compliance

As Enphase PV micro inverters and battery storage systems are marketed in over 100 countries, the product has been designed to provide "ride through" abilities for a range of voltage and frequency fault/disturbance parameters required by UL, IEC, VDE, and AS/NZS standards for some years. As a result, we can comply with the requirements "off the shelf".

Enphase micro inverters and battery systems sold in Australia use hardware and a default Australia only AS/NZS4777.2 grid profile with VDRT capability. As a result, Enphase will not require any special logistical measures for the South Australian VDRT requirement and normal stock held by wholesalers/our warehouse can continue to be supplied.

All Enphase systems are commissioned online with ongoing parameter monitoring via our "Enlighten" cloud-based system. This provides us with full oversight of the process and parameters before and after grid connection. Grid profiles do not allow any changes or overriding of AS/NZS4777.2 mandated UV/OV/UF/OF settings by the installer.

Enlighten is also used by Enphase to update firmware and grid profiles to current settings through-out the life of a system. This updating process can also be used to align a population of existing inverters to new regulatory requirements, i.e. the Volt/VAR updates applicable in South Australia from December 2019.

### 3.0 Certification requirements

We would support any initiative that preferred the testing of inverters by test facilities located in Australia or New Zealand who currently test and certify PV or BESS inverters. Whilst this testing can be conducted in other parts of the world, we believe it is important to support local companies with the technical ability to do this work to enable local development and feedback for better inverter interoperability.

For the South Australian proposal, Enphase see no problem meeting the timeline using test facilities in New Zealand as we do currently for all AS/NZS certification.

- Entest laboratories, 1 Teffer Rd, Wigram, Christchurch, NZ. (IANZ accredited testing facility to EN ISO/IEC 17025 – Testing and calibration laboratories).
- SAA Approvals, U5, 20 Rivergate Place, Murarrie, QLD – Independent 3<sup>rd</sup> party certification (JASANZ accredited). Entest use SAA for all Australian certifications of products

Enphase has commenced testing to the AEMO VDRT test for SA. We will be able to submit test results for SAA certification once the final requirements have been set by AEMO

We note that the Clean Energy Council (CEC) are proposed to administer the certification approval via the current “Approved Inverter” listing. Enphase view this an unnecessary step that would only delay the delivery of approved products.

The CEC website quote the normal processing time for standard approvals is 3 – 4 weeks however we (as with other manufacturers) often experience far greater delays for what is effectively only an administrative function. This can only get worse with a flood of approvals for SA.

Enphase Energy would prefer that the approval process be directly handled in South Australia, most appropriately at the network provider (SAPN). As equipment is already certified, it is standard practice in most parts of the world for the body responsible for approving grid connections to also be the approver of equipment that connect to a network.

### 4.0 Implementation time frame

All Enphase Energy products available in Australia currently meet the requirements so we have no issue with implementing the requirement in September 2020. The only delays we would see impacting this would be the “approval process” as noted in section 3.0

## 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 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 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. 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, 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 as a whole”.*

## Supply Chain:

**AC Solar Warehouse** is a leading Australian wholesaler of solar energy and energy storage equipment. The business employs 10 professional electrical engineers and are industry recognised experts in the deployment of microinverter technologies. AC Solar Warehouse has an administration office in Queensland and distribution centres in Brisbane, Sydney, Melbourne, Adelaide, Perth and Auckland, providing same or next day service to more than 6000 solar installers around Australia.

### **Grant Behrendorff:** Managing Director

*“Grant Behrendorff is an Electrical Fitter/Mechanic, Electrical Engineering Technologist and CEC accredited solar system designer and installer. He has been involved in the electrical industry in Australia for 35 years and in the solar industry for 23 of these. Grant has held technical, management, leadership and governance roles in the utility, not-for-profit, consulting and commercial sectors and was independent Chair of the Alice Springs Solar Cities Consortium for 7 years from its inception to conclusion in 2013. This project was responsible for some of the most iconic and ground-breaking solar installations in Australia at the time, based a wide range of solar technologies. Grant was awarded the Engineers Australia National Engineering Technologist of the Year in 2007 in recognition of his work in the solar power sector. Grant is Managing Director AC Solar Warehouse, and is non-executive Chair of Alice Springs based engineering consultancy firm Ekistica Pty. Ltd.”*

### **David Smyth:** Director and Principal Engineer

*“David Smyth is a qualified electrician with a Bachelor of Electrical Engineering with Honours. David is a Registered Professional Engineer of Queensland, a Member of Engineers Australia and Clean Energy Council and accredited for design and installation. David has been working with solar technologies since 1996; firstly designing remote area power supplies for cattle properties and National Park Ranger stations and later working on the design and installation of some of the earliest domestic and commercial solar grid connected systems in Queensland. David was Principal Engineer Generation at Ergon Energy for over 7 years where he was responsible for the management of 33 power stations, including wind, biomass, geothermal and solar farms. David is Director and Principal Engineer of AC Solar Warehouse”*