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A pathway to national standards for harmonic compliance on renewables

On behalf of the Australian Government, the Australian Renewable Energy Agency (ARENA) has today announced $1.04 million in funding to the University of Wollongong (UOW) to address challenges with the current harmonic compliance assessment framework by developing a new robust methodology to be used across Australia's energy grids.

The new methodology will be used as an interim best practice guideline for voluntary use by participating industry stakeholders, and as the basis for a submission to amend the Australian Standards.

UOW's $2.28 million project focuses on the issues associated with the assessment of compliance of harmonic emission allocations.

Harmonics are a periodic distortion of the voltage waveform and can be caused by the inverters used by renewable energy generators and storage devices. Equipment connected to an electricity network can tolerate a certain level of voltage waveform distortion.

Network Service Providers (NSPs) are required to ensure that voltage waveform distortion present on the network is below the level of equipment tolerance to ensure grid-connected equipment operates as intended. If harmonic distortion exceeds the tolerance, equipment may be impacted by reduced efficiency, reduced life and operational failure. The assessment of compliance with harmonic emission allocations is undertaken to ensure this tolerance is not breached.

The current regulatory guidelines do not account for the recent complexities of the energy system caused by variable renewable generation like solar and wind.

As a result, NSPs are implementing individual methodologies that vary by region, potentially leading to inconsistent estimates, unnecessary curtailment and overinvestment in harmonic mitigation equipment.

UOW's project is supported by 12 industry stakeholders including transmission and distribution network service providers, renewable energy developers and renewable energy equipment suppliers, all of whom will participate as research partners.

This project follows on from a recently completed ARENA-funded study by UOW which looked at estimating the total limit of harmonic emissions that any installation can contribute to, whereas this project is concerned with the process to identify whether an individual installation can meet those limits.

ARENA CEO Darren Miller said new national standards for managing harmonic distortion will help to smooth the transition to renewable electricity.

"The University of Wollongong is tackling a very important project in harmonics that has the potential to benefit our energy transition by reducing the grid connection costs associated with renewable energy generation, while also addressing the integration challenges of new grid scale supply. This will help ensure secure and reliable grid operation at high levels of renewables penetration.

With close collaboration from stakeholders involved, this project could help reduce the requirements for costly harmonic mitigation, reduce the number of abandoned renewable energy projects, and shorten the time frame for the grid connection process."

Australian Power Quality and Reliability Centre Director, Associate Professor Duane Robinson said: "We are extremely excited to be undertaking this project with the support of ARENA and our industry partners. As an industry facing research centre, we expect the outcomes of this very practical work to

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provide clarity with respect to the methodologies for compliance assessment for harmonic distortion leading to less complex connection processes and even more renewable energy in our power system."

UOW's project will take place over 29 months, with the last five months dedicated to developing all relevant documentation to be used in the submission process to amend the Australian Standards and the National Electricity Rules.

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