

Question 4: Data visibility

Should the DataLAC and DUG be tasked with curating/managing a list of relevant data sets and activities? What could be done to ensure that this is helpful rather than a burden?

Is a meta-portal worth considering? Could an existing site be expanded to play part of this role (such as one of the core agency sites, NEAR or AREMI)?

How could this be resourced and funded?

An independent body such as the DataLAC and DUG should be tasked with managing the DER data depositaries, but what data sets/formats etc. are required will take time to be determined. This will require access to comprehensive DER data sets by researchers, DNSPs, retailers etc. to utilise as they see fit and determine whether the data is "fit-for-purpose" for a specific function. If not, feedback can then be given on whether a higher time resolution measurement is required, more parameters, or more points of measurement etc.

Question 6: Data impact and resourcing analytics

How do we ensure that key research and analytical needs can be met, to maximise consumer outcomes? Who is the best party to support analytical services and build capability? Is this best undertaken internally by all parties or is some central or third-party expert capability advised?

Research institutes, DNSPs, AEMO, and commercial entities should be given access to whatever DER data can be made available, as long as strict data sharing and privacy rules are adhered to. All these entities can then test the utility of the data sets and innovate – and give feedback on its adequacy for a particular service/application. These applications will include customer facing ones.

Question 10: Energy data for research

Are there energy data challenges for researchers not effectively represented in this paper?

How are researchers' interests best represented in the DataLAC/DUG? Do they require specific representation in the group, a focused sub-group or leveraging of a wider existing process? Are there sufficient levels of interaction and engagement in the existing research community regarding these issues?

If reforms proposed under Pillar 2 to allow more research access to data are progressed, would protected access to more real data be more useful than synthetic open data sets (as proposed in a range of ARDC ePlatforms)? Or do synthetic open datasets have alternative value through less constraints and sharing of tools?

Current data portals for energy research data seem limited in their usability and visibility, with much useful research and data getting underleveraged. Are there examples in other sectors of better ways ensure research is visible, easier to navigate and integrate?

Researchers need access to as much DER data as possible, once accessed, researchers can then test the utility of the data sets – and give feedback on its adequacy for a particular service

APPENDIX A: RETAIL TRANSPARENCY

Question 11: Retail price reporting

How will consumers benefit from keeping retail plans and costs hidden?

Can you provide evidence around costs, barriers or benefits for linking digital retail plans to standing meter data?

There is soon to be a new form of tariff made available to households, a prosumer tariff. The prosumer tariff is designed for households with solar, battery and possibly shiftable loads. The measure of the “fairness” of these tariffs will be difficult, and a tool for benchmarking prosumer tariffs is necessary. It is difficult as an assessment of an offered tariff can’t simply use unaltered historical load and generation data – it needs to be assessed as if energy were shifted between household devices (solar, battery, shiftable load) in an optimised or semi-optimised fashion

An open source tool for performing this type of assessment is necessary. The UNSW CEEM tool is the most sophisticated open source available, but would need further development, optimisation functionality etc., before being able to assess new prosumer type tariffs

APPENDIX C: VISIBILITY OF THE LOW VOLTAGE NETWORK AND DER

Question 20: Overvoltage

Is there further evidence or other studies of existing voltage levels and related consumer impacts that should be considered before undertaking further investigations?

Over-voltage has a greater impact on households located towards the end of 400 V lines, localised/uncoordinated voltage inverter controls currently in place (Volt-Var/Watt response) are not designed to take this into account – this results in households located towards the end of 400 V lines experiencing more curtailment than those at the front.

The Dynamic Export Limit (DEL) implemented by SAPN goes some way to address this inequity, but this limit will only result in fair curtailment if the DEL is calculated per 400 V line. If the DEL is calculated at a less granular level, then inefficiencies (unnecessary curtailment when DEL is set too low) and inequity (due to Volt-Var/Watt response when DEL is set too high) will result.

See <https://digital-library.theiet.org/content/journals/10.1049/iet-stg.2018.0197> for work in this area and an alternative voltage control option which results in fair curtailment

Which body in the energy sector would be most appropriate and effective to lead this work?

The inequity of current inverter voltage control modes requires recognition by industry bodies, inverter standards committees and DNSPs

Given the role of jurisdictional regulators in network performance, how are these bodies best engaged?

Question 21: Analytical capabilities to support DER integration

Is the proposed collaboration to acceleration network analytics, datasets and tools workable?

It is likely that the following will be identified as barriers to large scale DER/LV monitoring data collection if not resolved:

- A standard API for DER/LV data access for the communication link between the DER/LV monitoring device (inverter, battery, NBN etc.) and the DER data platform (Greensync, WattWatchers, or Solar Analytics for example)
- A standard API for DER/LV data access for the communication link between the DER data platform and the party wishing to utilise the DER/LV data (retailer, research institute, AEMO, service provider etc.)

- A standard format that the DER/LV data is measured and collected from the DER/LV monitoring device
- A standard format that the DER/LV data is provided by the DER/LV data platform
- Agreement between collaborating bodies to ensure access to DER/LV data platform by retailers, research institutes, AEMO, service provider etc. to facilitate application/service development, innovation, analysis, transparency

The more standards in place the easier and cheaper it will be for all electricity network participants to integrate and access DER/LV monitoring data

What barriers or concerns does it raise? Could most networks engage in this process?

Input from networks is crucial, required to assess the value/utility of the DER/LV monitoring data provided

Who should lead this work and what is required to maximise its success?

The development of standards required collaboration from all industry participants, including technology vendors, industry bodies, consumer groups, and universities; not just DNSPs, AEMO, AEMC, etc. Ideally it should be led by an independent body or leadership committee.

Currently, CEEM UNSW is in the process of applying for grant funding from ARENA for a project designed to progress work on DER/LV monitoring data collection standards, this is in collaboration with technology vendors and networks. A brief overview of the project application is given below:

Objectives

The objective of the proposed project is to pilot the provision and use of a standardised set of near real-time solar PV and battery (DER) timeseries data and data management processes. The project will collaborate with project partners to:

- a) Demonstrate the *at scale* collection of DER/grid data as per the DER Visibility and Monitoring (DVM) best practice guide, found at <https://www.dermonitoring.guide/>.
- b) Share large DER data sets with DNSPs, AEMO, retailers, aggregators, and research institutes
- c) Assist the API task force with their objective to develop a standard API for DER communications through trials of use cases, and provision of feedback

Outcomes

Identify costs and implementation issues. The demonstration *at scale* of the collection of DER/grid data as per the DVM guide will:

- a) Enable vendors to accurately calculate the cost for providing the type of DER data sets required in a high DER penetration electricity network to ensure sufficient visibility. Importantly, it will also surface implementation issues. These are costs which can't be calculated, and issues which can't be identified (and therefore resolved), through one-off, isolated trials

Evaluate the value and utility of DER data. The sharing of large DER data sets with DNSPs, AEMO, retailers, aggregators, and research institutes for FREE will:

- a) Allow all recipients to establish internal data management processes (receive, store and access) for the data. With access to large DER data sets, recipients will be able to determine its operational utility and value (voltage management, load prediction, grid modelling etc.)
- b) Allow all recipients to investigate and analyse the data to explore new use cases, and to demonstrate the potential value of the data. This will be achieved by showing how it can be used to develop a variety of network applications and services.

Using the DER data format specifications in the DVM guide as a base case, the processes leading to the outcomes mentioned above will allow recipients to determine how “fit for purpose” the provided DER data sets are for each application.

Feedback on the value of the DER data sets to regulatory bodies (AEMC, AEMO, AER) will assist their decision-making processes around the regulation of DER

This pilot will assist with the advancement of standardising the DER collection process by “field testing” the data format specified in the DVM guide, and “field testing” the SDIWG API

Inform (both technical and social) the deployment of DER data collection and management systems throughout the NEM.

Question 22: LV reporting

What additional benefits, barriers or concerns does the proposal for LV network reporting requirement raise? Can you provide further evidence of benefits or costs to inform further consideration of this proposal?

Estimating DER hosting capacity and/or dynamic operating envelopes could be considered a required analytical capability (in reference to Question 21) – therefore the response to Question 21 is also applicable to this question

Question 23: LV visibility through metering

Are these regarding additional metering reporting requirements workable?

Can you provide supporting evidence of related costs or benefits to support further investigations?

Is the problem of locating meters within the grid critical to resolve to support wider monitoring, coordination of DER or planning? Will processes developing dynamic operating envelopes and better network models either resolve it or identify it as a further problem?

There are statistical analysis', using historical voltage data from meters, which can be used to determine the electrical location of the meter – these methods need to be tested and validated. I've had discussions with Ausgrid on developing and validating a method which would determine the electrical location of households using historical voltage data. Better network models aren't necessary for these types of methods, which can be grouped under State Estimation (SE) methods. The aim of SE is to give knowledge of the network in the absence of physical models

Both the electrical (effective impedance and V/P and V/Q sensitivity) and geographical location of a household are required to be able to calculate the dynamic operating envelopes and hosting capacity, and other applications such as DER coordination and VPPs

Are there additional issues or options that the AEMC should consider in their upcoming metering review?

DER gross metering, for solar, battery and large loads like electric hot water (EHW) and air-conditioning (AC) are important. A lot work has been done around disaggregation of load but there is still substantial error in these methods. I did a review of AC demand response trials funded by ARENA since 2010 and found that estimation of change in AC consumption during an AC DR event was a key implementation problem – if households are going to participate in AC DR events (and AC consumption is THE main factor determining investment in LV network capacity) their change in AC consumption needs to be accurately calculated, which can only be done accurately using AC measurements. Control of large household loads (which will also come with measurement) are also necessary if households are to deploy any form of automated load shifting to avoid curtailment of their solar PV systems due to Dynamic Export Limits (DEL)

Question 25: Visible and manageable DER

Are there particular data challenges in future market model designs which have not been recognised? Are there future areas in LV-DER data the Data Strategy should consider? In future models, are there considerations about the point of monitoring and control, or who manages data, that have not been raised or considered?

The geographical location of DER/LV monitoring data is important, no DNSP will need access to data outside their jurisdiction, a VPP won't need access to data outside of its operational zone. It is therefore sensible that there be a DER/LV monitoring data depository for each jurisdiction – this will distribute data management/storage costs, and minimise integration/access speeds