



What the NSW Government can do to support Distributed Energy Resources (DER)

*Putting consumers at the centre of the energy
transition*

IEEFA Submission to the 'Promoting innovation for NSW energy customers' Public Consultation
Paper

DER for a consumer-centred electricity system

Many threads needed for comprehensive DER integration

Distributed, decarbonised, democratic ... it is an often-quoted cliché about the future energy system. But where are we, in terms of progress towards this future and what is the role of state governments in supporting this triple-D energy transition?

This submission gives a high-level summary of what can be done across homes, businesses, appliances, electric vehicles and distribution networks responding to the issues raised in the NSW Government's "Promoting innovation for NSW energy customers" public consultation paper.

Distributed Energy Resources (DER) are resources located behind the meter or on the distribution system that generate or store electricity or manage demand. These include: rooftop solar, batteries, electric vehicles (EVs), vehicle-to-home (V2H), vehicle-to-load (V2L) and vehicle-to-grid services, smart (controllable) hot water systems, smart appliances (e.g., air conditioning, pool pumps) and energy management systems.

These are resources that consumers are prepared to pay for and can be leveraged to provide energy, grid services (Frequency Control and Ancillary Services, or FCAS) and, in some cases, distribution network services. For details on how DER can be aggregated into Virtual Power Plants, which will be detailed in a forthcoming IEEFA report.

All forecasts point to DER playing a major role in future electricity supply, demand response and grid services. The central scenario in the Australian Energy Market Operator's (AEMO) draft 2022 Integrated System Plan (ISP) is that there will be a five-fold increase from the current 15GW to about 75GW of rooftop solar by 2050 (providing a quarter of all consumption) and that three-quarters of all dispatchable capacity will be distributed by 2050.¹ This means batteries and flexible demand in homes, businesses, factories and electric vehicles will be the largest capacity that can be drawn upon to balance supply from variable renewables with demand. As the sun sets or wind speeds decrease, these millions of distributed assets will be critical to balancing the electricity system, alongside large-scale batteries and pumped hydro.

This suggests that we need to plan carefully to make the most of a DER-focused future.

Numerous players have significant roles in supporting the technical, regulatory and market integration of DER. State governments can take significant action, especially through their role in setting an overarching vision and targets for the

¹ AEMO, 2021, [Draft 2022 Integrated System Plan](#)

energy transition in their jurisdictions, regulating housing standards and electric vehicles, licensing distribution networks, managing, maintaining and supporting social housing, and providing incentives consistent with the vision. State governments can also play significant advocacy roles within the energy ministers' meetings and in setting directions for the energy market institutions.

However, state governments should be cautious about taking on responsibilities that are formally held with the energy market institutions or getting involved in operational matters of distribution network service providers (DNSPs). Instead, governments should focus on areas where there is a clear role for them to provide big-picture leadership and direction to these organisations.

State governments should also avoid buying into the technical scaremongering rhetoric about DER damaging or overwhelming the distribution grid. There has been a lot of this discussion with very little evidence presented on this topic over the past five years. The best example of the ability of the distribution network to handle very high penetrations of DER is South Australian Power Networks recent modelling of Dynamic Operating Envelopes. SA Power Networks is looking to offer 10kW dynamic limits, up from the current 5kW static limit, from the middle of this year. Recently it announced that modelling showed that households will be able to export to this new 10kW limit 98% of the year. The dynamic operating envelope will bind below this new doubled limit at only 2% of the time annually. This remarkable figure will need to be assessed in practice but it suggests that grid congestion or distribution network management issues are not, in fact, significant on a grid where more than one in three houses has a rooftop solar system.

So-called “overgeneration” from solar is an opportunity, not a threat. State governments can help support load shifting to the middle of the day to take advantage of abundant solar generation.

Minimum System Load (MSL) -- the balance of supply and demand at high solar generation, very low demand times -- is an issue that the Australian Energy Market Operator (AEMO) is managing through a new MSL mechanism, akin to the Reliability and Emergency Reserve Trader (RERT).

Upgrading housing, especially social housing

About a third of Australia's electricity use is in homes, yet Australian homes continue to have very poor thermal comfort in comparison with comparable jurisdictions such as California (which has the equivalent of 8-star NABERS rating). The best way to reduce household electricity bills, while improving health outcomes and creating jobs is mandating high thermal comfort and energy efficient housing and large household appliances with high levels of energy efficiency and demand response capability (especially if this mandate applies to existing homes). The NSW Government has been installing solar on 5,000 social and Indigenous housing properties without changes to the thermal performance.

While rooftop solar systems bring down the cost of electricity to existing homes, they don't solve the fundamental issue of the poor quality housing stock.

There is some progress with “7-star” building standards being included in National Construction Code planned to take effect from September 2022. However, the vast majority of housing in NSW is likely rated at 2.5 stars currently.

The energy performance of housing, while not considered DER, matters when making the most of any rooftop solar installations and improving climate resilience.

Modelling in a joint report by the University of NSW and the Australian Photovoltaic Institute showed that adding solar panels to the nation's 440,000 social housing dwellings -- for an initial investment of \$360 million a year for five years² -- would save low-income households at least \$750 a year on power bills, delivering annual savings of \$328m for 20 years.

The NSW Government could consider the following:

- minimum energy performance standards for existing houses and apartments – to be implemented and ratcheted up over time, with incentives for the upgrade of existing housing (potentially through the Energy Savings Scheme). Note that the [Victorian Energy Upgrades \(VEU\)](#) program has targets to achieve \$1.3 billion in investment in energy efficiency and energy management from 2022 to 2025. This includes support for ceiling insulation and energy management systems.
- mandatory disclosure of housing energy performance at point of sale and lease – as in the Australian Capital Territory.
- a program to upgrade all social housing over time. The Victorian Government has made a commitment to upgrade 35,000 social (public and community) housing properties through insulation and draught-proofing and replacing inefficient appliances. Such a program could also include the installation of solar (and batteries, when cost effective) where rooftops are suitable.

Electrifying homes

Relates to Issue 8: DER in New South Wales

In NSW, 1.3 million homes derive 35% of their household energy from gas. The arguments for reducing Australia's dependence on polluting fossil gas continue to grow with increasing evidence about the hidden emissions from gas production.³

² M Roberts, Z Abdullah-Vetter, P Heywood, A Bruce, R Egan. [Solar Potential of Australian Social Housing Stock](#). (2021) APVI

³ Get best reference from Bruce and Milad

Fossil fuel supply to any new residential or non-residential development is incompatible with it being “net zero-read”. Instead it is locking in expense and emissions for current and future property owners. The International Energy Agency (IEA) said last year there should be no new gas, oil or coal developments. Low-income households connected to gas pay the greatest price, having to service both electricity and gas supply and usage charges.

The NSW Government could consider the following:

- Developing a program to supply lower cost electric heating and cooling, hot water and cooking for low-income and vulnerable households. A comparable Victorian Government program is providing \$335.5 million in support to replace old, inefficient, high-cost and high-emissions heaters with high-efficiency reverse cycle air conditioners (it does not include hot water). Fewer NSW households depend on gas heating, though significant savings would be expected from such energy upgrades in parts of regional NSW that have cold winters, for example, Armidale. The Victorian program estimates energy bill savings of between \$300 and \$900 per year as a result of upgrades. Including hot water and cooking conversions in this program would enable households to disconnect from the gas network, eliminating connection and usage costs. It would also be important to ensure that the hot water system was controllable so that it could contribute to load shifting, especially to match peak solar generation.
- Amend the wording in clause 21 of the draft NSW State Environmental Planning Policy (Design and Place) 2021 to read “excludes the use of on-site gas” and include the statement that “fossil fuel supply to any new residential or non-residential development is incompatible with the NSW Government’s commitment to net zero by 2050”. This is a planning policy but, as currently written, it would result in higher prices and emissions for households and commercial properties, at odds with NSW Government policy.

Household appliance demand response standards

Relates to Issue 8: DER in New South Wales

Energy ministers have agreed that priority household appliances should have demand response capability. We disagree with the proposed standard and have suggested elsewhere that consideration be given to legislating “a demand response capability” requirement for priority household appliances under the Commonwealth Greenhouse and Energy Minimum Standards (GEMS) Act 2012.⁴ This would enable manufacturers, and the market, to offer a range of solutions, rather than locking Australia into AS4755, an out-of-date standard. In legislating a demand response capability, energy ministers should ensure solutions allow consumers to retain control (override), are certified to be interoperable, and support verification and validation over secure two-way communications. This would be preferable to state-by-state action on implementing demand response for household appliances.

The NSW Government could consider the following:

- Prioritising advocacy with energy ministers to ensure “a demand response capability” requirement for priority household appliances is legislated under the Commonwealth GEMS Act 2012 in 2022.

⁴ Mandating AS4755 Ignores Households and Widely Supported International Solutions

- If necessary, to fast-track the matter, the NSW Government could undertake the legal review and drafting of the relevant changes to the GEMS Act and present these for agreement at an energy ministers' meeting.
- Once legislated, NSW could include upgrades for demand response capability of these appliances within the Energy Savings Scheme.

Getting households into the Demand Response Mechanism

Relates to Issue 8: DER in New South Wales

Participation in the wholesale Demand Response Mechanism (DRM) is currently limited to large customers (>100 MWh or, in Victoria, >40 MWh) and requires the application of a baseline for load consumption at site. A future rule change could allow for aggregated DER participation, which would unlock greater value for residential and commercial DER.

The NSW Government could consider the following:

- Advocating to energy ministers for agreement to a rule change to expand the DRM to include aggregated DER -- or lodging this rule change itself.

Comparable energy efficiency and support for Commercial and Industrial (C&I) properties

Many of the principles applying to the importance of building and appliance/equipment energy efficiency and demand response also apply to commercial and industrial sites.

The NSW Energy Savings Scheme (ESS), in place since 2009, was revised in September 2021 to cover a wider range of fuel switching activities. This includes the installation of heat pump and solar water heaters in households and small business, and heat pump water heaters in commercial and industrial premises.

The ESS allows C&I businesses to receive funding for a wide range of energy efficiency upgrades from refrigeration to HVAC to motors, fans and pumps.⁵

The energy savings target for the scheme is planned to increase by 0.5% each year from 2022, topping out at 13% in 2030. The target will then remain at 13% until the end of the scheme in 2050.

The main issues with the ESS are that it was developed before smart measurement and interoperability between controllers and devices became affordable and common, before the NEM started to decarbonise and before the advent of the Wholesale Demand Response mechanism (DRM).

The NSW Government could consider the following:

- Reviewing the ESS to focus two major changes – rewarding “emiciency” (proportionate emissions reduction at the time) and becoming a “pay for performance” program for households and businesses that cannot participate in the DRM. Emiciency takes into account

⁵ <https://www.energysaver.nsw.gov.au/browse-energy-offers/business-offers/get-funding-business-equipment-upgrades-energy-savings-scheme>

the emissions being created by electricity generation at the time the efficiency measure is activated. For example, there is very little emissions reduction saving for energy efficiency measures in the middle of the day when solar generation is at its peak in Australia. We also now need to focus on shifting demand into the solar peak, something not in scope for the ESS. It is also very important that state governments move away from outdated “deemed” energy savings and actually look at rewarding verified energy savings – something that is now possible at much lower cost than a decade ago.⁶

EVs, as fast as possible, with managed charging

Relevant to Issue 13: EV infrastructure in existing apartment buildings

Electric vehicles (EVs) are the ideal partner to rooftop solar. They provide six to 10 times the capacity of stationary batteries, far more for larger vehicles such as trucks or buses. One of the fastest, cheapest way to decarbonise Australia is to match the three million households, plus numerous commercial and industrial buildings that have rooftop solar, with two-way managed EV charging. A further step is to support the transition to V2G (vehicle-to-grid) charging, whereby vehicle batteries will provide (subject to regulation) supply, frequency control and ancillary services, demand response and, where appropriate, network services.

The NSW Government could consider the following:

- Work with other states and territories to develop standards for managed EV charging, including V2G in all types of buildings and facilities (not just apartments).
- Work with the NSW DNSPs to ensure connection requirements for EV chargers are reasonable and consistent and provide data that assists DNSPs to manage the additional load from EV charging without compromising EV owner privacy.
- Ensuring there are no barriers in the current strata law to managed EV charging, regardless of how it is operated.
- In the NSW State Environmental Planning Policy (Design and Place) 2021, make the following changes:
 - Car parking – allow for fewer spaces than required in either Council guidance or the Guide to Traffic Generating requirements in any area with a Green Travel Plan. This is vital to allow for innovation for example, the inclusion of car and electric bike sharing schemes in developments
 - Bike parking – one per 2 bedrooms - half of bike parking spaces should be electric ready
 - Maximum 15% of apartments with no direct sunlight – can this be reduced? Ideally all apartments should have direct sunlight, through atriums and skylights etc
 - 100% EV-ready parking spaces should apply to all classes of buildings – as almost all vehicles will be electric by 2040
 - Minimum 20% (not 10%) of apartment visitor parking spaces installed with EV charging (future proofing through upfront installation)

⁶ <https://lnkd.in/g35jPyw>

IEEFA supports the options proposed in the consultation paper to:

1. Develop EV charging infrastructure guidance material, an EV retrofit costing tool and model by- laws for owners' corporations and strata building managers.
2. Conduct technical feasibility studies for installing EV charging infrastructure in a range of apartment buildings to create case studies on the various options for installation.

IEEFA also notes that a NSW Government website already states:

Making buildings 'EV-ready'

Not many existing buildings can currently accommodate the installation of EV charging infrastructure. To help building developers, owners, managers, occupants and strata managers design, construct and wire 'EV readiness' into new builds and building retrofits, we are developing helpful guidance materials and tools.⁷

EV fleets with V2G as fast as possible

Given the potential of V2G in reducing the cost of decarbonisation, it is worth looking at how to support the uptake of V2G by fleets as quickly as possible. The NSW Government has taken a leadership role through its EV Strategy, including committing to convert the entire state bus fleet to electric by 2050 and providing funding for EV fleets for business.⁸

The NSW Government could consider the following:

- Providing funding for V2G in future EV fleet funding rounds.

Changing how distribution networks do business

The nature of distribution networks has fundamentally changed. The former focus was on building more infrastructure as demand grew but from about 2007 demand has declined and multi-way flows in the network have increased. Recently, because of the “access and pricing” rule change, DNSPs were given responsibility for DER integration. For all these reasons and more, distribution network revenue regulation needs to change to match the changed roles and responsibilities of DNSPs. The financial incentives need to be consistent with consumer expectations and the transition to net-zero emissions.

The NSW Government could consider the following:

- Commissioning a detailed investigation into how DNSP revenue regulation should be updated to be fit-for-purpose for the energy transition. This investigation should look to performance-based regulation and changing the timing of revenue resets as detailed in my Churchill report:

⁷ <https://www.energysaver.nsw.gov.au/reducing-emissions-nsw/electric-vehicles>

⁸ <https://www.environment.nsw.gov.au/topics/climate-change/net-zero-plan/electric-vehicle-strategy>, <https://www.energysaver.nsw.gov.au/reducing-emissions-nsw/electric-vehicles/electric-vehicle-fleets>,

- *Performance-based regulation needs to enable innovation and risk and reward sharing between distribution businesses and consumers (or tax payers). In Australia we are a long way from the static networks in which the current form of CPI-X revenue regulation was developed. To create revenue regulation suited to the challenges of decarbonisation would mean moving not only to totex, but to whole system analysis; a major reconsideration of what kind of incentives are needed for decarbonisation across electricity, transport and gas (in particular) at reasonable cost.*
- *In addition, qualitative assessments may be a valuable tool for cultural change in utilities, as can benchmarking and ex-post reviews. And, regulators must be given sufficiently flexibility to change their regulation with changing technological and commercial circumstances.⁹*

By addressing this big picture issue about the financial incentives that drive DNSP's business models, the NSW Government will not have to concern itself with relatively minor issues such as how dynamic operating envelopes are being rolled out by NSW DNSPs (Issue 9), improving the visibility of residential DER and data management (Issue 11) or whether or not or how DNSPs should install community batteries (Issue 12) or greater digitalisation of energy businesses' engagement with customers (Issue 20). DNSPs should be able to manage these issues. What they cannot do, is provide the vision and direction for the energy transition. This must be provided by government and embedded in legislation and regulation, especially revenue regulation for regulated monopolies.¹⁰

Changing how we provide electricity services in remote and regional communities

Relevant to Issue 14: Service delivery model; Issue 15: Pricing; Issue 16: Service classification

The consultation paper focuses on some important regulatory matters about Stand Alone Power Systems (SAPS) but does not discuss the big opportunity that arises from the falling costs of solar+storage – the potential to supply many remote and regional electricity consumers more cheaply and more resiliently through SAPS and microgrids. The NSW distribution network is relatively new and the DNSPs are very wedded to traditional modes of operation. To provide NSW electricity consumers with cheaper, more reliable and more resilient electricity supply, the NSW Government should take the lead and consider how, and how far, to make the transition to off-grid and microgrid systems for areas of low customer density

The NSW Government could consider the following:

- An independent investigation to determine the commercial viability now and into the future of supplying remote, regional and climate vulnerable consumers with SAPs and microgrids. This should be a comprehensive

⁹ Kuiper, Gabrielle, 2019, 'The future of electricity distribution networks' Report for Churchill Fellowship

¹⁰ Kuiper, Gabrielle, What the NEM could learn from an economics professor and a moon landing, 9 February 2022

investigation looking across the state, modelling a range of scenarios, including associated write-downs of existing assets and it should take both a future-oriented and climate risk focused approach. It should seek to overcome status-quo bias and look imaginatively at future energy needs.

- The investigation should feed into the review of revenue regulation detailed above.

In terms of the very specific and short-term options put forward in the consultation paper, it would be preferable to offer customers “direct retail contracting with the relevant DNSP appropriate where the customer provides explicit and informed consent” with regulatory oversight of end-user customer prices provided by the Australian Energy Regulator (as responsible for tariffs) or the Independent Pricing and Regulatory Tribunal (IPART).

It makes sense to undertake the following actions suggested in the consultation paper:

1. Develop a NSW regulated price or price cap for DNSP-led SAPS end-user prices, that reflects the underlying costs of SAPS. There is potential to explore a time-varying element that could provide price signals for SAPS customers.
2. NSW to permit DNSPs to include SAPS generation assets in their Regulated Asset Base (RAB) above the AER generation cap. This would require NSW to derogate from the national framework to allow DNSPs to own and operate SAPS generation assets and include these assets in their RAB.

Compliance of DER installations

Relevant to Issue 10: Quality, standards and compliance

The issue of the lack of compliance of DER hardware and installations is important for DER integration and one that is best addressed at a national level by the Australian Energy Regulator (AER), which is responsible for almost all other compliance matters in the NEM.

The NSW Government could consider the following:

- Working with energy ministers to direct the AER to take responsibility for ensuring the compliance and enforcement of DER devices, software and installations. Immediate priorities are to ensure:
 - The DER hardware installed in Australian homes and businesses meets the required Australian Standards (e.g., the new AS 4777.2 for inverters)
 - The DER hardware is installed with the required Australian settings (not the settings for other jurisdictions).

In addition, the Energy Security Board’s rule change request on the Governance of DER technical standards was written in part to address issues of compliance and enforcement, by ensuring they were considered in the making of standards.

The NSW Government could consider the following:

- Making a submission to the Australian Energy Market Commission (AEMC) to support the Energy Security Board's rule change request on the Governance of DER technical standards in its original form whereby a DER technical standards committee would be established under the AEMC to forward plan and oversee the development of DER technical standards (noting this is an urgent issue as the AEMC is due to make a final determination on this rule change imminently).

Access to information about making apartment buildings sustainable

Issue 17: Access to information

It is very worthy that the NSW Government wants to assist in making apartment buildings more sustainable but it is quite unclear what actions in particular it wants strata owners to take. However, there is a best practice example of information about making properties more sustainable, the award-winning "Your Home" Guide.

The NSW Government could consider the following:

- Working with other governments to develop a "Your apartment" and "Your apartment building" versions of the above guide.

Informing consumers about electricity retailers' emissions performance

Relevant to Issue 18: Electricity retailers' emissions performance

It is very worth that the NSW Government is interested in consumers having better information about electricity retailers' emissions performance. IEEFA suggests that this issue has been addressed through the update to the Greenpeace Green Electricity Guide.

About IEEFA

The Institute for Energy Economics and Financial Analysis conducts research and analyses on financial and economic issues related to energy and the environment. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy. www.ieefa.org

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