AEMC

INFORMATION

Fact sheet
Distributed generation

Giving consumers options in the way they use electricity

The final report of the AEMC Power of choice review sets out a substantial reform package for the National Electricity Market. This package provides households, businesses and industry with more opportunities to make informed choices about the way they use electricity and manage expenditure.

This paper provides an overview of the key issues related to distributed generation as examined in the Power of choice review. We also include other AEMC work related to distributed generation, as well as references to several relevant external processes.

Benefits of distributed generation

Distributed generation (DG) has the potential to provide consumers with a range of benefits. Consumers who install DG units may be able to reduce the price they pay for electricity or may obtain improved reliability outcomes. DG may also help reduce the cost of power system augmentation, helping to reduce the overall cost of supply faced by consumers. Increased penetration of DG may also help reduce the overall emissions intensity of the NEM, by displacing other more emissions-intensive generation.

While DG may provide a range of benefits, it also includes a range of relatively new and developing technologies. Power systems and networks will need to adjust to the effects of these new technologies. It is important that these initial issues are recognised and addressed, in order to ensure that the benefits of DG can be fully realised.

The AEMC is addressing these issues through a number of processes. Generally, our approach seeks to promote the development of DG where it represents the most efficient and lowest cost solution to meeting community demand for electricity services. We are also seeking to identify how the full value of DG can be recognised and captured across the market supply chain.

What is distributed generation?

For the Power of choice review, distributed generation refers to smaller generation units that are located on the consumer's side of the meter. Distributed generation is also referred to as embedded generation. Examples of distributed generation units that can be installed include: roof top solar photovoltaic units; wind generating units; battery storage; batteries in electric vehicles used to export power back to the grid; combined heat and power units, or trigeneration units that also utilise waste heat to provide cooling; and biomass generators, which are fuelled with waste gas or industrial and agricultural by-products.

It is difficult to determine total volumes of DG in the NEM, as many of these generating units may not be registered with the market operator, or may not be used to export power to the grid. However, as an example of indicative volumes, estimates from the Clean Energy Council put total volumes of distributed co-generation at approximately 3338MW, 593MW of which is powered by renewable resources.[1] To put these figures in context, currently there is around 51000MW of total installed generation capacity in the NEM.[2]

[1] Clean Energy Council cogeneration project data, July 2011. Cited in Climate Works Australia, *Unlocking barriers to cogeneration: project outcomes report*, 2011, p. 14.

[2] These figures include total scheduled, semi scheduled, embedded and non-grid generation in the NEM. ESAA, *Electricity and Gas Australia 2012*, Energy Supply Association of Australia, 2012, p.21.

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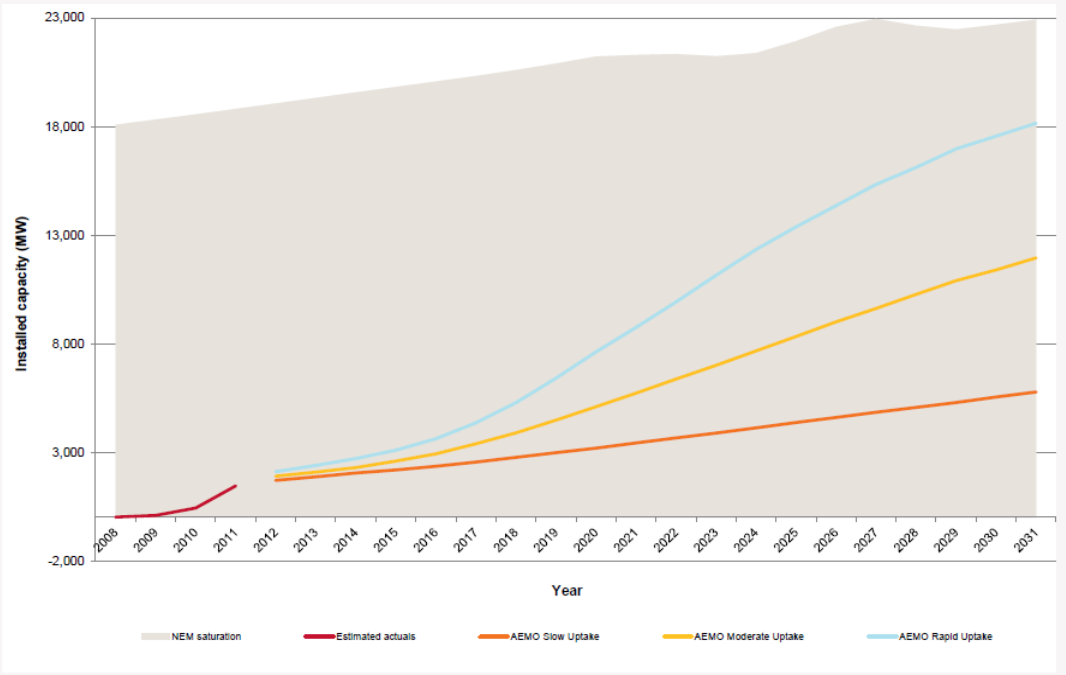
While distributed generation may provide benefits, it also includes a range of relatively new technologies. Power systems need to adjust to the effect of these innovations.

Distributed generation (continued).
The growth of rooftop solar PV generation provides an example of the scale and potential impacts of DG entry in the NEM. Recent estimates from AEMO identified around 1450MW of installed rooftop solar PV capacity as of February 2012. AEMO forecast that this number will grow to 5100MW by 2020 and almost 12000MW by 2031.[3] While at present, solar PV contributes only around 0.6% of total energy consumed in the NEM, AEMO predict that this number may grow to around 3.4% by 2021, partially offsetting the need for investment in increased electricity generation.[4]

Distributed generation units are classified according to their size (installed capacity).

Classification	Technical Definition	Typical Installation
Micro	Less than 2kW and connected to low voltage network	Roof top solar PV
Mini	Greater than 2kW and up to 10kW single phase or 30kW three phase	Fuel cells; combined heat and power systems
Small	Greater than 10kW single phase or 30kW three phase, but no more than 1MW	Biomass, small hydro
Medium	Greater than 1MW but no more than 5MW	Biomass, hydro, local wind generating units
Large	Greater than 5 MW	Co-generation, hydro, solar thermal. Many wind farms are distribution connected.

Rooftop PV installed capacity forecasts for the NEM



Source: AEMO, *Rooftop PV Information Paper*, Australian Energy Market Operator, 2012, p.12

Issues

There are a number of key issues relevant to the efficient utilisation of DG in the NEM. In the Power of Choice review we have focused on three main areas. However, there are a wide range of other issues that are being addressed, both through other AEMC projects and external processes.

[3] AEMO, *Rooftop PV Information Paper*, Australian Energy Market Operator, 2012
[4] AEMO, *National Electricity Forecasting Report*, Australian Energy Market Operator, 2012.

The production of electricity by distributed generation units can provide particular benefits to the market at specific times. Distributed generation owners should have flexibility to sell electricity they produce to the party which values it the most.

Key areas of focus in the power of choice review:

- **Distribution Network Service Providers (DNSP) incentives to facilitate connection and export of power from DG units:** DNSPs may not have strong incentives to connect and facilitate export of power from DG units, due to potential impacts of DG connections on revenue and network security, as well as the capacity of a DNSP to capture a portion of the total benefit of a DG project.

  In the Power of choice review, we considered whether there was need for a specific incentive mechanism to overcome these issues. However, we have found that there is no need for such a mechanism. The development of more general incentive mechanisms to promote efficient DSP, as well as changes to how the costs of DSP are considered in network revenue determinations, should be sufficient to address these issues.

- **Ring fencing arrangements and DNSP ownership of DG units:** Currently, DNSPs are subject to ring fencing arrangements that may limit their ability to own and operate DG units. However, allowing DNSPs to fully utilise DG units may provide benefits to consumers, by helping to meet peak demand.

  The Australian Energy Regulator (AER) is currently undertaking a review of ring fencing in the NEM, with a view to developing standardised ring fencing arrangements. We consider that in developing these arrangements, the AER should consider the potential benefits of allowing DNSPs to own and fully utilise DG assets. We also note that the AEMC's assessment of the *Economic Regulation of Network Service Providers* rule change will include an approach to address any potential cross subsidisation from regulated and non-regulated uses of DG assets.

- **Recognising and capturing the value of power from DG:** The production of electricity by DG units can provide particular benefits to the market at specific times. DG owners should have flexibility to sell electricity they produce to whichever party values it the most.

  We identified this issue of "portability" in the Power of choice review directions paper. We consider that it has been addressed through our proposal for allowing two financially responsible market participants at a single connection point, as recommended in the review of Energy Market Arrangements for Electric and Natural Gas Vehicles. Also relevant is our recommendation in the Power of choice review for the different classification of market participants to facilitate the unbundling of DSP products from the energy component of a retail contract.

  The value of DG is also related to the role it plays in facilitating other forms of DSP. For example, the Power of choice review includes a demand response mechanism that allows consumers to offer load reduction into the wholesale market. The capability of a consumer to offer this demand response may depend on the presence of DG; for example, large industrial consumers may use a DG unit to maintain production while reducing its consumption from the grid.

  Lastly, we consider that DG proponents could be encouraged to maximise their production of electricity during periods where this electricity is of highest value to the market. This could be achieved through the design of specific side payments to DG proponents, such as feed in tariffs (FiTs) or avoided TUoS payments.

  The Standing Council on Energy and Resources (SCER) is developing a consistent national approach to FiTs. We consider that in developing this approach, the SCER should consider how tariff structures might be used to encourage owners of DG to maximise export of energy at times when it is of most value to the market.

Traditionally, distribution networks have been planned and designed to facilitate flows from generation centres to consumers. Introduction of small-scale distribution generation units connected to the distribution network can have impacts on the security of the network and need to be managed.

Other relevant issues

- **DNSP engagement with DG proponents during connection:** Under existing arrangements, DNSPs may not have strong incentives to help DG proponents in the development of connection applications. However, this assistance may be valuable to DG proponents, particularly if they do not have substantial market experience.

  The *Connecting embedded generators* rule change request, submitted by the Property Council of Australia, Seed Advisory and Climateworks Australia, includes consideration of a "fee for service" arrangement. This would allow parties to negotiate a fee for the provision of assistance by the DNSP during the development of a network connection application.

- **Facilitating export of power from DG units:** Traditionally, distribution networks have been planned and designed to facilitate flows from generation centres toward consumers. Introduction of small-scale DG units connected to the distribution network can have impacts on the security of the network.[5] DNSPs may seek to limit these impacts by imposing stringent conditions in the connection agreements they negotiate with DG proponents, potentially limiting the ability of DG units to export their power to the grid.

  These issues are being considered as part of the AEMC's assessment of the *Connecting embedded generators* Rule change request. Part of this Rule change includes consideration of automatic access standards for DG units, which would help provide DG proponents with improved certainty as to their ability to export power to the grid.

- **Information on available network capacity:** Availability of information regarding opportunities for connection and the capacity of the network to accommodate DG may facilitate easier and transparent connection.

  The AEMC's *Distribution Network Planning and Expansion Framework* rule change proposed a number of measures designed to improve information availability, including a requirement for DNSPs to publish an annual planning report and to develop a demand side engagement strategy.

- **Connection charging:** The connection of a DG installation creates costs for a DNSP that are recovered through charges. However, these connection charges may influence the viability of a DG project.

  In June 2012, the AER published its *Connection charge guidelines under chapter 5A of the National Electricity Rules*.[6] These guidelines require DG proponents who are connecting to a distribution network to pay for any augmentations needed to remove a specific network limitation.

External processes

- The Victorian Competition and Efficiency Commission's (VCEC) Inquiry into Feed-in Tariff Arrangements and Barriers to Distributed Generation is considering whether there are barriers to the development of DG in Victoria, including the role of access standards. This review also considers the development of feed in tariff arrangements in Victoria. VCEC have noted that the AEMC's *Connecting embedded generators* rule change will be considering access arrangements for DG.

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[5] In this context, network security refers to the maintenance of the network within specific technical parameters, such as voltage levels.

[6] AER, *Final decision - Connection charge guidelines: under chapter 5A of the National Electricity Rules*, Australian Energy Regulator, 20 June 2012.

- As discussed above, SCER is developing a nationally consistent approach to feed in tariffs for micro-renewable generation. This approach is designed to encourage competition, with clear rights and obligations around the terms of connection and what constitutes a fair and reasonable return for these systems.
- The Senate Select Committee on Electricity Prices recently released a report which considered connection processes for DG and ways to facilitate export of power from DG units.
- The Productivity Commission also recently released a report which considered the potential for tailored feed in tariffs to drive more efficient investment in DG.

We have provided a copy of this final report to SCER for their consideration.

Next steps

We have provided a copy of this final report to SCER for their consideration.

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