

# Distributed energy resources and the potential to deliver competitive advantage to NSW primary industries

The primary industries sector, which spans livestock production, broadacre cropping, forestry and fisheries, is a vital part of the NSW economy. The sector directly employs nearly 88,000 people and delivered more than \$15.7 billion in gross economic output in 2018/19. However, the sector faces considerable challenges with volatile commodity prices, changing consumer markets, concerns about energy security and the increasing impacts of climate change.

One area in which primary industries can realise new benefits is through innovative approaches to energy consumption and production, including the uptake of distributed energy resources (DER). The NSW Department of Primary Industries engaged the Australian Alliance for Energy Productivity to commission research that will inform the development of policy and programs in this area. A2EP tasked Energetics with the research and report. This is a summary. [The complete report is available online here.](#)

Encompassing renewable generation, battery storage and microgrids, DER can support farming operations by reducing electricity costs, diversifying income streams and improving the reliability of power supply. Business models and farming practice can change with the deployment of DER. Remote and rural communities can develop resilience as they build energy independence, and primary industries and the supply chains in which they participate, can decarbonise. More broadly, growth in DER will support the shift to a low carbon economy and the achievement of the NSW net zero target.

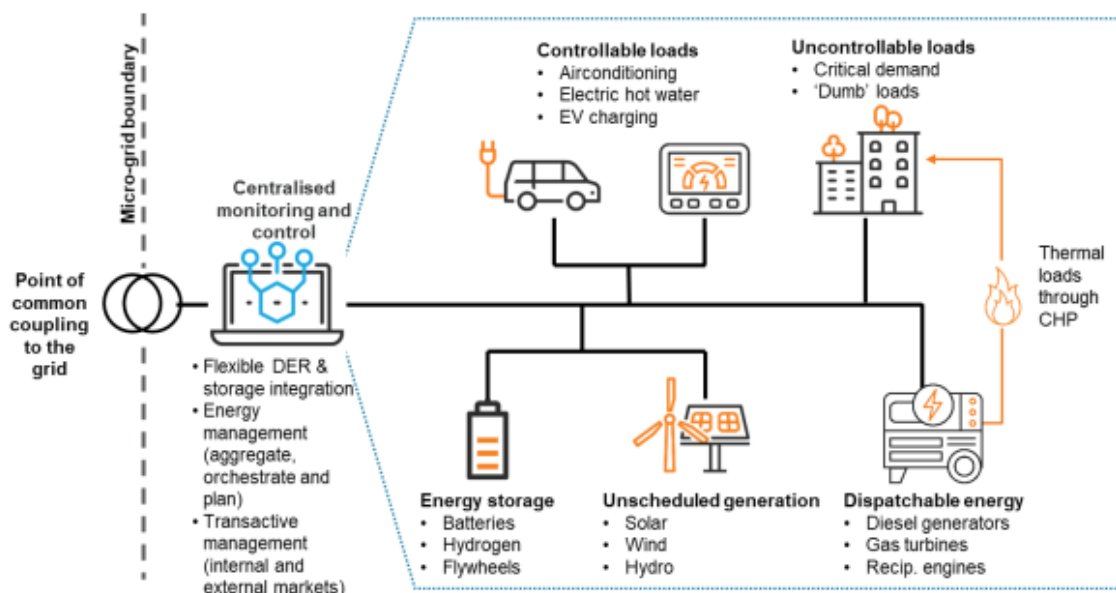


Figure 1. Basic building blocks of a microgrid

While DER technologies are relatively mature, there are barriers to their widespread use. Most of NSW is located within Australia's largest electricity grid, the National Electricity Market (NEM). Any potential grid-connected DER project must be able to operate in the regulatory and commercial environment of this energy-only gross-pool electricity market. Over the past decade, the NEM has experienced volatility as the energy mix incorporates a higher percentage of renewable energy generation. Many attractive DER opportunities have been deemed unfeasible due to the regulatory and technical limitations of the NEM.

This paper assesses the DER options available to primary industries, the challenges and the benefits, and the support that is needed to more broadly unlock DER's potential. It is produced as New South Wales leads with a suite of integrated policies across emissions reduction, electricity supply and regional development.

## Assessing four major opportunities

To understand the DER opportunity and where barriers lie, a full review of the challenges and benefits was undertaken, different DER technology solutions were examined, and a top-down review of the regulatory requirements for network connected DER projects was conducted. Four test scenarios describing a potentially attractive DER concept were also developed with each undergoing a high-level feasibility assessment that considered the ease of deployment with on-farm infrastructure, options for grid alignment, trading arrangements, financial performance, resourcing and administration. The scenarios are as follows:

1. Virtual net metering whereby individual primary producers install grid-connected, small scale renewable resource such as wind or solar. Excess generation is purchased by an industrial consumer via a direct commercial arrangement.
2. DER secondary revenue streams, in which a primary producer installs a grid connected renewable resource (up to 500kW) with the intention of generating a secondary revenue stream via on-selling the excess generation.
3. Grid connected micro-grid, whereby several geographically co-located primary producers connect their individual loads and generation capacity as a microgrid with a single point of NEM connection. The primary producers have access to the grid should back-up power be needed and as a way of exporting excess power generation.
4. A virtual trading network in which a number of NEM-connected participants, whether small or medium sized generators (spanning domestic solar PV, commercial solar PV), and multi sector consumers (industrial users, commercial buyers and domestic users), trade energy via a cloud-based control and trading platform.

## The findings

### Onsite renewables sized for onsite demand currently offer the best value

For primary industries, the most beneficial option for deploying DER remains installing renewable generation which is sized to meet the on-site demand with little or no export. Under this model the participant is able to reduce both network and retail electricity charges without the need to meet technical constraints imposed by the local distribution network. Although up-front capital for installation is still a barrier, alternative funding models are available to support a business case. These models include power purchase agreements (PPA) and build own operate (BOO).

However, primary producers tend to be drawn to farm-scale, easy to deploy, grid-connected DER solutions. The study found that such solutions do not currently provide a favourable value proposition due to a market 'blind spot'.

Domestic customers are well protected in the marketplace, can access local network infrastructure with relative ease and generate a secondary income through the negotiation of a feed-in tariff with a retailer or by generating and selling small technology certificates (STCs). At the opposite end of the spectrum, multi mega-watt capacity solar PV and wind farms, possibly combined with battery storage, can operate in the wholesale market with lucrative trading strategies. However, the financial backing, technical and legal expertise to drive such a scheme to success is out of the reach of the average primary industries participant. One of the only options for generating a secondary revenue for DER with a capacity over 100kW is the generation and trading of large generation certificates (LGCs). Technical constraints and the expected decreasing value of LGCs limits such applications.

## Microgrids and virtual networks present significant future opportunities

For remote and rural communities experiencing poor continuity of electricity supply, a micro-grid arrangement could provide the necessary infrastructure to improve energy security. In such circumstances, the opportunity is less about commercial viability and more a discussion around enabling critical infrastructure to provide energy independence, particularly if the community is exposed to distribution network single points of failure, or prone to catastrophic events such as bushfires.

While virtual trading networks are in their infancy, this innovative trading solution offers a near universal route for participation. Independent and impartial reviews of the long-term benefits will be needed to build consumer support. However, this model could fundamentally shift the nature of electricity trading by increasing the diversity of trading participants.

## Government support and stakeholder collaboration are essential

The law, regulation and policy surrounding the NEM is complex and determining a participant's obligations and responsibilities can be difficult to understand. Domestic customers are served relatively well with easy-to-follow schemes, while large scale projects are often backed by investors outside of the sector who can leverage legal and market expertise.

There is currently a gap in affordable and independent expertise for business participants wishing to explore their DER options. Ideally this support would be free or low-cost and focus on supporting potential participants through the identification of suitable DER opportunities and facilitating application processes and contract negotiations as part of pilot projects.

Furthermore, the complex nature of policy, market requirements and administrative load has resulted in DER simply being 'too hard' for most participants. A collaborative approach between primary industry participants, policy makers, Distribution Network Service Providers (DNSP) and retailers is needed to design targeted products which offer an attractive value proposition, build resilience within the network and work within streamlined regulatory requirements.

DER presents significant opportunities for NSW's primary producers, however support is needed to ensure that the sector can access a range of products and services to realise its full potential.

## **AUTHORSHIP**

This research was commissioned and managed by the Australian Alliance for Energy Productivity (A2EP) for the NSW Department of Primary Industries. The work was funded through the Climate Change Research Strategy (Project 1: Clean energy solutions). The team at Energetics [energetics.com.au] researched and wrote the report.

## **CLIMATE CHANGE RESEARCH STRATEGY**

To ensure the continued growth of NSW Primary Industries, and safeguard the future of the regional communities, the sector needs to be resilient and adaptable to changes in economic and environmental conditions. Supported by an investment of \$29.2 million from the NSW Climate Change Fund, the Strategy invests in project and program areas that could support the primary industries sector to adapt to climate change.

The Strategy seeks to identify through research, and innovation, energy supply and demand solutions, carbon opportunities and climate resilience building programs to enable our primary industries to prepare for the challenges and opportunities climate change presents. The results of this research will be useful in informing forward work programs and policy to support the long-term sustainability of primary industries for NSW. More at [dpi.nsw.gov.au](http://dpi.nsw.gov.au)

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The Australian Alliance for Energy Productivity (A2EP) is an independent, not-for-profit coalition of business, government and research leaders helping Australian businesses pursue a cleaner and more successful future by producing more with less energy.

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