

Over the Edge: The Australian Outlook for Embedded Microgrids to 2027

A Confidential Report for Strategic Research Clients

Embedded microgrids are set to become a cost effective approach for customers to increase the reliability of their electricity supply above grid levels within the decade. Longer-term, Energeia expect they will offer all customers the ultimate choice of disconnecting from the network, unleashing a new era of electricity industry transformation and regulatory reform.

In this confidential report for our Strategic Research clients, Energeia examines the emerging market for embedded microgrid systems in Australia. The report analyses the market's key drivers, barriers, customer segments, technologies, products and industry players to gain insight into its medium to long-term outlook. Energeia's fifteen year view covers total investment potential, final costs to the end consumer, and total installed capacity, energy trade, and peak supply potential.

Most of the world's microgrids are remote islands of electricity unable to interconnect with larger systems. Embedded microgrids are a relatively new, grid-interactive breed offering end users the ability to achieve greater levels of reliability than the local network at relatively low cost. The key to an embedded microgrid's lower cost is its ability to shape its demand from the grid to minimise energy costs while providing valuable market and network services that help offset system costs.

Energeia's research has found that while few institutional barriers to them exist, Australia lacks a formal policy or regulatory framework to encourage embedded microgrids. The main policy gaps in Australia relative to international best practice are supply side government incentives to build industry capability, demand side incentives to build capacity, and truly cost reflective demand management (DM) incentives. There is also the need to adopt recently agreed international microgrid standards.

Demand for premium reliability, driven by a gap in performance relative to requirements, occurs in rural, suburban and urban systems. Energeia's market analysis has found existing markets for premium levels of reliability to be the most likely adopters of the technology as a means for lowering costs. However, embedded microgrid projects to date have mainly been driven by government programs aimed at increasing the penetration of low carbon energy supplies.

The lack of off-the-shelf solutions, industry immaturity and high costs are the key barriers in the Australian market for embedded microgrids. Few control systems are available here, and there is a major gap in the cost effectiveness and availability of key solution components including fuel cells, energy storage systems and demand management systems. Traditional, combustion based backup generation (other than cogeneration) is not viable due to their high operating costs and emissions.

The key questions facing the microgrid market are when and where it is likely to become cost effective. Energeia's modelling shows solar PV based microgrids are the most likely solutions to become cost effective in the next five to ten years, largely due to pre-existing solar PV resources and the anticipated declines in the cost of the storage and control systems. Falling costs are expected to widen the market for improved reliability, particularly for rural and residential energy users.

By 2027, Energeia's outlook is for over 74,000 customers to have invested \$1.3 billion in embedded microgrid solutions to access better than grid levels of reliability. The market's total installed demand response capacity is estimated to be 42 MW with annual energy exports of 60 MWh. Although we expect lower prices to expand the market scope, Energeia sees the business segment representing a relatively small share of the overall market due to relatively fewer sites.

Energeia expects greater policy support for embedded microgrids once policymakers become aware of their potential for equalising the electricity service reliability of rural and remote areas. We also expect they will increasingly be promoted as a check on the monopoly power of electricity networks and the market power of major generators. As the technology matures and costs fall, Energeia expects more customers will begin to go 'over the edge' and completely disconnect from the network.

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