Essential Energy

4.01 Stand Alone Power Systems – Supporting Information

November 2023

Contents

Summary

This document provides additional information and justification to support the efficiency of our Stand Alone Power Systems (SAPS) program. This is in response to the Australian Energy Regulator's (AER) 2024-29 Draft Decision[1] and commentary.

SAPS costings as proposed in our 2024-29 Regulatory Proposal are efficient because:

- We have recently gone to market for a 'typical' residential size SAPS installation and quotes obtained are higher than those values used to build up our Proposal costings
- We are following the technical specifications and are generally sizing them appropriately (as per external consultant) to ensure that customers retain access to a grid-equivalent supply - providing the right level of reliability, system and security.

2024–29 Regulatory Proposal

Essential Energy proposed a new program of investment to roll out SAPS for the 2024-29 regulatory period. The program is expected to deliver approximately 400 SAPS or Off Grid Solutions (OGS) over the period with an increasing number of units delivered year-on-year from 40 to 120 per annum[2]. The total cost of this program is estimated to be $52M (FY24$) in the 2024-29 regulatory control period (RCP).

Draft Decision

As part of the Draft Decision, the AER was satisfied with total net forecast capex proposed for the 2024–29 period, however, made note of concerns related to the efficiency of the SAPs program - with support of the total capex forecast contingent on providing further information to justify the costs of that program.

The AER has referenced the EMCa report[3] that noted the following:

- *The proposed units appear to have a high capital cost and would benefit from an assessment of the market-based testing that Essential Energy has undertaken to determine the efficient level of cost, and to ensure that competitive tension is maintained.*
- *The proposed increase in installations from 40 to 120 units per year in the next RCP, from a base of 5 in FY23 should provide an opportunity to achieve economies of scale, reflected in lower costs per unit.*

Essential Energy Response

Essential Energy can demonstrate that the unit rates utilised in the SAPs forecast are efficient and are reflective of the efficient costs associated with deploying distribution network system provider (DNSP) grade units. These units have specific requirements relating to their design, sizing, supply and performance standards, customer coordination and engagement, reliability and communication requirements, site development/civil works and customer connection agreements.

Recent market testing by Essential Energy, that was not available during discussions with EMCa and the AER through the regulatory proposal process, shows that the unit rates used in our forecast are lower than those currently being offered in the market, and hence are efficient. Further detail is provided below.

In addition to information included in this document, independent analysis undertaken by Aurecon on the efficiency and prudency of our SAPS program technical specifications is available in confidential **Attachment 4.02**. This report confirmed that our specifications are appropriate, and our customers will be no

[1] AER, Essential Energy 2024-29 Draft Decision, Attachment 5 Capital Expenditure, September 2023, Link

[2] Essential Energy - 10.02.12 SAPS Investment Case - Nov22 - Confidential

[3] EMCa, Review of Essential Energy's Proposed Expenditure for Climate-driven Network Resilience, August 2023, Link

worse off from a reliability perspective than if they were connected to the grid, as we have ensured that the sizing is aligned to match the performance of the main grid.

Testing the Market

Essential Energy's January 2023 Proposal contained an overall program cost for SAPS that was established through a bottom-up build, using estimates of unit pricing obtained via a 2020 market "expression of interest" process. These unit rates were split into three main categories, Essential Energy owned, Essential Energy owned low consumption sites, and off grid support SAPS. Updated market costs for the Essential Energy owned equivalent have been obtained in an August 2023 tender.

As part of this tender, five external SAPS suppliers were provided with specific information for a site with characteristics aligned to those represented by the original Essential Energy owned example utilised in the January Proposal, and asked to submit a proposal and breakdown of associated costs for the design, supply and installation of a SAPS sized for this site.

The prices offered were between [redacted] and [redacted] per cent above estimated costs used in the January 2023 Proposal as shown in Table 1, along with our procurement system extract of the evaluation in Figure 1. The average costs are around [redacted] per cent higher than those used to develop our SAPS program costings. This demonstrates that the SAPS cost estimates approved in the AER's Draft Decision are efficient and may be below efficient market costs for DNSP-grade systems.

Table 1 - Tender Results

Quote	Price (FY24)	Variance from Proposal estimate
Original Estimate	[redacted]	
Quote 1	[redacted]	[redacted]
Quote 2	[redacted]	[redacted]
Quote 3	[redacted]	[redacted]
Quote 4	[redacted]	[redacted]
Quote 5	[redacted]	[redacted]
Average	[redacted]	[redacted]

Figure 1 Tender Evaluation for SAPS Procurement

All SAPS procurements use a competitive tender process offered to five approved suppliers, to ensure up to date market pricing is achieved in the early stages of deployments - resulting in efficiency of pricing.

Essential Energy agrees that there might be some improvements in costing as the scale of standardised installations increases or tenders are able to be completed in volume, however, we also note that each of the components of a SAPs solution already have established economies of scale. For example, PV systems, diesel generators and to a lesser extent batteries, and therefore are not expected to have further substantial reductions in unit costs. Meanwhile the labour components of SAPS installation are less likely to be scalable due to the isolated locations of SAPS, and the sporadic nature of customer agreements and bespoke installation requirements.

In practice, the prudency of each individual SAPS solution is investigated and determined on the merits of that business case with much more complete information. Based on the current market data, it appears that there is a greater risk of underestimating than overestimating costs at this early stage of the program especially considering the supply chain constraints that still exist post-COVID19 manufacturing issues.

It would therefore be appropriate for the SAPS costs in the January 2023 proposal to be considered efficient and hence accepted, given those costs are below current information available about efficient market-based costs, and this would also account for any limited scale efficiencies that may be available. Based on our intended roll-out program over the next few years, we expect to have better information to establish firmer cost data for future regulatory submissions.

Specification of SAPs Units

In 2020, Essential Energy engaged Global Sustainable Energy Solutions (GSES), who are experts in renewable energy, to prepare a baseline SAPS technical specification for Essential Energy (CEOS5070 SAPS Technical Specification). The AER was provided with this document during their review of the SAPS program.

CEOS5070 provides the minimum requirements for the design, supply, installation, commissioning and monitoring of a SAPS in compliance with the National Electricity Network Safety Code, relevant Australian standards and Essential Energy's electrical safety rules.

Essential Energy's external tier 1 SAPS suppliers are provided with the SAPS technical specification, along with information on site specific considerations to adequately quote for a proposed SAPS site. Site specific considerations include –

- climate
- location
- environmental considerations
- existing infrastructure (electrical wiring and switchboard condition)
- load data
- communications
- existing installation and protection
- and importantly customers future energy considerations, to capture expected electrification growth – renovations, appliances, machinery, electric vehicles plans, etc.

Aurecon was separately commissioned to undertake an independent review of the technical specifications to ensure that it was not over-specified, and therefore would ensure efficient costs. The table below shows Aurecon's assessment of technical requirements for DNSP SAPS performance standards (as per the National Electricity Rules (section 5.13 Table S5.13.1) and how Essential Energy's technical specification reflects these requirements. Aurecon did not find any aspect of the technical specifications that sought to exceed performance requirements and as such do not impose a higher capital cost to the units above and beyond the requirements of the AEMC legislation.

Table 2 - Aurecon review of SAPS technical specification

Parameter	Minimum content of standards	Essential Energy's Standard	Aurecon Comment
Frequency	Frequency band in normal operation Frequency band following a contingency and the maximum permitted time for excursions outside this band	Section 2.3 of Operational Standard: SAPS Performance and Supply Standards CEOS5061	Targets reflect Rules obligations
System stability	Transient, oscillatory or voltage stability requirements to ensure stable supply in a regulated SAPS	Section 3.3-3.5, and 3.16 of Essential Energy's Electricity Supply Standard CEOP8026.	Targets reflect Rules obligations
Power Frequency Voltage	Normal voltage of supply at connection points Acceptable limits of supply voltage variation from normal voltage in normal operation and following a contingency Maximum time for which voltage may vary from normal voltage for any given variation from normal voltage These are to be set to achieve distortion free voltage supply for the efficient and safe operation of equipment in customer installations	Section 3.3 and 3.11-3.13 of Essential Energy's Electricity Supply Standard, CEOP8026.	Targets reflect Rules obligations
Voltage fluctuations (flicker)	Maximum voltage fluctuation level of supply	Section 3.4 of Essential Energy's Electricity Supply Standard, CEOP8026.	Targets reflect Rules obligations
Voltage waveform distortion	Permitted voltage distortion (harmonics)		Targets reflect Rules obligations
Voltage unbalance	Voltage unbalance is to be measured as negative sequence voltage Maximum average voltage unbalance in normal operation, measured at a connection point, over a specified averaging period Maximum average voltage unbalance following a contingency	Section 3.9 of Essential Energy's Electricity Supply Standard, CEOP8026.	Targets reflect Rules obligations
Fault clearance times	Maximum allowed fault clearance times at nominal voltage levels Fault ride through requirements as necessary to meet stability requirements These must be reasonable and sufficiently fast that they ensure	Section 3.5 of Essential Energy's Electricity Supply Standard, CEOP8026.	Targets reflect Rules obligations

Parameter	Minimum content of standards	Essential Energy's Standard	Aurecon Comment
	stability and safety with respect to a regulated SAPS		
Reliability	Performance targets for frequency and duration of supply interruptions in a regulated SAPS Performance targets for expected load not served in a regulated SAPS	Section 2.4 Operational Standard: SAPS Performance and Supply Standards CEOS5061, which is consistent with IPARTs reliability targets[4].	Targets reflect Rules obligations

Sizing of SAPs Units

Essential Energy limit the range of SAPS system sizes that are commissioned. While this means that some customers may have a system that is larger than needed initially, limiting the number of system sizes and configurations delivers long term cost efficiencies in delivering the DNSP-grade systems. This practice aligns with SAPS suppliers who have also standardised battery and inverter cabinet configurations to reduce costs. This ensures that the SAPS systems have additional capacity available for potential growth in demand, including to accommodate electric vehicle uptake, electrification and general growth.

It has been proposed to size units with an additional 30% in peak capacity above historical measured maximum demand or up to the existing network connection capacity (typically 63A Single Phase). In addition to the peak capacity growth allowance, systems have been sized to accommodate a 50 per cent increase on annual average consumption, or as negotiated with customers (see **Attachment 8.02 Connection Policy**). This allowance of capacity is to ensure customers are "no-worse-off" under a transition to a regulated SAPS system from a standard grid connection (as per AEMC SAPS rule change).

Customer research performed by Woolcott with prospective Essential Energy SAPS customers, revealed expected consumption growth increases of 20-30% to be reasonable, as such a 50% threshold is proposed to slightly exceed customers' expectations. This approach broadly aligns with Energy Networks Australia (ENA) design guidance *ENA DOC 046-2021 National Guidelines for Distribution Network Service Provider-led Stand-Alone Power Systems*. The guideline advises:

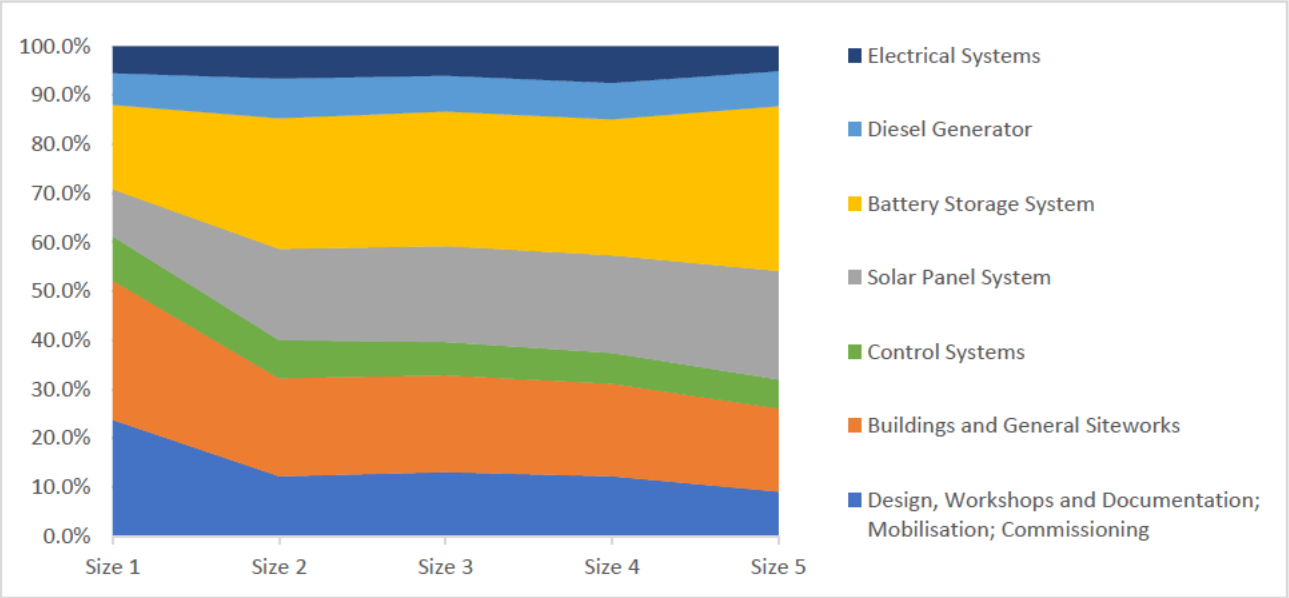
"SAPS sizing may be required to cater for future load growth or reduction without the replacement of major components. Therefore, the design of the SAPS may be required to cater for expansion of battery storage, additional renewable generation, and additional inverters and chargers without replacing enclosures to reducing ongoing operations costs for DNSP's. Spare space within enclosures may be nominated by the DNSP for switchboards, inverters and battery. Each DNSP will define within their Technical Specification the level of modularity required for the SAPS".

Previous market testing has also informed the optimal range of unit sizes offered.

In 2020, Essential Energy ran an initial Expression of Interest (EOI) to understand the availability and costs associated with designing and installing SAPS in remote locations. As a part of the EOI, suppliers were provided with five SAPS site examples containing various environmental conditions and load profiles. Suppliers were asked to design a system for each of these five sites, provide a breakdown of various component sizes and associated costs. 26 submissions were received for evaluation. A breakdown of the findings is contained in Figure 2 below (SAPs sizing increases from left to right).

[4] IPART, Final Licence Conditions – Electricity Distr bution Reliability Standards - May 2021 Link

Figure 2 – SAPs Size versus Component Breakdown



This analysis showed that all systems regardless of size incur minimum costs including design and construction costs, placing a floor on the minimum unit cost and size of SAPS. For this reason Essential Energy is satisfied with the allocation of sizing at the lowest end of the spectrum and currently does not see a basis for providing additional sizes for smaller systems.

The development of the Off Grid Support Process is also designed to improve customer options for low consumption sites or infrequently utilised connections. Customers owned installations potential cost saving measures that cannot be offered through DNSP owned systems (complying with AEMC guidelines) including, but not limited to:

- The ability to reduce demand to reduce capital costs
- Lower reliability requirements
- Utilise other customer owned mobile generation in lieu of generation assets at multiple sites
- Utilise customer owned infrastructure to support and house equipment

For all connections with low consumption where a DNSP owned SAPS could be over engineered, our customer engagement specialists will discuss all possible options with customers to ensure the most appropriate and suitable solution is considered.