Western Power

Demand Management Innovation Allowance Report 2022/23 to 2023/24

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1. Introduction

1.1 Purpose and Compliance

Western Power welcomes the opportunity to provide the Demand Management Innovation Allowance (DMIA) compliance report to the Economic Regulation Authority (ERA) under clause 6.32(H-J) of the *Electricity Networks Access Code 2004* (the code), amendments (No. 2), gazetted on 18 September 2020.

This report covers financial years 2022/23 and 2023/24 which are the first two years of the 5th Access Arrangement (AA5) and has been developed in accordance with the ERA's Demand Management Innovation Allowance Guideline.[1]

The DMIA mechanism enables Western Power to invest in research and development projects with the potential to reduce long-term network costs[2], and is an 'annual ex-ante allowance in the form of a fixed amount of annual revenue at the commencement of each pricing year of an AA period'. The DMIA project must comply with the ERA DMIA guidelines eligibility and reporting requirements.[3]

In line with section 6.32F of the code, an amount of the DMIA not used or approved by the ERA over the access arrangement period cannot be carried over to the subsequent access arrangement period or reduce the DMIA for the next access arrangement period[4]. The allowance of approximately $7M over the 5th access arrangement period (~$1.4M p.a.) is factored into prices and represents 0.08% of AA5 target revenue.

Initiatives may include research and development projects to reduce or shift customer demand to avoid or defer network augmentation or target a reduction in peak demand or broad-based demand. Peak demand continues to be a principal driver of network augmentation costs. Reducing peak demand will reduce costs for customers in the long term by avoiding the need for network investment. In recent years, increased two-way power flows, including 'peak reverse power flow' is similarly impacting the network.

The purpose of this report is to assist the ERA assessment of Western Power's DMIA initiatives in 2022-23 and 2023-24 and right to recover the expenditure listed in Table 1.1 under the DMIA mechanism.

The amount claimed under DMIA in this submission is $6.8M. This represents the first two years included as part of the $7M DMIA allowance for AA5 period. While the amount set for each year is $1.4M, it is not capped each year and can be accumulated up to the value of $7M over the AA5 period.

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1 ERA, 2021, Demand management innovation allowance guideline, (online).

2 Electricity Network Access Code 2004, clause 6.32G

3 ERA guideline: 3.2: Demand management innovation allowance guideline (erawa.com.au)

4 AA5 Access Arrangement for Western Power Network, section 9.1.3 page 53 :https://www.erawa.com.au/cproot/23203/2/Approved-Access-Arrangement.PDF

Table 1.1 DMIA expenditure ($M nominal)

DMIA eligible projects	Actual Capex ($M) – to date	Actual Opex ($M) – 2022/23	Actual Opex ($M) – 2023/24	Funding (ARENA & BESS) – 2022/23 and 2023/24	Net DMIA claim – 2022/23 and 2023/24
Project Symphony/Encore	Not claimed[5]	$4.9	$2	($1.9)	$5
Strategic EV integration	n/a	$0.4	$0.4	Nil	$0.8
Pathway to Net Zero Precinct	n/a	$0.5	$0.5	Nil	$1.0
Total	n/a	**$5.8**	**$2.9**	**($1.9)**	**$6.8**

[5] Use of the AA5 Capex allocation as NFIT compliant - https://www.erawa.com.au/cproot/22447/2/AAI---Attachment-8.1---AA5-Forecast-Capital-Expenditure-Report-4-February-2022.pdf

2. Research and development projects

Decarbonisation, decentralisation and digitisation of electricity supply systems are driving growth in distributed energy resources (DER) – such as distributed photovoltaic (DPV), distributed energy storage systems (DESS) and electric vehicles (EV). This presents challenges to maintaining reliable electricity supply but also material benefits to Western Power, our customers, and the State.

The main benefits of these changes include lower supply costs through deferred or avoided network investment (in both distribution and transmission assets); reduced operational risk due to improved network awareness and DER compliance; increased renewable energy generation driving lower carbon emissions; and the ability for customers to generate greater value from their energy assets.

Western Power is conducting and contributing to research and development to understand how best enable and utilised DER to manage demand and deliver benefits to consumers in the form of avoided network operation and investment costs.

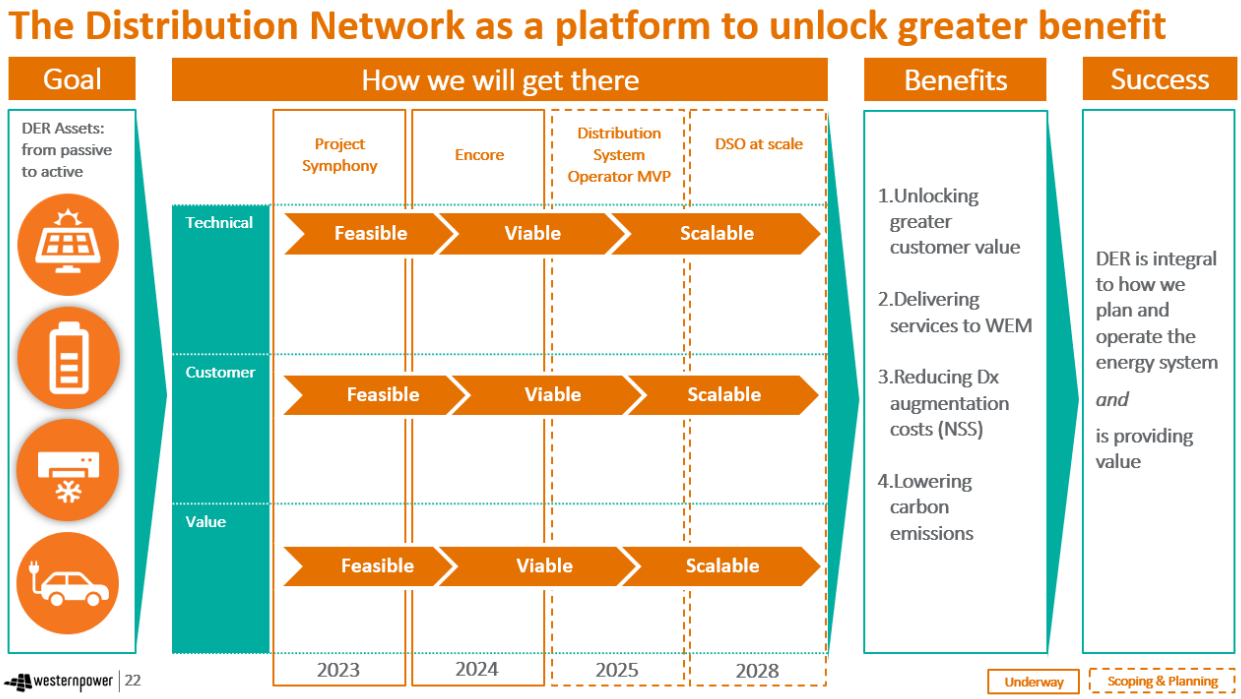
To help manage challenges and maximise benefits of DER, Western Power has committed to developing minimum viable product (MVP)[6] distribution system operator (DSO) capabilities by 2025 and scale DSO capabilities by 2031. These commitments are key to meeting Western Power's **Distribution Transformation** and **Reliable Supply and Efficient Customer Service** priorities.

Through 2023 and 2024, Western Power has developed a **DSO Strategy and Roadmap** (DSO Strategy) to guide the scale, scope, and timing of DSO commitments. The DSO Strategy works in conjunction with several other strategies which provide a consolidated approach to **DER Integration & Participation** in the SWIS (see figure 2.1).

Western Power's 2022-23 and 2023-24 DMIA has principally been used for DSO capability build, as listed in Table 1.1. Project Symphony and Project Encore have successfully demonstrated the feasibility and viability of **DER Participation** in the South-West Interconnected System (SWIS).

[6] A product that is simple enough to not overcommit resources, yet comprehensive enough to clearly demonstrate its value proposition.

Figure 2.1. DER integration roadmap



Western Power's DSO Program has a strong regulatory foundation and is aligned with the policy objectives of the WA State Government's Energy Transformation Strategy (ETS) – which was launched in 2019. Western Power has informed, supported and delivered on the ETS and in particular the Action Plan set out in the DER Roadmap[7].

In 2022, EPWA reinforced plans for DER participation in the SWIS, setting out the planned roles and responsibilities of industry participants[8] – including Western Power as the DSO. Legislative certainty for the DSO role was delivered in March 2024 when WA Parliament passed the *Electricity Industry Amendment (Distributed Energy Resources) Bill 2023*[9], which amends the *Electricity Industry Act 2004*, also referred to as the "DER Bill".

The DER Bill enables the uptake of new technologies and supports the State Government's commitment to net zero by 2050. The Bill also defines the role of the DSO – piloted by Western Power in Project Symphony – introduces the regulatory framework for DER and defines the roles and responsibilities of the Coordinator of Energy, the Australian Energy Market Operator (AEMO), Western Power and aggregators to enable DER participation.

In July 2024, EPWA updated the DER Roadmap, further reinforcing Western Power's role as the DSO. Regulatory implementation of the DER Bill and the establishment of the Electricity Supply and Market Rules (ESMR) will confer these powers over the coming 12 months.

Western Power is also contribution to research and development work being undertaken in two areas:

- The Strategic EV Integration project, which is part of the Reliable, Affordable Clean Energy (RACE) for 2030. SEVI brings together research capabilities across Australia to help address research questions

[7] WA Government (July 2024) - Online
[8] WA Government (July 2022) - Online
[9] WA Government (March 2024) - Online

faced by the industry. Western Power was invited to participate which it eventually joined as Steering Partner with accompanying financial investment. The research and development work will expand Western Power's understanding of the challenge of EV integration for Precincts, Fleets and Regions along the 5 work packages of Social and Market Research Trends, Technologies Deployment and Data, Business Models and Value Proposition, Legal, Tax, and Regulatory Reform, Energy System and Network Analysis.

- "Pathways to Net Zero Precincts" (NZP) is a project of RACE for 2030 Cooperative Research Centre. RACE's primary objective is to drive innovation for a secure, affordable, clean energy future by bringing together top research capabilities to address complex system-level challenges faced by the industry. NZP is developing templates to simplify and enable achievement of Net Zero by precincts. Western Power is one of the industry funders of the project.

2.1 DSO Capability

This section demonstrates how Project Symphony and Project Encore meet the DMIA requirements.

Table 2.1. Summary of Project Symphony and Encore

WP Project Numbers:	Comments
Strategy / Activity Description:	Project Symphony/Encore – Western Power total
Business case(s):	This investment is staged over 2 business cases: Symphony[10] – Western Power initiated in September 2021 Encore[11] – Western Power initiated in April 2024
Summary DMIA claim for both projects **In 2022/23 and 2023/24 (first 2 years of AA5)**	**Opex $5.0M (net of ARENA funding and project revenue)**
Details of Project Symphony **Investment cost and funding ($M)** **In 2022/23 and 2023/24 (first 2 years of AA5)**	**Project Symphony** Cost 2022/23 and 2023/24 = $6.3M (excluding forecast capex included in AA5) • FY23 $4.9M • FY24 $1.4M Less ARENA & BESS revenue received $1.8M • FY23 $1.4M • FY24 $0.4M **DMIA claim for FY23 and FY24 is $4.5M**

[10] Internal project code IAR130063
[11] Internal project code IAR147803

Details of Project Encore **Investment cost and funding ($M)** **From FY23 and FY24**	**Project Encore** Cost 2022/23 and 2023/24 = $0.6M FY23 $0M FY24 $0.6M Less BESS Revenue received $0.1M for FY24 only **DMIA claim for 2022/23 and 2023/24 $0.5M**
Regulatory Category:	Non-recurring operating expenditure

In April 2020 the State Government published a Distributed Energy Resources (DER) Roadmap for Western Australia, with the ambition to enable "a future where DER is integral to a safe, reliable and efficient electricity system, and where the full capabilities of DER can provide benefits and value to all customers". The roadmap also includes provisions to change policy and regulation, stemming from the inevitable evolution of the energy value chain.

Effective DER integration requires focus on both technical issues (e.g. network and system security and reliability), market issues (e.g. development of appropriate market frameworks to efficiently integrate DER), customer issues and regulatory and policy settings.

Project Symphony is an innovative project where customer-owned DER, including rooftop solar, battery energy storage and other major appliances such as air conditioning and pool pumps, are orchestrated as a virtual power plant (VPP) to participate in a future energy market, provide network support services by reducing peak demand and unlock economic and environmental benefits for customers and the wider community.

The findings from Project Symphony were published in a Final Report[12] and subsequently highlighted in the third DER Roadmap progress report, published in July 2024. Action 23b recognised the boundaries of the scope of Project Symphony and identified a need to extend testing under the Encore project.

Project Encore was delivered from December 2023 to September 2024, with testing completed at the end of June 2024. Building on the findings of Project Symphony, Encore leveraged the existing technical solutions and integrations built for Project Symphony to further demonstrate the viability of orchestrated DER operating in the WEM.

In keeping with the strategic goals of the DER Roadmap, Encore focussed on the same four market scenarios from Project Symphony and extended testing of DER orchestration from the autumn/winter period to the summer period to assess the impact on peak demand.

Upon completion, Project Symphony and Encore have helped inform Western Power in developing our DSO Business case which will be delivered through Project Jupiter, which will deliver Minimum Viable Product (MVP) with provision of Network Support Services to defer augmentation as a main objective and Scale DSO Capabilities by 2025 and 2027 respectively (the latter is three years ahead of schedule).

The following table provides the information required to be included in this compliance report per the DMIA guidelines.

Table 2.2: Compliance Reporting Information

Background, nature,	Distributed Energy Resources, or DER are smaller scale devices that can either

[12]

and scope of the project:

In this section we provide a summary of need and timing of the project and a summary of the nature and scope of works relevant to the DMIA

use, generate or store electricity, and form a part of the local distribution system, serving homes and businesses. DER can include renewable generation such as rooftop solar photovoltaic (PV) systems, energy storage, electric vehicles (EVs), and technology to manage demand, like air-conditioners at a premise.

Currently in Western Australia over 1 in 3 households has a solar PV system, contributing significantly to the 2GW of DER capacity available on the Southwest Interconnected System (SWIS) which can serve up to 67% of underlying demand.

Whilst customers choosing to install DER are already enjoying the benefits of lower electricity bills, and are contributing to decarbonising the power system, the level of DER comes with challenges for the network and power system. Further, peak demand in areas of the network continues to grow and as experienced over summer 2021 has caused power quality and reliability issues[13].

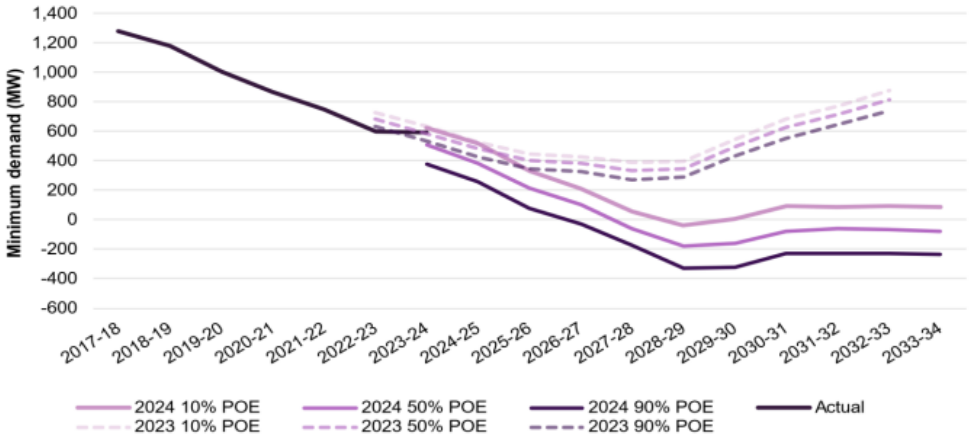
System Impacts

Excess solar power from households and businesses that is being fed unmanaged on to the network pushes the amount of synchronous generation on the power system to increasingly low levels. It also causes reverse power flows that see the physical limits of distribution network infrastructure being reached.

According to the 2020 Wholesale Energy Market Electricity Statement of Opportunities, as early as 2023-24, minimum demand was forecast to fall below the 700 MW system security threshold under the expected demand growth scenario. In response to this risk, the state implemented policy requiring new solar PV installations be enabled for the emergency solar management scheme.

The latest version (2024) of the WEM ESOO demonstrates minimum demand has continued to decline below previous forecasts, stating "Projected growth in DPV is expected to cause a rapid decline in minimum operational demand over the outlook period. Without mitigation, operational demand could notionally fall below zero as early as 2026-27 under the 90% POE Expected demand growth scenario."[14] The below graph compares the forecasts from the 2023 ESOO against the current 2024 ESOO.

Figure 18 Actual and 10%, 50%, and 90% minimum demand forecasts, Expected scenario, 2017-18 to 2033-34 (MW)



Note: Actual minimum demand for 2023-24 is a year-to-date value, based on data until 21 February 2024.

[13] Independent Review of Christmas 2021 Power Outages Final Report, March 2022.

[14] p9, 2024 Wholesale Electricity Market Electricity Statement of Opportunities

	In response and as an alternative to costly, customer impacting and frequent interventions by AEMO to maintain system stability, the State Government established the Energy Transformation Taskforce whose vision was to deliver: • A safe and reliable electricity system where customers can continue to connect DER and where DER supports the system in an efficient way. • DER capability that offers value throughout the electricity supply chain. • DER benefits that flow to all customers, both with and without DER. The taskforce endorsed the DER Roadmap, as the set of actions, action owners and timeframes required to realise this vision. <u>Network Impacts</u> The DER uptake is negatively affecting, and with EV growth has the potential to further affect, the economics of network investment. This is because an increase in solar PV generation and peak operating load, is leading to lower, less efficient utilisation of network assets. DER management provides a solution for both the system and network impacts and thus enables supply chain benefits. <u>The DER Roadmap</u> The DER Roadmap outlines the requirement for Western Power to continue our development as the Distribution System Operator (DSO). To do this Western Power will need to be able to remotely identify and manage issues at a distribution level. The DER Roadmap also outlines a future where customer aggregation can manage DER as a way of providing services in the WEM as well as managing day-to-day issues faced in managing the Western Power network including load, thermal and voltage constraints. The DER Roadmap and supporting changes made to the Electricity Networks Access Code also require that Western Power pursue alternative option services, demonstrating how DER can be harnessed as an alternative to distribution network investments. The Project Encore was a continuation of our DSO capability build. Encore combined a mixture of commercial, third party and residential aggregation to meet localised network needs, whilst also providing services to the system and potentially future new market services via the WEM.
Aims and expectations: *In this section we provide the aims and expectations of the project.*	**Project Symphony and Encore - DER Orchestration Pilot** Project Symphony's purpose was to address two of the high priority actions in the DER Roadmap: Action 22: DER Orchestration Pilot – technology demonstration - commence a comprehensive Virtual Power Plant (VPP) technology pilot to demonstrate the end-to-end technical capability of DER in the SWIS Action 23: DER Orchestration Pilot – market demonstration - complete a comprehensive VPP market participation pilot that tests the incorporation of aggregated DER into energy markets, including market dispatch and settlement arrangements from the market operator to individual customer. Project Symphony quantified the costs and benefits of integrating and orchestrating customer DER assets to more efficiently manage the 'peaks and

troughs' of energy demand in the distribution network while enabling broader participation in new energy markets e.g., balancing/capacity market and essential system services i.e., frequency.

Project Encore expanded upon the Symphony outcomes by delivering the following additional outcomes:

- Curtailing up to 116 residential air-conditioners in both synchronised (entire fleet in same 15 minute period) and sequential (fleet split into four 15 min control groups dispatched sequentially over one hour) during the 2023/2024 Summer period.
- Tested dispatch of the VPP to provide Reserve Capacity per the WEM rules for certification of electric storage assets and demonstrated the potential to value stack with NSS thus putting downward pressure on NSS prices.
- Tested "shaped dispatch" of the VPP through a contracted Network Support Service (NSS) during the 2023/2024 Summer period to provide 0.9 MW of feeder demand reduction at Southern River substation.
- Deployed the Western Power owned/Synergy leased Harrisdale BESS (1 MW/2.6MWh) and City of Armadale aquatic centre battery (250kW/500kWh) with the fleet of residential batteries to deliver energy balancing, NSS and Reserve Capacity services including the operation/provision over the summer peak demand days.

Test dispatch of hot water system control from third party aggregator (Rheem) to provide additional demand response.

Anticipated outcomes:

In this section we provide:

1. anticipated outcomes if the project proves viable.
2. An estimate of the potential to reduce long-term network costs

Anticipated outcomes if the project proves viable.

A high proportion of decentralised, unmanaged DER poses a risk to the stability of the WA power network when an excess of local rooftop solar generation greatly exceeds the demand for electricity at certain times of the day. If Symphony and Encore prove viable it will orchestrate customer DER to not only overcome the technical challenges to the electricity network but also enable DER participation in future energy markets to unlock greater benefits to customers. This also will drive investment in local services to install DER compliant equipment and control systems and manufacturers who may respond with innovative products.

Most importantly, through DER orchestration there is an opportunity to flatten the "duck curve"[15] by shifting demand from evening to midday and thereby improving the utilisation of network assets, enabling decarbonisation of the grid, and potentially providing an economically viable non-network option to network investment.

Project Symphony engaged Oakley Greenwood (OGW) consultants to perform modelling of the economic benefits likely available from a full-scale deployment of the technology and processes available from Symphony[16]. The report also found "It is also worth noting that the VPP could result in a significant source of new dispatchable generation in the WEM. As shown in Figure 2 below, based on the economic benefits available, the VPP could result in the addition of over 1,600 MW of dispatchable generation/load by the end of the modelling period. For context, it should be noted that peak demand within the WEM at present is

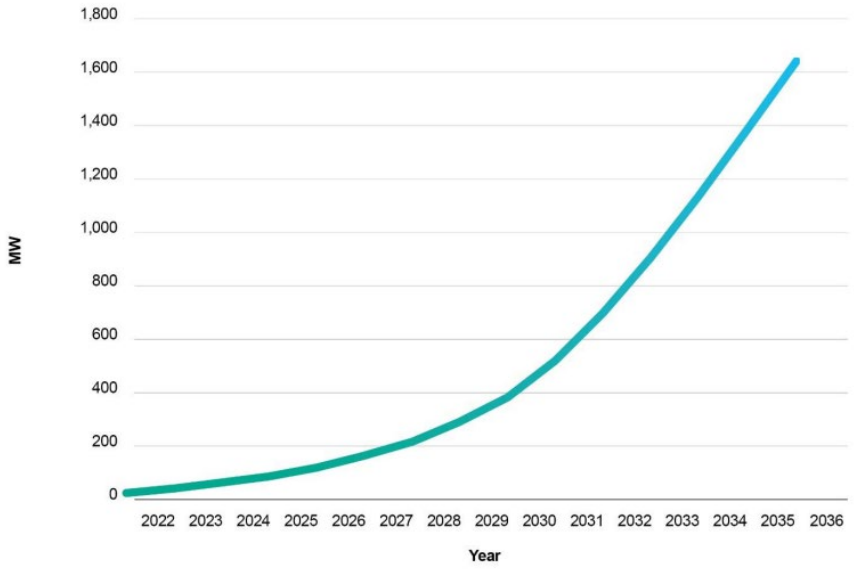
[15] The duck curve describes the shape of the SWIS daily energy demand profile which is characterised by an evening peak (the head of the duck) and the daytime trough (the belly of the duck). Exacerbation of the duck curve adversely affects the economics of DNSPs as infrastructure must be built to support a few hours per year of peak demand.

[16] The OGW report can be found here: project-symphony-der-services-report.pdf (arena.gov.au)

about 4,000 MW and Collie, the largest central generation plant in the WEM is about 340 MW."

The forecast increase in battery capacity coupled with the development of DSO capability provides an opportunity for Western Power to contract and manage dispatchable generation for the purpose of providing NSS to manage peak demand in the network.

Figure 2: Total economic potential of VPP-enabled BTM battery capacity (MW) through 2038



Source: OGW analysis

It should include an estimate of the potential to reduce long-term network costs, taking into account any additional costs that may arise in total electricity costs as a result (for example, additional essential services that maybe required).

The findings from the OGW economic modelling are contained in section 1.4 of the report and a summary of the scenarios modelled is reproduced below. It is difficult to accurately apportion the economic benefits to downward pressure on network costs. As the report findings demonstrate the economic benefits may be shared in various ways depending upon the assumptions made about incentive payments by Aggregators to customers and the value sharing between participants, such as AEMO, Aggregators and Western Power.

Aside from the potential to reduce long term network costs, Symphony does provide increased opportunity for customers to increase energy self-sufficiency as the DSO will enable management of DER and this will provide Western Power the means to offer higher generation connection and export limits, which when coupled with battery storage enable customers to reduce their net energy expenditure. This benefit is in addition to the OGW economic analysis as this outcome was not included in the model.

Thus, the report suggests there will be strong economic incentives for customers to invest in battery storage and other forms of demand management (such as load control).

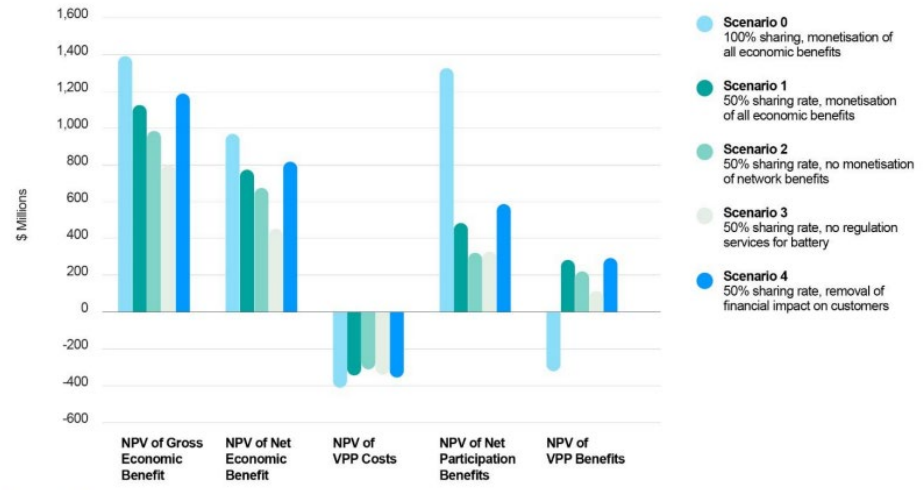
OGW Findings:

All scenarios produce positive gross economic benefits. The maximum economic benefit that is produced in Scenario 0 is significant at just over $1.4b over 15 years

in present value terms, based on a weighted cost of capital (WACC) of 4%.

The maximum net economic benefits of $967m over the 15-year forecast time horizon occur in Scenario 0; they fall to just over $776m and $671m under Scenarios 1 and 2, and down to $453m for Scenario 3.

Figure 1: Summary of scenario results



Source: OGW analysis

In relation to the above graph:

The 'Gross Economic Benefit' reflects the total economic benefit calculated under each scenario, in net present value (NPV) terms, excluding any economic cost associated with implementing the VPP.

The 'Net Economic Benefit' reflects the gross economic benefits less the estimated economic costs of implementing the VPP, expressed in NPV terms.

The 'VPP costs' reflects the cost of implementing the VPP, in NPV terms. The 'Net Participant Benefit' is the net benefit that accrues to participants (being the providers of the DER devices which are orchestrated via the VPP) under each of the scenarios, which reflects: (a) the proportion of the economic benefit that is assumed to be passed on to them under that scenario (e.g., the sharing ratio); (b) the upfront costs they are assumed to have to incur in order to participate in the VPP; 7 and (c) except for Scenario 4, the financial (opportunity) cost they face from ceding management of their devices to the VPP operator.

The 'VPP benefits' reflect the benefit to the VPP provider, in NPV terms, taking into account: (a) the proportion of the economic benefit that they are assumed to retain under each scenario (e.g., the sharing ratio); and (b) the cost of implementing the VPP.

The Symphony project built upon in the delivery of ARENA work package 8.3 Cost benefit Analysis Report. Extract from The project Symphony Pilot Results & recommendations report are below[17]:

[17] Final report – p12 Executive Summary, Value Outcomes : Western-Power-Project-Symphony-Pilot-Results-and-Recommendations.pdf (arena.gov.au)

Value Outcomes

With customer participation and technical feasibility achieved as part of Symphony, the pilot was able to consider the financial costs and benefits of DER orchestration in the WEM and SWIS by extrapolating its results over a 10-year period. The resultant Cost Benefit Analysis (CBA) prepared by Ernst & Young (EY) quantitatively assessed the costs and benefits of each participant in the Pilot: customers, Aggregator/s, Western Power as DSO and AEMO as DMO in relation, and limited, to the available DER orchestrated and the four 'must-have' scenarios. Further, the CBA considered barriers to equitable distribution of value and provided high level recommendations for achieving the conditions under which VPPs could scale in the SWIS. Limitations naturally exist in CBA modelling such as the dependency on how Symphony was rolled out (being the first time such end-to-end orchestration of assets had been attempted), the higher costs incurred in a pilot and development environment when compared with mature products and technology, and necessarily conservative assumptions used regarding future market constructs. However, the modelling showed that the combined cashflows for the DSO, DMO, aggregators, and customers still increased year on year, delivering a combined positive NPV of $450 million over 10-years in the 'Expected Growth' scenario (mid), with the NPV ranging from $280 million in the 'Limited Pilot' scenario (low) to $920 million in the 'Hyper Growth' scenario (high). The analysis demonstrates that substantial value can be created from DER orchestration in the SWIS. This suggests that implementing enabling actions or recommendations and creating conditions for DER aggregation over the short to medium-term is in the long-term interests of customers. Additionally, sensitivity analysis around issues such as the cost of development and implementation suggest that the benefits of DER aggregation are likely to grow materially as technology, systems, processes, and underpinning policy and regulation matures.

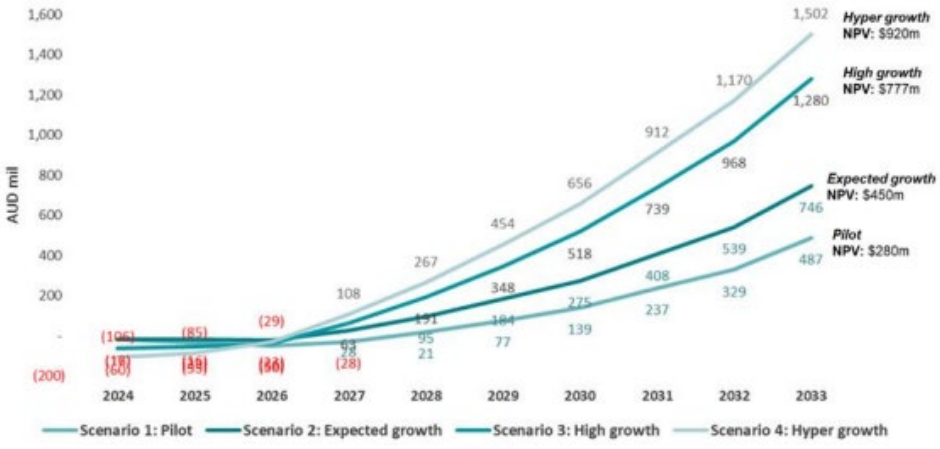


Figure 6: Combined undiscounted yearly cashflows for the Fully Orchestrated scenario.

Over and above the positive NPV achieved under the modelled scenarios, the most noteworthy outcomes of the CBA include:

- A net positive value across all participants can only be achieved when value stacking both network and market services, indicating the need for optimisation or sophistication in the participation of aggregated DER.
- The distribution of value across participants is sensitive to the costs associated with developing and maintaining DER orchestration and aggregator capabilities; however, significant upside potential can be realised as technology costs reduce, business

	capabilities mature, and customer engagement approaches become more commercially focused. • The greater the number of customer DER assets that are recruited into a VPP, the greater the value generated per customer and the higher the opportunity to share benefits across all participants. • Orchestrating DER through aggregation via a VPP can substantially reduce system costs and helps alleviate local network constraints, ultimately allowing a reduction in costs to be passed through to market participants and end-use customers. • Further work is required to develop the commerciality of a VPP to equitably pass through the financial benefits of DER orchestration across participants and actors within a VPP while not passing-through additional costs to customers in the SWIS that do not own DER or elect not to participate in a VPP. • The way in which payment for NSS and CTZ is provided requires further work to ensure it is priced to provide sufficient incentive for aggregators to invest in providing the service, whilst maintaining an acceptable distribution of benefits. • Battery storage within a VPP can access multiple revenue streams from the market and nonmarket services, in contrast to other DER assets. Further value could be derived in VPPs by prioritising the recruitment of battery storage over other types of DER.
The amount of the allowance incurred by the Service Provider (SP): 3. *Incurred to date as at the end of that pricing year.* 4. *Incurred in that pricing year.* 5. *Expected to be incurred in total over the duration of the project.*	1. *Incurred to date as at the end of the period assessed:* **Project Symphony DMIA claim for FY23 and FY24 is $4.5M** Cost 2022/23 and 2023/24 = $6.3M (excluding forecast capex included in AA5) • FY23 $4.9M • FY24 $1.4M • Forecast future spend $0M Less ARENA & BESS revenue received $1.8M • FY23 $1.4M • FY24 $0.4M **Project Encore DMIA claim for 2022/23 and 2023/24 $0.5M** Cost 2022/23 and 2023/24 = $0.6M • FY23 $0M • FY24 $0.6M Less BESS Revenue received $0.1M for FY24 only • Forecast future spend = $0M

How and why the project meets 'Eligibility Criteria': In this section we provide details on how and why the project meets the guideline's 6 x eligibility criteria specified in the DMIA guideline	**#1. Project consists of research and development**: *Demonstrate that the project is for experimental activities whose outcomes cannot be known or determined in advance using current knowledge, information, or experience and that the activities are conducted for the purpose of generating new knowledge:* The project required each of the partners to invest in development of bespoke platforms and communications systems to implement the Hybrid OPeN model. During Encore Western Power chose to continue to use technology it had developed during Symphony with the following enhancements: Engaged Australian National University (ANU) to develop advanced feeder forecasting method using machine learning techniques. Forecasting methods will be important to reliably schedule NSS to mitigate peak demand. Engaged ANU to provide a CSIP-AUS sandbox for demonstration of potential application of this protocol for DSO management of DER. CSIP-AUS is an emerging standard which Australia is pioneering its application in the management of DER via DOEs. Joined a national consortium of DNSPs to develop and procure public key infrastructure (PKI) to certify and enable secure communication with DER, Aggregators and original equipment manufacturers (OEMs). Secure communications to DER and Aggregators are critical to avoid the cybersecurity attacks which could have significant consequences for network and system security and reliability.

#2. Project is for demand management:

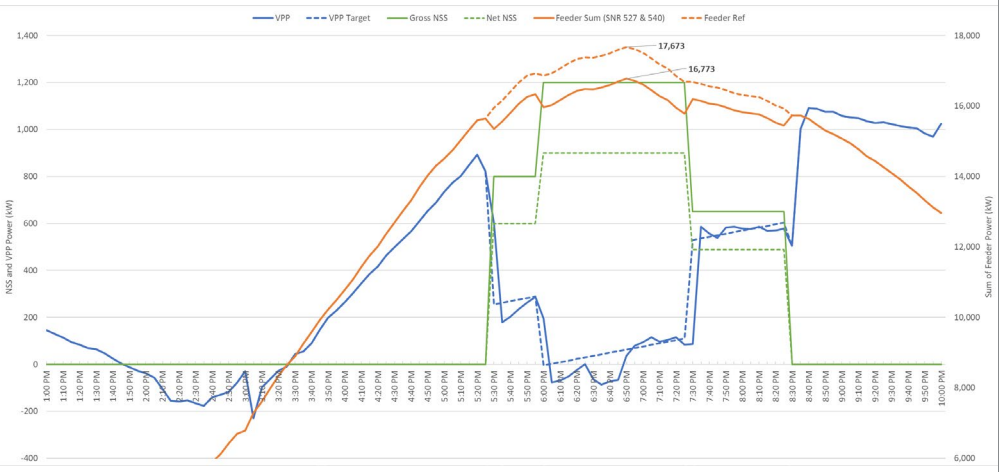
The service provider must provide details of the effect the project, if proved viable, will have on network demand usage patterns:

The projects piloted ways to support the lifting of the “belly of the duck” and “reducing peak demand” by providing customer incentives and market control enabling:

- solar PV to be curtailed during low system demand periods in response to negative WEM pricing.
- batteries to be charged during low system demand periods in response to low WEM pricing and to be discharged during high evening peak periods, under Network Support Service (NSS) contracts to Western Power
- managed loads, such as air-conditioners and in future EVs, to be curtailed during high evening peak periods, under NSS contracts to Western Power

Western Power’s Fifth Access Arrangement (AA5) contains substantial network investment, some of which may be deferred using NSS. Other energy market services facilitated by Symphony (such as balancing market trades based upon system demand) are likely to assist reduce demand.

The figure below shows during Encore the data for 7 of the dates with highest average temperatures using a shaped NSS profile dispatch. The feeder peak (mean over 7 days) is 16,773 kW whereas the feeder reference peak was 17,673 (mean difference of 900 kW). This shows an observable reduction in feeder peak demand.



The graph below shows how Symphony orchestrated residential batteries and a Western Power owned community battery to ‘lift the belly of the duck’ (increase daytime load by charging batteries) and flatten its head (lower feeder peak) by a “shaped” NSS deployment in the evening on 21/6/2023. The graph shows the deployment signal sent to the facility containing residential BESS (dark blue line is deployment and orange is actual response) and another containing the Harrisdale BESS installed by Western Power (yellow line is deployment and light blue is response).

The Harrisdale BESS was dispatched at 800kW from 5.30pm to 8pm and residential BESS dispatched at 300kW from 6pm to 7:30pm to achieve a combined 1.1MW of NSS (green line). The benefit of a shaped dispatch is it enables the shape of the peak to be more closely followed and thus leads to more efficient utilisation of storage capacity. In other dispatches the residential and Harrisdale BESS were combined into a single facility for deployment to achieve the same outcome.

#3. Project has the potential, if proved viable, to reduce long term network cost:

The service provider must provide a description and estimation of the costs that can be reduced. Any additional costs that may arise in total electricity costs as a result of the demand management project (for example, effects on power system security, power system reliability or other aspects of the wholesale electricity market) should be taken into account when estimating the reduction in costs.

This project provided a blueprint for unlocking future efficiencies and cost savings for the state and constituents through the integration of distributed energy resource services. The project initially focuses on the orchestration of customer DER and the provision and validation of services that support the power system network, and access to markets or other arrangements to unlock the value of these services. It will transition into testing of integration between aggregated DER, network management systems and market dispatch systems.

Opportunities are significant due to the direct engagement of key WA electricity market stakeholders (Western Power, Synergy and AEMO), with a commitment by all parties to share learnings, and integrate into broader DER programs including Distributed Energy Integration Programs (DEIP).

However, what is known is that targeting demand reduction at the edge of the grid provides benefit upstream through the entire distribution and transmission system. In the AA5 Western Power is approved to invest heavily in network augmentation to cater for decarbonisation and growth. The project has the potential to reduce these costs and transfer some of this investment from capital works to energy market services. This project also provides flexibility for Western Power to manage network risks with incremental investment in NSS until a firm business case for network augmentation is justified.

In October 2024, Western Power published an EOI for Metropolitan Capacity Expansion Services as a Network Support Service (NSS) via the Non co-optimised Essential System Services (NCESS) framework. This event will hopefully realise our first deferral of capacity expansion capital investment though the use of non-network solutions.

During Encore the following additional objectives were achieved:

Tested the potential for network and residential storage assets orchestrated in a VPP to obtain Reserve Capacity credits. This provides the opportunity of value stacking services on battery assets and thus provides an additional revenue stream. Modelling of NSS dispatch during RCM dispatch obligation intervals demonstrated the additional revenue would place downward pressure on NSS pricing and thus potentially further reduce network costs.

Tested enhanced methods of forecasting peak network demand using weather forecasts which enabled more reliable and efficient dispatch of NSS.

Implemented a new NSS control architecture which enabled direct communication between Western Power and the NSS provider (Synergy) and thus removed a potential point of failure in the control of NSS.

#4. Project is innovative and not an otherwise efficient and prudent alternative option that a service provider should have provided for in its proposed access arrangement.

The service provider will need to describe and demonstrate that the project is innovative in terms of one or more of the following:

- *is based on new or original concepts, and/or*
- *it involves technology or techniques or concepts that differ from those previously implemented or used by network operators in Australia, and/or*
- *It is focused on customers in a market segment that significantly differs from those previously targeted by implementations of the relevant technology, in relevant geographic or demographic characteristics that are likely to affect demand.*

Western Power would ordinarily not undertake a project like Encore as an Access Arrangement investment due to the uncertainty of network benefits and the ability to recruit the other industry participants (Synergy and AEMO), who also needed to commit significant budget for R&D, and without the support of the State Government to make key regulatory reforms in support of the OPeN Hybrid model.

A continued collaboration between Western Power, Synergy and AEMO, the Encore project extended the test scenarios (added RCM testing) and collected additional data on the deployment of key assets (Harrisdale BESS, City of Armadale BESS, air-conditioning control and HWS control).

The unique design of the WEM market, with inclusion of a capacity market, means testing of RCM as a value stacking opportunity have not been tested in the NEM.

Similarly, the role of Synergy as the only retailer for non-contestable customers means the market design and customer recruitment into Aggregated VPPs in WA is different to other states.

System security risks continue to develop as DPV and large-scale renewable generation displaces dispatchable thermal generators that currently provide all system security services (e.g., inertia, frequency control, system strength and voltage control). Thus in the WEM there is greater importance to market mechanisms to procure frequency support services provided by storage assets than in the NEM, which is interconnected between states.

	#5. The service provider must identify all potential sources of funding for the project with an explanation of why it was not able to obtain funding for the project from those sources. *This should include sources such as the Australian Renewable Energy Agency, and federal or state government schemes.* In July 2021, the Minster for Energy approved Western Power to enter into a Commonwealth Funding Agreement with the Australian Renewable Energy Association (ARENA) as part of the Advancing Renewables Program. ARENA has agreed to provide a $8.557M contribution towards the Sympony project to offset the total project cost. Despite Symphony achieving its objectives, additional ARENA funding was not available for the Encore project and, as the delivery by project Partners of an oPEN hybrid model was part of the State Government DER Roadmap, the further investment in Encore was considered necessary to achieve additional outcomes explained in this report.
	#6. The costs were not included in the forecast capital expenditure or operating expenditure approved in the ERA's determination for the Access Arrangement period under which the demand management innovation mechanism applies, or under any other incentive scheme in the Access Arrangement determination. No specific allocation for this investment was included in the AA4 Submission. When the AA4 submission was prepared (in 2016): • the outlook for system lows and their impact was not well understood; and • the DER roadmap work was not available, noting that it had not started, and was only published in April 2020. Project Encore investment costs were not included in the AA5 investment forecast. Alternative investment options were also not included in the AA5 investment forecasts. Note that the AA5 Capacity Expansion Capex expenditure plan included $6M for DSO implementation post symphony ($1.2M in FY23). AA5 also contained an Opex step change of $4.4M per annum for DSO capability. This DMIA submission only relates to R&D activities within Project Symphony, beyond the approved Access Arrangement expenditure.

For projects that have not been completed during the year:
In this section we should include

1. A summary of project activity to date
2. An update on any material changes in that regulatory year
3. Any preliminary results
4. A summary of planned future activity.

1. *A summary of project activity to date*.

Project Encore's project scoping and planning, build, and testing milestones were completed by the end of June 2024. The only work undertaken after June 2024 is to finalise the Encore Final Report and decommission/transfer assets.

2. An update on any material changes in that regulatory year.

Project Symphony published their CBA report and Final report including Pilot Results and recommendations[18]

Encore achieved project milestones.

3. Any preliminary results.

Western Power has concluded its analysis and reporting on the Encore test outcomes and a copy of the report is available upon request. The below are a short summary of the outcomes:

- Western Power contracted a NSS from Synergy and dispatched it under contract on 18 days during the 2023/24 Summer peak period achieving its objective of 0.9MW net reduction in peak demand.
- Encore was able to test a "shaped" NSS and used weather forecasting algorithms to predict the dates when peak network demand were expected.
- The partner's platforms were modified to enable a direct NSS deployment signal to be sent to Synergy to remove a point of potential failure and this proved successful.
- Harrisdale BESS was included in Encore for the entirety and was leased to and orchestrated by Synergy in delivery of market services (including NSS) and achieved its stated availability objective of 94%.
- The City of Armadale BESS was included in the VPP.

A summary of planned future activity.

The Encore final report between all partners is being compiled by Ernst & Young under direction from the Encore program management office of Synergy.

Western Power is currently in the Planning and Scoping phase of enabling DER integration and participation at scale in its role as the DSO. This continues to be a joint initiative involving Energy Policy WA (EPWA), AEMO and Synergy – tying the major SWIS delivery partners to a set of shared objectives and **accelerating delivery of scaled DSO capabilities**. Current objectives include the commercial integration of DER within the SWIS at scale. This will include recruiting a minimum of 100MW of DER nameplate capacity into a virtual power plant (VPP) via aggregator/s (including the use of third-party aggregators) to actively provide network and market services.

For Western Power, this will include the development of three digital products (Network Support & Storage, Dynamic Connections and Distribution Visibility and Forecasting) and enabling organisational changes to support its transition to a DSO to meet the milestones described in the State Government's DER Roadmap.

[18] arena.gov.au/assets/2024/06/Western-Power-Project-Symphony-CBA-Recommendations-Report.pdf and

For projects that have been completed during the year: *In this section we should include:* 1. *The quantitative results of the project.* 2. *Analysis of the results.* 3. *A description of how the results of the project will inform future demand management projects.* 4. *Any other information available to the SP required to make an informed reader to understand and evaluate the project*.	*The quantitative results of the project.* Synergy as the PMO has engaged Ernst and Young to prepare the overall Encore Final Report including analysis, findings and recommendations from all partners. It is anticipated the final version of this document will be available from early November 2024. *Analysis of the results.* A draft copy of Western Power's including analysis, findings and recommendations of the Encore project results is available upon request. Western Power are willing to provide a presentation demonstrating the findings of Encore and its benefits to the network. *A description of how the results of the project will inform future demand management projects, including any lessons learnt about what demand management projects or techniques (either generally or in specific circumstances) are unlikely to form technically or economically viable non-network options.* Encore provided the following benefits to Western Power: • User interface and platform for sending control signals to Synergy to deploy NSS or NCESS on a 5-minute interval basis. • Contract artefacts for leasing Western Power owned batteries and procuring NSS services from suppliers (including Synergy). • A method to deploy NSS with a shaped profile thus maximising the demand reduction available from a finite energy source. • A temperature-based forecasting method for predicting feeder peak and scheduling NSS deployment. • Methods for evaluating the net effect of NSS procured on a gross measurement basis (measured at the battery terminals) on network demand reduction. *Any other information available to the service provider required to enable an informed reader to understand and evaluate the project*. None.

Western-Power-Project-Symphony-Pilot-Results-and-Recommendations.pdf (arena.gov.au)

2.2 Strategic Electric Vehicle Integration

This section demonstrates how the Strategic Electric Vehicle Integration trial meets the DMIA requirements.

Table 2.2: High level summary

WP Project Numbers:	Comments
Strategy / Activity Description:	Strategic Electric Vehicle Integration
Business case(s):	IAR154743 – Innovation Investment Fund
Investment cost and funding **From inception to date**	Opex. Actual cost $75,507 (May 2023-June 2024) Forecast $42,794 (July 2024-June 2025) Estimated total cost to Western Power $118,301
Investment cost and funding	Actual $35,714 **FY23 only** Actual $39,793 **FY24 only**
Regulatory Category:	Non-recurring operating expenditure

Table 2.2-1: Compliance Reporting Information

Background, nature, and scope of the project: *In this section we provide a summary of need and timing of the project and a summary of the nature and scope of works relevant to the DMIA*	In CSIRO's EV Projection 2023[19], projected annual electricity consumption from EV in the SWIS is expected to reach 4TWh by 2035[20]. As a point of comparison, current total annual electricity consumption in the SWIS is 17 TWh[21]. While it is clear that EV will drive significant consumption increase, there are huge opportunity to manage its impact on network demand given its flexibility and future bi-directional and remote management technological capabilities. Like all cars, EVs are generally parked more than 90% of the time[22], providing significant flexibility for charging to happen outside of network demand peak period, however, EV charging infrastructure needs to be designed to enable this. Most EVs are constantly connected to the internet, with multiple features, including charging, available for remote management. This enables a future where EV charging can be coordinated or orchestrated to avoid network constraints for a lower overall cost. Vehicle-to-Grid (V2G) is a technology that allows EVs to export electricity energy to the grid. V2G is already here, and its mass adoption is a key priority for the Australian government[23]. With V2G, EVs can provide more network services

19 Strategic Electric Vehicle Integration | RACE for 2030 - https://racefor2030.com.au/project/strategic-electric-vehicle-integration/

20 https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/nem_esoo/2024/csiro-2023-electric-vehicle-forecast-report.pdf

21 https://aemo.com.au/-/media/files/electricity/wem/wholesale-electricity-market-fact-sheet.pdf

22 Can the current energy grid handle the increasing number of electric vehicles on the road? - Electric Vehicle Council

23 ECMC Communique 19 July 2024.docx (live.com)

	beyond demand management, helping to inject more energy into the grid during network peak, reducing network infrastructure cost for all. Overall, EVs present massive promising opportunities, but they will not be realised by default. The right policies and infrastructure need to be designed and implemented timely for the EV ecosystem to invest and develop the right culture and capabilities. While the big picture is fairly clear, there are major uncertainties and unknowns on the specifics and timings of policies and investments. The EV ecosystem consists of numerous global players interacting with a diverse profile of EV users and diverse typology of the Australian electricity networks. There are many use cases, for Western Power to effectively plan for EV transition, it needs to engage and understand the use cases sufficiently. The Reliable, Affordable Clean Energy (RACE) for 2030 Cooperative Research Centres (CRC) is one of the larger industry-led CRCs funded by a $68.5 million government investment. It identifies EV as an important priority and set up the 3-year project "Strategic EV Integration" (SEVI) project[24]. SEVI brings together top-notch research capabilities across Australia to help address broader systemic research questions faced by the industry. Western Power was invited to participate which it eventually joined as Steering Partner with accompanying financial investment. SEVI identified 3 key research domains under the broader theme of integrating EVs "strategically", such that EVs can serve multiple objectives concurrently, including that of a network operator like Western Power. 1) EVs and Precincts – EV adoption in a local area 2) EVs and Fleets – EV adoption by business and government organisations 3) EVs and Regions – EV adoption in regional areas where the grid is weaker. These are pertinent use cases for the Western Power network. Western Power needs to understand how EV adoption may affect network assets in a local area, how quickly businesses will convert their vehicle fleet, especially heavier vehicles to electric, and how the regional network can support EV adoption without significant cost increase due to network upgrades. By engaging these use cases early, Western Power will maximise the opportunity to harness EVs' flexibility for demand management and avoid a future of high network investments due to overwhelming charging during peak.
Aims and expectations: *In this section we provide the aims and expectations of the project.*	**Strategic EV Integration" (SEVI) project** - focuses on 5 work packages for each of the 3 research domains, EVs and Precincts, EVs and Fleets, and EVs and Regions. The 5 work packages are: 1) Social and Market Research Trends 2) Technologies Deployment and Data 3) Business Models and Value Proposition 4) Legal, Tax, and Regulatory Reform 5) Energy System and Network Analysis While "Energy System and Network Analysis" is clearly relevant and an important

[24] Strategic Electric Vehicle Integration | RACE for 2030

	subject to a network operator like Western Power, all 5 work packages are valuable to help Western Power developed a comprehensive and more nuanced understanding of big change ahead due to EV transition. SEVI will identify a suitable, pre-existing project for each of the research domains. Companion research will be designed with guidance from Steering Partners, which include Western Power. The companion research will address the 5 work packages. Following are corresponding projects for the research domains: 1) EVs and Precincts – Witchcliffe Ecovillage 2) EVs and Fleets – NSW Government and Ausgrid 3) EVs and Regions – Windsor Gardens Holiday Park (South Australia) (pending confirmation) supported by SA government. Above projects all have sufficient scale and complexity to provide insightful lessons. Western Power is fully supportive of the scope and approach and look forward to the outputs from all 5 work packages from the companion research of the 3 projects.
Anticipated outcomes: *In this section we provide:* 1. anticipated outcomes if the project proves viable. 2. An estimate of the potential to reduce long-term network costs	*Anticipated outcomes if the project proves viable.* 1. Expand Western Power's understanding of the challenge of EV integration for Precincts, Fleets and Regions along the 5 work packages of Social and Market Research Trends, Technologies Deployment and Data, Business Models and Value Proposition, Legal, Tax, and Regulatory Reform, Energy System and Network Analysis. 2. EVs is expected to reach annual energy consumption of 4TWh by 2035[20], which will require significant network augmentation if most EVs are charged during peak demand period, which is the most convenient time to charge for most people as they return home from work. The earlier and better Western Power understand various use cases, the more lead time is available to develop and implement the right policies and technological infrastructure to facilitate the gird friendly EV charging culture and behaviours. 3. The uptake of EVs among business fleets may also see sudden ramp up given stakeholders' pressure to reduce emission and the financial capacity for larger volume procurement. There is currently a lack of suitable electric light to medium duty commercial vehicle models. When the product is available, Western Power may see sudden increase if both grid connection upgrades and network demand. Understanding the decision-making factors of fleet early allows more time for Western Power to develop suitable products and policies that encourage more daytime and overnight fleet charging. 4. There are parts of Western Power regional network that are served by long feeders, microgrids or standalone power systems. The right solutions to enable regional uptake of EVs, which is also an equity consideration, will depend on how quickly EVs are adopted and what innovative solutions can be provided at a local level. E.g. SEVI is working with Witchcliffe Ecovillage and Windsor Gardens Holiday Park, which are both in the regions. If EV charging can be provided by residential developments or holiday parks via their distributed energy resources (DER) investments, that will help reduce or avoid

	expensive regional network upgrades.
The amount of the allowance incurred by the Service Provider (SP): 3. *Incurred to date as at the end of that pricing year.* 4. *Incurred in that pricing year.* 5. *Expected to be incurred in total over the duration of the project.*	Opex. Actual cost. $75,507 (May 2023-June 2024) Forecast $42,794 (July 2024-June 2025) Estimated total investment from Western Power $118,301
How and why the project meets 'Eligibility Criteria': *In this section we provide details on how and why the project meets the guideline's 6 x eligibility criteria specified in the DMIA guideline*	**#1. Project consists of research and development**: *Demonstrate that the project is for experimental activities whose outcomes cannot be known or determined in advance using current knowledge, information, or experience and that the activities are conducted for the purpose of generating new knowledge:* EV is a relatively new industry with a product that in many ways have not achieved parity with existing solution, internal combustion engine vehicle (ICEV). Chief of those include range and charging. ICEV has longer range per full tank and can be refuelled very quickly with numerous conveniently located fuel stations. In certain segment, like UTEs and other light to medium duty vehicles that many business fleets use, there are no practically viable EV product yet. However, the pace of innovation is rapid. New EV products with better capabilities are launched with lower prices. The research scope for EVs is broad and complex as it involves many products, technology, suppliers, customers and stakeholders, all innovating and adapting simultaneously. Every player in the ecosystem has its own small piece of a big jigsaw puzzle, however, to better understand the future will require all players to come together, a feat that no one organisation will be able, nor will it be sensible from a resource point of view to undertake on its own. The research has to be led by a non-commercial entity in order to viably recruit commercial organisations which may compete in similar market, develop a comprehensive scope, produce and distribute new knowledge broadly. Each industry entity will find the knowledge useful but impossible and unworthwhile to acquire with only its resources.

#2. Project is for demand management:

The service provider must provide details of the effect the project, if proved viable, will have on network demand usage patterns:

The focus of SEVI is broadly about enabling efficient EV uptake, avoiding grid constraints and expensive grid upgrades. Each domain explores specific demand management opportunities:

1) EVs and Precinct: Focuses on supporting residential and public EV charging with on-site PV generation and battery storage. Seeking to understand the optimum DER technology mix to maximise return on investment. Understand the grid policies and products required to unlock financial benefits for the precincts. Facilitate demand management outcomes of lower export to the grid during system low and higher export during system peak and supporting EV charging with onsite DER rather than grid upgrade.

2) EVs and Fleet: Understand the pace of fleet electrification. The opportunity for flexible connection – where a higher grid capacity is provided overnight, and a much smaller constraint grid capacity during peak period, managing the demand away from peak to overnight. Also to understand the opportunity of fleet participating in Virtual Power Plant (VPP) when vehicle-to-grid (V2G) become available. Further strengthening the scope for demand management.

EVs and Regions: Understand how EV charging can be provide in the region without significantly more expensive network upgrade. Holiday parks' DER investments can support charging. When EVs become mainstream, they can also support other peak period electricity usage by exporting to the grid.

	#3. Project has the potential, if proved viable, to reduce long term network cost: *The service provider must provide a description and estimation of the costs that can be reduced. Any additional costs that may arise in total electricity costs as a result of the demand management project (for example, effects on power system security, power system reliability or other aspects of the wholesale electricity market) should be taken into account when estimating the reduction in costs.* EVs have two key phases, before and after V2G becomes mainstream. In the near term and before V2G becomes mainstream, the key is to encourage solar hours and overnight charging with by encouraging solar investment and providing cheaper overnight electricity tariff rate. The second phase, after V2G become mainstream, will see EVs being bi-directional and able to operate as battery energy storage system and export to the grid during peak period or provide other grid and system services. V2G provides strong incentives for EV owners to use their EVs to power their homes during peak – self consumption, creating a significant drop in peak demand. For WA, where solar generation is plentiful, the key to reduce long-term network cost is to encourage grid friendly charging behaviour during pre-V2G phase and provide more opportunities for asset investment returns during V2G mainstream.
	#4. Project is innovative and not an otherwise efficient and prudent alternative option that a service provider should have provided for in its proposed access arrangement. *The service provider will need to describe and demonstrate that the project is innovative in terms of one or more of the following:* • *is based on new or original concepts, and/or* • *it involves technology or techniques or concepts that differ from those previously implemented or used by network operators in Australia, and/or* • *It is focused on customers in a market segment that significantly differs from those previously targeted by implementations of the relevant technology, in relevant geographic or demographic characteristics that are likely to affect demand.* EVs is relatively new to WA, as of June 2024, there are only 20k EVs in WA, versus more than 2 million vehicles in total. V2G is a nascent technology that has no implementation in WA. As consumers and businesses adopt EVs, charging from the grid, at home or outside, using PV or storage, is very different from refuelling at gas service stations. At this stage, there is no established behaviour. EV charging customers as a collective is also a new customer segment for the grid.

#5. The service provider must identify all potential sources of funding for the project with an explanation of why it was not able to obtain funding for the project from those sources.

SEVI is partly funded by the Commonwealth, and partly by industry and academic institutions. Western Power is one of the industry funders.

Western Power is not the appropriate party to apply for ARENA funding given it does not lead the research project. The project is led by RACE.

#6. The costs were not included in the forecast capital expenditure or operating expenditure approved in the ERA's determination for the Access Arrangement period under which the demand management innovation mechanism applies, or under any other incentive scheme in the Access Arrangement determination.

RACE started initial discussion with Western Power on SEVI in July 2022. The project was eventually finalised in May 2023. Due to the uncertain nature of early discussions and a mismatch of timing, it was not factored in the forecast.

For projects that have not been completed during the year:
In this section we should include

6. *A summary of project activity to date*
7. *An update on any material changes in that regulatory year*
8. *Any preliminary results*
9. *A summary of planned future activity.*

A summary of project activity to date.

Strategic Electric Vehicle Integration | RACE for 2030 - The project website has the Stage 2 Progress Report and the project brochure.

22.N1.S.0457 Strategic EV Integration Project Plan Final (v2.0).docx – Full project plan but not a public document.

Key Milestone/ Deliverable	Original Target Date	Forecast Date	Completion Date
Consultation and prioritisation of various use cases	31/03/2023	31/05/2023	01/05/2023
Trial design of various use cases	30/06/2023	29/02/2024	07/02/2024
Trial execution of various use cases	31/12/2023	31/12/2024	
Trial learnings of various use cases	31/03/2024	31/12/2024	
Ongoing design execution of emerging use cases	31/03/2024	31/12/2024	
Close out report & recommendations	31/12/2024	31/12/2025	

Output Copies; Approach & Methods Copies – Analysis frameworks and tools.

Any preliminary results.

There are no preliminary trial learnings to report as this point.

For projects that have been completed during the year: *In this section we should include:* 10. *The quantitative results of the project.* 11. *Analysis of the results.* 12. *A description of how the results of the project will inform future demand management projects.* 13. *Any other information available to the SP required to make an informed reader to understand and evaluate the project.*	Feb 23 – Feb 24 – Research Co-design - Completed - Demonstration Selection - Companion Research Plan - Approach and Methods Statement - Market and Regulatory Landscape - Data Inventory and Collection Plan - Data and Analytical Framework - Ongoing Partner Engagement Feb 24 – Nov 24 – Demonstration Planning – Underway - Research Planning in collaboration with partners - Refining research approaches and demonstrating partner value - Piloting data collection and analytical approach - Knowledge dissemination approach - Project Management approaches Nov 24 – Nov 25 – Research Activities and Data Gathering – Future - EV charging behaviour - Potential interventions - Energy orchestration - Ev and DER utilisation - Business and financial models - Economic multipliers, procurement and investment - Grid support - Regulatory change Dec 25 – Jan 26 – Analysis and Reporting – Future - Sense making to identify successful approaches to barriers and opportunities - Project reporting and documentation - Knowledge sharing activities - Lesson for scalability and replicability to inform EV readiness

2.3 Pathway to Net Zero Precincts

This section demonstrates how the Pathway to Net Zero Precincts trial meets the DMIA requirements.

Table 2.3: High level summary

WP Project Numbers:	Comments
Strategy / Activity Description:	Pathway to Net Zero Precincts
Business case(s):	IAR154746 – Innovation Investment Fund FY24
Investment cost and funding **From inception to date**	Opex. Actual cost $50,353 (Nov 2023-June 2024) Forecast $103,048 (July 2024-June 2026) Estimated total Western Power investment (claimed under DMIA during AA5) $153,401
Investment cost and funding **From FY23 only**	zero
Regulatory Category:	Non-recurring operating expenditure

Table 2.3-1: Compliance Reporting Information

Background, nature, and scope of the project: *In this section we provide a summary of need and timing of the project and a summary of the nature and scope of works relevant to the DMIA*	"Pathways to Net Zero Precincts" (NZP) is a project of "Reliable Affordable Clean Energy for 2030 Cooperative Research Centre" (RACE). RACE is an industry-led research centre established in 2020 with $68.5 million of Commonwealth funding[25]. RACE's primary objective is to drive innovation for a secure, affordable, clean energy future by bringing together top research capabilities to address complex system-level challenges faced by the industry. NZP identifies a strategy for national or state overall carbon Net Zero objectives to be progressed bottom-up, precinct by precinct. A precinct here is an area where there is an organisation that has effective ability to manage the area's carbon emission. The precincts can be a strata development, a large corporate or university campus, an industrial park, an area designated by its local government for special development. NZP analyses representative case studies to understand on how various precinct configurations can develop effective Net Zero structure, strategy and plans, how they can meet various global and local accreditation standards, and therefore distil the lessons to templates that will simplify and catalyse the adoption of Net Zero strategies by various precincts across Australia, enabling the nation to achieve its Net Zero ambitions.

[25] Strategic Electric Vehicle Integration | RACE for 2030 - https://racefor2030.com.au/project/strategic-electric-vehicle-integration/

	NZP focuses on 4 core aspects: 1) NZP Certification; 2) NZP DER & Grid Integration; 3) NZP Governance; 4) Urban Design NZP commenced with 13 case studies, 7 of which are based in Western Australia, with the rest from South Australia, Victoria, Queensland and New South Wales. NZP is led by a WA research team based in Curtin University.
Aims and expectations: *In this section we provide the aims and expectations of the project.*	Western Power needs to work closer with these emerging models to better understand how to adapt the grid to support them and thus decarbonisation, and how these projects are ensuring reliable electricity supply to the communities. Western Power's strategic vision is "Working together to power a cleaner energy future". The vision reflects a once-in-a-generation opportunity that will fundamentally shift the way electricity is used - and the key role our employees, industry, government and the community have in enabling decarbonisation. Our community remains our key beneficiary. We need to continue to provide reliable power, keep cost low and to enable decarbonisation. The goal of this research is to help Australia achieves its Net Zero ambition through NZP, which the grid has an important role. Supporting this research is an exemplification of the strategy. Another important goal is to ensure that our community has reliable supply. Participating in this research provides an avenue for WP to emphasise the importance of electricity supply that is reliable for the long-term and under various challenging scenarios, e.g., continuous hot summer days. It is also an avenue for WP to understand the needs of NZPs, such that more suitable products or services can be developed to meet their needs.
Anticipated outcomes: *In this section we provide:* 1. anticipated outcomes if the project proves viable. 2. An estimate of the potential to reduce long-term network costs	*Anticipated outcomes if the project proves viable.* If successful, the project will provide effective templates to achieve Net Zero for various types of precincts, which can be residential, commercial or industrial, under various ownership and connection arrangements. Each template will have a component on DER and Grid Integration, which will encourage DER investment and guide the precincts to adopt energy behaviour that supports the grid and enhances returns on investment. Western Power will learn through this project how its connection processes and technical rules need to change to facilitate the DER investments by the precincts. What technical capabilities Western Power need to be built to better integrate with the precincts, and what network and system opportunities the precincts are better placed to capture and should be prioritised by Western Power.

The amount of the allowance incurred by the Service Provider (SP): 3. *Incurred to date as at the end of that pricing year.* 4. *Incurred in that pricing year.* 5. *Expected to be incurred in total over the duration of the project.*	Opex. Actual cost in FY24 $50,353 (Nov 2023-June 2024) Forecast to completion. $103,048 (July 2024-June 2026) Estimated total Western Power Cost (AA5 DMIA claim) $153,401
How and why the project meets 'Eligibility Criteria': *In this section we provide details on how and why the project meets the guideline's 6 x eligibility criteria specified in the DMIA guideline*	**#1. Project consists of research and development**: *Demonstrate that the project is for experimental activities whose outcomes cannot be known or determined in advance using current knowledge, information, or experience and that the activities are conducted for the purpose of generating new knowledge:* NZP is developing templates to simplify and enable achievement of Net Zero by precincts. This is an emerging field as net zero certification standards, precincts' business models, and DER technologies are all in early stages, and interacting with one another iteratively. It is not clear how viable the net zero precincts are, how quickly they will be adopted, what kind of technology investments and policy changes are required to enable them. Without this project, investors of each type of precincts will conduct their own development and experimentation. But none will have the skills and scale to engage net zero certification authorities meaningfully. Western Power will have to engage each precinct separately and will find difficulty establishing a general and strategic view. Overall progress of the ecosystem will be slow and cumbersome, with significant rework and trial and error. Notwithstanding, no single party will find establishing an overarching view via a research project worthwhile, and unlikely to share the knowledge openly after significant investment. The project brings together participants of various types of precincts, distil their common endeavours and challenges, and streamline engagement with common authorities. Western Power will benefit from a centralised engagement and the value adding analysis and facilitation provided by the project.

	#2. Project is for demand management: *The service provider must provide details of the effect the project, if proved viable, will have on network demand usage patterns:* A key lever to achieve net zero is to increase the contribution of renewable energy, which for the precincts will typically be solar, and also battery storage systems to store excess solar generated electricity for evening consumption. There are two key impacts to the network: 1) alleviate daytime minimum demand as charging of battery storage increases daytime demand; 2) alleviate peak maximum demand as battery storage supports self-consumption or export to the network. Self-consumption of daytime solar generated electricity stored in during peak period will help manage peak demand downwards. In the future, as the grid offers more ways for distributed energy resources to provides services, precincts are also better positioned, given their scale and resources, to invest in required technological capabilities to further improve their returns on investment. At that stage, demand management will be more sophisticated and better able to meet the grid's needs.

#3. Project has the potential, if proved viable, to reduce long term network cost:

The service provider must provide a description and estimation of the costs that can be reduced. Any additional costs that may arise in total electricity costs as a result of the demand management project (for example, effects on power system security, power system reliability or other aspects of the wholesale electricity market) should be taken into account when estimating the reduction in costs.

This project is R&D in nature with many unknown unknowns, however, being involved in this research at a modest cost allows Western power to share its knowledge and in return, influence the scope of the research to derive direct impacts analysis on the network, which in turn may lead to more practical applications or further research specific to the Grid impact and response.

In addition, the insight gained will enable Western Power to more proactively respond to changes in market and customer needs.

It is generally easy for individual homeowner, especially those on a green title to invest in DER like solar, battery and EVs. Those who are part of a larger development may encounter barriers to the installation of DERs and the charging of EVs. They are also likely part of an embedded network, limiting their flexibility to engage with electricity retailers.

Notwithstanding, these larger developments may present better opportunities to the network, as they have more physical space for DER installation, economies of scale that reduce average investment fixed costs, and greater leverage from larger grid connection and consumption. In addition, there is a significant population of these larger developments, and their number will only increase as population density increases.

In order to turn this from a challenge to an opportunity, what is required is an easy how-to manual and template for developments to adopt net zero and the accompanying DER and demand management. WA is starting from an advantageous position given its larger share of net zero precincts compared nationally. And that is what the NZP project is seeking to achieve.

When there is a simpler and more straightforward way to adopt net zero, the long-term network cost will naturally reduce.

#4. Project is innovative and not an otherwise efficient and prudent alternative option that a service provider should have provided for in its proposed access arrangement.

The service provider will need to describe and demonstrate that the project is innovative in terms of one or more of the following:

- *is based on new or original concepts, and/or*
- *it involves technology or techniques or concepts that differ from those previously implemented or used by network operators in Australia, and/or*
- *It is focused on customers in a market segment that significantly differs from those previously targeted by implementations of the relevant technology, in relevant geographic or demographic characteristics that are likely to affect demand.*

Net zero precincts is a new idea, so new that there is no clear global or national guidelines and standards for its certification. It is also a confluence of 3 key domains: 1) net zero concepts and calculations; 2) enabling technologies; 3) grid connection rules. While "1" and "2" are broadly globally defined, "3" will be more locally defined based on the standards and rules of the Southwest Interconnected System (SWIS). In fact, it is not a one-way relationship as the SWIS will have to understand the new requirements and adapt itself to meet them.

Most DER installations thus far have been passive solar systems. They are generally set and forget and require no ongoing active intervention from its users, With the focus on net zero and as battery storage system and management software becomes more financially viable, users now need to be more involved if they want better returns on their investments. This also creates more opportunities for Western Power. Instead of just letting asset owners charge and discharge around self-consumption, their assets can be utilised to provide more services to the grid.

This opportunity is bigger with precincts given their larger systems.

Western Power current DER policies have been developed in a more static and passive DER environment. The assumptions and policies need to be reviewed to unlock more value and eliminate outdated policies that increase cost barriers to entry.

Net zero precincts as a customer segment is very new and they do not present sufficient common traits or scale, which as a result have been poorly served by Western Power current policies and processes.

By participating in NZP, Western Power ensures that the project understand the unique requirements of the SWIS and gains insights on the development of net zero precincts.

	#5. The service provider must identify all potential sources of funding for the project with an explanation of why it was not able to obtain funding for the project from those sources. NZP is partly funded by the Commonwealth, and partly by industry and academic institutions. Western Power is one of the industry funders (Western Power funding represents 5% of the total investment - Project total expense = $2,066,785; Western Power's cash contribution is $100,000) Western Power is not the appropriate party to apply for ARENA funding given it does not lead the research project. The project is led by RACE.
	#6. The costs were not included in the forecast capital expenditure or operating expenditure approved in the ERA's determination for the Access Arrangement period under which the demand management innovation mechanism applies, or under any other incentive scheme in the Access Arrangement determination. The costs were not included in the forecast capital expenditure or operating expenditure approved in the ERA's determination for the Access Arrangement period.
For projects that have not been completed during the year: *In this section we should include* 6. *A summary of project activity to date* 7. *An update on any material changes in that regulatory year* 8. *Any preliminary results* 9. *A summary of planned future activity.*	Project Establishment – Oct 23 – Mar 24 – Done NZP Certification Review – Oct 23 – Jan 24 – Done Case studies – Jan 24 – June 26 – Underway Synthesis Pathways – Jan 24 – Sep 26 – Underway ■ NZP Certification Practices ■ DER & Grid Integration Practices ■ Governance Practices Synthesis Report will be produced between July and September 2026. Pathways to Net Zero Precincts | RACE for 2030 – Project Website that provides project brochure. There is no public progress report yet. 240223 RACE NZP M2 Progress Report 1.pdf – Project progress report 1 – Non-public document. 22.E2.S.0486 NZP Project Plan FINAL (v4.1) 2023 0305.docx – Full project plan – Non-public document.

For projects that have been completed during the year: *In this section we should include:* 10. *The quantitative results of the project.* 11. *Analysis of the results.* 12. *A description of how the results of the project will inform future demand management projects.* 13. *Any other information available to the SP required to make an informed reader to understand and evaluate the project.*	n/a