



# Project Symphony

Our energy future

Lessons Learnt Report

Milestone 04: Project Completion

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## Acknowledgements and Disclaimers

Project Symphony has received funding from the Australian Renewable Energy Agency (ARENA) as part of ARENA's Advancing Renewables Program.

The views expressed herein are not necessarily the views of the Australian Government, and the Australian Government does not accept responsibility for any information or advice contained herein.

The views expressed herein are specific to the conditions set within the Symphony Pilot and are made within the context of the Wholesale Electricity Market in Western Australia.

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## 1. Introduction

For the final Milestone of Project Symphony, Milestone 4 - Project Close Out, we have reviewed the lessons learnt across previous milestones of the pilot being;

1. Milestone 1 – Planning & Scoping,
2. Milestone 2 – Build & Integrate,
3. Milestone 3 – Testing.

In this report we consolidate and articulate the significant lessons learnt during the key phases of the pilot and propose recommendations which will enable the scaled uptake of DER and participation of those aggregated DER assets in the WEM. The intent of this report is for these key lessons to be utilised by future VPP projects prior to commencement, to assist in project scope and structure and to accelerate some outcomes for those teams.

## 2. Governance

Project Symphony assessed lessons learnt at each milestone of the pilot and adopted these lessons within the next phase of the pilot where possible. Table 1, below, provides a view of the number of governance lessons learnt by milestone. The detail of these lessons can be found in reports on lessons learnt at the end of each milestone (Milestones 1 – Project Scoping and Planning, 2 – Build and Integrate and 3 - Testing), published on the ARENA site.<sup>1</sup>

Milestone	M1	M2	M3	Sub Total
Governance	2	3	17	<b>22</b>

Table 1 - Number of Governance Lessons Learnt throughout Project Symphony

This section highlights key overarching lessons learnt on governance matters across the duration of the pilot, that should be utilised to inform future or similar projects.

### 2.1. Strategic Alignment and Organisational Commitment

Symphony was executed in Western Australia during a period of extensive transmission network and renewable energy build. The project partners are responsible for both the transformation of both the transmission and distribution networks whilst also integrating DER into new energy markets. The degree of focus on both transformation efforts is significant and should not be underestimated.

Strategic alignment and organisational commitment of all project partners to the pilot was at times absent or inconsistent. Without consistent organisational commitment from the outset, achieving the objectives of the pilot was challenging. Competing priorities impacted visibility and strategic priority of the pilot for some project partners.

<sup>1</sup> <https://arena.gov.au/projects/western-australia-distributed-energy-resources-orchestration-pilot/>

The pilot also commenced during COVID, where traditional ways of collaboration including face to face interactions and meetings became rare, if not impossible to coordinate. This meant the primary interactions between teams occurred online.

This negatively influenced the growing levels of trust between project partners, inhibiting greater collaboration at crucial times and the pilot’s agreed ways of working. It also meant that at several points the project lost priority within partner organisations, impacting the pilot’s resourcing (capability and commitment) and causing delays to delivery timelines.

The consequence of inconsistent/unclear strategic alignment *and* project complexity can be seen in high staff turnover, experienced over a 2.5 year period. By way of example the number of Core Team members that worked on Project Symphony, from the signing of the Funding Agreement in June 2021, is outlined in Table 2:

Project Partner	# of Product Owners	# of Project Managers	# of Lead Architects	# of Comms Leads
AEMO	1	2	2	1
Synergy	4	8	1	5
Western Power	2	2	3	2
EPWA	1	0	0	0
<b>Subtotal</b>	<b>8</b>	<b>12</b>	<b>6</b>	<b>8</b>
Staff Turnover <sup>2</sup>	<b>125%</b>	<b>300%</b>	<b>100%</b>	<b>167%</b>

Table 2: Turnover of Core Team Members since June 2021

## LESSONS:

No.	Subject / Topic	Barrier OR Benefit	Outcome and / or Lesson
1	Governance – strategy	<b>Barrier:</b> Different organisations were at different stages of strategic maturity relating to VPPs.	<p><b>Outcome:</b> The demands on each partner, including the scope of change occurring in each organisation, understanding where the project fits into each organisation’s respective strategic priorities and how each organisation will ensure the ongoing commitment to the project was not well understood between partners.</p> <p><b>Lesson:</b> It is important to recognise during the planning for a project with multiple organisations, the strategic context in which that project will be executed.</p> <p>It would also be worth agreeing between organisations that this information is re-evaluated and shared at regular intervals to incorporate any required changes and to build</p>

<sup>2</sup> Where “turnover rate” is calculated as number of people who have left the role, divided by the number of roles, multiplied by 100. The “number of people who have left the role” is calculated as the total number of people who have held the role subtract the current occupants of the role.

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No.	Subject / Topic	Barrier OR Benefit	Outcome and / or Lesson
			transparent and trusting relationships between organisations.
2	Governance – strategy	<b>Barrier:</b> The Strategic priority of each partner was not understood at the outset of the pilot.	<p><b>Outcome:</b> If possible, projects of this significance should be embedded into each partner’s corporate strategic plan/s to ensure organisational commitment and ownership.</p> <p><b>Lesson:</b> Strategic intent should be clear, shared and reinforced within all project partner organisation’s strategies.</p>
3	Governance – scope	<b>Barrier:</b> Each project partner was at a different level of readiness to deliver the scope and outcomes agreed at the start of the pilot.	<p><b>Outcome:</b> The difference in readiness affected the organisational support of the pilot, the ease of delivery, staff engagement and turnover.</p> <p><b>Lesson:</b> Prior to commencing further VPP related projects with multiple partners, an independent <i>change readiness assessment</i> should be completed on all organisations at the outset and change management plans for each project partner developed to mitigate the risks and dependencies between the partners.</p>

## 2.2. Clarity on Outcome (Trial vs Pilot)

There was a lack of shared understanding, amongst partners, on whether Project Symphony was a ‘pilot’ or a ‘trial’. This led to different understandings of whether Project Symphony was a temporary, standalone project to be stood down on completion, or whether it was the first step with an expectation to scale. This impacted on design, resourcing and general ‘ways of working’ among project partners, which resulted in a mixed commitment from each partner regarding the level of priority, the resource allocation and availability of required capability.

### LESSONS:

No.	Subject / Topic	Barrier OR Benefit	Outcome and / or Lesson
1	Governance – clarity on outcome	<b>Barrier:</b> Project partners not having a shared view on the pathway to scale following Project Symphony completion.	<p><b>Outcome:</b> The opportunity to build consensus and organisational commitment was not maximised and this had implications for mindset, long term plans, risk appetite, priority, and resourcing of the pilot.</p> <p><b>Lesson:</b> In planning future projects, it is important for all partners to have a <i>shared</i> understanding of the pathway</p>

No.	Subject / Topic	Barrier OR Benefit	Outcome and / or Lesson
			for project assets/resources (including customers, platforms and other assets) beyond completion.

## 2.3. Centralised Program Management

Centralised leadership, co-ordination and oversight were essential to driving and delivering the outcomes of Symphony. The governance structures provided by ARENA through the Funding Agreement were also helpful.

Western Power was the lead partner for Project Symphony and consequently hosted the Program Management Office (PMO) to oversee and administer the project. Other partners also could have taken on this lead role – for example, Synergy in owning the customer, or EPWA as lead in policy development.

Central coordination of activities and prioritisation is required, and the capacity and capability required to perform this role should not be underestimated.

### LESSONS:

No.	Subject / Topic	Barrier OR Benefit	Outcome and / or Lesson
1	Governance – Centralised program management	<b>Benefit:</b> ARENA Governance structures.	<b>Outcome:</b> Centralised leadership, co-ordination and oversight were essential to driving and delivering the outcomes. <b>Lesson:</b> In the absence of the third-party contract (ARENA) similar governance structures would be beneficial, if not essential.
2	Governance – Centralised program management	<b>Benefit:</b> Centralised program management office.	<b>Outcome:</b> The PMO existed to facilitate and lead the project with well documented and understood processes and systems, along with clear escalation pathways (including a Program Steering Committee) for decision making and risk management. <b>Lesson:</b> Centralised leadership, co-ordination and oversight were essential to driving and delivering the outcome
3	Governance – Centralised program management	<b>Benefit:</b> Identifying a lead partner organisation.	<b>Lesson:</b> For projects involving multiple partners, consciously agree which party will be the lead partner, the rationale for this and include this in the governance framework.

## 2.4. Decision Making

Project Symphony involved a great deal of innovation; building new solutions that were not present in the market. The high degree of novel capability being developed (both asset and people), combined with the challenges of program management across four organisations, led to delays in the pilot. Project delays were presented incrementally, sometimes without reference to the original delivery date supporting the “sunk cost” bias and making it difficult for the Steering Committee to intervene and preserve the overall timeline.

### LESSONS:

No.	Subject / Topic	Barrier OR Benefit	Outcome and / or Lesson
1	Governance – Decision making	<b>Benefit:</b> Establish a clear program delivery methodology.	<b>Lesson:</b> When attempting complex projects, start with the foundational building blocks and then add layers of complexity. This may impact the choice of delivery methodology.
2	Governance – Decision making	<b>Benefit:</b> Establishment of a Steering Committee.	<b>Outcome:</b> Where areas of risk have been highlighted, the risk assessment and proposed remediation options covering time, budget and scope should be presented to a Steering Committee for senior decision making.  <b>Lesson:</b> Establish a Steering Committee comprised of senior leaders from partner organisations to enhance centralised leadership and decision making.
3	Governance – Decision making	<b>Barrier:</b> At times slow, inefficient decision-making.	<b>Outcome:</b> Project timeframes were hampered.  <b>Lesson:</b> Collaborative, quick and respected/directive decision making is required.
4	Governance – Decision making	<b>Barrier:</b> At times unclear decision escalation pathways.	<b>Outcome:</b> Risks and issues were not always escalated quickly for the Steering Committee, meaning at times they were unable to preserve the project timeline where possible.  <b>Lesson:</b> The Steering Committee needs to be enabled by clear, transparent, and regular project reporting that highlights areas of risk (with an assessment and options) that allows the Steering Committee the ability to intervene when necessary.



## 3. Customer Experience

Project Symphony assessed lessons learnt at each milestone of the pilot and adopted these lessons within the next phase of the pilot where possible. Table 3, below, provides view of the number of Customer Experience lessons learnt by milestone. The detail of these lessons can be found in reports on lessons learnt at the end of each milestone (Milestones 1 – Project Scoping and Planning, 2 – Build and Integrate and 3 - Testing), published on the ARENA site.<sup>3</sup>

Milestone	M1	M2	M3	Sub Total
Customer Lessons Learnt	5	5	9	19

Table 3 - Number of Customer Engagement & Experience Lessons Learnt throughout Project Symphony

For lessons learnt Milestone 4, we have provided overarching lessons learnt on customer engagement across the duration of the pilot, that should be utilised to inform future or similar projects.

### 3.1. Customer Recruitment Criteria (DER Asset Eligibility)

Customers were recruited based on the Aggregator’s understanding of asset eligibility at the time of recruitment. This understanding was formed based on initial discussions with OEM vendors. As more information was provided by technology vendors around what assets could be integrated into their systems, some customers had to have their involvement terminated as their assets were not able to be commissioned. This occurred most with air conditioning assets where often only a site visit would provide clear visibility on compatibility / eligibility. On some occasions OEMs were not able to determine if air conditioning or inverter models would be compatible, unless tested.

This resulted in the shrinking of the available recruitment pool and hindered the pilot in meeting the asset targets. It also created a poor experience for affected customers when they were told their assets could no longer participate.

#### LESSONS:

No.	Subject / Topic	Barrier OR Benefit	Outcome and / or Lesson
1	Customer – Recruitment Criteria	<b>Barrier:</b> OEM vendors’ knowledge of their current products and compliance with AS4755 – Demand Response Standard was limited.	<p><b>Outcome:</b> Customers who had signed up to the pilot were disappointed to be told they could no longer participate, particularly if they had already had orchestration equipment installed.</p> <p><b>Outcome:</b> The pilot didn't reach the air conditioning target despite initially surpassing the amount of assets required.</p> <p><b>Lesson:</b> Clear DER asset eligibility criteria should be established before</p>

<sup>3</sup> <https://arena.gov.au/projects/western-australia-distributed-energy-resources-orchestration-pilot/>

No.	Subject / Topic	Barrier OR Benefit	Outcome and / or Lesson
			customer recruitment begins. This will avoid raising customer expectations around participation where the expectations cannot be met an enable better targeting of eligible customers.
2	Customer – Recruitment Criteria	<b>Barrier:</b> OEM vendors are not incentivised to assist in selling parts (e.g. Demand Response Module (DRM) cards) for AC load control, rather they are focussed on selling the entire product.	<b>Lesson:</b> In setting which DER assets will be eligible, work with the gateway platform vendor to understand what OEM products have been proven to be compatible with gateway devices and which OEM products are on their roadmap for integration ahead of recruitment.
3	Customer – Recruitment Criteria	<b>Barrier:</b> During the pilot, the Aggregator was building knowledge on the Demand Response capability and what would be required to achieve orchestration.	<p><b>Outcome:</b> Recruitment began ahead of clear customer recruitment criteria, including DER asset eligibility/assessment process (what DER works with the technology solution) being established.</p> <p><b>Lesson:</b> Early engagement with OEM and gateway platform vendors on which DER assets comply with their solutions is essential to streamlining eligibility.</p> <p><b>Lesson:</b> Conduct research on similar DER integration programs to understand or identify which AC units are known to be compliant with standards (such as Energy Queensland’s Peak Smart program).</p>
4	Customer – Recruitment Criteria	<b>Barrier:</b> Lack of common communication protocol between assets.	<p><b>Outcome:</b> There were several variations as to how customers could be eligible to participate - new assets v existing assets v both. This presented challenges in aggregating those assets at scale.</p> <p><b>Lesson:</b> Testing the interoperability of DER assets before confirming the DER asset eligibility criteria with customers will provide assurance that the proposed products will work in an aggregated DER orchestration solution. This could be better understood via lab-based tests or a small test group.</p>

## RECOMMENDATIONS:

- ✓ Adopt a single communications protocol for all inverter-based DER (CSIP-AUS) to maximise asset interoperability.
- ✓ Establish a ‘DER Test Lab’ accessible by DSO, Aggregator and DMO to prototype and test DER integration products and solutions prior to rollout.
- ✓ Explore opportunities to establish platform and communications solutions such as AMI to lower risk and achieve greater efficiencies.
- ✓ Mandate adoption of *AS4755 Demand Response Standard* by OEMs to enable greater interoperability of air conditioners for load management by aggregators.
- ✓ Review and reform end to end DER installation, connection, commissioning and compliance processes.

## 3.2. Customer Engagement & Communications

The complexity of the pilot and the associated emergent learnings presented initial challenges in communicating the full scope to customers. It was difficult to strike a balance between providing up to date accurate information, which was evolving, along with trying to explain the high-level concepts of the pilot in language that was accessible to customers.

Participants identified as early adopters and were enthusiastic to learn more around DER. Demographics were skewed to males in their 30s and 40s with tertiary educations and above average incomes. Feedback from these customers was that they found communications overly technical, jargonistic and confusing.

Asset requirements also added complexity, there were several combinations of how customers could participate – with new assets vs existing assets vs both. There were also permutations of DER asset configurations within a home (e.g. solar and aircon *or* solar, aircon and battery *or* solar and battery etc). Communications were not specific on assets and customers felt they didn’t have enough information.

## LESSONS:

No.	Subject / Topic	Barrier OR Benefit	Outcome and / or Lesson
1	Customer – Engagement and Communication	<b>Barrier:</b> Project related communications were considered overly technical, jargonistic and confusing by customers.	<b>Outcome:</b> Customers felt that they were not adequately informed on how their assets were being used to participate. <b>Lesson:</b> This can in part be addressed by more simplified ‘everyday language’ in communications and including use of infographics would be beneficial.
2	Customer – Engagement and Communication	<b>Barrier:</b> Customer impact was not considered when the initial testing of assets occurred more frequently	<b>Outcome:</b> Emergent technical requirements were not adequately communicated to the customer teams, resulting in the impact of evolving asset

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No.	Subject / Topic	Barrier OR Benefit	Outcome and / or Lesson
		and intensely then planned.	<p>testing not being considered with regards to the impact it was having on the customer experience.</p> <p><b>Lesson:</b> End to end mapping of the customer journey, including an approved test and learn schedule is required to inform customer journey mapping and key communication touch points. Any change to the testing schedule needs to be clearly communicated to the customer teams in advance of testing.</p>
3	Customer – Engagement and Communication	<b>Barrier:</b> DER asset composition	<p><b>Outcome:</b> The DER asset composition of the pilot (i.e. new assets vs existing assets vs both, and permutations of DER assets) was complex. The range of possible customer ‘products’ meant there were in turn many types of customer experiences to understand, maintain and manage.</p> <p><b>Lesson:</b> A less complex participation structure could be considered with clear eligibility criteria established prior to customer recruitment beginning.</p>
4	Customer – Engagement and Communication	<b>Benefit:</b> Regular check points with customers allowed the pilot to refine and adapt its communications.	<p><b>Outcome:</b> Customers were very engaged in providing constructive &amp; informative feedback that informed the ongoing refinement of customer communications.</p> <p><b>Lesson:</b> Establish a clear approach for measuring customer sentiment and ensure that the schedule can account for potential delays, ensuring that customer sentiment can be captured at the right point of the customer journey and insights can be adopted into future communication material.</p>
5	Customer – Engagement and Communication	<b>Barrier:</b> Customers general awareness of VPPs and asset orchestration concepts was low.	<p><b>Outcome:</b> Most participants felt that orchestration was poorly communicated and was not well understood.</p> <p><b>Lesson:</b> There is an opportunity to raise general awareness of VPPs and asset orchestration concepts in the community.</p>

## RECOMMENDATIONS:

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- ✓ Create simple, transparent and accurate customer facing information on VPP participation for communication throughout the customer journey to improve customer experience, buy-in and retention.
- ✓ Develop end-to-end customer engagement tools to manage and improve the customer experience of VPP participation.
- ✓ Establish a SWIS-wide customer engagement strategy and plan to achieve a consistent and cohesive approach to improving general customer awareness of VPPs.

### 3.3. Asset Orchestration

Customer recruitment for the pilot occurred in parallel to planning of asset orchestration (type and frequency) and the potential impacts on customers. Consequently, customers were only provided with general information on what to expect from DER orchestration.

Some customers wanted to optimise their energy usage or understand how to change behaviour in support of the project and due to the lack of visibility, awareness/understanding on the purpose of orchestration, this led to some confusion among customers.

Customers indicated they wanted more visibility around asset orchestration (type and frequency).

#### LESSONS:

No.	Subject / Topic	Barrier OR Benefit	Outcome and / or Lesson
1	Customer – Asset Orchestration	<b>Barrier:</b> Communicating complex and technical concepts was challenging and customer impact was not considered when the initial testing of assets occurred more frequently and intensely than planned.	<b>Outcome:</b> Communications did not clearly articulate what customers might expect with orchestration during customer recruitment, with customer sentiment being negatively impacted.  <b>Lesson:</b> Orchestration impact and frequency to be established before customer recruitment begins.  This will enable clear communications/articulation of what customers might expect with orchestration during customer recruitment.
2	Customer – Asset Orchestration	<b>Barrier:</b> Customers did not have visibility on how or when their assets were being orchestrated.	<b>Outcome:</b> Customers were not informed when their assets were being orchestrated or what they were being orchestrated for, with customer sentiment being negatively impacted.  <b>Lesson:</b> Consider the methods to provide greater visibility for customers such as a customer portal, mobile application or dedicated website.

## RECOMMENDATIONS:

- ✓ Create simple, transparent and accurate customer facing information on VPP participation for communication throughout the customer journey to improve customer experience, buy-in and retention.
- ✓ Develop end-to-end customer engagement tools to manage and improve the customer experience of VPP participation.

## 3.4. Financial Impact

A primary objective of Symphony was to determine VPP value across four test scenarios, with the Cost Benefit Analysis<sup>4</sup> report being completed following the testing of the scenarios. Establishing the technical feasibility of the platform was more challenging than planned, resulting in a 3-month delay to the testing schedule. It also resulted in an initial period of testing which was both more frequent and more intensive than initially planned. Due to the uncertainty in both VPP values and the test and learn schedule, the bill impact of orchestration was not able to be forecast and calculated on an individual customer basis. This resulted in the pilot not clearly communicating the (financial) participation benefits of orchestration to customers. Instead of providing an actual value, customers were provided an orchestration payment to ensure no negative financial impact from orchestration.

Ultimately, customers were unsure as to what the bill impact of orchestration would be, and this built anxiety ahead of the testing phase. The delays also resulted in the Orchestration of assets occurring well after asset incentive subsidies were paid, and customers tended not to take this into account when considering value, resulting in a sense of loss or loss aversion.

In the pilot, the orchestration payment was calculated based on conservative assumptions formed at the beginning of the pilot. Whilst the Cost Benefit Analysis concluded that the orchestration payment was higher on average than the orchestration impact, these assumptions will need to be refined.

## LESSONS:

No.	Subject / Topic	Barrier OR Benefit	Outcome and / or Lesson
1	Customer – Financial Impact	<b>Barrier:</b> Delay between customers receiving their new battery and orchestration occurring.	<p><b>Outcome:</b> Customers enjoyed the benefits of their new battery and/or incentives for months ahead of orchestration occurring, resulting in a false sense of orchestration impact.</p> <p><b>Lesson:</b> Orchestration of customer assets should happen in a timely manner after a customer has been onboarded.</p>

<sup>4</sup> Project Symphony Cost Benefit Analysis, EY. Available at: <https://arena.gov.au/knowledge-bank/?keywords=Western+Australia+Distributed+Energy+Resources+Orchestration+Pilot>

No.	Subject / Topic	Barrier OR Benefit	Outcome and / or Lesson
2	Customer – Financial Impact	<b>Barrier:</b> Pilot incentives to offset financial impact were not communicated effectively.	<b>Outcome:</b> Customers became anxious about the impact of orchestration on their bills.  <b>Lesson:</b> Communication on orchestration payments and their purpose should be clear, ongoing (including via a mobile application) and, in the future, be able to be directly tied to bill impact.

## RECOMMENDATIONS:

- ✓ Create simple, transparent and accurate customer facing information on VPP participation for communication throughout the customer journey to improve customer experience, buy-in and retention.
- ✓ Develop end-to-end customer engagement tools to manage and improve the customer experience of VPP participation.

## 4. Technical

Project Symphony assessed lessons learnt at each milestone of the pilot and adopted these lessons within the next phase of the pilot where possible. Table 4, below, provides view of the number of technology lessons learnt by milestone. The detail of these lessons can be found in reports on lessons learnt at the end of each milestone (Milestones 1 – Project Scoping and Planning, 2 – Build and Integrate and 3 - Testing), published on the ARENA site.<sup>5</sup>

Milestone	M1	M2	M3	Sub Total
Technology	5	6	167	<b>178</b>

Table 4 - Number of Technology Lessons Learnt throughout Project Symphony

For lessons learnt Milestone 4, we have provided overarching lessons learnt on technical matters across the duration of the pilot, that should be utilised to inform future or similar projects.

### 4.1. Technology Solution Market Maturity

The energy industry is experiencing a rapid evolution due to the increasing integration of renewable energy and other DER into our electricity mix. However, the software and hardware based solutions necessary for managing DER and renewable energy, such as communication, integration, aggregation, and settlement of DER services, are still in a relatively immature state of development.

<sup>5</sup> <https://arena.gov.au/projects/western-australia-distributed-energy-resources-orchestration-pilot/>

Each project partner developed their own non-functional and functional requirements, and these were brought together in the *Platform Functional and Non-Functional Requirements Report*.<sup>6</sup> Procurement processes were not well coordinated across the project partners with three independent approaches, causing some confusion in the vendor market.

Assumptions of shared understanding on functional requirements amongst project partners was tested during the build phase with a misalignment in platform build. The platform build was remedied and delivered - with timeline and budget impacts.

During the execution, the pilot clearly demonstrated the technical *feasibility* of integrating, aggregating and orchestrating a facility comprised of customer owned DER assets, but the project partners faced the challenge of not finding complete 'off the shelf' software solutions that met their specific needs. As a result, the pilot had to prepare for and rely on some co-development of solutions in parallel to the pilots' implementation.

## LESSONS:

No.	Subject / Topic	Barrier OR Benefit	Outcome and / or Lesson
1	Technology – Market Maturity	<b>Barrier:</b> Absence of mature 'off the shelf' solutions.	<p><b>Outcome:</b> Custom development for aggregator, DSO, and DMO platforms was required, including establishing communication channels between these platforms.</p> <p>Technical solutions for DER (communications, integration &amp; aggregation) are still maturing and consequently, co-development/true partnering will be required.</p> <p><b>Lesson:</b> Budgets and schedules should consider the need for some bespoke development in similar projects.</p>
2	Technology – Market Maturity	<b>Barrier:</b> Absence of a single/joint end to end high level design of the end-to-end solution.	<p><b>Outcome:</b> Unclear understanding of platform requirements and where development was required.</p> <p><b>Lesson:</b> A single/joint end to end high level design of the end-to-end technical solution, including functional and non-functional requirements, should be developed by the project partners and centrally managed.</p>
5	Technology – Market Maturity	<b>Barrier:</b> Lack of detailed asset information included in platform design.	<b>Outcome:</b> Additional work was required following intimal platform design, impacting all project partners.

<sup>6</sup><https://arena.gov.au/assets/2022/02/project-symphony-platform-functional-and-non-functional-requirements-report.pdf>



No.	Subject / Topic	Barrier OR Benefit	Outcome and / or Lesson
			<b>Lesson:</b> Where possible, documentation of requirements should include identification of the type, location, and concentration of DERs that need to be integrated.
6	Technology – Market Maturity	<b>Barrier:</b> Partners procured technology vendors separately with their own requirements, rather than a view of the complete platform.	<p><b>Outcome:</b> Additional work was required following intimal platform design, impacting all project partners.</p> <p><b>Lesson:</b> In projects involving multiple partners and solutions, early joint or well-coordinated vendor/market briefings should be arranged to enable a greater understanding of the overall solution requirements and to enable more effective collaboration.</p>

## RECOMMENDATIONS:

- ✓ Develop specifications around parent Aggregator service delivery standards to accelerate compliance to service delivery standards in the WEM.
- ✓ Explore opportunities to establish platform and communications solutions such as AMI to lower risk and achieve greater efficiencies.

## 4.2. Technical Interoperability

With the emerging maturity of the individual aggregator, DSO and DMO platform software solutions, the interoperability between those same solutions and DER assets had limited compatibility/interoperability. This limited interoperability was exemplified by the limited adoption of standards such as AS4755 – Demand Response Standards by manufacturers and technology providers. The limited adoption of AS4755 was experienced in the pilot with limited ability to access a demand response mode for air conditioners. In addition, a significant proportion of existing/legacy DER assets were unable to be seamlessly registered and integrated with the technology platforms for orchestration, further limiting the pool of eligible assets and customers.

## LESSONS:

No.	Subject / Topic	Barrier OR Benefit	Outcome and / or Lesson
1	Technology – Interoperability	<b>Barrier:</b> Interoperability between platform solutions and DER assets had limitations.	<p><b>Outcome:</b> A significant proportion of contracted DER assets were unable to be seamlessly registered and integrated with the technology platforms for orchestration.</p> <p><b>Lesson:</b> OEM Vendors do not share a common understanding / interpretation</p>

No.	Subject / Topic	Barrier OR Benefit	Outcome and / or Lesson
			<p>of relevant standards and communication protocols.</p> <p><b>Lesson:</b> Early involvement of OEMs would allow for subject matter expert engagement and support from the beginning of the project.</p> <p><b>Lesson:</b> Clearly define roles and responsibilities to enable monitoring and compliance of DER to mandated standards and technical rules.</p>
2	Technology – Interoperability	<b>Barrier:</b> Existing/legacy DER assets were unable to be seamlessly registered into the platform without making additional enhancements.	<p><b>Outcome:</b> Additional costs were experienced to cover the product enhancement and requirements of customers.</p> <p><b>Lesson:</b> Contingency needs to be available to enable product enhancements and offerings to customers, including compatible inverter replacements, battery energy storage offerings and compatible appliance replacement where cost effective to do so.</p>

## RECOMMENDATIONS:

- ✓ Adopt a single communications protocol for all inverter-based DER (CSIP-AUS) to maximise asset interoperability.
- ✓ Develop the business case for a 'DER Data Hub' to facilitate effective and efficient data exchange between the DMO, DSO and Aggregators.
- ✓ Develop specifications around parent Aggregator service delivery standards to accelerate compliance to service delivery standards in the WEM.
- ✓ Establish a 'DER Test Lab' accessible by DSO, Aggregator and DMO to prototype and test DER integration products and solutions prior to rollout.
- ✓ Mandate adoption of *AS4755 Demand Response Standard* by OEMs to enable greater interoperability of air conditioners for load management by aggregators.

## 5. Value

Project Symphony assessed lessons learnt at each milestone of the pilot and adopted these lessons within the next phase of the pilot where possible. Table 5, below, provides view of the number of value lessons learnt by milestone. The detail of these lessons can be found in reports on lessons

learnt at the end of each milestone (Milestones 1 – Project Scoping and Planning, 2 – Build and Integrate and 3 - Testing), published on the ARENA site.<sup>7</sup>

Milestone	M1	M2	M3	Sub Total
Value	0	1	0	1

Table 5 - Number of Value Lessons Learnt throughout Project Symphony

For lessons learnt Milestone 4, we have provided overarching lessons learnt on value matters across the duration of the pilot, that should be utilised to inform future or similar projects.

## 5.1. Development of Enabling Policy & Frameworks

Demonstrating the feasibility of orchestrating of DER assets, Project Symphony considered the policy and rule changes that would be needed to encourage and facilitate participation of aggregated Distributed Energy Resources (DER) in the Wholesale Electricity Market (WEM).

Anticipating DER aggregations are expected to start small and scale over time, Project Symphony’s DER Participation Framework<sup>8</sup>, lays out a pathway that enables a progressive rollout by promoting visibility in the first instance whilst defining a pathway into the WEM. The proposed pathway seeks to avoid unintended consequences and impacts on existing participants, thereby opening opportunities for consumers and limit impact to the market.

### LESSONS:

No.	Subject / Topic	Barrier OR Benefit	Outcome and / or Lesson
1	Value – Frameworks and policy	<b>Barrier:</b> A lack of specific accommodations in the WEM Rules for the registration and participation of aggregated DER.	<p><b>Outcome:</b> The interaction of aggregated DER with the energy market is fundamentally different to that contemplated by the existing WEM arrangements.</p> <p><b>Lesson:</b> ‘Facilities’ comprising aggregated customer-owned DER, with or without stand-alone DER (such as a distribution-connected battery), could provide additional value through modes of operation based on capabilities that cut across those contemplated for multiple Facility Classes in the WEM’s existing registration framework, rather than aligning neatly with a single Facility Class.</p>

<sup>7</sup> <https://arena.gov.au/projects/western-australia-distributed-energy-resources-orchestration-pilot/>

<sup>8</sup> *Project Symphony’s DER Participation Framework*. Available at: <https://arena.gov.au/knowledge-bank/?keywords=Western+Australia+Distributed+Energy+Resources+Orchestration+Pilot>

No.	Subject / Topic	Barrier OR Benefit	Outcome and / or Lesson
2	Value – Frameworks and policy	<b>Barrier:</b> Retaining existing frameworks for aggregated DER facilities is likely to significantly constrain scale and opportunities for DER orchestration.	<p><b>Outcome:</b> Access to the WEM is not limited by technical capability, rather it is limited by existing obligations that place barriers to participation that are largely founded in a misalignment between the underlying technical capabilities of aggregated DER, customer preferences, and the existing market framework.</p> <p><b>Lesson:</b> Limitations may be overcome by an Aggregator through very conservative DER operations that will limit value to the Aggregator and system, or by aligning market obligations with DER capability to enable aggregations to scale and derive value to both the Aggregator (therefore customers) and the system.</p>

## RECOMMENDATIONS:

- ✓ Commence work on policy solutions to establish market frameworks that support the participation of DER aggregations in the WEM.
- ✓ Support VPP visibility for the DMO and DSO through implementing amendments to wholesale electricity market rules as required.

## 5.2. Demonstrating Value Streams – Parent Aggregator & Third Party Aggregators (TPAs)

Non-contestable customers are those consuming less than 50MWh in a year, capturing all residential customers and most small businesses. To mitigate the volatility of energy prices and ensure energy remains accessible for residential customers, Synergy has sole responsibility for providing retail services to non-contestable customers.<sup>9</sup>

Synergy took on a Parent Aggregator role in the Pilot and was responsible for DER valuation, acquiring customers and procuring a minimum of two additional TPAs for the Pilot. Additionally, Synergy was responsible for developing an Aggregator Platform to orchestrate DER assets, allowing DER to participate in the wholesale markets.

The commercial framework used in the pilot to recruit and incentivise customers was established to test desirability of a VPP product offering to the market and recruiting a minimum number of DER assets required to test the technical viability of the VPP model and associated platforms.

TPAs received a payment from Synergy for each asset they enrolled in the VPP. The Project Symphony Cost Benefit Analysis<sup>10</sup> highlighted that more work was required to establish a viable TPA business model. TPAs had a negative Net Present Value due to bearing the full cost of orchestration relating to the integration of their systems with the Aggregator Platform, system access fees, and payments to customers. Though they receive revenue from Synergy, the value of this benefit is outweighed by the combined costs.

## LESSONS:

No.	Subject / Topic	Barrier OR Benefit	Outcome and / or Lesson
1	Value – value stacking	<b>Barrier:</b> Optimising the value streams or value stacking with TPA platforms was difficult to implement on the current technology stack.	<b>Outcome:</b> Platforms and technology was not mature enough to implement this feature as intended.  <b>Lesson:</b> More work is required to establish what value is available and how it can be shared between all parties (customer, aggregator, retailer, network).

<sup>9</sup> WEM Rules 2023 (WA)

<sup>10</sup> [insert link when available]

In partnership with:

No.	Subject / Topic	Barrier OR Benefit	Outcome and / or Lesson
2	Value – TPA framework	<b>Barrier:</b> Development of a compelling offer to provide value to TPA's and their customers.	<b>Lesson:</b> Development of a TPA framework would be desirable, that allows innovation, flexibility in business models and leverages natural market forces, to ensure TPAs and their customers are adequately compensated.

## RECOMMENDATIONS:

- ✓ Quantify the actual value of DER asset participation for non-contestable customers (>12 months data and without pilot participation costs) to better inform value streams and the distribution of value between DER owners and the aggregator.
- ✓ Establish policy positions that appropriately incentivise aggregators to participate, and ensure value is passed through to customers.
- ✓ Establish clear frameworks to enable TPAs to engage with the parent aggregator Synergy for non-contestable customers, to reduce barriers of entry and ensure consistent customer experience.

## 5.3. Demonstrating Value Streams - NSS

Significant network investments have been identified by Western Power and are already in the planning phase to be delivered over the next 10-years. These investments will alleviate some of the existing network constraints, at both transmission and distribution levels, caused by localised voltage or thermal constraints. However, there are significant parts of the network that will require augmentation soon, as increases in energy demand provide further loading constraints on the network, compounded by increased DER penetration and an aging network.

There are tangible capex savings or deferral that could be provided by NSS, where there is sufficient localised capacity within the VPP that can be called upon to provide NSS and to relieve localised network constraints. Logistically, enrolling sufficient capacity of DER such as BESS and other controllable DER loads in the same geographical area may be problematic.

## LESSONS:

No.	Subject / Topic	Barrier OR Benefit	Outcome and / or Lesson
1	Value – NSS	<b>Barrier:</b> WA does not require air-conditioning units to be DRM compatible with AS4755.	<b>Outcome:</b> Symphony failed to recruit sufficient compatible air conditioning load on either a feeder or transformer level to provide a firm NSS.  <b>Lesson:</b> Without interoperability standards in place, consideration should be given to incentivise compatible product uptake to allow firm A/C NSS testing.

No.	Subject / Topic	Barrier OR Benefit	Outcome and / or Lesson
			<b>Lesson:</b> Conduct research on similar DER integration programs to understand or identify which AC units are known to be compliant with standards (such as Energy Queensland’s Peak Smart program).
2	Value – NSS	<b>Barrier:</b> Complex commercial agreement for the Network BESS .	<p><b>Outcome:</b> Complex commercial contracts can affect the Aggregator’s ability to deliver valuable NSS.</p> <p><b>Lesson:</b> Contracts with BESS should be structured to ensure that aggregator benefits are optimised.</p>

### RECOMMENDATIONS:

- ✓ Establish policy positions that appropriately incentivise aggregators to participate, and ensure value is passed through to customers.
- ✓ Deliver a Network Support Service that achieves deferral of network augmentation, to confirm existing funding, recovery, incentivisation and coordination mechanisms are adequate at scale.

## 6. Policy and Regulation

Project Symphony assessed lessons learnt at each milestone of the pilot and adopted these lessons within the next phase of the pilot where possible. Table 4, below, provides view of the number of regulation and policy lessons learnt by milestone. The detail of these lessons can be found in reports on lessons learnt at the end of each milestone (Milestones 1 – Project Scoping and Planning, 2 – Build and Integrate and 3 - Testing), published on the ARENA site.<sup>11</sup>

Milestone	M1	M2	M3	Sub Total
Regulation & Policy	1	2	37	<b>40</b>

Table 6 - Number of Regulation & Policy Lessons Learnt throughout Project Symphony

For lessons learnt Milestone 4, we have provided overarching lessons learnt on regulation and policy matters across the duration of the pilot, that should be utilised to inform future or similar projects.

### 6.1. Virtual Power Plant (VPP) Visibility

The WEM is evolving and transitioning rapidly as it moves to incorporate greater levels of renewables, storage and other distributed energy resources. This meant that Project Symphony was developed and implemented in a period of relative uncertainty and change. Increases in the

<sup>11</sup> <https://arena.gov.au/projects/western-australia-distributed-energy-resources-orchestration-pilot/>

number of DER assets connected to the network need to be managed in order to support the security and reliability of the power system.

No.	Subject / Topic	Barrier OR Benefit	Outcome and / or Lesson
1	Visibility - DSO	<p><b>Benefit:</b> Project Symphony used AMI and transformer monitoring to obtain visibility in Project Symphony</p>	<p><b>Outcome:</b> Project Symphony obtained valuable insight on the minimum level of visibility needed for DSO when monitoring power flow or calculating the DOE including:</p> <ul style="list-style-type: none"> <li>• Understanding the requirements to facilitate market settlement.</li> <li>• Quantify market benefits to compare against costs.</li> </ul> <p><b>Outcome:</b> Aggregator NSS services have been validated just as well through AMI as with distribution transformer monitoring even when AMI saturation is not 100%.</p> <p><b>Lesson:</b> AMI including a subset of AMI is enough to validate services provided by an aggregator and provides the DSO with data that could be used for additional compliance monitoring activities (for example to infer non-compliance with some equipment standards).</p>
2	Visibility - DMO	<p><b>Benefit:</b> Project Symphony has tested both on-market and off market services</p> <p><b>Barrier:</b> Market services like ESS Contingency Raise require a higher degree of measurement than that of market services like CtZ.</p>	<p><b>Outcome:</b> Under the existing WEM rules the DSO and DMO will not have full visibility on how assets are performing. There is a threshold at which the DSO and DMO require visibility (at each NMI or at what facility size in MW) questions remain around the point at which off-market portfolio optimisation needs to be considered as a service itself in terms of net energy variations from baseline forecasts. That is, when does an 'optimised' customer behaviour become the new normal from a forecasting perspective.</p> <p><b>Lesson:</b> There needs to be a unified framework for the procurement of market services (see lack of alignment between AOS/NSS/NCESS drivers, processes and outcomes) and a clear transition pathway from existing processes to future arrangements.</p>



## RECOMMENDATIONS:

- ✓ Support VPP visibility for the DMO and DSO through implementing amendments to wholesale electricity market rules as required.
- ✓ Review and reform end to end DER installation, connection, commissioning and compliance processes.

## 6.2. Tariffs & Incentives

Project Symphony highlighted that battery storage does a lot of the “heavy lifting” (benefits) in facilitating value from DER participation. Currently, the installation of battery assets is significantly lagging PV installations due to the relatively high cost of home battery storage systems. The pilot identified that without a steady uptake of small-scale battery storage, DER orchestration will likely struggle to realise the required value.

## LESSONS:

No.	Subject / Topic	Barrier OR Benefit	Outcome and / or Lesson
1	Incentives	<b>Barrier:</b> The installation of battery assets is significantly lagging PV installations.	<p><b>Outcome:</b> The current flat rate tariff does not incentivise the acquisition and use of small-scale customer owned battery energy storage as part of VPPs.</p> <p><b>Lesson:</b> Based on value and efficiency for the energy system overall, an opportunity exists for utilities and/or government to better incentivise the adoption of certain DERs, home battery storage in particular, as coupled with a more cost reflective tariff.</p>

## RECOMMENDATIONS:

- ✓ Develop incentives to accelerate the take-up of energy storage, bringing forward power system and decarbonisation benefits.
- ✓ Introduce dynamic network connections to enable unconstrained connection of DER onto Western Power’s network to improve customer choice and flexibility whilst contributing to decarbonisation.
- ✓ Review and reform end to end DER installation, connection, commissioning and compliance processes.