AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

Project EDGE

May 2021

Lessons Learned Report #1

Important notice

PURPOSE

The purpose of this document is to provide an initial update to the Australian Renewable Energy Agency (ARENA) and the industry regarding progress and lessons learned to date on Project Energy Demand and Generation Exchange ('Project EDGE').

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VERSION CONTROL

Version	Release date	Changes
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ARENA summary

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Ref	Lessons Learned Report #1
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1. Background

1.1 Project EDGE overview

Project Energy Demand and Generation Exchange ('Project EDGE') will develop and test the concept of a Distributed Energy Resources (DER) Marketplace for DER services. Project EDGE is being undertaken by AEMO in partnership with AusNet Services ('AusNet') and Mondo, with funding from the Australian Renewable Energy Agency (ARENA).

The proof-of-concept DER Marketplace in Project EDGE aims to optimally facilitate DER participating at scale in the wholesale markets and delivering local network support services. This small-scale off-market[1] trial will take place in the Hume Region of Victoria, Australia, demonstrating the following key functions:

- Data exchange – providing a secure, efficient, and scalable way for data exchange between Project EDGE participants.
- Wholesale integration of DER – trialling how aggregated DER might participate with progressive sophistication in the NEM wholesale dispatch process and operate within distribution network limits.
- Delivery of local network services using aggregated DER to meet requirements set by the distribution network service provider (DNSP) – providing DER owners and aggregators the opportunity to deliver new value streams.
- Understanding and defining the customer value proposition that market aggregators can offer their customer by developing and testing incentives for DER owners (customers) that promote active market participation.

AEMO, AusNet, and Mondo have been working together to engage heavily with industry to define the research questions Project EDGE will seek to answer and shape the project's DER Marketplace design. This collaborative approach aims to provide purposeful insights for industry that may inform the future design of markets alongside other key areas of work including the Energy Security Board's (ESB's) Post 2025 electricity market design[2] initiatives.

A more detailed overview of Project EDGE, including its objectives and high-level research questions, can be found in the Project EDGE factsheet and March 2021 webinar (recording and slides) on AEMO's Project EDGE webpage[3].

1.2 Progression from Open Energy Networks

One of the conclusions of Open Energy Networks study (OpEN)[4] was that a hybrid (of the two-step tiered and single integrated platform framework models) is a pragmatic solution that required further definition and would benefit from further development and testing. Project EDGE was designed to provide that opportunity.

A key activity during Phase 1 of the project has been the collaborative high-level functional design of the Project EDGE DER marketplace between AEMO, AusNet, and Mondo. This effectively leverages the work done

[1] While the trial is 'off-market' in that it is not integrated with AEMO's market operation systems and settlements will be simulated only, consumers will be engaged and the function of delivering services through DER to meet the wholesale market and local network service needs will be done in real time.

[2] See https://esb-post2025-market-design.aemc.gov.au/.

[3] At https://aemo.com.au/en/initiatives/major-programs/nem-distributed-energy-resources-der-program/der-demonstrations/project-edge.

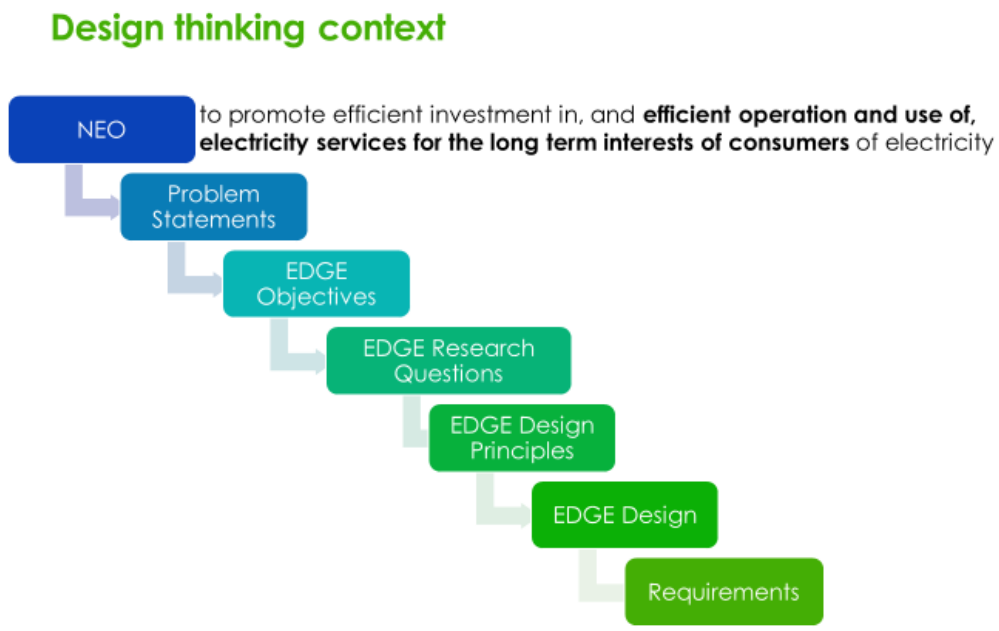
[4] Energy Networks Australia, Open Energy Networks, at https://www.energynetworks.com.au/projects/open-energy-networks/.

in OpEN and builds out the next layers of detail for a practical demonstration of a hybrid framework model that will produce evidence to inform key industry stakeholders and the regulatory reform process.

Key observations from the activities to date can be summarised as follows:

- The formulation of DER market operating models for testing requires a high degree of collaborative input from subject matter experts within the incumbent energy market operator (AEMO), DNSPs, and the managers of DER/market participants – in this case, represented by an aggregator. The process used was targeted virtual workshops with key representatives from each entity to work through the specific aspects that needed to be covered, for both the proposed wholesale energy market operating models and the local services exchange (including network services). From this work it was evident that the combined knowledge and expertise of all parties was necessary to adequately frame the design, and that all entities were able to expand their understanding of "adjacent" processes through the work.
- The up-front agreement on the design thinking to be applied in Project EDGE, shown in Figure 1 as a cascade, starts with the National Electricity Objective.

Figure 1 Project EDGE design thinking



- This will be explored further in future knowledge sharing reports that outline Project EDGE's research plan, but the definition of principles to guide the design of the DER Marketplace was helpful in decision-making and served as foundational reference points.
- The Hybrid model framework enables multiple operating models to be tested (primarily because of the flexibility in interactions between the DNSP, the market operator, and the aggregators) as well as the shared nature of the data exchange platform. These proposed operating models range from the relatively simple through to the more complex, which in turn should provide valuable comparable evidence for future market design.

1.3 Purpose of this report

This report provides an overview of the challenges, learnings and new practices being implemented from inception through to completion of milestone one. These lessons are the result of collaborations with industry, knowledge sharing through the design process, and new ways of working remotely through challenging times. Future reports will be combined into Knowledge Sharing Reports aligned to the knowledge sharing plan outlined in Section 3.

2. Lessons learned

2.1 Effectively collaborating under remote working conditions

Mandatory restrictions put in place to deal with the Covid-19 pandemic have eliminated the possibility of face-to-face meetings for most of Project EDGE so far, limiting the ability to use face-to-face workshops between the three project partners to anchor the lengthy and technically complex design discussions.

Project design, milestone planning, and technical specifications are traditionally developed through such collaborative workshops in a single location, requiring all contributing parties to attend with ideas debated through whiteboard discussions.

However, a willingness across all partners to uplift virtual workshop capability across the teams quickly mitigated this issue. Some of the benefits of the virtual nature of the workshops was the ease with which a large number of participants could join sessions, stepping in and out as required to manage conflicting priorities, and joining only for sections relevant to their area of expertise, resulting in more efficient use of time.

It also identified the need to set individual leads on key tasks to manage a small group of subject matter experts (traditionally done in workshop settings by physically grouping attendees and assigning a lead) to develop options and provide recommendations and rationale behind detailed design decisions for broader group endorsement.

The outcomes of managing the challenges of virtual environments, with the willingness from all project partners to proactively develop the design, was an agreed high-level DER Marketplace design informing the requirements of the technology vendor tender process. The project partners also held ongoing deep dives into the minimum viable product capability and function sets that will further inform the marketplace design upon selection of technology vendors.

Outside of these workshops, the daily interactions and face-to-face meetings that would normally be used to build rapport, trust and common understandings were unavailable to the team due to Covid-19 restrictions.

In response, the teams worked on enhancing the virtual opportunities made available – video switched on during calls was largely a pre-requisite. A shared commitment to remaining present throughout meetings and actively utilising digital collaboration tools such as Mural, Miro, and Microsoft Teams made remote working much more efficient and effective.

The Project EDGE team has identified that digital tools were highly effective at gathering input across large groups of people and collating into meaningful outputs for the high-level design. Digital tools will continue to be used as an essential component to the ongoing success of Project EDGE, but the detailed design phase is expected to require even more collaboration and debate, for which some face-to-face interactions and workshops may be preferable (if possible).

2.2 Project design collaboration

As a collaborative project, the design of the DER Marketplace (including associated technology solutions, interactions between parties, and services to be tested) was informed by requirements/input from all project participants captured in the design thinking cascade outlined above. The final element of that cascade resulted in each project partner developing detailed requirements to facilitate its role in the DER Marketplace. The inter-related nature of these requirements highlights the importance of effective collaboration between the project partners when developing them.

Having common goals and alignment has been key to supporting the positive and collaborative relationship between partners, fostering a solution-oriented approach to resolving challenges that have arisen throughout the design process.

Furthermore, Project EDGE's objective of delivering best practice stakeholder engagement saw wide consultation with industry from the project's outset on the outcomes, high-level design, and case studies to be trialled through the project.

Broader industry stakeholder engagement

To align to the objective of stakeholder engagement best practice, AEMO, AusNet, and Mondo sought to engage with a broad range of stakeholders from project inception to keep them informed and gain insights, feedback and input into the design of services, scenarios and capabilities to be tested in Project EDGE.

These stakeholders are:

- Network businesses.
- Market bodies.
- Consumer groups.
- Aggregators and retailers.
- Industry experts.

The outcome of early engagement has been enhancements to the project design and understanding of what case studies need to be undertaken as part of Project EDGE to best inform future marketplace requirements, frameworks, and regulatory changes. These activities have also given stakeholders an understanding of Project EDGE's vision to enable efficient integration of DER into wholesale markets and provide access to local network services within distribution network constraints.

Another benefit of early engagement has been to identify gaps in understanding, potential misconceptions of the project, and areas where information is complex or not relevant. This has informed communication strategies and material and provided opportunities to bring all stakeholders to the same level of understanding.

2.3 Stakeholder forums

The project has already established four key stakeholder forums:

- DER Demonstrations Insights Forum.
- Network Advisory Group.
- DER Market Integration Consultative Forum.
- Consumer Advisory Group.

A full overview and terms of reference for these forums are available on AEMO's industry working group webpage[5], with a high-level summary provided below. It is important to note that while input and feedback is captured from each forum, decision-making on the project lies solely with the project's Steering Committee.

The project partners also seek to use existing forums and working groups, and set ad hoc webinars, to support industry and consumer engagement and knowledge sharing.

As the project progresses, forums will seek to accommodate the discussion required to maximise the outcomes of the project. This may mean introducing additional forums to facilitate items such as broader consumer awareness, data exchange requirements, and technical knowledge sharing. These will be established as required.

[5] At https://aemo.com.au/consultations/industry-forums-and-working-groups/list-of-industry-forums-and-working-groups/der-micf

DER Demonstrations Insights Forum (DIF)

This forum was established by AEMO to provide a critical link between the evidence developed and the regulatory reform process by engaging a focused panel of industry experts for feedback on project design, implementation, research questions, and outputs.

During these sessions it was identified that:

- The technical nature of the content discussed resulted in misunderstanding and challenges for comprehension of materials presented. The forum therefore provided an opportunity to gain feedback on areas of ambiguity and clarify these, as well as inform the information and design of factsheets and diagrams. The forum will be used ongoing to discuss the best method to achieve clear understanding of technical concepts and diagrams.
- In relation to diagrams and infographics, the DIF stakeholders suggested that existing diagrams and descriptions did not fully represent Project EDGE, the key functions being examined, and the role of each partner. The project team was able to use this information to adapt the diagrams, information, and communication materials to improve representation of the DER marketplace being tested in Project EDGE and its consistency with the hybrid model explored in the OpEN process.
- Varying stakeholder priorities and views made it difficult to achieve and maintain alignment around project design. While the extent of the divergent views was not apparent initially, this forum helped identify which concepts were contested. The project team approached discussions on such topics openly, allowing input and varying positions to be put forward so the group could converge on a more considered direction for the project.
- The design of approaches to test how virtual power plants (VPPs) could participate in the energy market dispatch process highlighted the need to incorporate an additional test model. This feedback resulted in an additional 'first step' approach being incorporated into the design, in which VPPs only provide visibility through forecasts and/or near real-time telemetry, but do not submit bids/offers into the dispatch process.

Network Advisory Group (NAG)

The NAG is led by AusNet and facilitates feedback on distribution network service-specific design aspects of the project, such as how operating envelopes should be calculated from distribution businesses.

The focus of the NAG meetings during the reporting period has covered:

- An industry-centric introduction to Project EDGE.
- The proposed operating envelope calculation and allocation methods for testing.
- The high-level design of the wholesale energy market operating models to test, with special focus on the role of the DNSP/distribution system operator (DSO) in those models.
- An overview of the proposed local services exchange process for network services.

To date, the NAG discussions have highlighted the following:

- The operating envelope (OE) design is perceived to be a key industry consideration (sensing, analytics, telemetry, fairness, bi-direction, value released).
- There is a high level of DNSP interest in the market operating models to be tested.
- The importance placed on the specific operational scenarios, and on the definition of local services, how to value the services, and how to evaluate performance.
- There is strong interest in the DER-Network-Market optimisation area – the who/what/how pertaining to the functions.

- NAG members indicated that an OE allocation method based on fairness is likely to be most accepted, although all three proposed methodologies in the trial were supported, with varying priorities.
- Having a fail-safe mechanism for active DER operation (when things go wrong) was a perceived requirement, as well as a means to manage performance compliance.
- Consideration should be given to having more than one allocation method under different operational arrangements (for example, system security related, and network reliability).
- Multiple trading relationships/different measurement points and their impact on operating envelopes was briefly explored, and this needs further consideration.
- Further thought needs to be given as to how unused capacity is to be treated after aggregator decisions are made.

Through this forum, stakeholders have had the opportunity to provide input and agree on the scope of the project in relation to network-related inclusions. This increases the validity of the project and will better inform industry and future market development.

Furthermore, the project partners clearly understand the expectations of DNSPs and can incorporate this feedback into the design of the research plan and outputs. The NAG has identified the following desired inclusions of the project:

- A 'base case' with rudimentary operating envelopes.
- Consideration on how network pricing and tariffs shape active DER behaviour.
- Provision of an evidence base that shows progressive information from a simplistic to more sophisticated operating model.
- An assessment of the impact of network-side levers on the DER marketplace.

The importance of this feedback loop will be prominent throughout the project, providing opportunities to assess the project direction and consider further opportunities for concepts to be tested in line with the rapidly changing energy environment.

DER Market Integration Consultative Forum (MICF)

Transitioning from AEMO's existing VPP Demonstrations FAQ working group, this aggregator- and retailer-focused forum engages with aggregators, retailers, and stakeholders directly impacting or impacted by DER integration into markets. It gives them an opportunity to stay informed, provide feedback on the market mechanisms supporting DER participation, and ask questions specific to Project EDGE.

The forum has highlighted the importance of engaging with aggregators and retailers early, providing this opportunity for stakeholders to obtain information from the outset and prepare for upcoming opportunities to engage and participate. The outcomes of Project EDGE directly impact future opportunities for aggregators and retailers. As such, gaining their input, understanding their questions and feedback, and sharing knowledge with this group will influence the overall effectiveness of the project.

To date, the following has been identified through the MICF:

- Aggregators are the key point of contact with consumers. Ensuring they have accurate information available influences their ability to communicate with end consumers and drive innovation in the development of products and services.
- The aggregator market is still in early stages, with a significant proportion of new entrants unfamiliar with the energy market and systems. Running such forums for the benefit of this emerging market promotes uplift and enhances capability.
- Project EDGE has already captured the attention of these stakeholders with five aggregators expressing interest in participating, to uplift their own capabilities and conduct research and development into the types of products and services that consumers would engage with.

As the project progresses, feedback from this forum will be key to ensure the marketplace developed is accessible and designed to increase competitive opportunities.

Consumer Advisory Group (CAG)

Mondo is leading consumer engagement in the Hume region, and leads this forum to engage with community groups and customer representatives from the area. The CAG sessions are designed to provide an opportunity for the project to understand the views, requirements, and concerns of the residential and commercial consumers, in the context of their DER investments and potential benefits from participating in this market trial and potential future implementations of similar market arrangements.

Further observations and learnings from the first two CAG meetings and customer engagement activities are noted below:

- The community groups approach by the Mondo team are highly receptive to the program and show a high degree of interest in being involved in the trials.
- The CAG forum sessions have shown that there are gaps in the community's understanding of how the current electricity market arrangements work. Questions such as "Why are feed-in tariffs lower than what we pay retailers for electricity?" suggest there is further work to do in educating consumer groups to allow them to make better choices and support worthwhile future initiatives.
- It was observed that the community forums need to be actively facilitated to encourage more interactive engagement. The value derived from the forums may be impacted if the format defaults to a "presentation" mode where the Project EDGE customer teams are engaged in a monologue rather than a dialogue with community. The Mondo teams will be seeking to provide more structure and share relevant material with the groups sufficiently in advance of future sessions to further maximise the contributions from the consumer and community groups with which the project team engages.
- Further review of the engagement with commercial and industrial (C&I) customers has been suggested from the forums held thus far. The effective channels for engagement with that group may be materially different to those which work for the residential customers. Where C&I customers are represented by intermediaries at the forums, the facilitating team will need to carefully draw out the needs and concerns of the C&I end customers versus that of the intermediaries alone.

Project EDGE also intends to provide regular (quarterly) updates to AEMO's Consumer Forum, through which AEMO has fostered a partnership to exchange information with consumer advocacy groups on various aspects of AEMO's work program.

2.3.1 General challenges and achievements

The stakeholder forums have used the skillset and expertise of each of the project partners to maximise the value of such forums to stakeholders. They have provided opportunities for industry to provide preliminary feedback into the design of the wholesale market and local network services, the data exchange requirements, and the roles and responsibilities of each of the actors (AEMO, DNSP/DSO, aggregator).

In addition to the specific challenges and opportunities gained through each of the established forums, more broadly the aspect of virtual meetings has enhanced the ability for a diverse and dispersed set of stakeholders to engage actively in the conversation, with less emphasis on the physical location and attendance in person. While gauging sentiment via non-verbal cues has been challenging, the use of virtual tools, persistence from facilitators, and the establishment of a clear set of etiquette guidelines and expectations for each forum have resulted in productive discussions that will continue to inform the direction of Project EDGE. Virtual forums will remain the primary form of interaction throughout the project to ensure equal opportunity for participation, and the learnings obtained on using virtual tools to facilitate interaction will continue to be of use.

2.3.2 Future engagement opportunities

As the project progresses, further engagements with industry will take place. A consumer engagement forum led by Energy Consumers Australia will also be established, which the project will seek to leverage to obtain feedback from a broader consumer representative group.

Additionally, a data exchange working group will be established (or the project will engage with existing data exchange focused industry forums) to further unpack the data exchange requirements and recommendations for Project EDGE to test via its marketplace platform.

To register interest in the forums established to date, or future forums, contact EDGE@aemo.com.au with information on the forums you are seeking to participate in, and how you would like to contribute.

2.4 Collaboration and interaction with complementary projects

The evolution of the Australian electricity grid is one of the foremost priorities of the energy industry. As such, there are many DER integration-related projects taking place across a range of organisations. Key to maximising the outcomes from Project EDGE is leveraging adjacent work being done in other projects. During Phase 1 there have been several opportunities to engage with other projects so collective industry investment and knowledge can be utilised more efficiently.

Throughout the project, the Project EDGE team will collaboratively work with and monitor the outcomes from the following projects.

Project Evolve DER

The Evolve DER project also has a focus on operating envelope design, so the principal engagement between Project EDGE and Evolve DER has centred on this aspect. Several collaborative sessions were held to share the concepts and approaches that are being adopted, so similar learnings from the adjacent projects would not be repeated, and to achieve value from the different techniques and methodologies being tested. This mutual engagement extended to include presentations to the Networks Advisory Group within Project EDGE.

Key differences across the two projects relate to the digital architecture, the data calculation engine for the operating envelopes, and the allocation methodologies to be tested (also aligned with market operating models in Project EDGE).

The use of smart meter measurement data is proposed in both projects, however the Victorian case tested in Project EDGE will provide additional learnings, consistent with a very high penetration of meters in the Victorian network.

SA Power Networks (SAPN) Flexible PV Exports project

The SAPN-led Flexible PV Exports project is another adjacent initiative which is being leveraged in Project EDGE. As much of the technical design work overlaps, some of the AusNet activities have been able to be combined or integrated for mutual efficiency and to provide a pathway for enhancement of the dynamic PV export limit determination over time. This particularly relates to the customer load/generation forecasting analytics and the generation side of the operating envelope determination.

A key learning here is the need to adequately test and evaluate simple or rudimentary analytical concepts (such as in the Flexible PV Exports project) before moving on to trial more advanced techniques in the latter stages of Project EDGE.

Engagements with the WA DER roadmap and related projects

Early engagement with the Western Australian DER Roadmap and related projects during the reporting period included sharing of proposed design information which is actively encouraging and enlarging the collective scope for learnings from market-related projects.

Dynamic EV Charging

Aspects of the Jemena-led Dynamic EV Charging project design in AusNet Services are leveraging the work being undertaken in Project EDGE, particularly the transformer monitoring and forecasting analytics. As the project progresses, there will be ongoing two-way communication to provide updates and further information on findings across both projects.

AEMO VPP Demonstrations

The VPP Demonstrations provided valuable learnings that are relevant to and are being built upon in Project EDGE, such as:

- The value of near real-time data to observe the responsiveness of VPPs to energy spot prices.
- The advantages/disadvantages of exchanging such data over APIs via public internet.
- The ability of VPPs to value stack by responding to energy spot price signals, delivering contingency frequency control ancillary services (FCAS) and (in specific circumstances) delivering local network support services.
- Cyber security considerations for VPPs and distribution level data exchange.

2.5 Technology development and procurements

The nature of Project EDGE is such that new technology and platforms are required to be built or procured to facilitate the sharing of data and management of DER within the operating envelopes set out by the DSO. Both AEMO and AusNet sought to procure the required software and platform development over in-house builds to leverage the expertise and growing capability in the market.

2.5.1 AusNet Services – DER management system procurement

A key activity during Phase 1 of Project EDGE was the procurement of a suitable DER management system (DERMS) software product for the trial and as a tactical solution for BAU needs within the business until a more strategic capability is operationalised.

The key learnings and observations relating to this activity are as follows.

International product suitability to Australia's unique environment

Network-related (as opposed to customer-related) DERMS products developed overseas appear to have primarily been designed to suit vertically integrated utilities with a "command and control" functionality rather than a publish-subscribe "operating envelope" type of model. As such, it was found that none of the international DSO/DERMS product offerings could be directly applied into the Australian disaggregated, contestable market context without a measure of adaption.

This being the case, a project of this sort presented commercial opportunities for vendors to design for this ecosystem and thus position themselves to access a vibrant emerging market with their products.

Emerging nature of DERMS market

The network-related DERMS vendor marketplace remains in its infancy. AusNet observed that the larger, more established enterprise system vendors were developing product in alignment with a broader corporate roadmap, in which DER management is one of many product features being prioritised. In contrast, smaller niche-market vendors appeared to have more mature product in the space, presumably because of their dedicated focus and adaptive ability, however these products typically need to be integrated into other enterprise environments.

Future proofing within a trial setting

A key consideration for AusNet in this procurement was how to align the trial/pilot activities with incumbent enterprise systems and strategic product/system renewal and enhancement activities that are part of the

proposed new regulatory period expenditure. The approach that was taken, recognising the high degree of uncertainty that exists in the DER marketplace, was to prioritise agility and adaptiveness in the DERMS product being procured and in the design solution, so a minimum-viable-product could be realised, minimising technical debt and at the same time providing a tactical capability that could be operationalised to service business-as-usual (BAU) needs in the short to medium term.

In addition to the learning gained, it is hoped that this approach will create future option value when the surrounding enterprise systems are renewed.

Alignment with technical standards

Although technical standards were called out in the procurement process, it is recognised that there will need to be some adaption or further development to suit the local environment and the trial functions (i.e. operating envelope centric communication). It is anticipated that the use/adoption of industry standards within the project will be matched with the implementation risk and the practicalities/cost impact.

2.5.2 AEMO – EDGE marketplace platform procurement

A critical component of the early phase of Project EDGE is the procurement of a technology solution to facilitate the DER Marketplace that, at a very high level, has three core function sets:

- Data exchange – to facilitate efficient, secure, and scalable exchange of data between participants connected to the EDGE Marketplace.
- Wholesale integration – to facilitate DER aggregator participation in the wholesale dispatch process (in an off-market setting) with various levels of sophistication, but always within the secure limits of the distribution network.
- Local Services Exchange – to facilitate the interactions between DNSPs and aggregators relating to the trade of local network services.

AEMO will announce the outcome of the ongoing procurement process once it is complete, but the key learnings and observations so far relating to this activity are as follows.

Project EDGE is internationally unique

There is no existing product that meets all high-level requirements for the DER Marketplace, so Project EDGE is at the leading edge of product development in this space. AEMO sought proposals from various domestic and international technology vendors with experience in delivering previous projects related to the objectives/requirements of Project EDGE.

Aligning with technical standards where possible

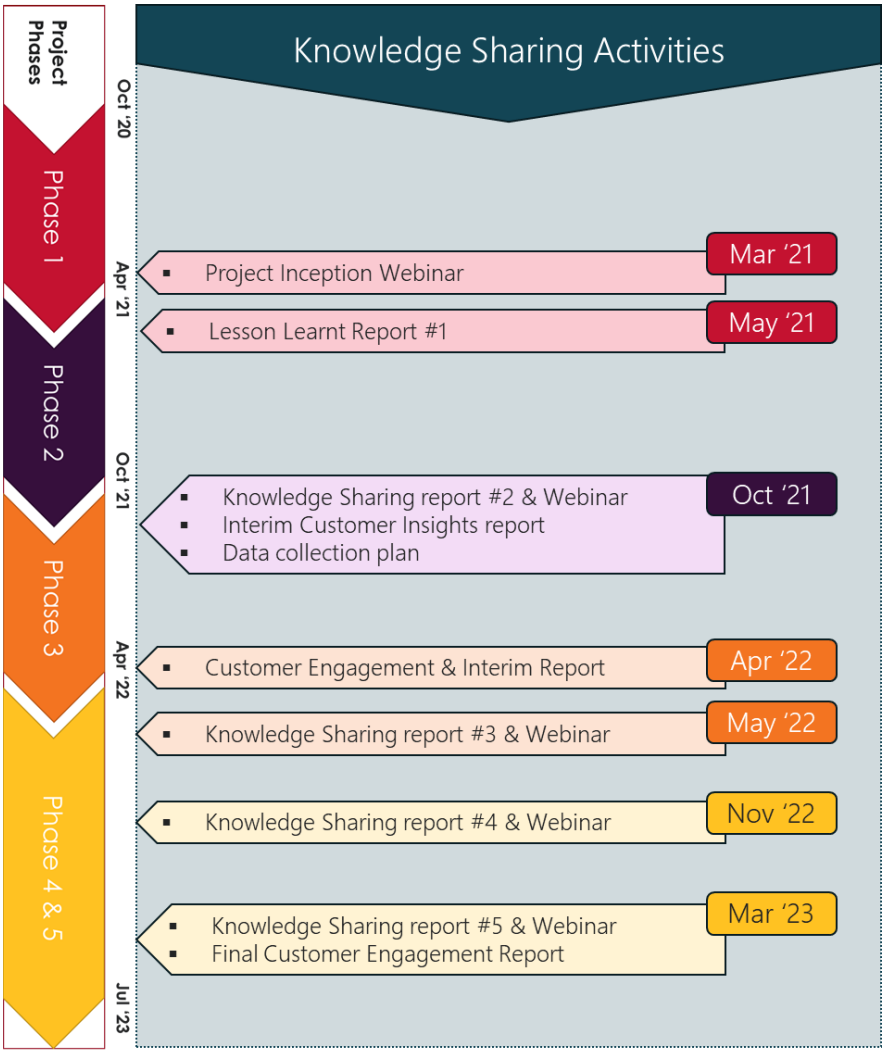
AEMO has learned similar lessons to AusNet on the alignment to existing technical standards, specifically for data exchange protocols from market operator to market participants and data models used. Through detailed design and engagement with the incoming data exchange working group, AEMO has learned there will be a need to assess the cost/learning trade-off of strict compliance within the project. Project EDGE aims to align with existing standards where possible and inform where these standards are not adequate for a data exchange platform in the NEM or where they impose unnecessary costs of compliance on potential aggregators.

3. Knowledge sharing

The primary purpose of demonstrations and trials are to provide fact-based evidence on the functionality, capabilities, and regulatory changes required to facilitate DER integration at scale. Project EDGE is seeking to provide industry with regular updates on the learnings and knowledge gained throughout the lifetime of this demonstration. This information will be communicated through knowledge sharing reports and webinars, and regular project communications/website publications.

Figure 2 provides indicative dates for knowledge sharing deliverables, aligned with the project's key milestones.

Figure 2 Knowledge sharing deliverables aligned to project phases



AEMO, AusNet, and Mondo will also participate in industry forums and events – both nationally and internationally – to provide insights on key learnings and outcomes from the project.

3.1 Avenues for knowledge sharing

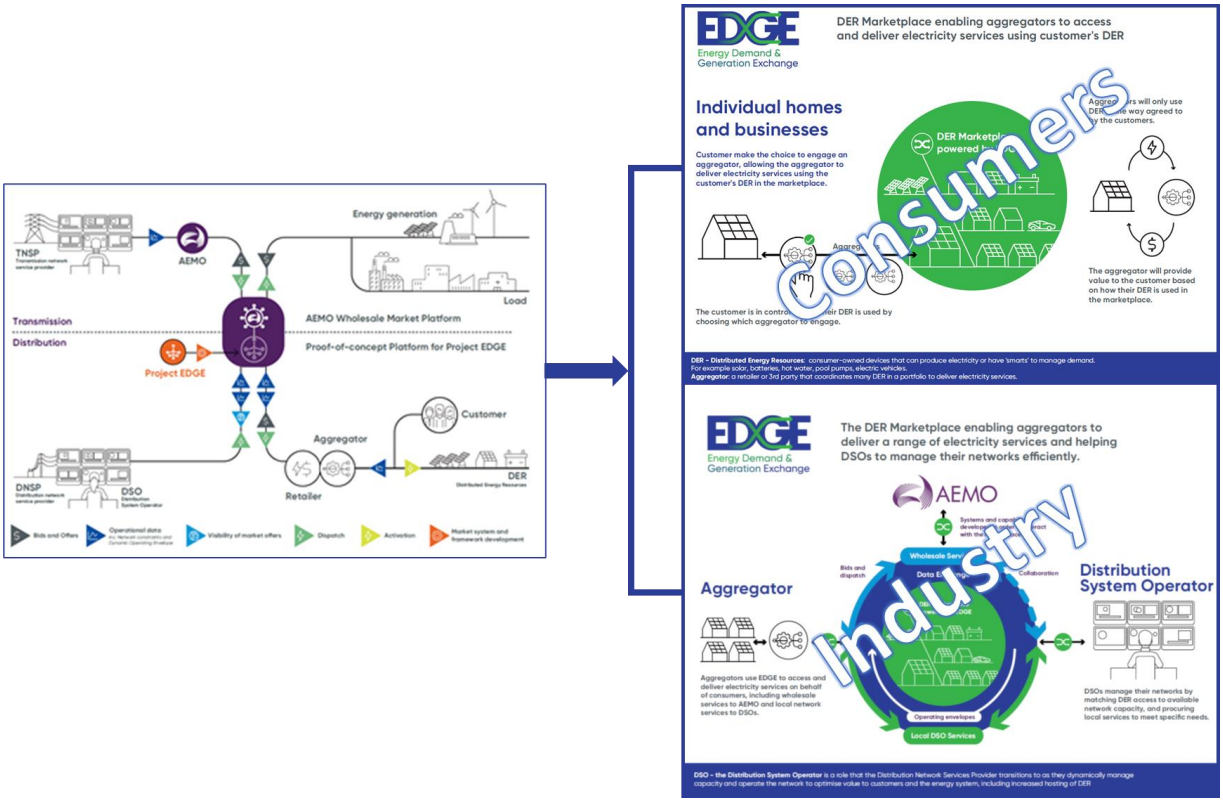
3.1.1 Project communications

ARENA and AEMO launched Project EDGE on 2 December 2020[6], with media releases and the launch of dedicated web pages by both AEMO and Mondo. Communications have largely focused on providing overviews of the project design, objectives, and opportunities for engagement. This has provided industry with significant insights into what the project will achieve and the opportunity to register for ongoing updates.

It was found in the initial stages, via stakeholder engagement activities, that terms and diagrams used in Project EDGE communications needed additional context and explanation. Using feedback from stakeholders, the partners have clarified terms and given additional context where jargon is being used, uplifting the understanding of the broader audience.

Figure 3 shows the evolution of diagrams used in Project EDGE to address the needs of specific audiences and remove confusion raised by stakeholders at the start of the project. A third version of the new diagrams will be developed for a subject matter expert audience, to show the DER Marketplace at a functional view and clearly articulate roles and responsibilities for each function.

Figure 3 Transition from complex, technical diagram to consumer- and industry-specific diagrams showing clear roles, responsibilities and interactions



As Project EDGE continues, AEMO, AusNet and Mondo will continue to obtain feedback from stakeholders on communications to ensure understanding and clarity are continuously improved.

[6] ARENA media release available at https://arena.gov.au/news/distributed-energy-marketplace-trial-giving-consumers-an-edge/.

3.1.2 Launch webinar

AEMO, AusNet, and Mondo held a joint webinar[7] on 25 March 2021 to communicate the purpose, objectives and design of Project EDGE to interested stakeholders. The webinar reached a broad audience from the industry, universities and research institutions, consumer representatives, and the general interested public, and as such was intended to remain high-level and easy to understand.

Stakeholders were highly engaged, with questions asked ranging across the themes of:

- Consumer benefit, impact and equity.
- How DER will participate including challenges with growing participation.
- How DER will operate within operating envelopes and how such limits will be managed.
- How the marketplace platform will operate and AEMO's role in managing this.
- How to get involved or participate in the project.

Such questions have provided valuable insights into the areas where potential gaps in knowledge or information exist and will be addressed throughout the project through various means including an FAQ, factsheets, and further information on the project website[8].

3.2 Knowledge sharing plan

A summary of the main knowledge sharing deliverables that will be shared publicly and anticipated topics is provided in Table 1 below. AEMO, AusNet, and Mondo will incorporate stakeholder feedback throughout the project to ensure knowledge sharing deliverables are as relevant as possible.

Table 1 Overview of primary knowledge sharing deliverables for Project EDGE

Deliverable	Phase	Purpose / Anticipated topics
Project Inception Webinar	1	Introduce Project EDGE to industry
Lessons Learned Reports	All	To share lessons, challenges, solutions and opportunities for the following topics as applicable: • Project objectives, challenges experienced and how these were overcome • Technical, regulatory/legal, financial/ economic, social/ consumer lessons • System design and operations • Data collection, access, storage, sharing, validation, usage, integration, privacy and cybersecurity • Industry stakeholder engagement, consultation, outcomes, and impact • Customer engagement, consultation, Study outcomes and impact
Data collection and sharing plan	2	To share project approach to collecting relevant data and securely publishing data at an aggregated level in a way that is publicly accessible and shareable. Topics may include: • Methods for identification of relevant data, details on how data, including sensitive data, will be managed and shared • How relevant data will be made available to policy and research institutions • API specifications and data protocols used in Project EDGE, with reference to relevant industry standards development work as required

[7] Webinar is available at Project EDGE website

[8] At https://aemo.com.au/initiatives/major-programs/nem-distributed-energy-resources-der-program/der-demonstrations/project-edge

Deliverable	Phase	Purpose / Anticipated topics
Public Customer Insights and Engagement Study Report and Webinar	2 (Interim) 5 (Final)	Share key insights, findings and lessons learned on the Customer Insights Study activity undertaken during the Project. Topics may include: • Study methodologies employed, including methods used for building customer energy literacy • Customer journey • Customer personas observed • Findings on customer attitudes, values, motivators, barriers, willingness to participate, demonstrated education, understanding and behaviours • Customer value propositions and business model on how revenue is distributed across the parties involved • Direct customer feedback • Lessons on the Study itself: successes, challenges, opportunities and gaps
Public Findings Report and Webinar	2 (Interim) 5 (Final)	To share key insights, findings and lessons learnt on the Project. Topics may include: • Existing knowledge and information from Market Operators and DSOs that informed the Project • Approach development of platform/systems/capability for each project partner • Interoperability and communications between market participants and impacts on interfacing stakeholders (such as original equipment manufacturers [OEMs]) • Projected outcomes for the scale up of the DER marketplace • Insights on requirements for regulatory or operational arrangements affecting market participation of VPPs • Information to support broader industry learnings, impacts on industry • Market Operator Chapter: – Explanation of how the market operator platform will remain neutral for prospective participants – Defined and documented Marketplace design including interactions and interdependencies between Project Participants – Description of the Marketplace trial capabilities, including system operations, market operation, aggregation platforms – Interaction between Local and wholesale bids within a constrained distribution grid – Analysis on regulatory impacts and changes (e.g. regulatory changes needed to enable full access to DER capability and incentivise DER ownership) – Assessment of the potential impact on the NEM system operations to facilitate DER market participation – Assessment of the replicability of the market design in other locations and jurisdictions (e.g. the WEM) – Identification of the characteristics for the most prospective options (e.g. cost-effectiveness, practicability, durability, stakeholder acceptability, etc) of electricity supply system for different sectors of energy users (e.g. residential -C&I -energy-intensive industry) • DSO Chapter: – Approach and findings in relation to operating envelope model(s) tested – Definitions, approaches and findings of DER services tested – Data collection, access, storage, sharing, validation, usage, integration, privacy and cybersecurity • Aggregator Chapter:

Deliverable	Phase	Purpose / Anticipated topics
		– Use of monitoring and management systems to provide real-time data and control capability – Findings on coordination with market participants to structure and submit market bids into the wholesale market, develop forecasts, manage dispatch and compliance of DER to dispatch instructions • Cost Benefit Analysis (CBA) Chapter: – Detailed methodology, with consideration of existing regulatory framework and CBA frameworks – Description of financial money flows, and roles/responsibilities of participant, including governance and operational revenue model for a DER marketplace – Pricing information for transparency and market development purposes (subject to confidentiality and commercial sensitivity constraints) – Understanding on how the flow of costs and revenue informs future design decisions and the future of DER integration – Economic assessment of: ○ Benefits for the coordination and optimisation of DER/DR technology services ○ Incentives to customers for greater DER/DR uptake and increased energy productivity ○ Benefits of greater visibility, predictability and control for AEMO and network operators (e.g. reduced regulation requirements, enhanced reliability) – Assessment of the economic efficiency of the designed market and service options understanding of the commercial opportunity of the DER Marketplace and quantification of the overall Cost Benefit Analysis.

3.3 National and international knowledge sharing activities

As part of best practice stakeholder engagement, the project seeks to engage both nationally and internationally providing insights and opportunities for feedback from both those within the Australian market, and those experiencing similar challenges overseas. It is internationally recognised that Australia is at the forefront of many of the challenges facing power systems with high and increasing levels of DER. AEMO, AusNet and Mondo are committed to sharing knowledge and have completed the following to date:

Table 2 National and international knowledge sharing activities since project inception

Event	Date
National forums	
Australian Energy Regulator private briefing	17 February 2021
Project Launch – Public Webinar	25 March 2021
Energy Networks Australia Strategy and Policy Committee private briefing	29 March 2021
AEMO Consumer Forum	5 May 2021
Energy Network Australia Asset Management Committee private briefing	13 May 2021
International forums	
World Bank Forum	5 March 2021

Event	Date
ESB Networks (Ireland) knowledge sharing sessions	April and May 2021
Canadian Renewable Energy Association – Spring Forum	29 April 2021
Hawaiian Electric Company knowledge sharing session	30 April 2021

Throughout the project, more opportunities will be sought to share outcomes nationally and internationally, and to consider the unique environments globally that may inform activities undertaken locally.

4. Next steps

Project EDGE has entered Phase 2, which primarily focuses on establishing the marketplace minimum viable product (MVP) in preparation for DER to commence delivering wholesale and local network services and required data exchange infrastructure.

A knowledge sharing consultant will be engaged. The project's research plan including research questions and data collection plan will be established with industry input. These artefacts will be addressed in future knowledge sharing reports.

To deliver on the cost benefit analysis (CBA), AEMO will engage an independent consultant to develop a CBA methodology, deliver analysis, and present these findings as part of the interim and final knowledge sharing reports.

For further information on the project, or to get involved, contact EDGE@aemo.com.au or visit:

- AEMO's Project EDGE web page, at https://aemo.com.au/en/initiatives/major-programs/nem-distributed-energy-resources-der-program/der-demonstrations/project-edge
- Mondo's Project EDGE web page, at https://mondo.com.au/edge .