Networks Advisory Group
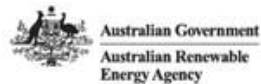## Meeting 17 Briefing Information

Tuesday 13 December 2022 | 1:30pm – 3:00pm ADST

Agenda

Item	Lead	Timing
Welcome, Acknowledgement of Country and Safety Moment	John Theunissen	5 min
EDGE Project update	John Theunissen	10 min
Overview of EDGE workstreams being supported by EY and some preliminary findings	Fredy Mejia	40 min
Overview of EDGE Lessons Learnt #2 Report	John Theunissen and Anoop Nambiar	30 min
Wrap up and look-ahead	John Theunissen	5 min

Acknowledgment of Country

We acknowledge the Traditional Owners of country throughout Australia and recognise their continuing connection to land, waters and culture.

We pay our respects to their Elders past, present and emerging.

Safety moment

Safety item | Safety tips as you head towards the holidays

EDGE

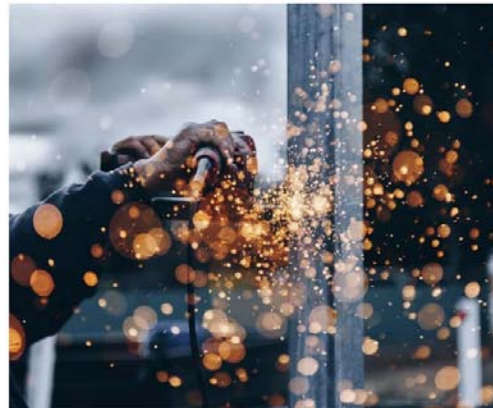**STAYSAFE #1**

Slow down and plan

With your social calendar filled, it's important to plan the next few weeks, making sure you have enough time available.

STAYSAFE #2

Wear your PPE

Even if you're in a hurry, don't forget your personal protective equipment.

STAYSAFE #3

Avoid shortcuts

It's the busy time of the year, pressure is on to get things done. Take your time to stay safe.

https://www.safetydimensions.com.au/stay-safe-christmas-lead-up/

STAYSAFE #4

Ask for help

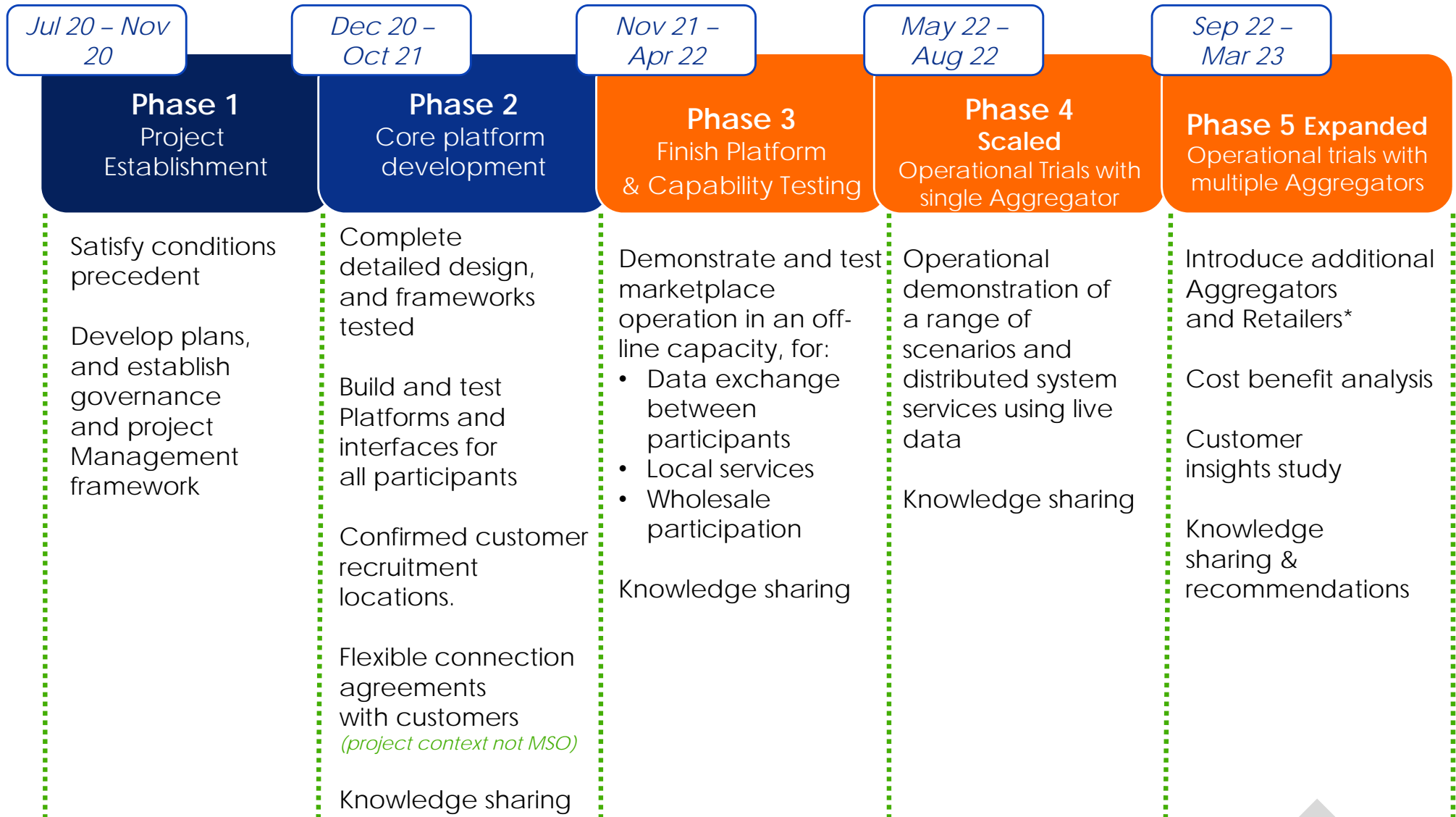If you need help, ask for it. It's better to get help than to get hurt at work.

STAYSAFE #5

Help each other

Help each other, especially because everyone's busy rushing to finish things off.

EDGE Project update

Project Update | Program view

Jul 20 – Nov 20	*Dec 20 – Oct 21*	*Nov 21 – Apr 22*	*May 22 – Aug 22*	*Sep 22 – Mar 23*
Phase 1 Project Establishment	**Phase 2** Core platform development	**Phase 3** Finish Platform & Capability Testing	**Phase 4** **Scaled** Operational Trials with single Aggregator	**Phase 5 Expanded** Operational trials with multiple Aggregators

Phase 1

Satisfy conditions precedent

Develop plans, and establish governance and project Management framework

Phase 2

Complete detailed design, and frameworks tested

Build and test Platforms and interfaces for all participants

Confirmed customer recruitment locations.

Flexible connection agreements with customers
(project context not MSO)

Knowledge sharing

Phase 3

Demonstrate and test marketplace operation in an off-line capacity, for:
• Data exchange between participants
• Local services
• Wholesale participation

Knowledge sharing

Phase 4

Operational demonstration of a range of scenarios and distributed system services using live data

Knowledge sharing

Phase 5

Introduce additional Aggregators and Retailers*

Cost benefit analysis

Customer insights study

Knowledge sharing & recommendations

We are here

Project Update | M4 Complete, working towards M5

Project Management

D5.1 Provision of a Milestone Report

31 March 2023 🟢

D5.3 Provision of an updated Project Plan and material updates to other plans

31 March 2023 🟢

Trial Platform Development and Testing

D5.4 Evidence of successful operation of key Marketplace components

31 March 2023 🟢

D5.5 Provision of completed Phase 5 test plan, which is endorsed by the Steering Committee

31 March 2023 🟢

Customer Acquisition

D5.2 Confirmation of the addition of at least 200 residential customers and 30 business customers participating in the Project

31 March 2023 🟠

Stakeholder Engagement, Knowledge Sharing and Cost Benefit Analysis

D5.6 Provision of completed CBA for Phase 5, which is endorsed by the Steering Committee

31 March 2023 🟢

D5.7 Consideration of the feedback of the stakeholder engagement and community

31 March 2023 🟢

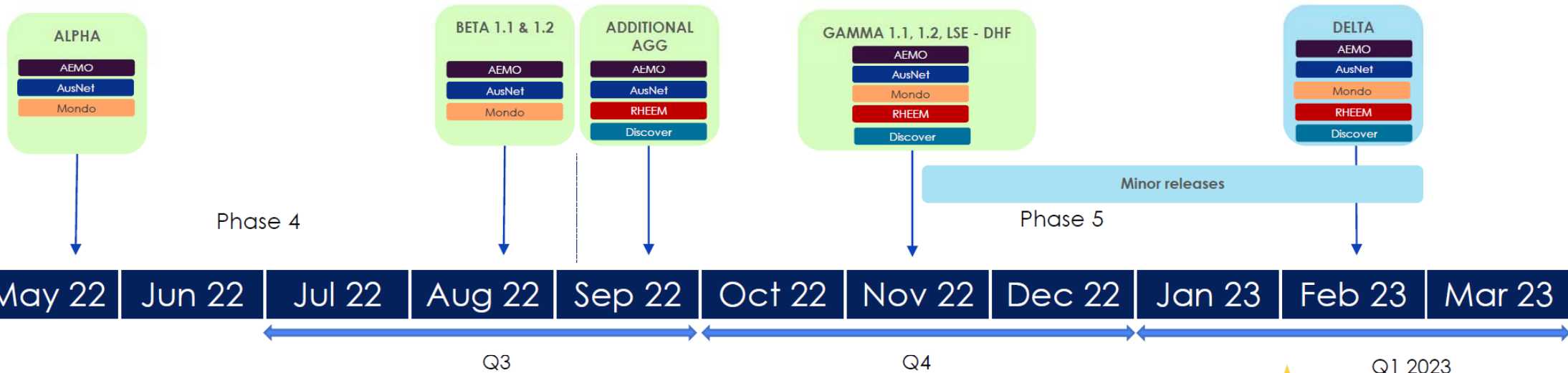**D5.8 Provision of a completed customer insights study**

31 March 2023 🟢

Knowledge Sharing Deliverables	Delivery date	Status
Public Project Lessons Learnt Report	30 November 2022	🟢
Public final project report	31 May 2023	🟢
Public customer insights and engagement final report	31 May 2023	🟢
Final project report webinar	31 May 2023	🟢
Final CIES report webinar	31 May 2023	🟢

Project Update | Platform release update

- **Success Story:** Gamma went live successfully on 4th Nov. With Gamma, project could now test
  - Local Service Exchange (LSE) for Demand High Firmness
  - Drill down to NMI level data to enhance research outcomes
  - Simulate high impact, low frequency market events through simulated pricing
- **Delta & minor releases:** Team is now focussing on delta scope & other preferable functionalities for Trial
  - LSE –Voltage High firmness & LSE-Demand low firmness
  - Refining the fleet preparation and other maturity enhancements by aggregators for upcoming pricing events
  - Other field trial scenarios & data exchange use cases

| May 22 | Jun 22 | Jul 22 | Aug 22 | Sep 22 | Oct 22 | Nov 22 | Dec 22 | Jan 23 | Feb 23 | Mar 23 |

Q3 — Q4 — Q1 2023

ALPHA	BETA 1.1 & 1.2	ADDITIONAL AGGREGATORS	GAMMA 1.1 & 1.2, LSE - DHF	DELTA
• End-to-end basic wholesale marketplace integration between AEMO, AusNet & Mondo	• EWF Transport layer v2 (DDHub) • DOE V2 (in CSIP format) • PD price forecast • Remove NMI & device • Defect fixes	• End-to-end basic wholesale marketplace integration between AEMO, AusNet, Discover & RHEEM	• Enrolment updates • Desktop Assessments • Local Service Exchange (LSE) for Demand High Firmness (DHF) • Price simulation capability • DERMS additional functionality (Intraday)	• DOE with power quality (PQ) curve calculation • Local Service Exchange (LSE) for Voltage High Firmness • Local Service Exchange (LSE) for Demand Low Firmness

Legend- Green: completed Blue: In Progress Grey: Next release

Project Update | Two recent knowledge sharing releases reveal customer insights and have been well received

Customer insights

General Community Perceptions of Distributed Energy Resources

- Discusses results of Customer Insights Survey sent to potential DER customers
- Seeks to understand motivations and perceptions in adopting DER and joining aggregation services
- Furthers understanding how to reach a critical mass of customers within a VPP
- Published on AEMO website and presented at EDGE engagement forums

Literature review

Gaps in Existing DER Customer Insights Research

- Reviews literature to capture the current state of Australian knowledge of customer insights relating to DER
- Covers industry, government and academic literature
- Provides an important understanding for Australian DER stakeholder to guide product and service development to meet customer needs and expectations
- Published on AEMO website and informs customer insights research
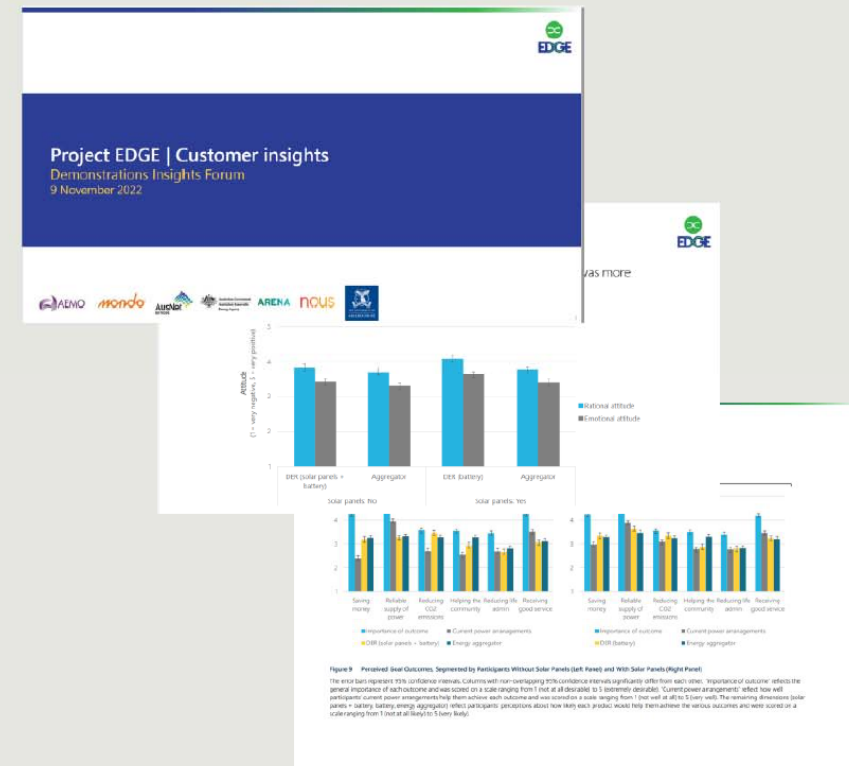
Project EDGE
Overview of EDGE workstreams being supported by EY and some preliminary findings
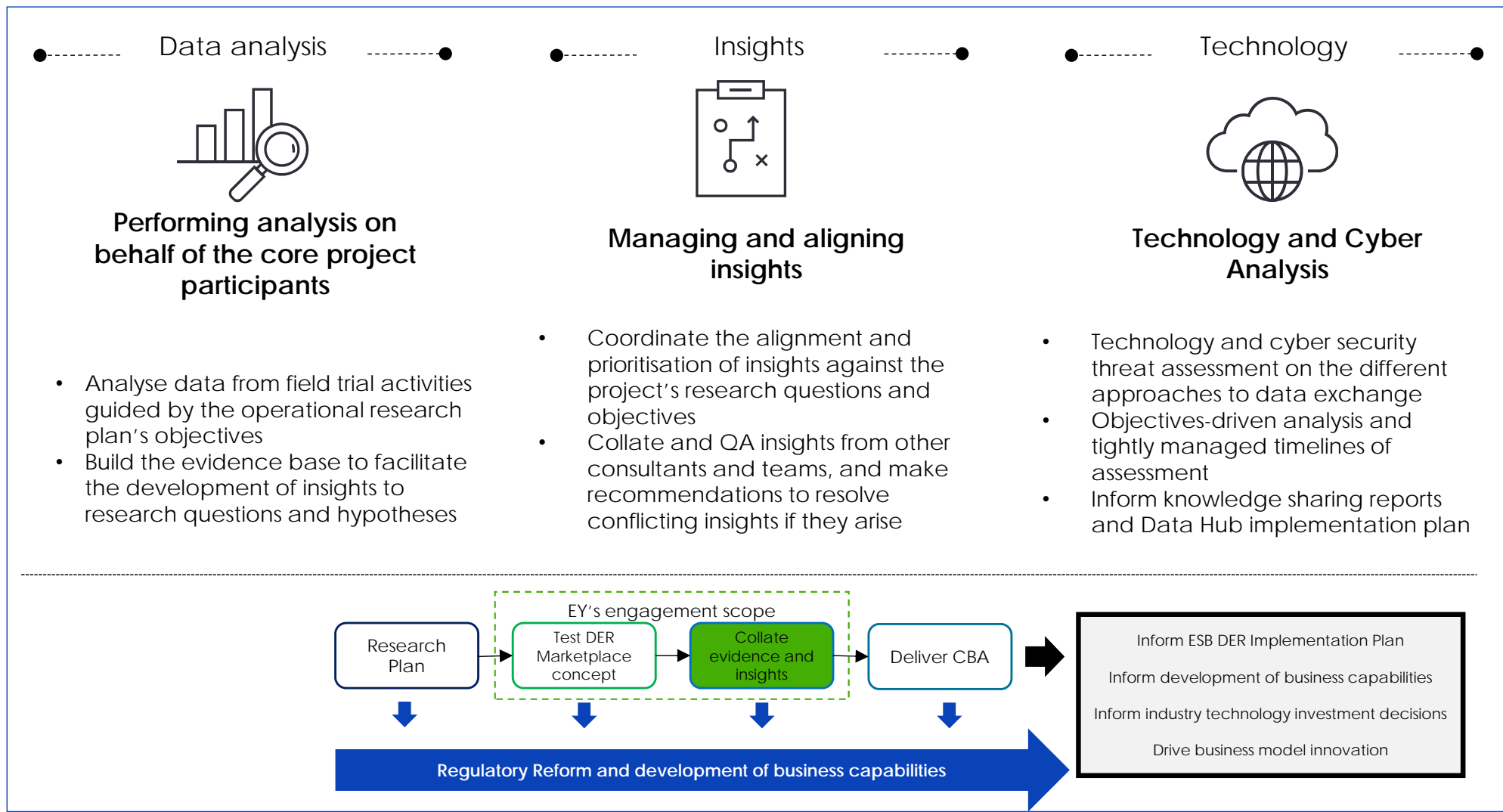
Tuesday 13 December 2022

Introduction

Item #	Agenda item
1	Approach and delivery plan
2	Preliminary findings
3	Discussion

Approach and delivery plan

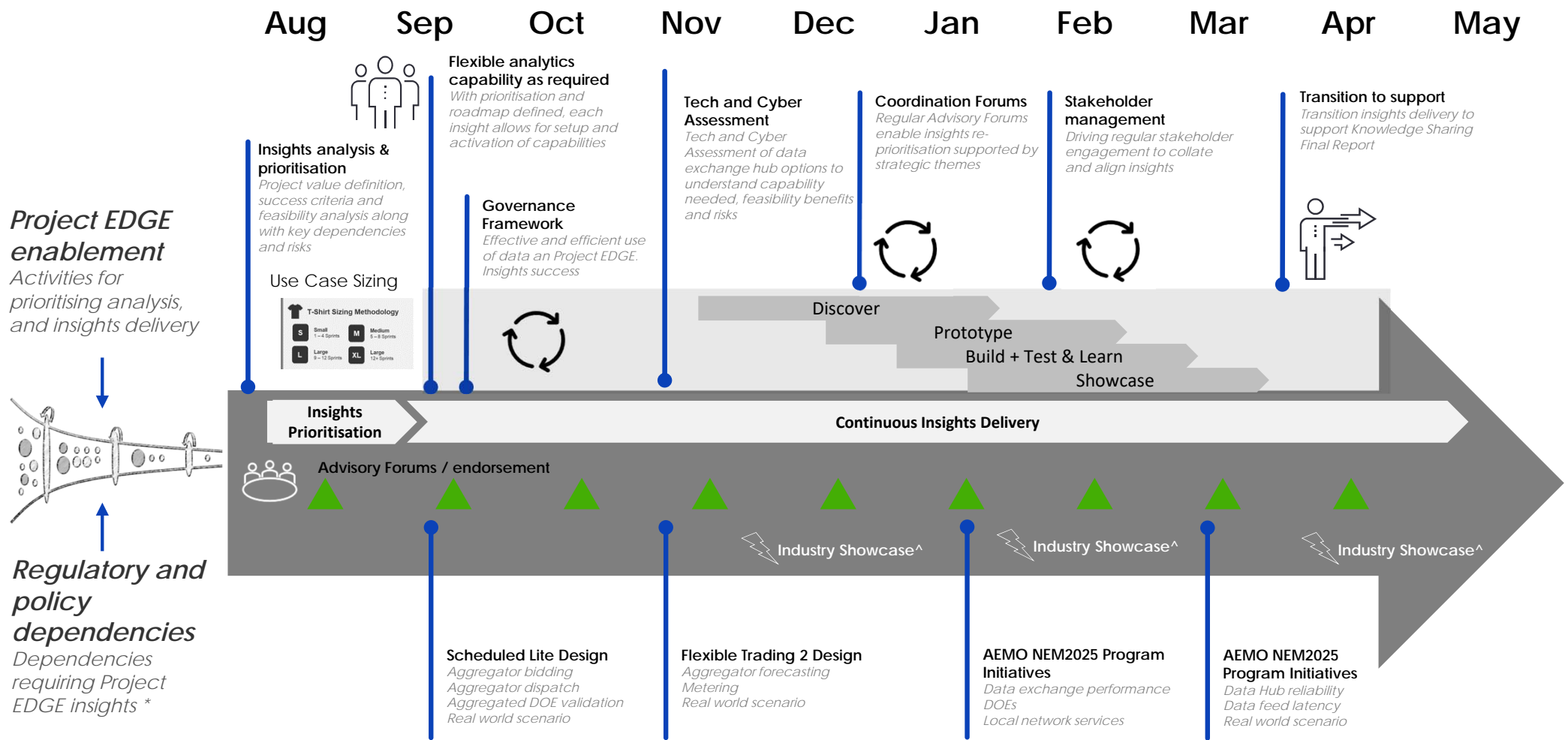# EY will deliver three workstreams to support Project EDGE objectives

The EY team has been engaged to support Project EDGE action the operational plan for research activities and meet the project's objectives. EY is supporting three workstreams.

Data analysis

Performing analysis on behalf of the core project participants

- Analyse data from field trial activities guided by the operational research plan's objectives
- Build the evidence base to facilitate the development of insights to research questions and hypotheses

Insights

Managing and aligning insights

- Coordinate the alignment and prioritisation of insights against the project's research questions and objectives
- Collate and QA insights from other consultants and teams, and make recommendations to resolve conflicting insights if they arise

Technology

Technology and Cyber Analysis

- Technology and cyber security threat assessment on the different approaches to data exchange
- Objectives-driven analysis and tightly managed timelines of assessment
- Inform knowledge sharing reports and Data Hub implementation plan

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EY's engagement scope

Research Plan → Test DER Marketplace concept → Collate evidence and insights → Deliver CBA →

Inform ESB DER Implementation Plan

Inform development of business capabilities

Inform industry technology investment decisions

Drive business model innovation

Regulatory Reform and development of business capabilities

High-level delivery plan on a page

An approach that considers the whole-of-life Operational Research Plan to group analysis activities, assess data readiness and value to prioritise and sequence analytics and drive the best outcomes and meet project objectives.

Aug   Sep   Oct   Nov   Dec   Jan   Feb   Mar   Apr   May

Flexible analytics capability as required
With prioritisation and roadmap defined, each insight allows for setup and activation of capabilities

Insights analysis & prioritisation
Project value definition, success criteria and feasibility analysis along with key dependencies and risks

Tech and Cyber Assessment
Tech and Cyber Assessment of data exchange hub options to understand capability needed, feasibility benefits and risks

Coordination Forums
Regular Advisory Forums enable insights re-prioritisation supported by strategic themes

Stakeholder management
Driving regular stakeholder engagement to collate and align insights

Transition to support
Transition insights delivery to support Knowledge Sharing Final Report

Project EDGE enablement

Governance Framework
Effective and efficient use of data an Project EDGE. Insights success

Activities for prioritising analysis, and insights delivery

Use Case Sizing

T-Shirt Sizing Methodology
S Small 1 – 4 Sprints
M Medium 5 – 8 Sprints
L Large 9 – 12 Sprints
XL Large 12+ Sprints

Discover
Prototype
Build + Test & Learn
Showcase

Insights Prioritisation

Continuous Insights Delivery

Advisory Forums / endorsement

Industry Showcase^   Industry Showcase^   Industry Showcase^

Regulatory and policy dependencies

Dependencies requiring Project EDGE insights *

Scheduled Lite Design
Aggregator bidding
Aggregator dispatch
Aggregated DOE validation
Real world scenario

Flexible Trading 2 Design
Aggregator forecasting
Metering
Real world scenario

AEMO NEM2025 Program Initiatives
Data exchange performance
DOEs
Local network services

AEMO NEM2025 Program Initiatives
Data Hub reliability
Data feed latency
Real world scenario

*The full view of all relevant dependencies is outlined in the reform map. These will be monitored to reassess priority if anticipated dependency dates change.
^ Updates to the Project EDGE Demonstration Insights Forum

Preliminary findings

Analysis seeks to answer how DER participation in wholesale dispatch can facilitated

The guiding research question for this analysis so far has been **research question 4**:

> How can the Distributed Energy Resource (DER) Marketplace facilitate activation of DER to respond to wholesale price signals, operate within network limits and progress to participation in wholesale dispatch over time?

The **hypothesis** for this research question is:

> DER participation in wholesale energy markets can be achieved progressively, as DER fleets reach materiality thresholds, aligning with Energy Security Board (ESB) visibility and dispatchability models.

- The focus of the analysis has been on aggregator performance in the wholesale electricity market:
    - Performance with dispatch instructions (targets).
    - Forecasting performance.
    - Bidding behaviour.
- There are several other workstreams connected to this set of results. Overall aggregator performance to dispatch targets has intersection points that have implications on accurately forecasting and DOE compliance.

Bidding behaviour

Aggregator performance

Forecasting

DOE Compliance
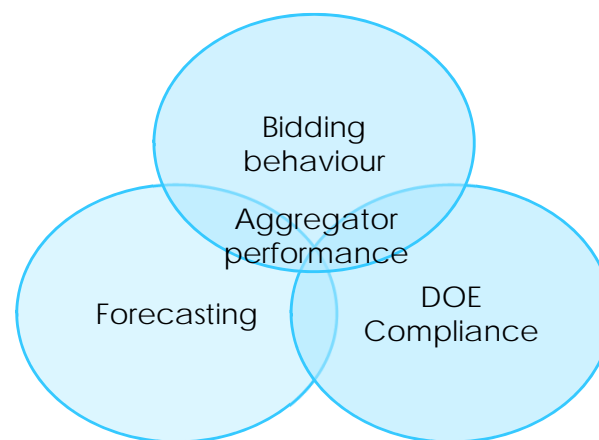
High-level approach to answering research questions and hypothesis

A key learning is that data analysis only reveals so much and much of the 'so what' requires discussions with participants.

Therefore, a collaborative approach to answer the research question and generate meaningful insights has been established.

Overview of approach
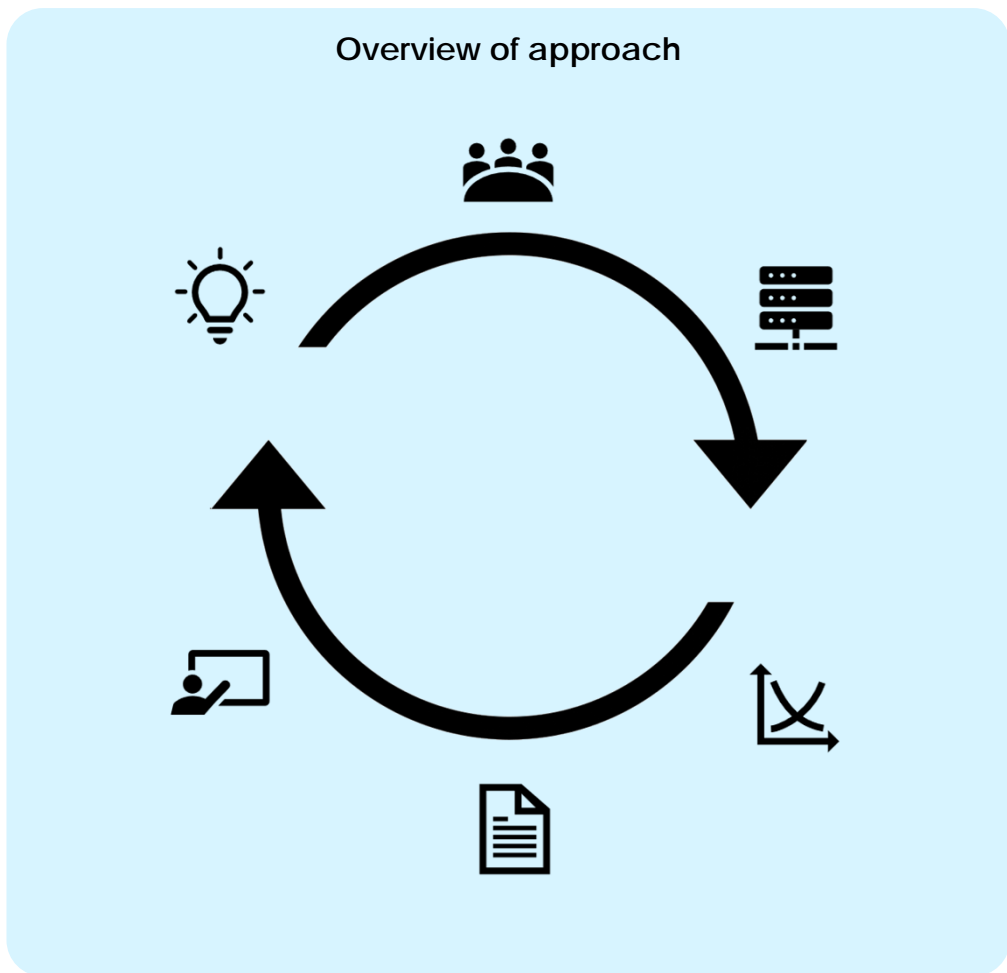
	Planning workshop	Co-design methodology with EDGE team and SMEs
	Data sourcing	Source trial data from EDP server
	Data analysis	Conduct statistical analysis
	Generate findings	Produce summary of analysis
	Workshops	Draw out insights from aggregators and SMEs
	Generate insights	Provide answers to research questions and their impact

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Aggregator fleet size, and practice, support better performance

- Discussions with the aggregator analysed revealed that there were two key drivers supporting better performance over time:

  - Increased number of customers

  - Deliberate improvements in the algorithms

- This suggests that the size of the fleet is an important factor because it increases the diversity of customers that aggregator can draw upon to meet its dispatch targets

- This, along with the deliberate improvements in the algorithm have led to progression in forecasting available fleet capacity, more refined bidding quantities, and meeting more realistic dispatch targets.

- This progression over time can also be visualised through graphs illustrating the difference between the first field trial tested and a more recent field trial. The graphs show the correlation between targets and telemetry.
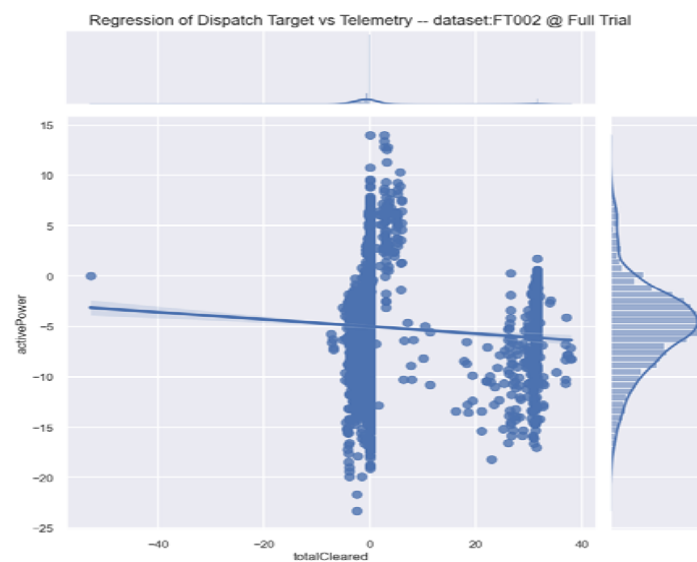
Summary of findings

Preliminary findings suggest the hypothesis may be true and begins to answer the research question by providing insights into how activation of DER to progress to participation in wholesale dispatch could be achieved.

Research question	How can the Distributed Energy Resource (DER) Marketplace facilitate activation of DER to respond to wholesale price signals, operate within network limits and progress to participation in wholesale dispatch over time?		
Hypothesis	DER participation in wholesale energy markets can be achieved progressively, as DER fleets reach materiality thresholds, aligning with Energy Security Board's (ESB) visibility and dispatchability models		
Preliminary Insights	• Aggregators need a **stepping stone approach** to participate in the market reliably	• Performance **improves over time** as aggregators develop and refine processes	• The make-up and size of an aggregator fleet (**a materiality threshold**) also supports more reliable performance
	• **Time of day and cold** temperatures can influence the ability to accurately forecast	• Aggregators are likely to reach a **trade-off point** between accuracy and business value	• Aggregators **prioritise customer self-consumption** and this reduces 'active variability' in bidding behaviour (i.e. how often bids change)

Bidding strategy

- As aggregators' forecasting capability improves, their bidding strategy will mature.

- However, even given time and maturity, forecasting and bidding for aggregated DER can never be perfect due to factors that affect forecasting accuracy and which are unavoidable given a mixed DER fleet.

- The project seeks to understand the level of accuracy needed to better integrate DER into the scheduling process and support secure and reliable operation of the energy system.

Maturity of forecasting capability

Model selection

Model benchmark

Continuous Performance

Data sourcing / Model training

Model implementation
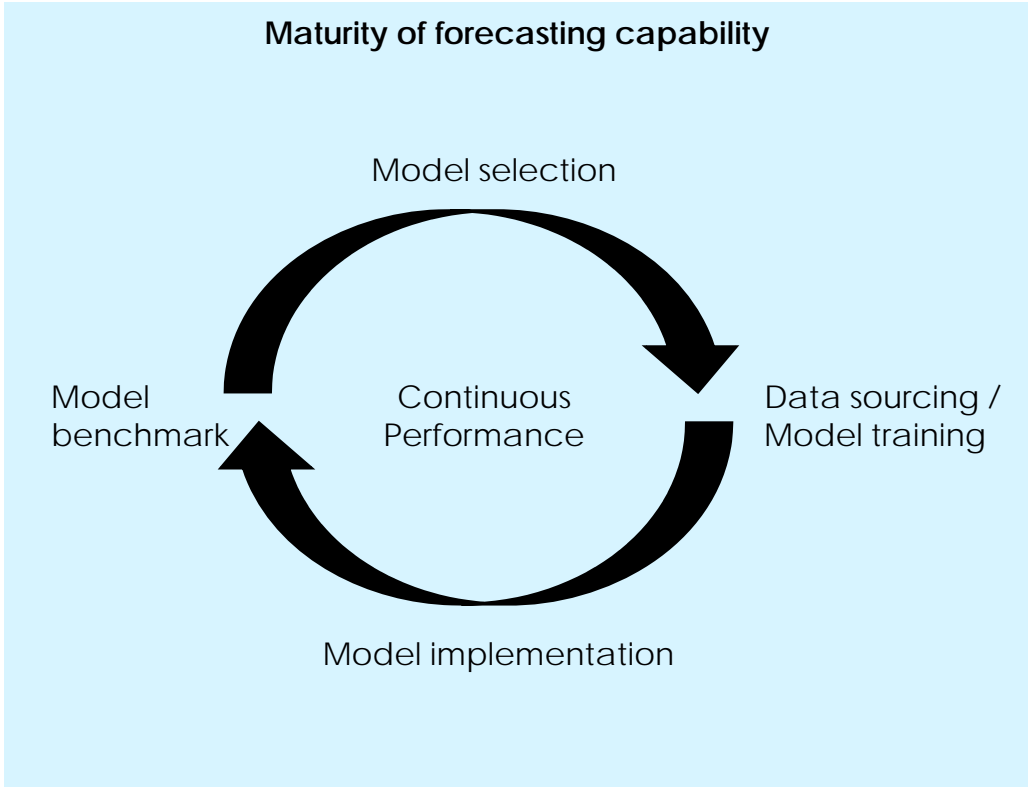
Bidding strategy

1. The 'perfect' sophistication of bidding is constrained by the variability and unpredictability of the entire system. No amount of data and understanding can produce perfect forecasting.

2. Bidding strategy is also constrained by the quantity and makeup of a fleet. Certain controllable assets will only ever act to high value events due to consumer requirements (if that's the aggregator's business model).

3. High price events, and negative and low prices will likely trigger specific bidding strategies.

- Industry needs to consider a key question on whether a battery should be used to supply customer load as its prime function, or should it be used primarily for wholesale arbitrage.
- Experience to date suggests customers do want their battery use primarily for wholesale arbitrage.

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Business as usual bidding behaviour

Workshops with aggregators revealed key influencing factors that will elicit a response in a business as usual (BAU) context.
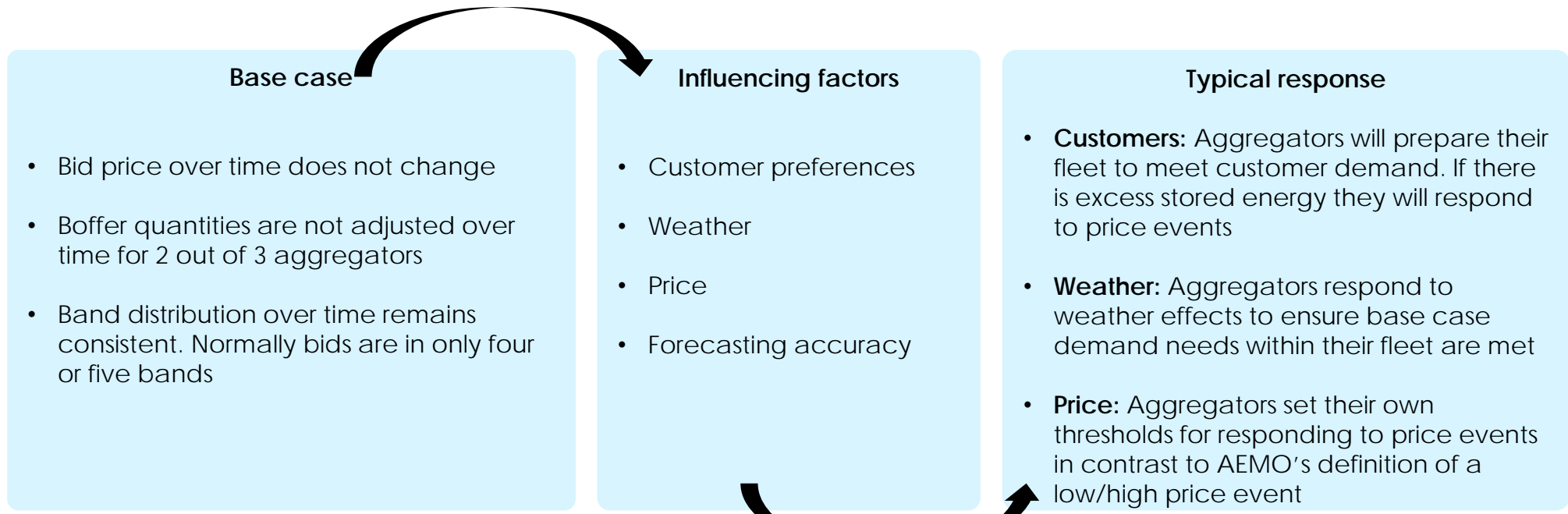
Base case

- Bid price over time does not change

- Boffer quantities are not adjusted over time for 2 out of 3 aggregators

- Band distribution over time remains consistent. Normally bids are in only four or five bands

Influencing factors

- Customer preferences

- Weather

- Price

- Forecasting accuracy

Typical response

- **Customers:** Aggregators will prepare their fleet to meet customer demand. If there is excess stored energy they will respond to price events

- **Weather:** Aggregators respond to weather effects to ensure base case demand needs within their fleet are met

- **Price:** Aggregators set their own thresholds for responding to price events in contrast to AEMO's definition of a low/high price event

Impacts

- In a BAU case aggregators will have predictable bidding behaviour based on their weather forecasting models and strategy of self-consumption prioritisation.

- Under Net NMI, for load, aggregators exhibit general bidding behaviour that did not substantially change at 0, 2, and 6 hour forecasts. Dispatch generally followed their last forecast (as expected). This is not the case for generation where there are large differences. This has the following implications:
  - Aggregators are more likely to perform better as scheduled resources during evening periods when there are less external factors impacting forecasting accuracy (e.g. cloud impacting solar during the day).
  - AEMO can place a higher degree of weighting on bidding behaviour during evening periods to inform operational planning.

Bidding behaviour as a response to a price event

Aggregators are continuously improving their algorithms in response to both growing fleet size and market signals. During workshops influencing factors and responses to high price events were identified:

Aggregators may define price events differently according to their customer value strategy.

For example, Aggregator B defines a high price event as $1,000 / MW and a low price event as -$500 / MW

Meanwhile, AEMO defines a high price event as $1000 / MW and a low price event as -$100 / MW

Influencing factors

- **Customer value** – For the two aggregators consulted, managing the DER devices for their residential customers' self-consumption is the key consideration. They seek to provide extra value when there is spare capacity left in the portfolio – spare capacity is typically not high for residential customers.

- **Network cost** – A key factor for low price events are network costs. A low price may not cover the network costs and is therefore a consideration in the definition of, and response to, low price events.

- **Weather** – Combined with price, weather is a key factor. Generally, energy is conserved at night and exported in the day to take advantage of prices. If the price is considerably higher than at night, it provides an opportunity to capitalise from the market with spare energy the portfolio can export.

Typical response

- **Consistent low/high price:** A consideration for price is how predictable the prices are. If prices are forecast to remain consistently high or low, this will trigger preparation of the fleet for the event.
- **Capturing a broader set of price events:** One of the aggregators chooses to set their price event thresholds lower to capture more price events rather than react to less frequent large price events.

Next steps

The rest of the delivery plan includes DOE and LSE research activities.

DOEs and LSE
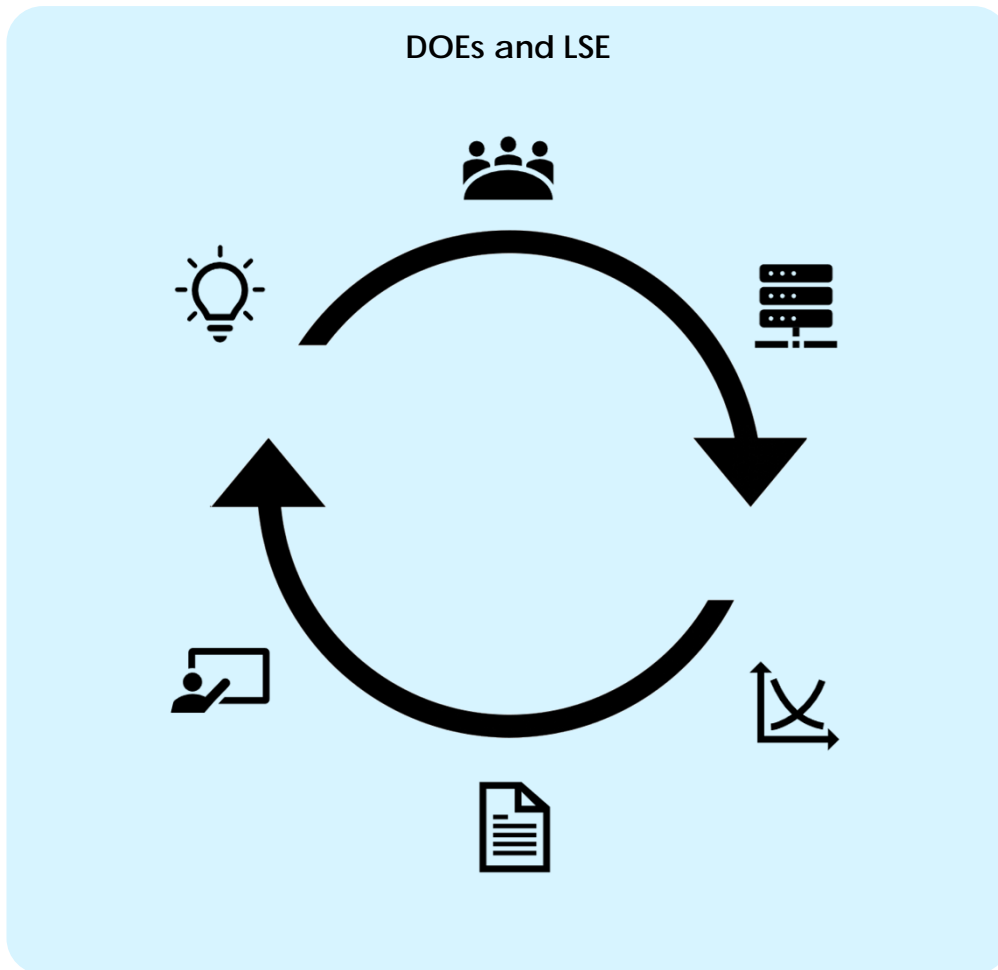
👥	Planning workshop	Continue to co-design methodology with EDGE team and SMEs
🖥	Data sourcing	Source necessary data
📈	Data analysis	Conduct statistical analysis
📄	Generate findings	Produce summary of analysis
🧑‍🏫	Workshops	Draw out insights from aggregators and DSO SMEs
💡	Generate insights	Provide answers to research questions and their impact

Questions / Discussion

Project EDGE
Lessons Learnt #2 Report

John Theunissen (AusNet)

Where are we now

Trial Ops
- We are in the operational and final phase of the trial, have run some extreme price events.
- All aggregators are participating in all field tests to answer questions under the Research Plan

CBA
- Finalised and published the CBA methodology – thanks for your input

Customer Insights
- Deakin University are working with Aggregators on two additional pieces of the Customer Insights Study.

DOEs
- University of Melbourne are working through testing different DOEs arrangements and DER penetrations with real work networks. Objective function study results to be published early 2023.

Data Exchange
- EY Tech and Cyber assessment being finalised for publishing in early 2023.

Knowledge Sharing
- Published knowledge sharing milestone in our Lessons Learnt #2 Report (wc 12/12). This report provides;
  - Sharing early insights aligned to research questions and hypothesis
  - Builds on previous knowledge sharing reports such as the Lesson Learned Report #1 and the Public Interim Report

Lessons Learnt Executive Summary

- The Research Plan independently designed by UoM is guiding the objectives of the Project.

- Diversified customer base and DER technology across the aggregators is strengthening the robustness of the insights produced in the trial

- The report focuses on a number of key areas such as:

  - **Alignment between Aggregator Customer Acquisition and Deakin University's Customer Insights Observations**
    - Early majority (beyond innovators) are optimistic but unclear about value proposition of joining a VPP.
    - Need guaranteed financial returns, understanding of how VPPs work, transparent comms and agreement on DER use to build trust (social licence).

  - **Early Field Trial observations**
    - Aggregators can follow AEMO intervention targets when directed during unexpected events and achieve this within Network Limits.
    - Early analysis shows progressive aggregator participation and understanding improves as the trial progresses.

  - **Preliminary Data Exchange Findings**
    - A **theoretical** evaluation of the data exchange approach indicates a data hub represents the higher value option for industry and consumers but shows current immaturity of technology around the decentralised model over the centralised model despite the benefits.
    - The aggregator experience is key in implementation and needs to be clear and progress over time.

Research Questions & Hypothesises targeted in LL #2

The below diagram outlines the research questions and hypothesis discussed throughout the report and where you can find further details.

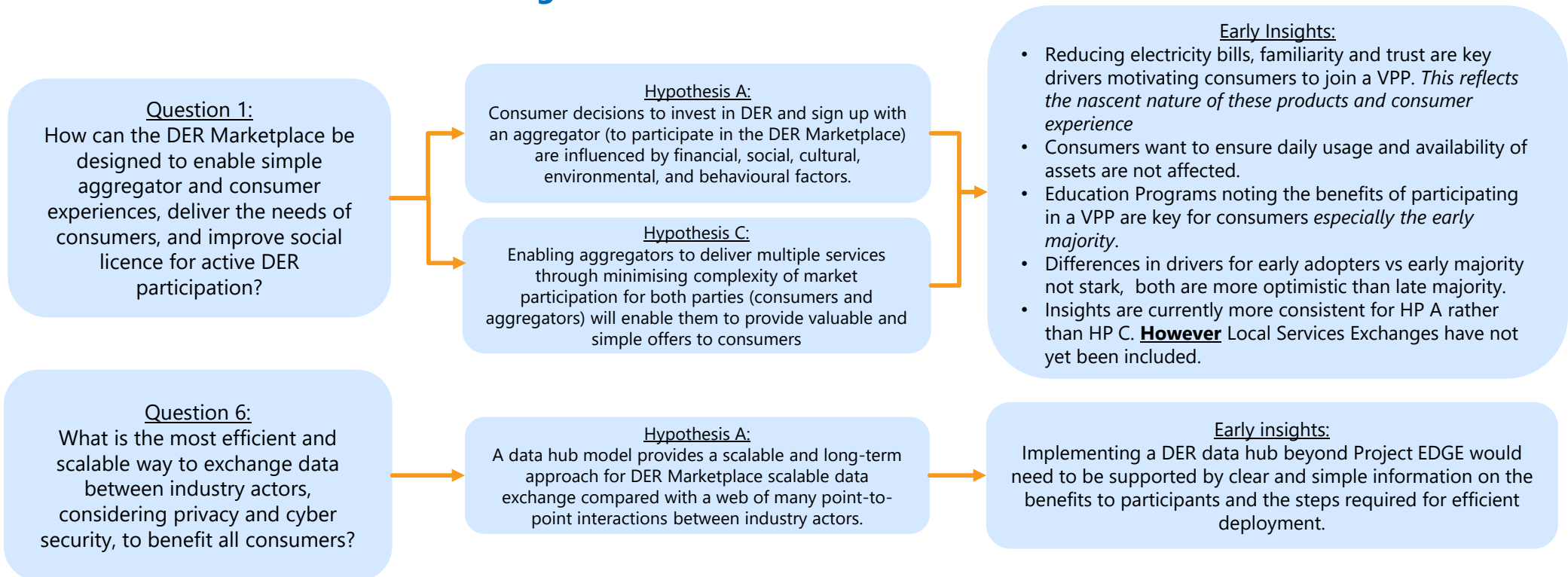| Research questions discussed in this report		Summary of hypotheses discussed in this report	Chapter
Customer	RQ.1 How can the DER Marketplace be designed to enable simple customer experiences, deliver the needs of customers and improve social license for active DER participation?	HA: Consumer decisions to invest in DER and sign up with an aggregator (to participate in the DER Marketplace) are influenced by financial, social, cultural, environmental, and behavioural factors.	• Chapter 2 • Sections 2.1, 2.2, 2.4 • Chapter 3 Sections 3.1, 3.2, 3.3 • Chapter 4
		HB: Customers are willing to let aggregators utilise their assets if offers are presented to them simply and provide sufficient value over time.	• Chapter 3 Sections 3.1, 3.2, 3.3 • Chapter 4
		HC: Enabling aggregators to deliver multiple services through minimising complexity of market participation for both parties (consumers and aggregators) will enable them to provide valuable and simple offers to consumers.	• Chapter 2 Sections 2.1, 2.2, 2.4
Wholesale integration	RQ.4 How can the DER Marketplace facilitate efficient activation of DER to respond to wholesale price signals, operate within network limits and progress to participation in wholesale dispatch over time?	HA: DER participation in wholesale energy markets can be achieved progressively, as DER fleets reach materiality thresholds, aligning with ESB visibility and dispatchability models.	• Chapter 5
Efficient data exchange	RQ.6 What is the most efficient and scalable way to exchange data between industry actors, considering privacy and cyber security, to benefit all consumers?	HA: A data hub model provides a scalable and long-term approach for DER Marketplace scalable data exchange compared with a web of many point-to-point interactions between industry actors.	• Chapter 2, Section 2.3, 2.4 • Chapter 7

Early Insights from New EDGE Aggregators

The diversification of the aggregators has provided additional insights on:

- The different business models used for customer acquisition for VPPs.
- The variation of DER technology used in the trial.
- The risk profile and experience of each Aggregator participating in the DER Marketplace.

This combination of aggregators has diversified the consumer base and DER technologies participating in the trial, and deliver further insights for the Project EDGE evidence base.

Research Questions Targeted

Question 1:
How can the DER Marketplace be designed to enable simple aggregator and consumer experiences, deliver the needs of consumers, and improve social licence for active DER participation?

Hypothesis A:
Consumer decisions to invest in DER and sign up with an aggregator (to participate in the DER Marketplace) are influenced by financial, social, cultural, environmental, and behavioural factors.

Hypothesis C:
Enabling aggregators to deliver multiple services through minimising complexity of market participation for both parties (consumers and aggregators) will enable them to provide valuable and simple offers to consumers

Early Insights:
- Reducing electricity bills, familiarity and trust are key drivers motivating consumers to join a VPP. *This reflects the nascent nature of these products and consumer experience*
- Consumers want to ensure daily usage and availability of assets are not affected.
- Education Programs noting the benefits of participating in a VPP are key for consumers *especially the early majority*.
- Differences in drivers for early adopters vs early majority not stark, both are more optimistic than late majority.
- Insights are currently more consistent for HP A rather than HP C. **However** Local Services Exchanges have not yet been included.

Question 6:
What is the most efficient and scalable way to exchange data between industry actors, considering privacy and cyber security, to benefit all consumers?

Hypothesis A:
A data hub model provides a scalable and long-term approach for DER Marketplace scalable data exchange compared with a web of many point-to-point interactions between industry actors.

Early insights:
Implementing a DER data hub beyond Project EDGE would need to be supported by clear and simple information on the benefits to participants and the steps required for efficient deployment.

Consumer Alignment shown between Deakin Research and the EDGE Aggregator Experience

The alignment of insights so far between the Consumer Insights Study and the acquisition experience of the two new EDGE aggregators in the trial indicates that:

- Aggregators are more able to provide **simple** and **compelling** offers to consumers if they are able to deliver electricity services (both wholesale and local) in a simple and consistent way across jurisdictions.

- A consumer's decision to sign up with an aggregator and participate in the DER Marketplace are influenced by a range of factors. But the primary drivers are **financial (guarantees), cultural (trust)** and **behavioural (daily living impacts).**

    - <u>Forum question</u>: *Might future products be able to separate value to DER owners from strict self-consumption?*

- Consumers are willing to let aggregators utilise their assets if offers are presented to them simply and provide sufficient value over time.

    - The critical insight here however is that unless a compelling value proposition is clearly and simply communicated, consumers are unlikely to perceive a benefit from joining and participating in a VPP.

- These factors are generally consistent among the **early adopter** categories and the **later adopte**r categories. However, **early adopters** are more likely to have stronger interest in, and more optimistic and positive attitudes towards, adoption of DER and participating in a VPP compared to later adopters.

How are we testing in the field?

The field trial is cycling through the different pre-determined modes that test permutations on DNSP operating envelopes and aggregator bidding. These are designed to isolate effects of different variables

Mode	OE Frequency	DOE calculation	OE Active vs. Reactive	DOE Objective function	Bidding Type	Bidding	Bidding Qty	Dispatch instruction
1	Day ahead	Network + approximation	Active only	Equal allocation	Scheduled bidding	Visibility	Net NMI	Not actioned
2	Day ahead	Network only	Active only	Max service	Scheduled bidding	Visibility	Net NMI	Not actioned
3	Day ahead	Approximation only	Active only	Max service	Scheduled bidding	Visibility	Net NMI	Not actioned
4	Day ahead	Network + approximation	Active only	Max service	EFL	Self-dispatch	Net NMI	Actioned
5	Day ahead	Network + approximation	Active only	Max service	Scheduled bidding	Scheduled	Net NMI	Actioned
6	Day ahead	Network + approximation	Active only	Max service	Scheduled bidding	Scheduled	Flex	Actioned
7	Intra-day	Network + approximation	Active only	Max service	Scheduled bidding	Scheduled	Net NMI	Actioned
8	Intra-day	Network + approximation	Active + Reactive	Max service	Scheduled bidding	Scheduled	Net NMI	Actioned
9	Intra-day	Network + approximation	Active + Reactive	Max service	Scheduled bidding	Scheduled	Flex	Actioned

Further description and details of the Trial Modes can be found in **Chapter 5 of the Lessons Learned report**

EDGE Market Suspension field tests – June 2022

The AEMO, AusNet and Mondo team reacted quickly to establish a test plan to learn from this rare event

Why specific Market Suspension tests?

> In Market Suspension AEMO was directing large scale generators.
> **What should this look like in a high DER future (via VPPs)?**

Hypothesis 1:
AEMO Dispatch Instructions that give a 'target' are more reliable than DOEs which give 'permissible limits'.

Hypothesis 2:
These two signals together will conflict at times and this needs to be understood to be managed in future operations.

To operate the system AEMO needs:
1. **Visibility** of telemetry in real time
2. **Predictability** of generator forecasts
3. **Controllability** of dispatch instructions
4. **Measurement** of telemetry (settlement)

What did we do?

Test	Summary
Test 1 Self-Dispatch (no AEMO direction)	• In lieu of capability to dispatch VPPs at scale ('Controllability') i.e. current state, AEMO needs visibility (telemetry) and predictability (forecasts via boffers) to consider when directing large scale resources • **Q: What do VPPs do without AEMO direction?**
Test 2 AEMO -> DUID direction via Dispatch Instructions	• Under market suspension AEMO instructs generators/loads test is for future where controllability exists for VPPs (i.e. test will provide setpoints for aggregators to follow). • **How reliably can VPPs follow AEMO directions that differ from market incentivised behaviour?**
Test 3 AEMO –> DNSP –> DUID direction via DOEs	• Currently AEMO instructs NSPs to maintain a profile within their network, NSPs currently do this by shedding load or generation. • **Are DOEs a better mechanism than directing VPPs under a non-market use case (e.g. market suspension) ?**
Test 4 Synchronous AEMO directions to DNSP and Aggregator (Test 2+3)	• Testing synchronous instructions from AEMO to DNSP and Aggregator to see if this helps reduce potential conflicts. Test 2 & Test 3 together. • **Is it worth building capability to do both mechanisms for redundancy?**

Market Suspension Event – Summary Learnings

- Aggregators can hit AEMO intervention targets in the absence of market signals, when directed.

- DNSPs can calculate DOEs to achieve a set point <u>under certain conditions.</u>

- However, DOEs alone may not elicit an aggregator response that is as accurate as dispatch instructions because they provide a permissible limit rather than a specific target.

- DOEs take priority to keep the network operating within secure limits, but need to be communicated to AEMO to ensure they **do not issue directions that exceed DOEs.**

- Visibility for AEMO of the DOEs was provided by the data exchange hub. This scalable data exchange approach allows multiple subscribers to receive certain data, including AEMO and aggregators.

- This supports **Market Suspension Hypothesis 1** that AEMO dispatch instructions that give a 'target' are more reliable than DOEs which give 'permissible limits'.

- The tests were inconclusive regarding **Market Suspension Hypothesis 2** that these two signals will conflict at times and this needs to understood to be managed in future operations.

Preliminary Data Exchange findings – EY Tech & Cyber stream

EDGE's Research Plan includes a theoretical evaluation of the data exchange models at the industry actor level.

The independent assessment is being conducted by EY, seeking to understand which architecture model would best support the NEO and ensure a secure, scalable and effective DER Marketplace.

Covers: Cyber risks and threats, Options assessment, Implementation benefits and hurdles and mitigating controls.

Preliminary findings

- In line with EDGE Hypothesis 6A, the assessment found a data hub approach to offer more efficient long-term outcomes for consumers than Point to Point.

- A decentralised approach can **theoretically** deliver greater benefits than centralised in each of four criteria assessed <u>over the long term</u>.

- One finding was that the maturity of some decentralised technology elements is not yet at enterprise grade and a phased implementation is recommended.

    - E.g. W3C standard for identities is emerging but not internationally recognised, MS getting involved. Also Self-Sovereign Identity and DLT applications in energy

- Implementing a decentralised data hub would require a long-term phased approach and need to consider a number of practical considerations to establish the feasibility of successful implementation, included Establishment, Governance, Ownership & Cost Recovery & Stakeholder Education

Assessment Framework: Data Exchange Options

Next Steps

- Continue to undertake the field trials to test against all research questions and hypothesis from the research plan

  - For current progress on the fields trials, please refer to Appendix A of the Lesson Learnt Report # 2

- Number of smaller reports to be shared before April (UoM, EY, Deakin)

- The CBA Findings Report is due March 2023

- The Final Report and Customer Insight Study Reports are expected to be shared in May 2023 with recorded webinars to follow in June 2023

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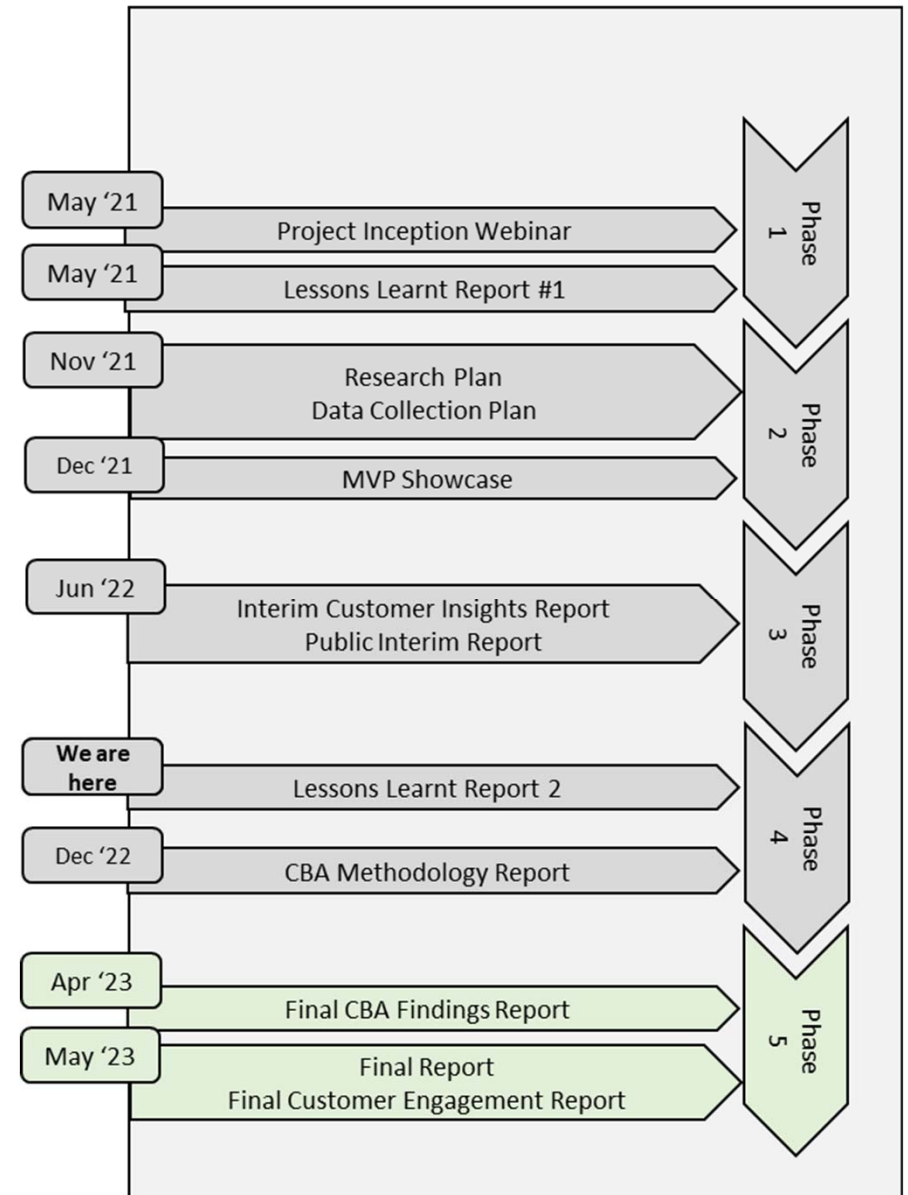
Publications	Publication Date
Project EDGE Lesson Learnt #2 Report	December 2022
Project EDGE: CBA Methodology	December 2022
Project EDGE: Community Perceptions of DER & Aggregation Services	November 2022
Project EDGE: Literature Review : DER Customer Insights Research	October 2022
Project EDGE Public Interim Report	June 2022
Project EDGE Customer Insights Study	June 2022
Project EDGE Research Plan	March 2022
Project EDGE MVP Showcase	December 2021
Project EDGE Lessons Learned Report #1	May 2021
Project EDGE Public Webinar #1	March 2021
Project EDGE Factsheet	January 2021

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Look ahead