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FlexTalk: Connecting the dots and planning next steps

Workshop

10th September 2024

eea | Electricity Engineers' Association

EECA | TE TARI TIAKI PŪNGAO
ENERGY EFFICIENCY & CONSERVATION AUTHORITY

Housekeeping

Emergency Procedures:
- Please follow the instructions of the automated emergency system and the Te Pae Christchurch team.
- The Assembly Area is located on the "Green" directly opposite the exhibition halls/ Lot 3 (next to the river walk)

Restrooms & Facilities:
- Washrooms are in the foyer outside the rooms.

Timing & Breaks:
- Session runs from 9 – 1pm
- Morning tea break is 10.20 – 10.50am

Workshop Outcomes:
- Workshop materials and any outcomes will be shared via email after the event

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Session 1 – Scene Setting, Our Current State

MC Stuart Johnston

9.10am Electrifying NZ, Policy and Government Focus - Murray Bell, EECA

9.20am The Flexibility Plan and Alignment with FlexTalk – Craig Evans, FlexForum

9.30am Current State Scan of Flexibility Projects across NZ and Internationally – Yogendra Vashishtha, EA Technology

10.00am Current State – What are we yet to capture? (Facilitated exercise) – Yogendra Vashishtha (EATech), Connie Dunbar, EEA

10.20am Morning Tea

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EECA: Electrifying New Zealand

Murray Bell

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Electrify NZ – government priorities

- Renewable energy is New Zealand's greatest asset for delivering on our climate change commitments. It can also power a growing, productive New Zealand economy into the future.

- New Zealand can prosper and grow while delivering its climate change goals by harnessing renewable energy. Delivering on our climate change goals should not be about sacrifice.

- Renewables – solar, wind, hydro, geothermal and biomass – already generate most of this country's electricity. But the energy sector as a whole is responsible for **40%** of New Zealand's greenhouse gas emissions, mostly from the combustion of fossil fuels in transport and industrial heating
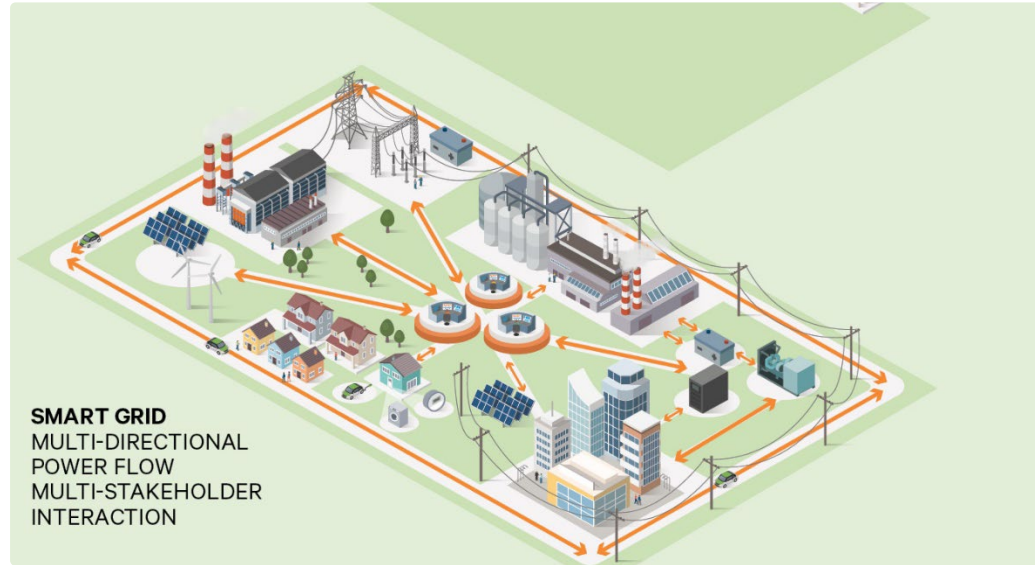
EECA

Electrify NZ - government priorities

- New Zealand can dramatically reduce its carbon footprint by shifting transport and industry off fossil fuels to clean electricity. Electrification could reduce annual carbon emissions by **22 million tonnes** in 2050, about **70%** of the emissions reductions from transport and industry this country needs to reach our net carbon zero targe

- But electrifying large parts of the economy will require enormous investment in renewable generation, transmission and local lines – more than **$40 billion** by 2030, according to a recent study.[3] New Zealand is already short of the investment it needs by around **8,000 gigawatt-hours** or nearly 20% of current electricity generation.

- 1. Turbo-charge new renewable wind, geothermal, and solar power projects

- 2. Unleash transmission and distribution infrastructure

EECA

Where EECA fits in

The Grid
Transpower

The Electricity Market
The Electricity Authority

The Consumer
Energy Efficiency &
Conservation Authority

SMART GRID
MULTI-DIRECTIONAL
POWER FLOW
MULTI-STAKEHOLDER
INTERACTION

EECA

EECA's strategy

Our mission

Mobilise New Zealanders to be world leaders in clean and clever energy use.

Our desired outcome

Energy users save energy, money and reduce emissions.

Energy productivity and resilience improves.

Energy efficiency first

Efficient energy use is the first option users adopt.

Empower energy users

Users are empowered to control their energy.

Accelerate renewable energy

Users transition to low emissions energy.

EECA

Strategic areas of interest

1) Electrification of the energy system offers increased security, affordability and a significantly reduced emissions profile

2) Accelerating electrification requires a focus on making the most efficient use of the system as a whole

3) Providing system-level market analysis to help coordinate investment and match energy supply to demand

4) Transitional low-carbon fuels, such as biomass and hydrogen, will play an important role in complementing electrification to improve security of supply

5) Quality EV charging infrastructure is central to increasing public confidence in electric vehicles

6) Demonstration of new technologies and applications is vital to market uptake

EECA

EECA's role in demand/distributed flexibility

EECA has an important role in supporting the development of a functioning flexibility system that empowers consumers to participate in clean & clever energy use.

Accordingly, we conduct activities to influence, coordinate, and promote aspects of the broader system.

Coordination	**Regulation**	**Education**
Engaging and supporting other agencies and stakeholders to address market and regulatory barriers, and coordinate system settings.	Regulating products & services for energy efficiency and smart functionality.	As a trusted authority, raise public awareness via monitoring, arranging research, assessment studies and demonstrations.

EECA

Momentum is building

Standards

Supercharging EV infrastructure programme includes enabling standards to improve consumers' ability to shift home EV charging demand away from network "peaks"

Consumer information campaigns

Pursuing consumer information campaigns e.g. "Smart Homes" & "Electrify your Home"

Government coordination and engagement

We are working closely with MBIE, EA, ComCom and Ara Ake to coordinate our demand flexibility activities, including through cross-agency working groups

Stakeholder engagement

EECA is supporting FlexTalk, OpenADR and FlexForum projects and engaging with various international counterparts for shared learnings

Research and insights

EECA is pursuing a "Smart" insights programme and purposefully build our evidence base. An initial smart EV charging insights piece was launched alongside EECA's approved list of smart EV chargers

Smart EV chargers

Deliberate marketing of the list of approved smart EV chargers. As a priority "smart" product, EECA is positioned well to regulate the smart functionality of EV chargers, once our legislation is amended.

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We need your support
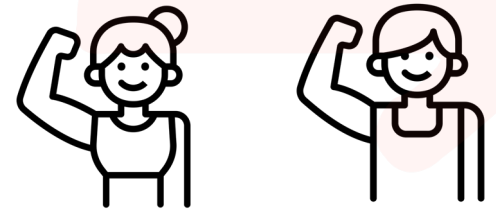
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Questions?

Flexibility progress requires more focus on the human

...how does it become easier for people to make choices and use flexibility?

Future FlexTalk: Connecting the dots and planning next steps
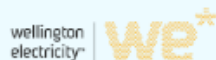
10 September 2024

FLEXFORUM

We will be focusing on 4 things over the coming year

Updating the Flexibility Plan and checking progress

- the updated Flexibility Plan will go a bit further to include a sequenced roadmap for flexibility development with 3, 5 and 10 year milestones
- assessing progress against the Flexibility Plan is a necessary condition for effective coordination and collaboration

More deep dives on gnarly topics

- We can make consultation less painful and more productive by using 3-month sprints leveraging the diverse and deep expertise of FlexForum Members to work out where the facts are not known or agreed, where trade-offs are required, and to identify a good direction and keep moving

More learning-by-doing…that focuses on the critical priorities and is inclusive

- We willidentify 4 or more MVPs/pilots/trials at the inaugural Flex Day that keep things moving towards whatever good looks like

More openness on learning-by-doing

- We will keep (over?) sharing what we do and are thinking. Our Knowledge Hub will be available to host information on what is planned, is happening and learned – ball is in your court

Learning-by-doing to identify minimum viable propositions

Learning-by-doing will show us HOW to deal with the list of challenges and opportunities of the fundamental changes to the power system

Two areas which require much more learning-by-doing effort are:

– How to provide people with the ability to easily get personalised information and advice either directly or from advisers?

– How can the holes in the value stack be filled and provide people with (pricing) signals about when, where and how flexibility is valuable?

We cannot credibly demonstrate things work while treating households and businesses as non-playing characters…

FLEXFORUM

Thanks

FLEXFORUM

info@flexforum.nz to get involved

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Questions?

Topics:

- Scope

- Deliverables

- Approach

- Initial findings

- Stakeholder engagement - Survey

- Next steps

Scope

The scope will include a literature review of the flexibility projects undertaken in NZ.

This will include review of the publicly available information as well as information gathered through stakeholder engagement covering suggested topics.

In addition, a quick scan will be done for similar information on key flexibility initiatives from the selected international jurisdictions e.g., USA, Europe, UK, Japan, Korea, and Australia.

Literature Review Research topics to consider include:
- Use of data and IT
- DSO and hosting capacity
- Dynamic operating Envelopes (DOEs) and network monitoring
- DER integration
- DER model comparisons
- Standards review
- Algorithms for the control and optimisation of major household appliances
- Methods to maximise use of data
- Aggregators - including procurement, design, build, integrate and testing of aggregator platforms
- Customer behavioural aspects of energy use, energy savings and market participation
- A high-level overview of what standards are being utilised in each of these jurisdictions to enable flexibility, and also how these jurisdictions are ensuring standardisation across their systems

Deliverables

Initial findings- EA Technology will present these findings in the workshop organised by EEA on 10th September and will collate the feedback.

Survey – Encourage delegates that are attending the workshop to fill a survey. I

Report- an excel spreadsheet and a slide pack will be provided listing all the flexibility projects. The slide pack will provide a very brief explanation of the methodology, high-level overview of the findings, and key insights.

Project Name:
Project Category: *(Please chose from Technical, Regulatory, Societal, financial or logistical)*
Area of Operation: *(Clearly identify the area of operation i.e., identifying technical barriers and solutions; customer engagement; pricing etc.)*
Project status: *(Please choose from: Initiation; planned; in-progress; complete/published)*
Lead Organisation: *(Clearly identify the organisation who has overall responsibility for ensuring that the project is or has been delivered)*
Project partners: *(Clearly identify all the organisation, or groups etc., who have/will be providing direct support or value to the project)*
Project location: *(Clearly identify the general location and/or areas where the project is/was undertaken)*
Project objectives: *(Provide the specific, measurable outcomes that a project aims to achieve – dot points)*
Project description: *(Provide a brief high-level summary of the project including the need and action/approach used. This could also describe the scale and/or project budget if applicable)*
Key Project Deliverables: *(Provide a list of the key quantifiable aspects from the project that mark a completion i.e. Report, analysis, plan, design, roadmap etc...)*
Key learnings: *(Provide a summary of the projects successes, valuable insights and failures)*
Links: *(i.e. Provide links to Reports, websites etc...)*
Project contact: *(Provide name and email if applicable)*

Approach

Step 1: Environmental Scanning -EA Technology will design and conduct a survey in consultation with EEA to collect key information from NZ EDBs, government agencies, and regulatory bodies.
In parallel, EA Technology will also conduct online search for similar information from NZ, USA, Europe, UK, Japan, Korea, and Australia. This will also include searching for flexibility initiatives carried out under the banner of regulators, government and industry bodies, and other community organisations.

Step 2: Firming up the scope-The scope will be tweaked and confirmed based upon the online search, survey responses, and the feedback received during the 10th September workshop.

Step 3: Stakeholder engagement -It is proposed to engage with the key stakeholders during the workshop as well as 1:1 to collect targeted information.

Step 4: Report - A draft report (an excel spreadsheet and a slide pack) will be prepared for the review and the final report will be submitted after incorporating feedback from EEA and the key stakeholders.

Initial Findings- Highlights

➤43 Projects / Initiatives identified so far

    ➤NZ   17 projects
    ➤UK   5 projects
    ➤Australia   12 projects
    ➤USA   4 projects
    ➤EU   5 projects

The following classification is used for these projects:

Project Category

        Technical
        Regulatory
        Societal
        Financial
        Logistical

Area of Operation

- Identification of Technical Barrier / Solutions
- Customer Engagement
- Pricing & Incentives
- Roles & Responsibility
- Other

Often area of operation is more than one and overlapping e.g., customer engagement is essential for anything else to be done for all flexibility projects

Preliminary Findings- Insights

NZ is exploring, mapping & trialling:

- Communication protocols for DER/CER coordination and dispatch

- Battery VPP

- Commercial mechanisms for demand flexibility

- LV data integration, visibility, analysis and data access to customers

- DER/CER integration to defer network investments

- Hosting capacity information and network utilisation

- Dynamic control of Boilers

- Managed EV charging

- Flexibility market principles

- Time of use tariffs

- BESS

Preliminary Findings- Insights

Internationally – Progressing Towards:

- Dynamic/locational pricing for flexibility procurement
- Regulatory rule changes for households to participate in the flexibility market
- Different types of the flexibility services-short term, day ahead, month ahead
- Managed EV charging (ToU and DSM) and V2G (FCAS from EVs)
- Large VPP, EV VPP
- Dynamic control of hot water systems, supermarket refrigeration/ac, grocery stores, warehouse loads
- Orchestrated home energy management system
- Real-time integration of DER/CER including distribution operating envelopes, forecasting, bids and dispatch
- Dynamic pricing to allocate network capacity and rewards
- Dynamic pricing and load flex e.g., HVAC, EV, Pumping etc.
- Testing software based 'platforms' to register, aggregate and orchestrate DER
- Demand response
- Load flexibility
- Use of flexibility by Distribution System Operators (DSO) and their interaction with the new flexibility markets
- Deploying AI, ledger technologies, peer-to-peer trading and a toolbox comprising advanced monitoring and prediction algorithms
- Orchestration of advanced electricity grid models and tools, flexibility assets' management tools, and data analytics and accurate RES forecasts
- Software-as-a-Service (SaaS) platform that operates as a powerful virtual building management system

Survey

Flexibility Projects across New Zealand

Through this form, we would like to gain a high-level overview into the flexibility projects in NZ.

1. Provide a list of flexibility projects in NZ - recently completed in the last three years, ongoing and planned. *

2. Share further details on key flexibility projects - project name, objectives and point of contacts. Please let us know who we can get in touch with for more information on these projects. *

3. Any further comments? If you would like to share more insights into the flexibility projects in NZ, please send your resources to Yogendra.Vashishtha@eatechnology.com *

Please share your details.

4. Name *

5. Email *

6. Company *

7. Job Title *

Here's a link to the form:
https://forms.office.com/e/D3cKmRy4NC

Next Steps

1. Provide information on the projects as not all information is available publicly e.g., standards utilised to enable flexibility.

2. Further help identify more flexibility projects in NZ and internationally.

3. Prepare input for an interactive resource on flexibility.

4. Ensure this remains relevant with 6 monthly updates.

5. Establish context such as Flexibility potential and Flexibility needs (DER/CER scenarios & trends, network size, regulations, markets), relationships of these projects, interdependencies and lessons learned.

6. Benchmark the journey on a maturity scale.

Thank you

Connect with us on LinkedIn!

EA Technology:

Dr Yogendra Vashishtha

Head of Future Networks
EA Technology AUS

yogendra.vashishtha@eatechnology.com

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Questions?

Current state – What else? *Exercise 1*

Objective: The following audience interactive exercise seeks to identify projects missing from the scan and make linkages between international projects and local projects

PROJECT NAME

LEAD ORGANISATION

LOCATION

PROJECT CATEGORY

☐ Technical ☐ Regulatory ☐ Societal ☐ Financial ☐ Logistical

AREA OF OPERATION

☐ Identification of technical barriers/solutions ☐ Customer engagement ☐ Pricing & incentives ☐ Roles & responsibilities

Other (please specify):

STATUS

☐ Initiated ☐ Planned ☐ In-progress ☐ Complete / published

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Current state – What else? *Exercise 1*

Instructions:

1. Please fill in the provided templates identifying demand flexibility projects not identified in the scan, runners will gather templates as completed to be populated on the map . *10 min*

2. *Group discussion (per table)* Are there synergies (or differences) between international projects and local projects? What synergies and differences exist?

PROJECT NAME

LEAD ORGANISATION

LOCATION

PROJECT CATEGORY

☐ Technical ☐ Regulatory ☐ Societal ☐ Financial ☐ Logistical

AREA OF OPERATION

☐ Identification of technical barriers/solutions ☐ Customer engagement ☐ Pricing & incentives ☐ Roles & responsibilities

Other (please specify):

STATUS

☐ Initiated ☐ Planned ☐ In-progress ☐ Complete / published

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Morning Tea 10.20 – 10.50am

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Session 2 – Connecting the Dots and Planning Next Steps

MC Stuart Johnston

11.00am Australian Perspectives and key lessons for NZ on consumer and household grid integration – Bill Lilley, RACE2030

11.40am FlexTalk: Planning next steps – Rodger Griffiths, Connie Dunbar & Terry Paddy

12.15pm FlexTalk: Interactive session to define scenarios to test

12.40pm FlexTalk: What must we solve next?

12.45 Closing remarks – Stuart Johnston, EEA

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Agenda

- RACE for 2030 CRC
- Drivers in Australia
- Systems innovation
- RACE's CER Unleashed report
- SAPN Energy Masters
- Other RACE network projects
- CSIRO's National Energy Analysis Centre
- Key observations of FlexTalk
- Lessons from RACE and Australia

RACE for 2030

Reliable Affordable Clean Energy for 2030 CRC

Focused on emissions reduction and decreased energy costs for end-users.

Targeting demand-side actions within a whole of system solution.
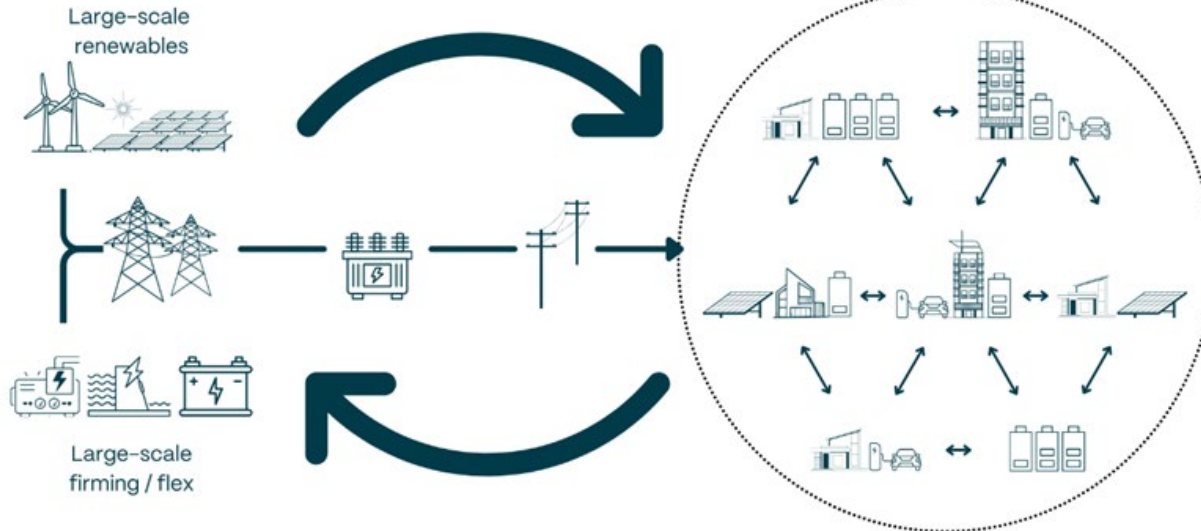
RACE for 2030 research programs
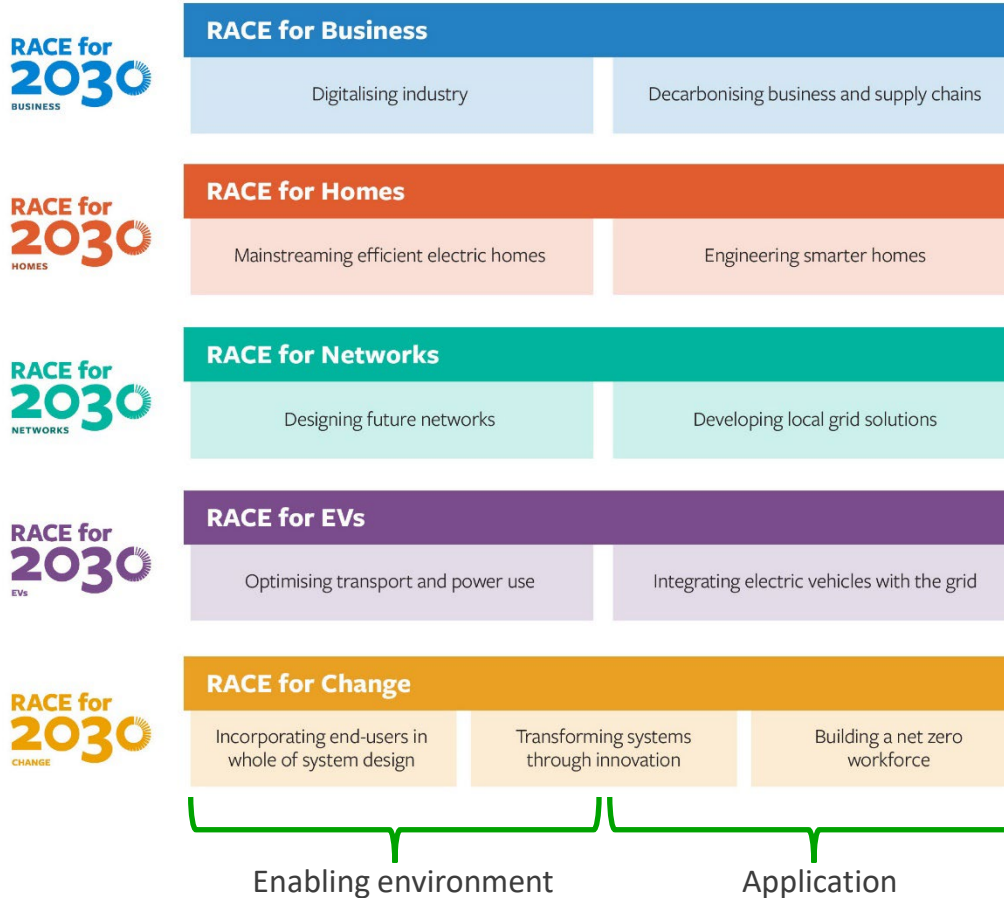
Historical growth in CER

- Australia is leading the pack with rooftop PV
  - ~5m Australians live in post codes where greater than 50% of homes have PV
  - And we have rapidly developed solutions for their integration.
- But Australia is a laggard in EV adoption
  - So, we can learn from others and our PV experience.

Per capita electricity generation from solar

Share of new cars sold that are electric

RACE for
2030
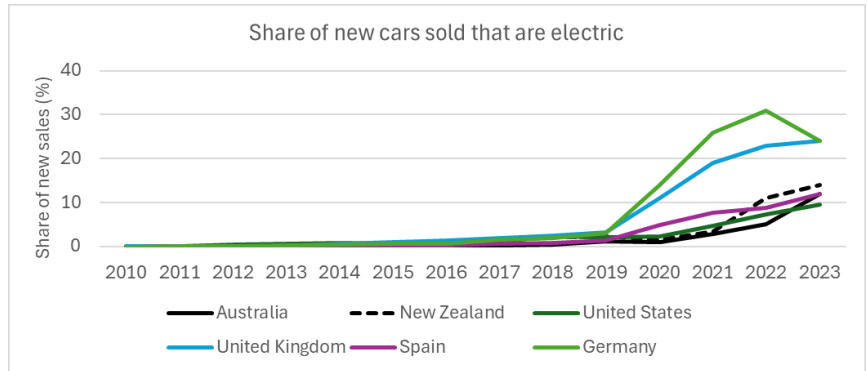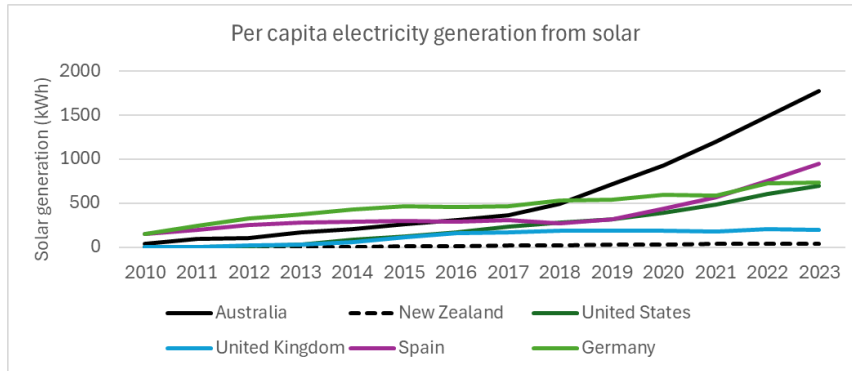
Forecast growth in CER
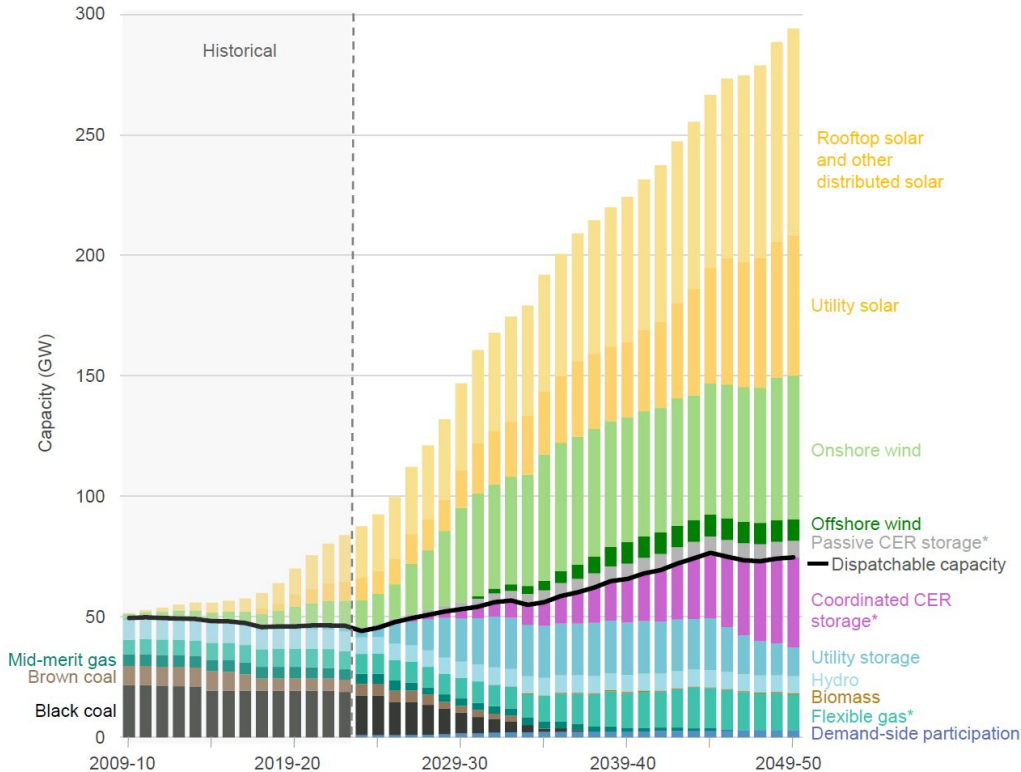
The Australian market operator (AEMO) foresees a continual expansion of CER generation and storage.
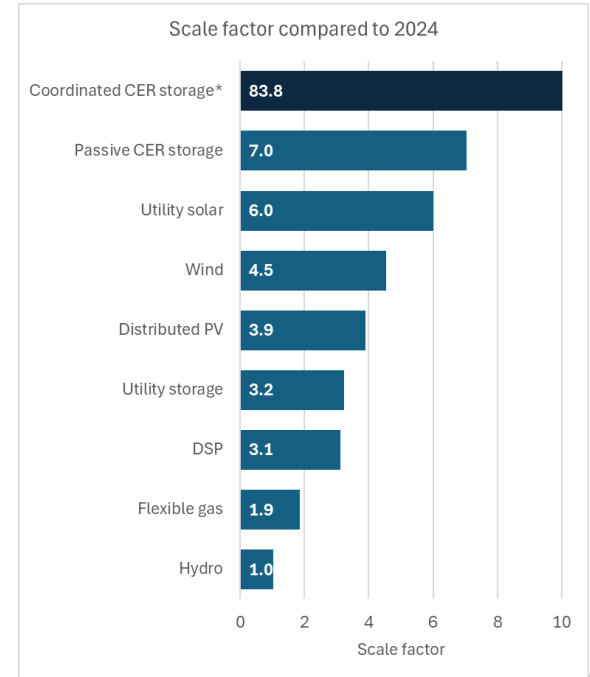
And RES continues to be underestimated in forecasts
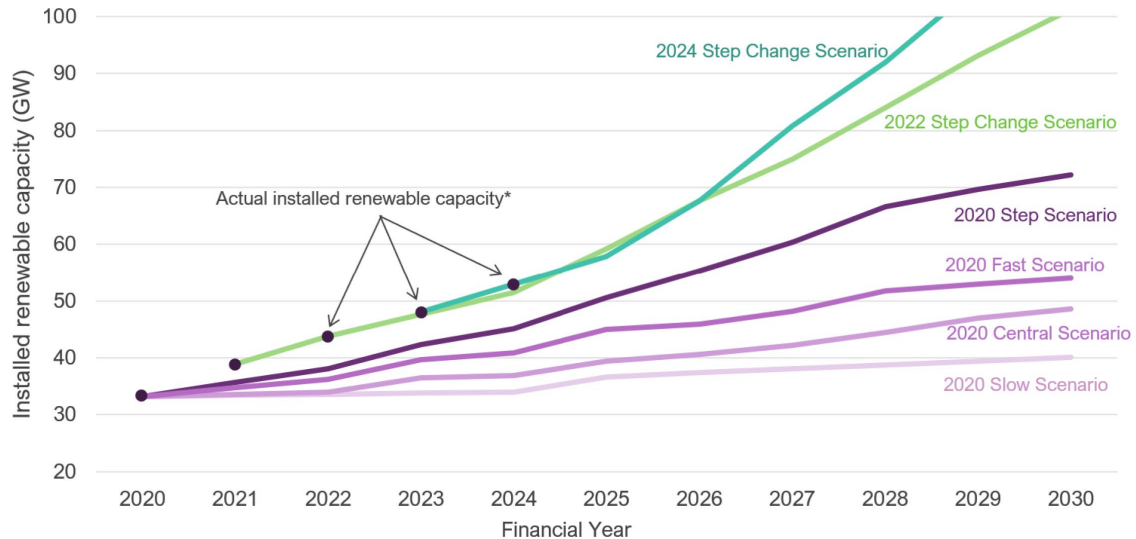
- Renewable technology uptake has been underestimated locally and internationally.
- This can restrict our planning activities, limiting our ability to respond to new challenges.

We are facing technical challenges today
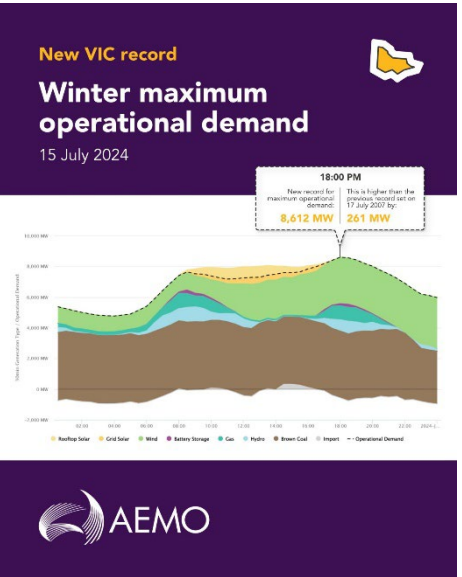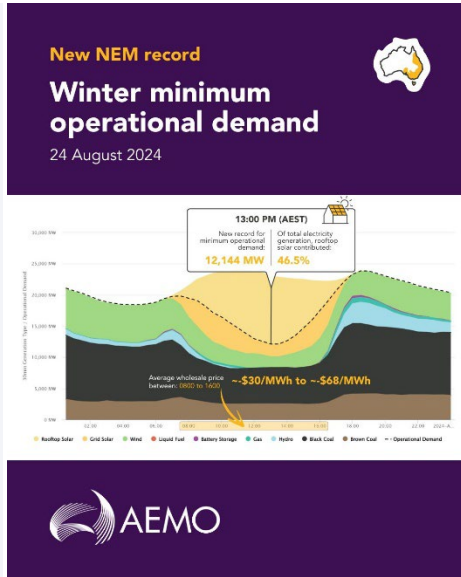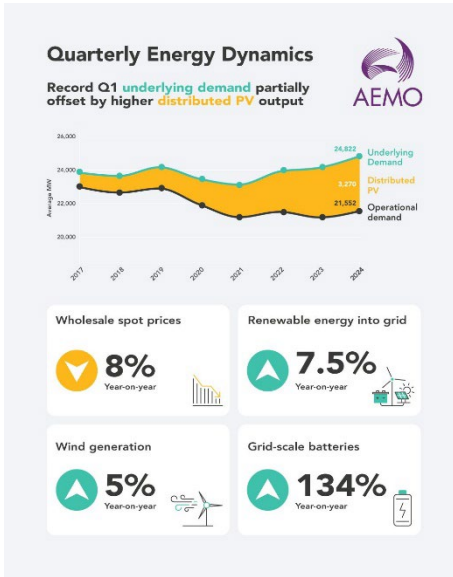
- Records are being continually broken
- But often we are too focused on incremental technocratic solutions and the tyranny of the urgent

System design challenges

- Developing short, medium and long-term actions that resonate with *all* stakeholders
- Addressing near-term concerns without locking-out or delaying long-term solutions
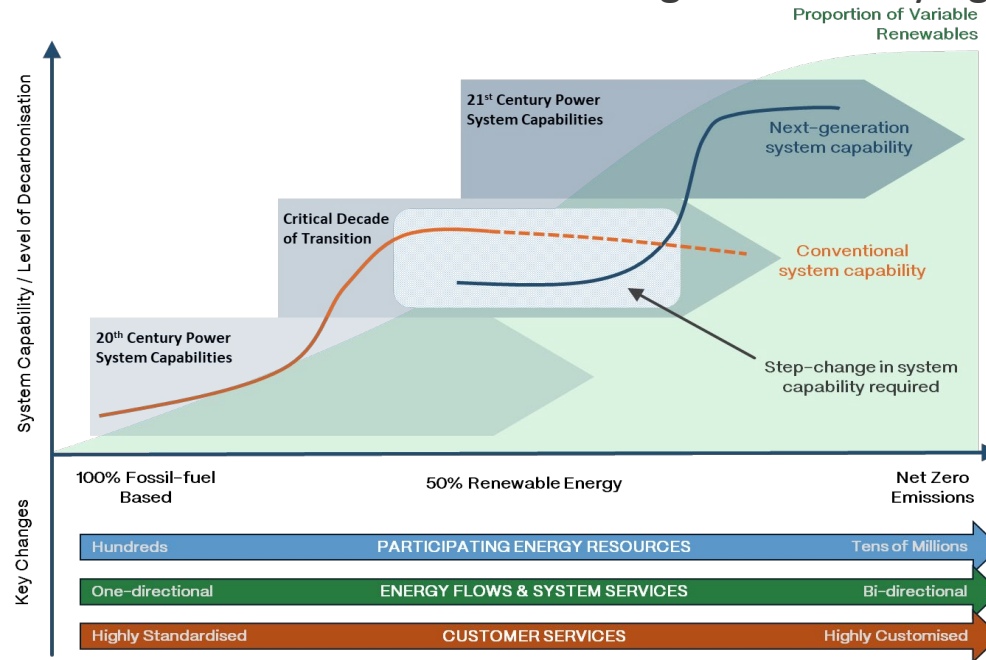
System design challenges

- In Australia, AEMO is looking to fast-track system design efforts recognizing the step change scenario requires new capabilities.
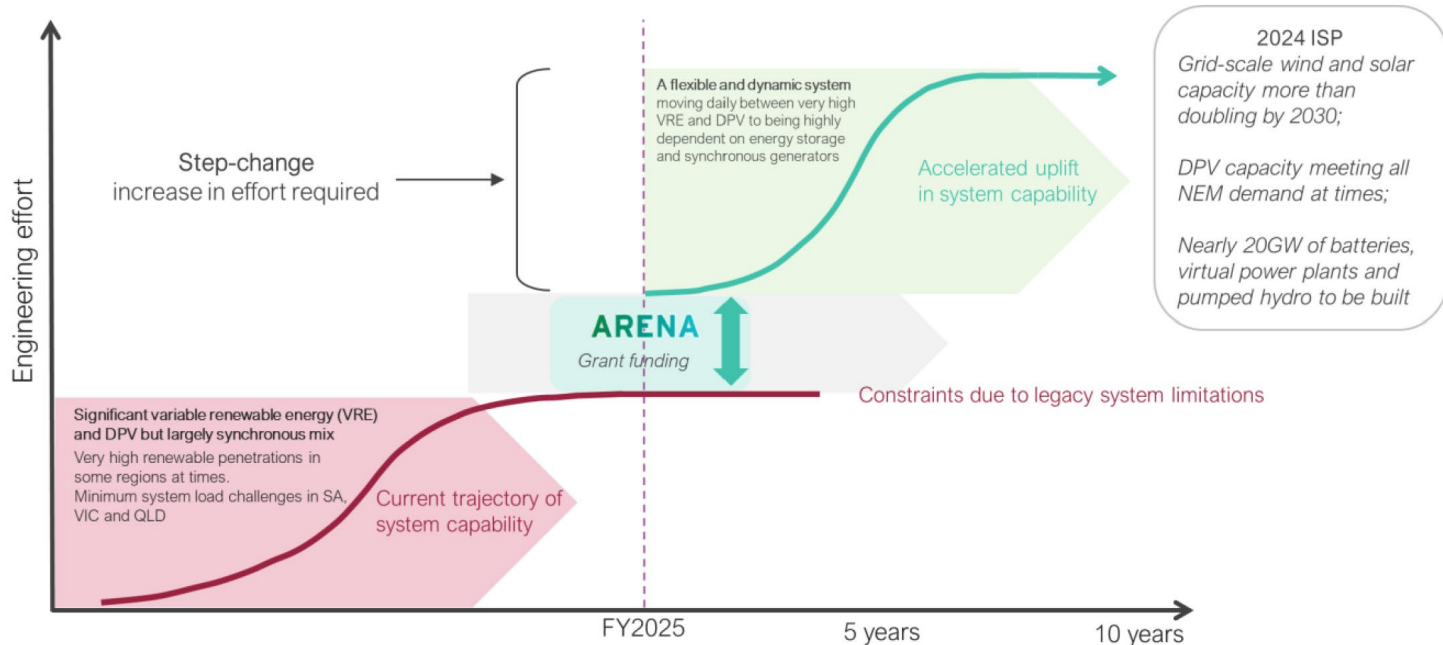
RACE innovation framing for systemic change

- The role of CRCs is to embed innovation from research into industry

- We utilise an innovation framework to consider a balance of levers to drive systemic change
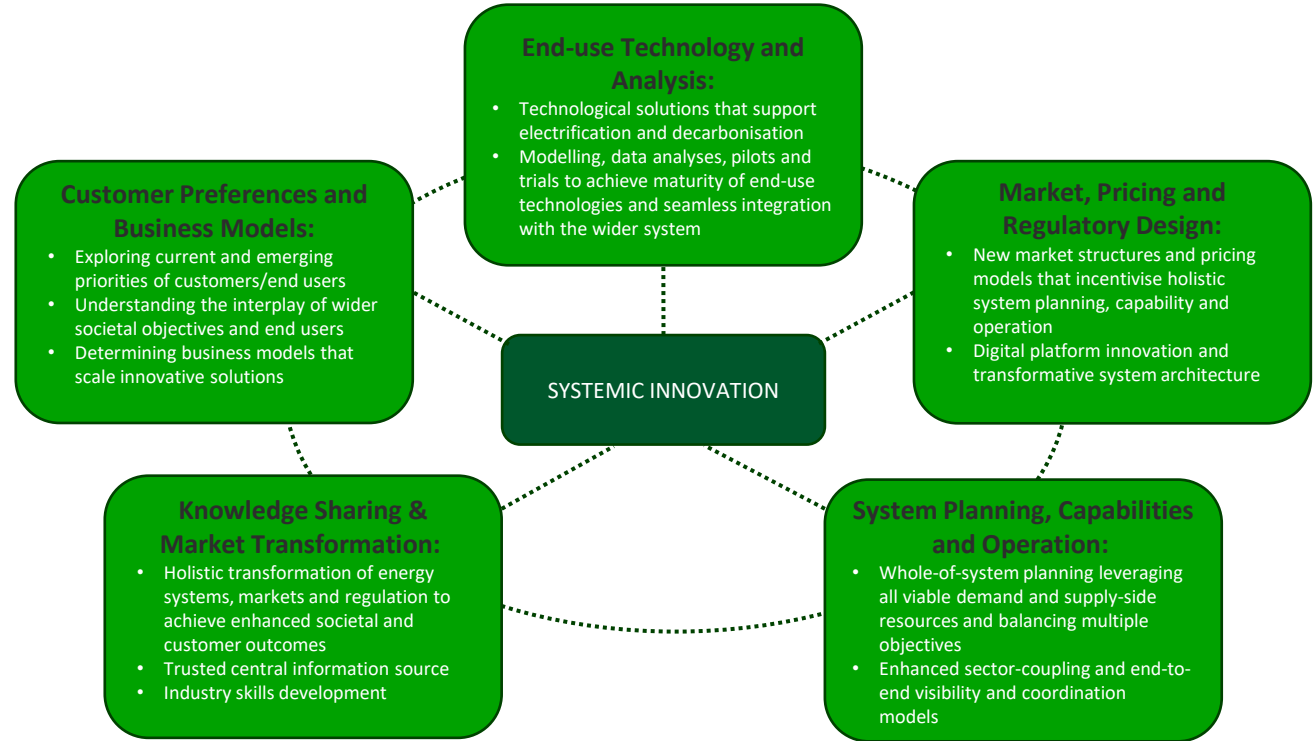
> " I can't learn stuff without a framework into which to put it. "

Stephen Wolfram

SYSTEMIC INNOVATION

End-use Technology and Analysis:
- Technological solutions that support electrification and decarbonisation
- Modelling, data analyses, pilots and trials to achieve maturity of end-use technologies and seamless integration with the wider system

Customer Preferences and Business Models:
- Exploring current and emerging priorities of customers/end users
- Understanding the interplay of wider societal objectives and end users
- Determining business models that scale innovative solutions

Market, Pricing and Regulatory Design:
- New market structures and pricing models that incentivise holistic system planning, capability and operation
- Digital platform innovation and transformative system architecture

Knowledge Sharing & Market Transformation:
- Holistic transformation of energy systems, markets and regulation to achieve enhanced societal and customer outcomes
- Trusted central information source
- Industry skills development

System Planning, Capabilities and Operation:
- Whole-of-system planning leveraging all viable demand and supply-side resources and balancing multiple objectives
- Enhanced sector-coupling and end-to-end visibility and coordination models

RACE for 2030

*Expanding and refining IRENA innovation framework: https://www.irena.org/Publications/2023/Jun/Innovation-landscape-for-smart-electrification

Consumer Energy Unleashed

Mapping Australia's CER/DER priorities to unlock billions in customer, societal and whole-system value.

Purpose of our report:

- To examine Australia's portfolio of CER/DER studies, trials and demonstration projects
- To map the priority gaps that must be addressed to unleash their full potential
- To enable efficient, low carbon and self-balancing future power systems that serve the long-term interests of all consumers.

Consumer Energy Unleashed

Mapping Australia's CER/DER priorities to unlock billions in customer, societal and whole-system value.

182 x CER–related Studies, Trials & Demonstrations

T1. Customer & Societal Objectives for Future System
- D1.2 Customer Objectives
- D1.1 System Transformation Directions
- D1.3 Societal Objectives

T2. End-use Solution Innovations
- D2.2 Specific End-use Technologies
- D2.1 End-use Device/Technology Capabilities
- D2.3 Business Model Innovations

T3. Market, Pricing & Regulatory Innovations
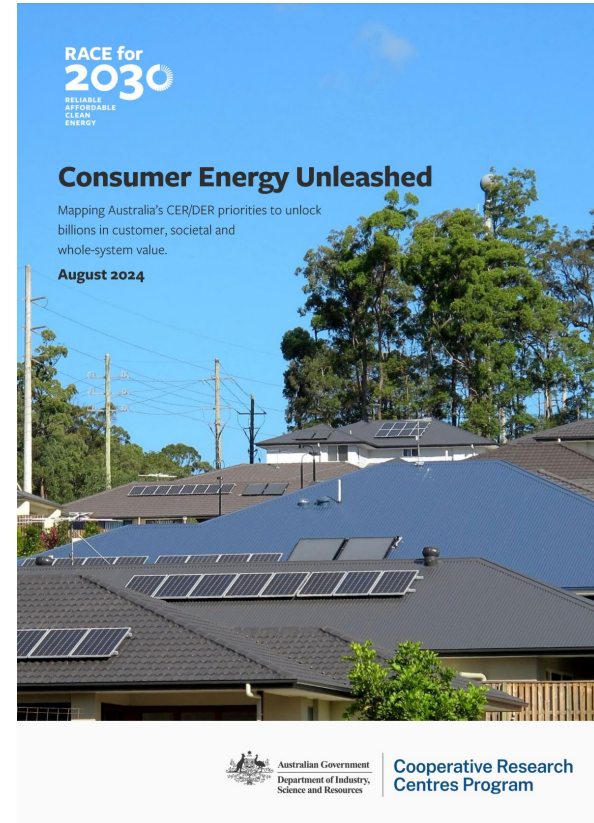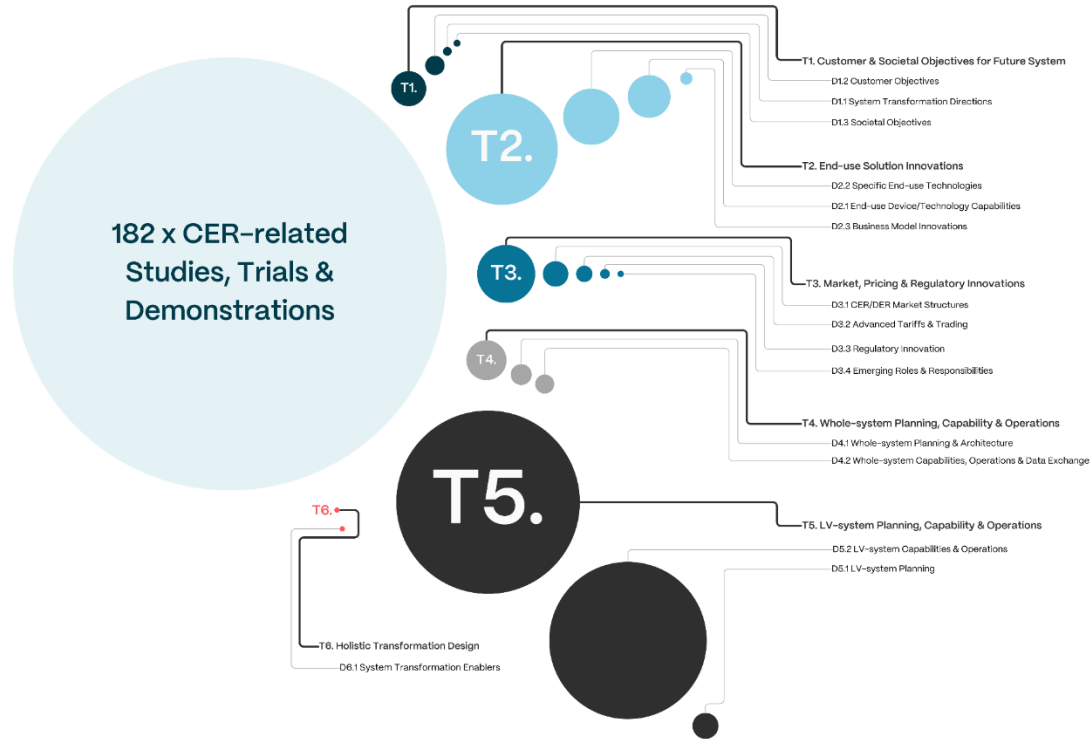- D3.1 CER/DER Market Structures
- D3.2 Advanced Tariffs & Trading
- D3.3 Regulatory Innovation
- D3.4 Emerging Roles & Responsibilities

T4. Whole-system Planning, Capability & Operations
- D4.1 Whole-system Planning & Architecture
- D4.2 Whole-system Capabilities, Operations & Data Exchange

T5. LV–system Planning, Capability & Operations
- D5.2 LV-system Capabilities & Operations
- D5.1 LV-system Planning

T6. Holistic Transformation Design
- D6.1 System Transformation Enablers

We used a combination of our innovation framework and a scoring index to evaluate:
- 182 x CER/DER initiatives (high-level)
- Comparison over 6 x Themes
- Comparison over 15 x Domains
- Comparison over 61 x Research Topics

The scoring focused on a progression from:
- Studies → Trials → Full Deployment

High Focus	Moderate Focus	Low Focus
Theme 5 LV-system Planning, Capability & Operations *(42%)*	**Theme 3** Market, Pricing & Regulatory Innovations *(13%)*	**Theme 1** Customer & Societal Objectives for Future System *(8%)*
Theme 2 End-use Solution Innovations *(26%).*	**Theme 4** Whole-system Planning, Capability & Operations *(9%).*	**Theme 6** Holistic Transformation Design *(1%).*

2030

Edith

Symphony

1.56
2.10
2.29
1.79
2.91
1.71

Energy Masters Pilot
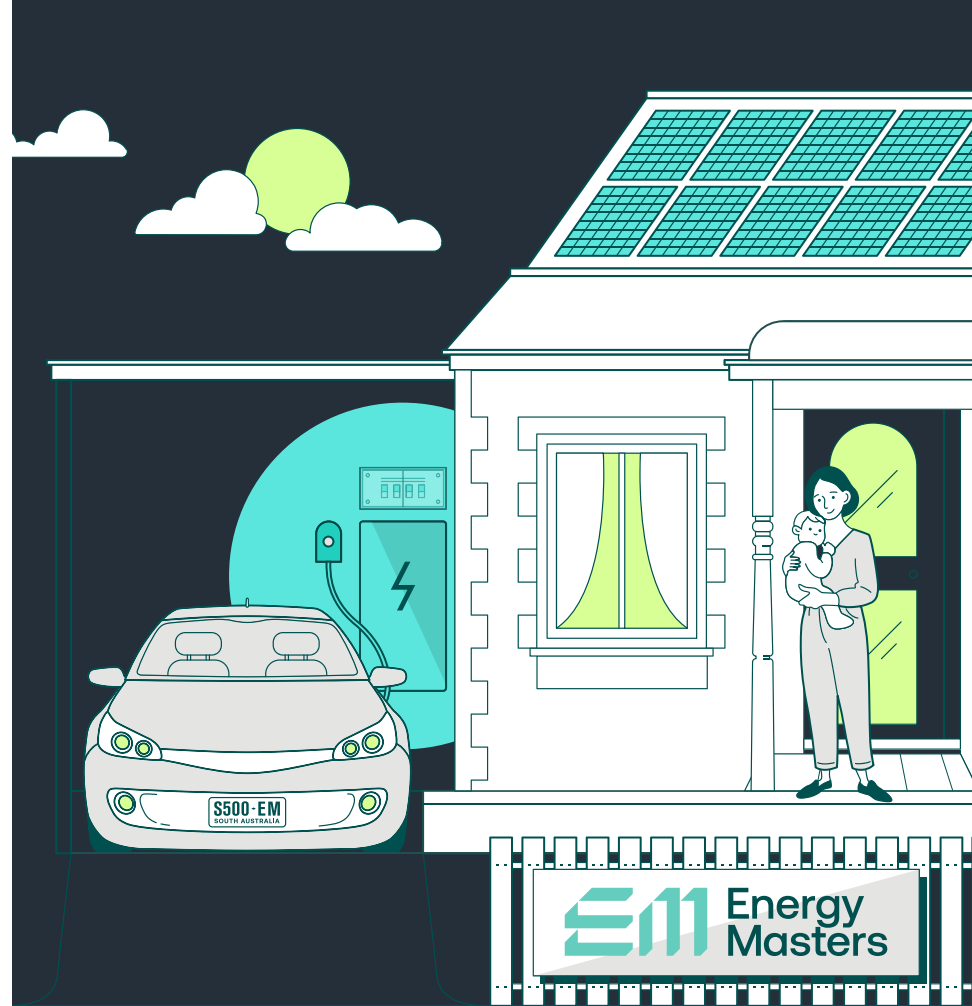
SA Power Network's evolution in interoperability

Non-standardised | Standards based interoperability

Basic CER
Solar & batteries
Solar PV and batteries have no remote management capabilities

VPPs
Home batteries
Residential batteries remotely managed to release market benefits and provide grid support services

Salisbury VPP trial

Advanced VPP Grid Integration

Flexible Exports
Smart Solar
Solar systems provided with dynamic export limits to manage network constraints and become market-aware

Flexible Exports for Solar PV

Market Active Solar trial

Energy Masters will standardise

Dynamic Operating Envelopes
Bi-directional limits for smart appliances within the home - PV, batteries, hot water, heater, EV charger, etc

- Responding to network export & import limits published by a DNSP

Orchestrated Homes
Market active PV, batteries, hot water, heater, EV charger

- Responding to market signals and optimisation from a retailer/aggregator

- Sophisticated optimisation of energy use within the home

- Operating within the DoE published by the DNSP

Smart Home Vision
*Customers have access to simple retail offers enabled by **smart 'plug-and-play'** CER/appliances and home energy management technology*

2010 - 2017 | 2017 - 2019 | 2020 - 2023 | 2023 - 2026 | 2030+

Why Energy Masters?

Electrification is the next big thing for our industry

Twice the electricity usage

13 million EVs

6 million home batteries

50% of homes with PV

Demand flexibility presents new opportunities

Avoided network build ~$11.3 B

Avoided generation and storage $8-18 B
Improved market efficiency

Improved solar self-consumption
Reduced energy bills and emissions

But barriers exit today

Lack of interoperability standards
Technical capability

Simple, accessible energy offers

Customer benefit or reward
Customer willingness
Customer understanding and trust

Energy Masters Scope

- Recruit 500 homes

- Install HEMS and electric appliances with subsidy support

- Develop and trial new energy offers and demand flexibility technologies

- Run an 18-month research program exploring technical, policy and behavioural barriers

- Inform the design of interoperability standards for national adoption

- Deliver knowledge sharing to stimulate industry and accelerate scale up
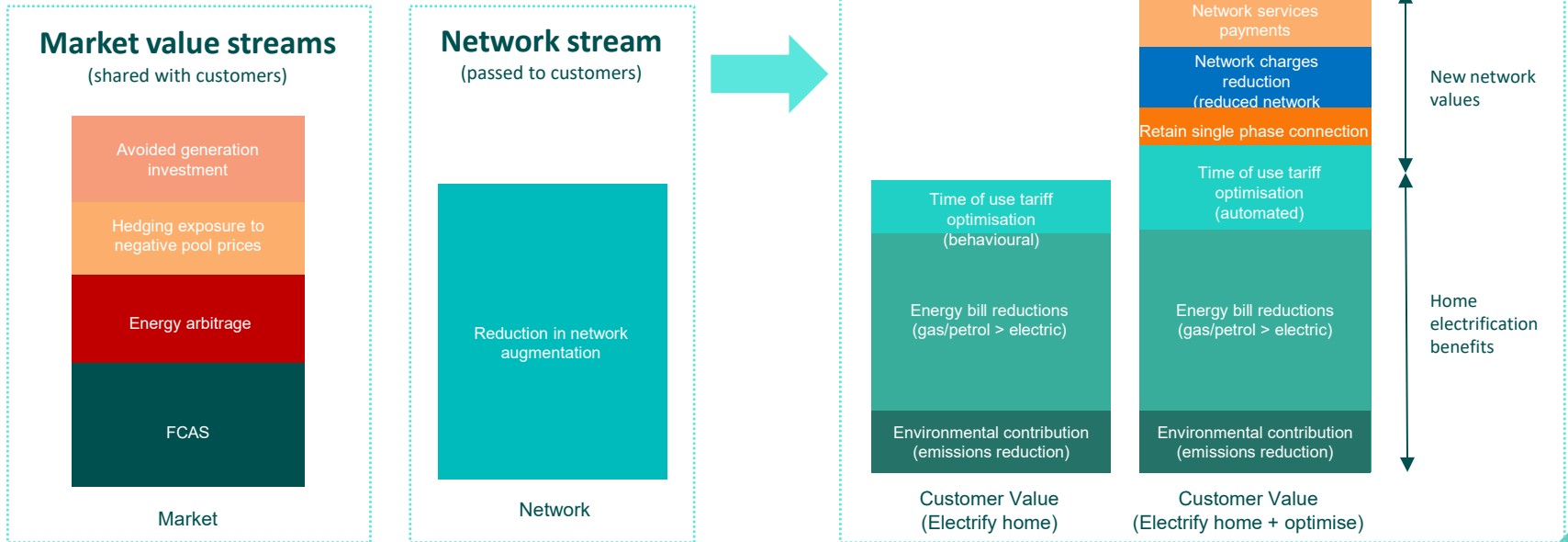
Demand flexibility will unlock new customer, electricity market, and network values, but these bring added complexity and cost

We are searching for the 'sweet-spot' between complexity, cost, value and customer acceptance

Orchestrated electric home

Optimised electric home

Simple electric home

Value

Complexity
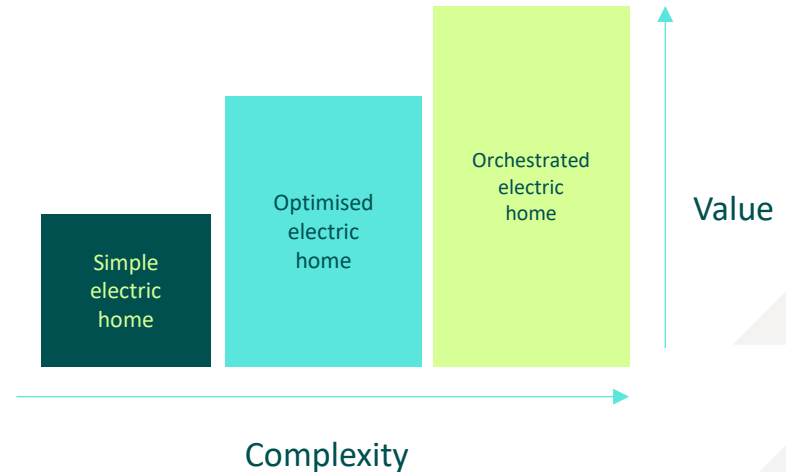
What are the new values?

We are seeking to 'grow the size of the pie' by accessing the new values for customer benefit

Market value streams
(shared with customers)

- Avoided generation investment
- Hedging exposure to negative pool prices
- Energy arbitrage
- FCAS

Market

Network stream
(passed to customers)

Reduction in network augmentation

Network

Customer Value Streams

- Avoided generation energy bill reduction
- Retail reimbursement for market services
- Retail pass down of wholesale price reduction (hedging neg pool price)

New market values

- Network services payments
- Network charges reduction (reduced network
- Retain single phase connection

New network values

- Time of use tariff optimisation (behavioural)
- Energy bill reductions (gas/petrol > electric)
- Environmental contribution (emissions reduction)

Customer Value
(Electrify home)

- Time of use tariff optimisation (automated)
- Energy bill reductions (gas/petrol > electric)
- Environmental contribution (emissions reduction)

Home electrification benefits

Customer Value
(Electrify home + optimise)

Other RACE network projects

- Demonstrating pathways for Urban REZ
- Understanding Power System Dynamics with High Levels of Grid-forming Inverters
- AI Technologies in network operations
  - Layering technologies for impact
  - 3D Digital twins for visualisation (Gaming platforms for speed and accessibility)
  - Machine Learning to develop load flow patters under different known conditions
  - Generative AI to forecast load flow patterns under new scenarios
  - LLM to provide plain language accessibility to interrogating the model
- Diagnostic platforms for sustaining solar output for the longer term
- Smart energy community battery trials
- Scenarios for future living
- Back-casting our future with industry leaders
- Designing reliability into microgrids (PhD)
- Coordinating (enhanced) hosting capacity of CER using AI (PhD)
- Optimal participation of VPPs in energy and reserve markets (PhD)
- Net load and minimum demand in networks (PhD)
- Scalable DOEs (PhD)

CSIRO National Energy Analysis Centre (NEAC)

The National Energy Analysis Centre (NEAC) is an open, collaborative, national energy data and research centre, prioritising a holistic approach to the energy transformation. It features:

A **Living Lab** of 1000s of people in real homes and businesses across Australia, pre-recruited and ready for research.

A **Data Nexus** with rich data and analytical capabilities, structured in a coherent multi-energy systems framework.

An **Insights Platform** with powerful geospatial visualisations and analysis, backed by modern systems science.

Extensive **Innovation Networks** of NEAC users and collaborators.

NEAC will accelerate and de-risk the energy transformation and focus on decarbonisation, resilience, equity, economic opportunity and innovation.

Living Lab: consumer-focused energy system innovation

- Simple interaction with consumers

- Easy to modify to include new technologies

- Supports multiple trials

- Variety of consumers, homes and technologies

- Scalable to '000s of homes

- Combines consumer insight and digital analysis
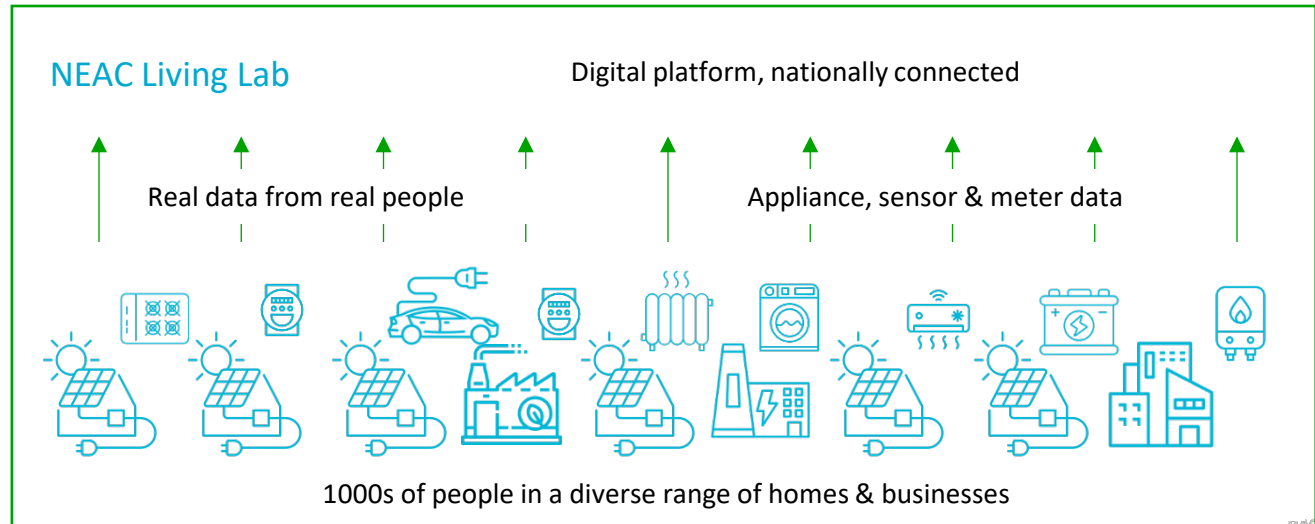
Researchers and innovators

Investors, planners and approvers

Industry, regulators and consultants

Policymakers and public advocates

NEAC Living Lab

Digital platform, nationally connected

Real data from real people

Appliance, sensor & meter data

1000s of people in a diverse range of homes & businesses

RACE for 2030

Key observations in FlexTalk

- Enabling maximum potential of wide-ranging energy resources with consumers at the center
- Initial testing of end-to-end interoperability with emerging storage e.g. EV and batteries.
- Some reluctance by residential and commercial consumers. Consumer related issues include:
  - Economic
  - Behavioural/Informational
  - Technical
- Identified Australia's Energy Charter as a promising collaborative process with consumer and customer representatives sharing critical perspectives and insights with the industry and government

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**FlexTalk: OpenADR®
Technical Insights**

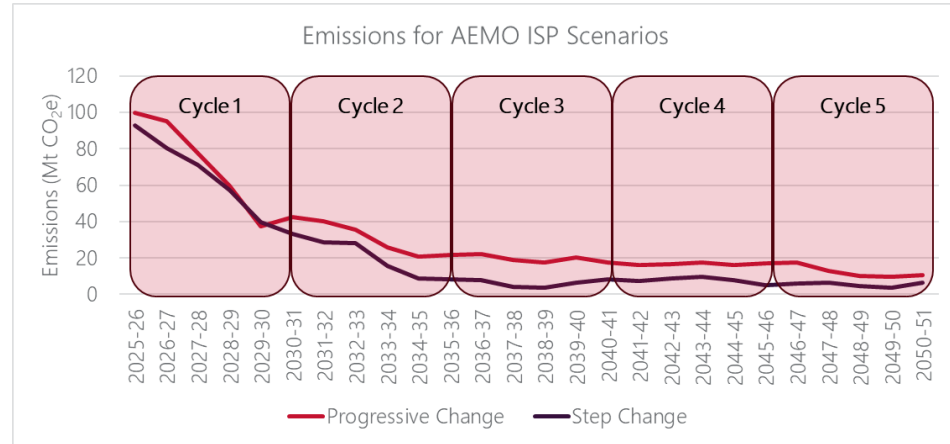eea Electricity Engineers' Association   EECA TE TARI TIAKI PŪNGAO

MAY 2024

ISBN (PDF): 978-1-0670105-1-5

RACE for 2030

Lessons from RACE and Australia

- A substantial set of trials and pilots have been performed.
- Whole-of-system approaches are required to scale.
- Industry, government and research need to work together to drive innovation.
- International collaboration is required to build capacity quickly.
- The public has to be at the center or we will fail.
- Constraints are often technical, solutions are often consumer driven.

Emissions for AEMO ISP Scenarios

Thank you!

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Questions?

eea | Electricity Engineers' Association

EECA
TE TARI TIAKI PŪNGAO
ENERGY EFFICIENCY & CONSERVATION AUTHORITY

The future is electric

Energy is becoming more decentralised yet still interconnected

Electricity networks must be responsive to shifting demands for traditional services while enabling new opportunities for energy resource sharing and balancing.

Consumers now have choice and control!

CLEAN ENERGY TRANSITION

LOWER BILLS FOR VALUED SERVICES

CONSUMER CHOICE & CONTROL

SAFE, RELIABLE & SECURE

FAIRNESS & INCENTIVES

Source: CSIRO and Energy Networks Australia, 2017: Electricity Networks Transformation Roadmap: Final Report

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The role of flexibility

Flexibility in the energy system can contribute to resolving the key challenges

1. Avoiding the curtailment of renewables by utilising flexible demand at times of high supply.

2. Avoiding the deployment of peak generation capacity

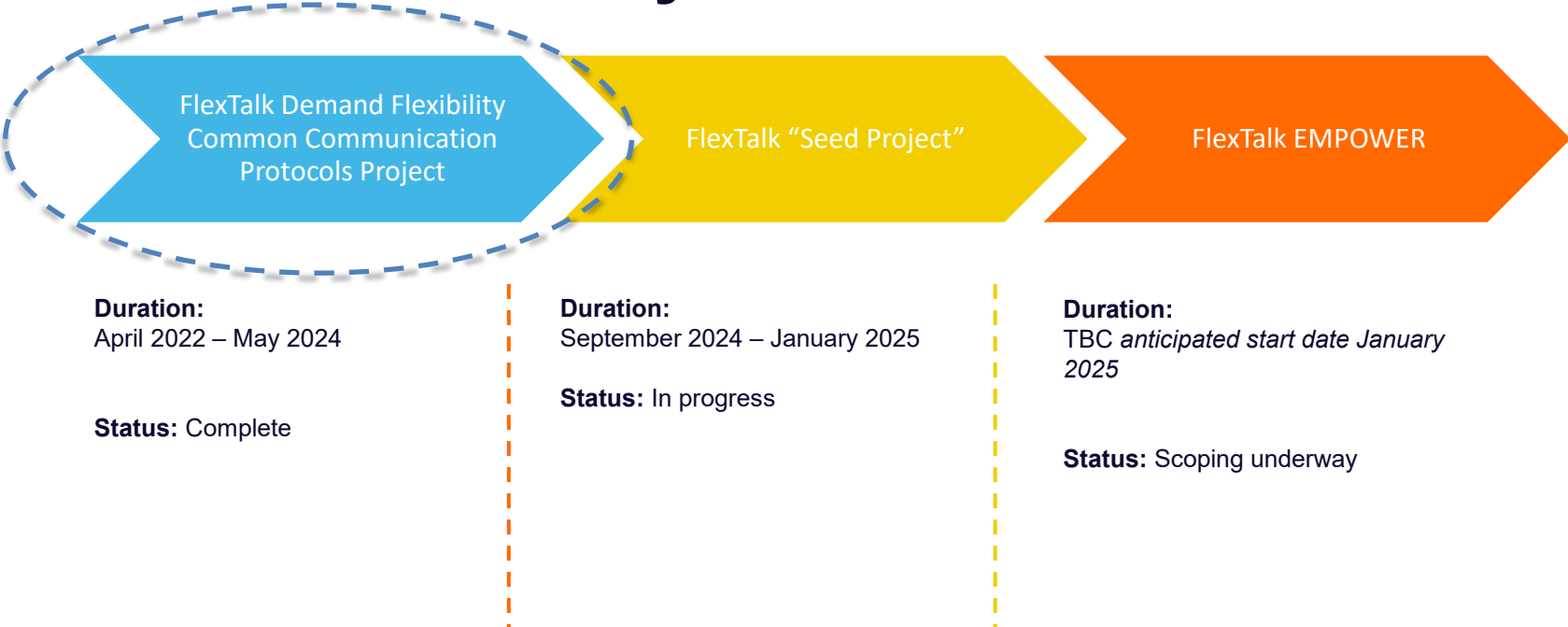3. Deferring grid and network infrastructure investment

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The value of flexibility

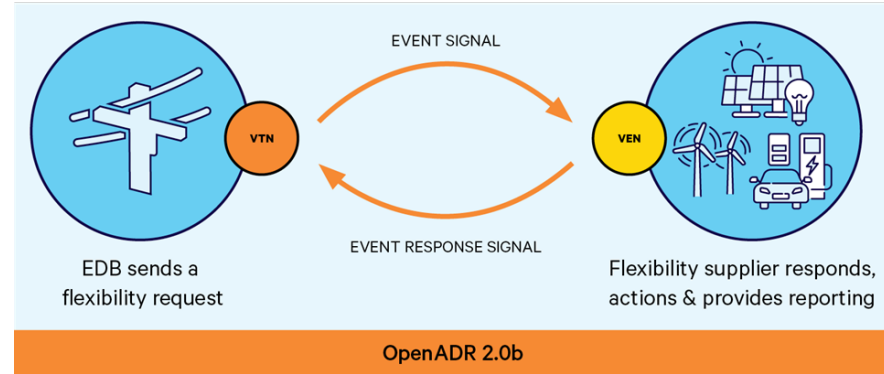Figure 1: An estimate of the stacked value which could be provided using flexibility in 2035
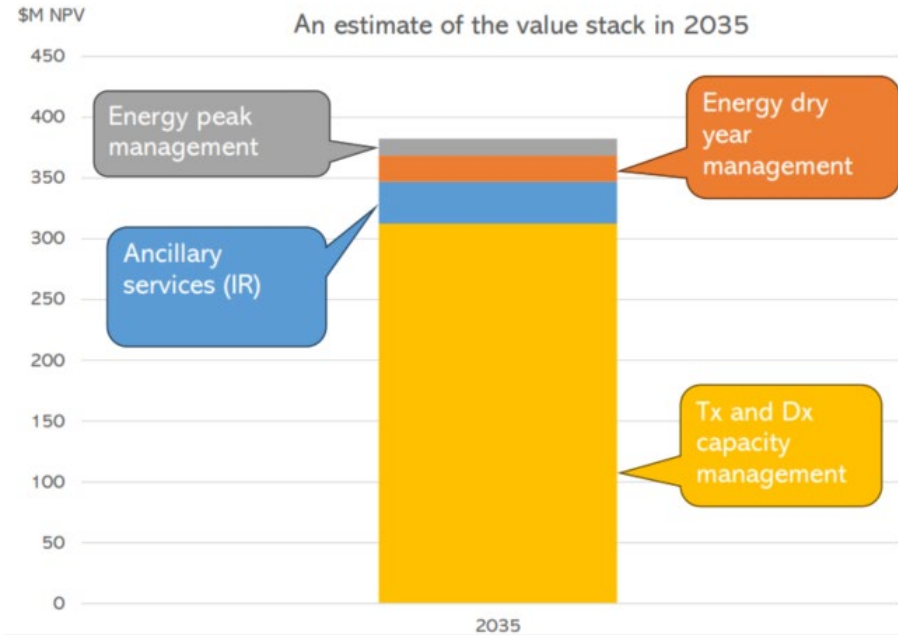
Source: FlexForum and Sapere, September 2021, Cost-benefit analysis of distributed energy resources in New Zealand. A report for the Electricity Authority
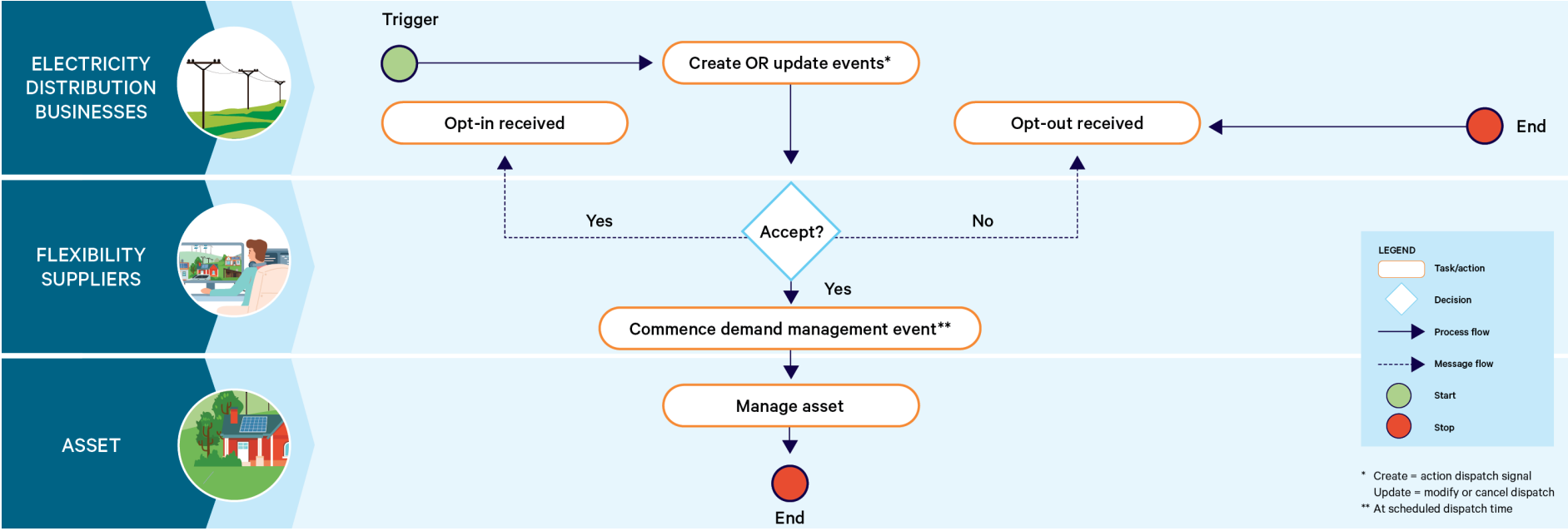
FlexTalk – Delivery overview

FlexTalk Demand Flexibility Common Communication Protocols Project

FlexTalk "Seed Project"

FlexTalk EMPOWER

Duration:
April 2022 – May 2024

Status: Complete

Duration:
September 2024 – January 2025

Status: In progress

Duration:
TBC *anticipated start date January 2025*

Status: Scoping underway

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FlexTalk Common Communications Protocol Project – Recap

- Evaluation of the processes that need to be in place to apply the OpenADR 2.0 (2.0a and or 2.0b) communication protocol to achieve active managed charging of electric vehicles (EVs)

- Enabling flexibility services to be utilised in the electricity sector in New Zealand.

EVENT SIGNAL

EVENT RESPONSE SIGNAL

VTN

VEN

EDB sends a flexibility request

Flexibility supplier responds, actions & provides reporting

OpenADR 2.0b

FlexTalk Demand Flexibility Common Communication Protocols Project

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A flexibility 'event'

FlexTalk seven defined programs

- In Advance
- Dynamic
- Emergency
- Price Responsive Bid
- Price Responsive Discovery
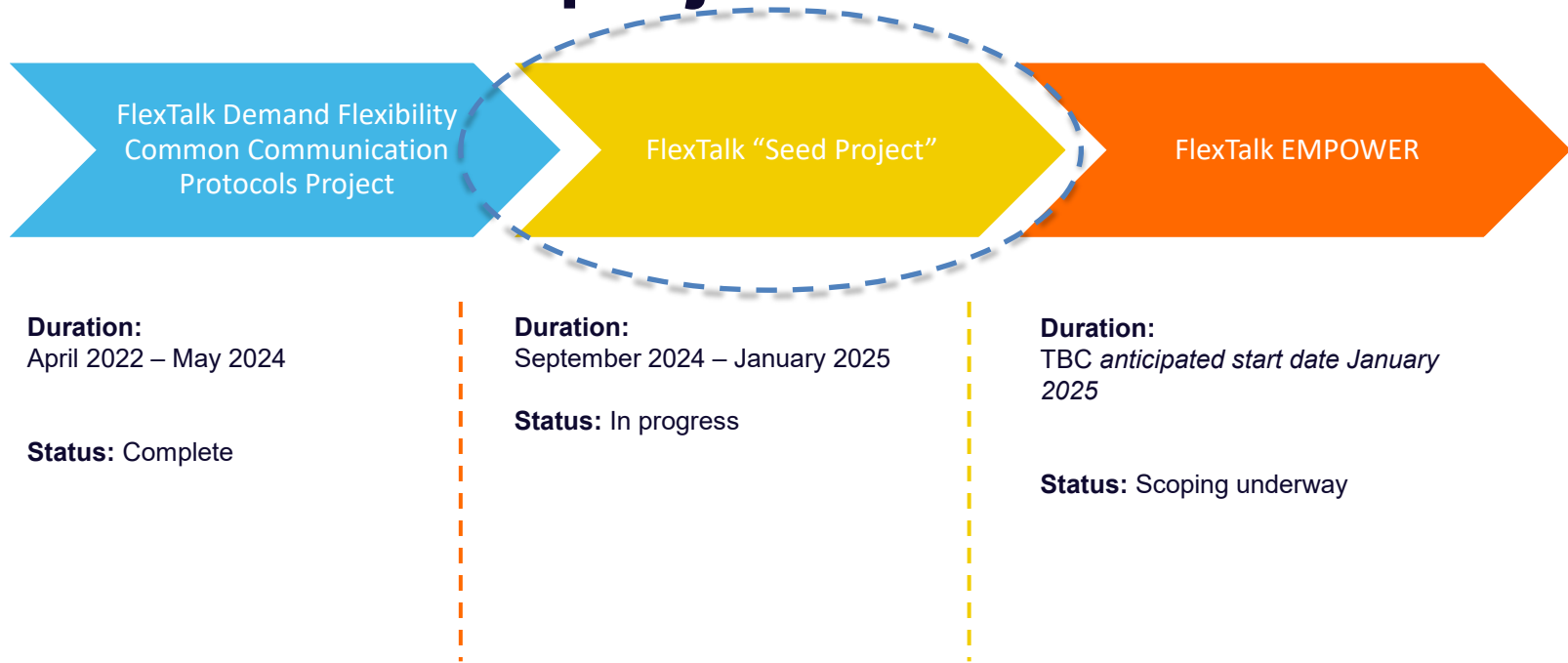- Dynamic Operating Envelope
- Battery Level

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FlexTalk

Common communications protocol project – key findings

- Proven interoperability between EDB, flexibility supplier and end devices demonstrated by active managed charging of Electric vehicles and batteries connected to solar arrays

- › Open communication standards / protocols are a key enabler of flexibility

- › Agreed industry standardisation of protocols will provide enhanced interoperability, real-time data exchange, improved flexibility and scalability

- › The two most mature open communication protocols are OpenADR and IEEE 2030.5, each have advantages specific to their intended use case
- › International adoption of standard protocols vary due to individual needs and context

- › While simple APIs allow industry to participate in flexibility, they are short-term solutions and will hinder long term participation, interoperability, scalability and security.

- › Assessment of OpenADR within FlexTalk met all defined assessment criteria for "least-regrets" functionality to enable flexibility

FlexTalk Demand Flexibility
Common Communication
Protocols Project

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FlexTalk – Seed project

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FlexTalk – Key Principles

KEY PRINCIPLES
CONSUMER CENTRIC
OPEN NON-PROPRIETARY
TECHNOLOGY AGNOSTIC
LEARN BY DOING AND SAFE TO FAIL MENTALITY
ADAPTABILITY
WE ENCOMPASS COORDINATION
COLLABORATION AND COMPROMISE

CLEAN ENERGY TRANSITION

LOWER BILLS FOR VALUED SERVICES

CONSUMER CHOICE & CONTROL*

SAFE, RELIABLE & SECURE

FAIRNESS & INCENTIVES

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FlexTalk – Purpose

The purpose of the project is to seed the wider FlexTalk - EMPOWER project, by:

- Testing the ability to **install and communicate** with a wide range of consumer smart devices on the existing communication platform established under FlexTalk 1.0.

- Testing various technologies in **10 consumer homes** to assess their suitability and inclusion to scale under the wider FlexTalk – EMPOWER

- The seed project starts with learning and documenting the installation, connectivity and communication functional requirements. The seed project will define what smart devices *may* be included (and scaled up) in FlexTalk - EMPOWER.

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FlexTalk – Seed project – Key objectives

✓ Identify potential technologies and standards

✓ Identify components for FlexTalk EMPOWER project planning

✓ Provide a starting point for the design team

✓ Guide / input to EEA's Streamlining Connections Programme

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FlexTalk – Seed project – A "straw man"
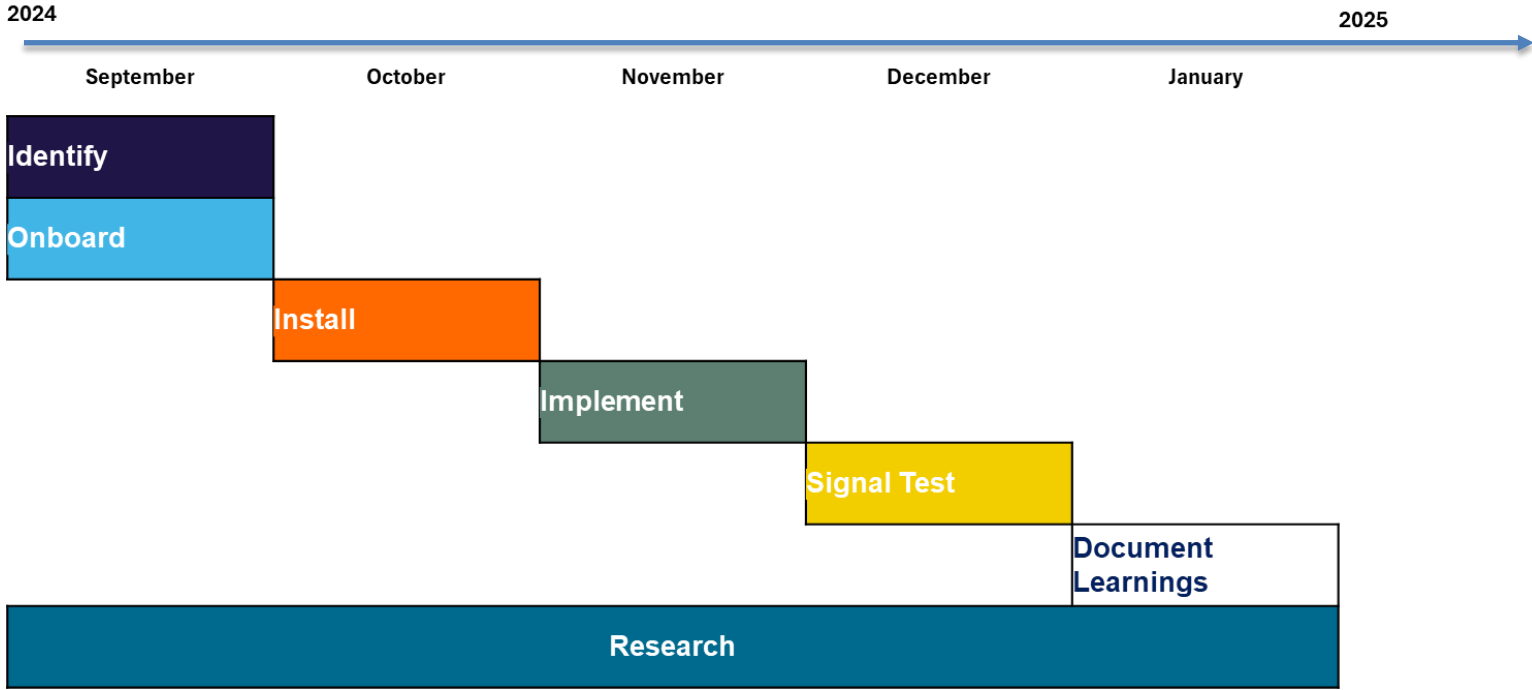
Can we test the water before we embark on a bigger-scale FlexTalk 2 "Empower" project?

- How easy is it to connect to "standard" home loads

- Do manufacture's cloud services add value or get in the way

- How robust is in-home connectivity

- Do Home Energy Management Systems make it easy for consumers to connect to any Flexibility Supplier (Flexibility co-ordinator)

- How much effort and cost

- How does the customer feel and react to demand management

- What's good, what's bad, what would we do differently

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FlexTalk – Technical approach (1)

## *Off-the-shelf technology*

In-home load

- Hot water control (but smart)
- Heat pump control
- Home energy management systems
  - High-end BMS/HEMS
  - Mass market HEMS
- Potential use of the CTA-2045 (Ecoport) standard for "appliance control"

'Standard' connectivity options

Flex supplier connection to the home device

- Via manufacturers' cloud API
- Direct to the device via API
- Via a smart meter
- Direct to HEMS via
  - API from OpenADR VEN
  - Built-in OpenADR VEN

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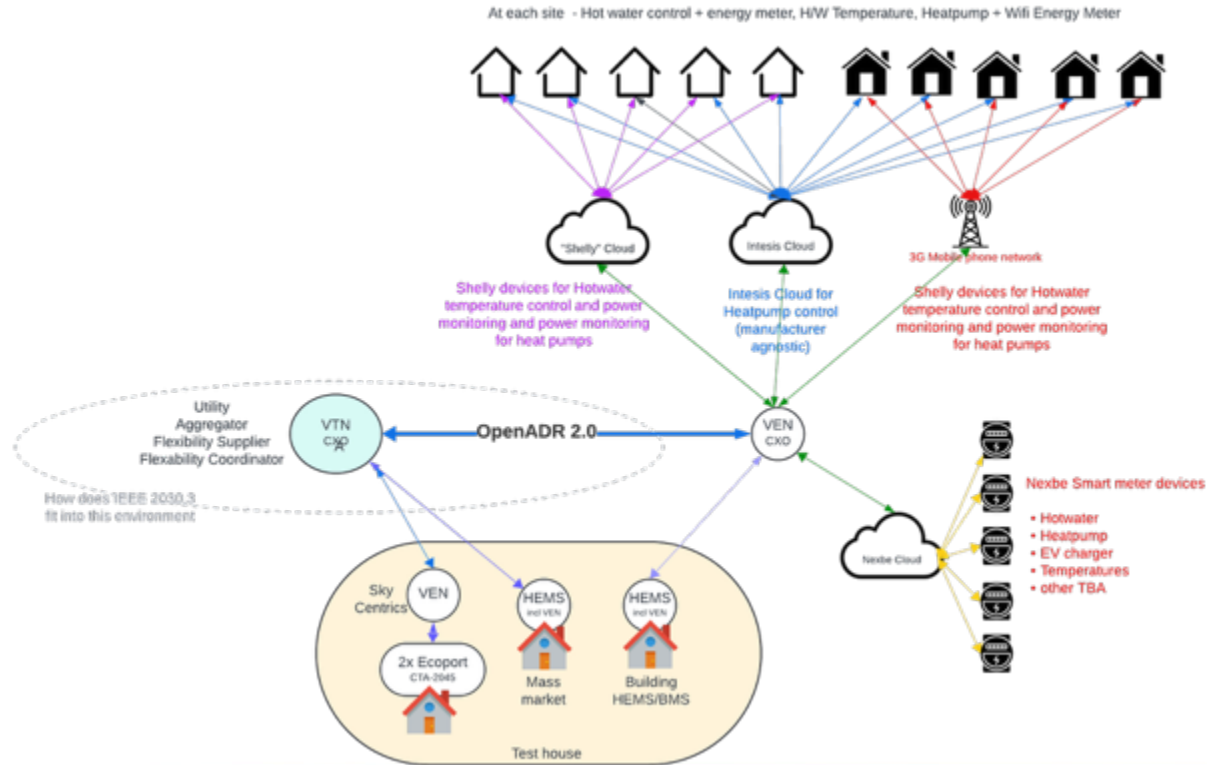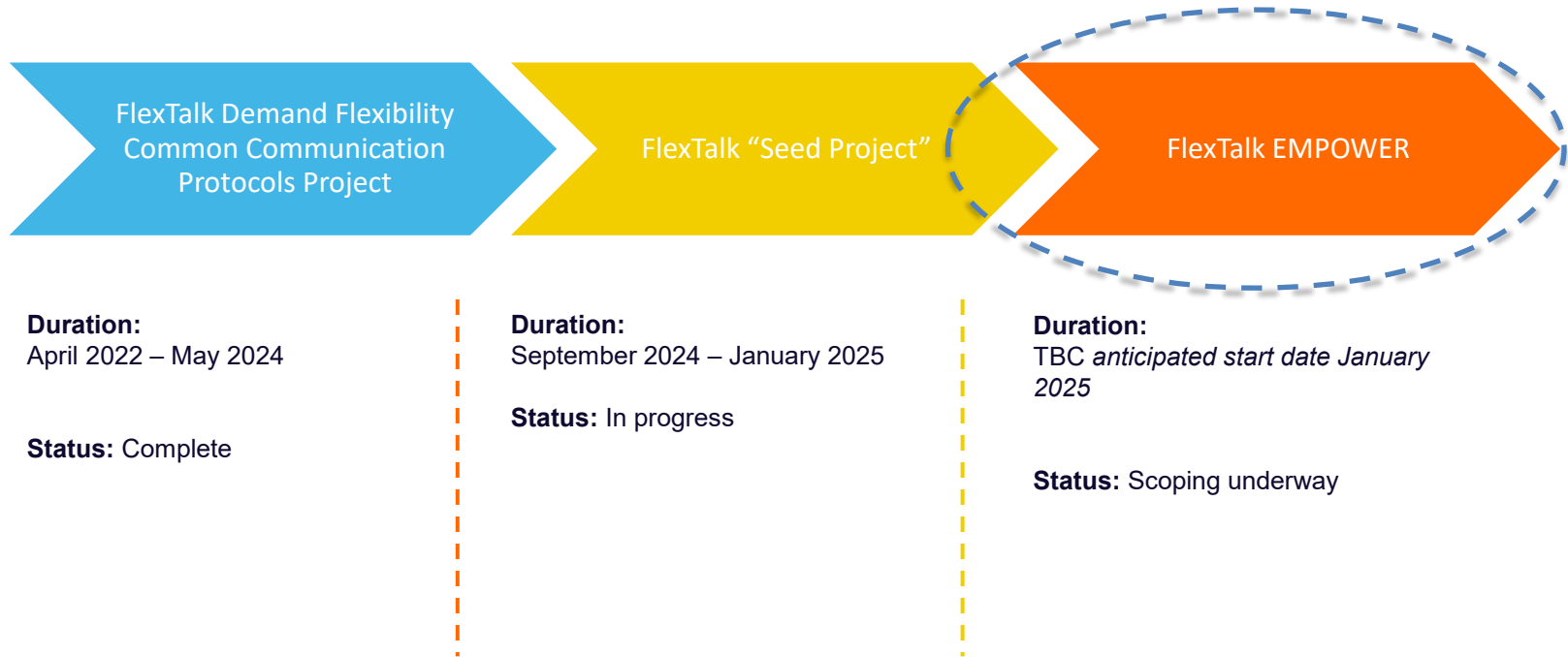
FlexTalk – Technical approach (3)

The seed project is testing options

- What is worthy of large-scale testing?

- What appears to be going down the wrong patch?

- How cost-effective is it?

Remember, it's a strawman, not an indication of a future solution

Your input is essential

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FlexTalk – EMPOWER

FlexTalk Demand Flexibility Common Communication Protocols Project

FlexTalk "Seed Project"

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FlexTalk – EMPOWER

Enabling maximum potential of wide-ranging energy resources

Vision:

Delivering seamless integration of consumer smart devices and homes into NZ's energy system to ensure safety, affordability and resilience for the future.

Purpose:

Collaboratively trial the active management of smart appliances (CER) with participants in the electricity industry and consumers to understand how CER is best integrated into the energy system with maximum benefit to the consumer.


SMART GRID
MULTI-DIRECTIONAL
POWER FLOW
MULTI-STAKEHOLDER
INTERACTION

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FlexTalk – EMPOWER Discovery
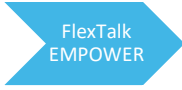
What activities have informed EMPOWER scope to date?

✓ Recommendations from FlexTalk's demand communication protocols project

✓ MoSCoW prioritisation of scope inclusions completed by EEA, EECA and FlexTalk design team

✓ Collaboration workshop run 11th April with EEA, EECA, Ara Ake, Cortexo and EA's input to define the potential future state for each actor and the potential road blocks to realising this.

✓ 4 x Alignment sessions with EECA to inform project name, vision, purpose, key objectives

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FlexTalk – EMPOWER Discovery
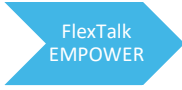
The following activities will further support EMPOWER's scope:

- ✓ Pre-conference workshop: FlexTalk connecting the dots and planning next steps

- ✓ Outcomes of the EA Tech independent review

- ✓ Further industry engagement via 1:1 catch-ups, webinar delivery, attendance at conferences (SEANZ etc.)

- ✓ An industry survey to determine areas of constraint

- ✓ Establishment/engagement with the FlexTalk EMPOWER design team

- ✓ Outputs from the FlexTalk Seed Project

- ✓ Further support and guidance from EEA and EECA

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FlexTalk – EMPOWER – *Draft* Key objectives

CONSUMER

- Identify clear pathways to release the full value of CER to consumers

- Generate awareness and insights to encourage consumer participation in demand-side flexibility services

- Identify a simplified pathway of suitable technologies to enable consumers to plug and play participate in flexibility

TECHNICAL

- Identify the technical standards (in line with global standards) needed for flexibility for example, communication protocol standards, data standards, cybersecurity standards

- Make aggregated consumer demand visible on the electricity system at GXP level

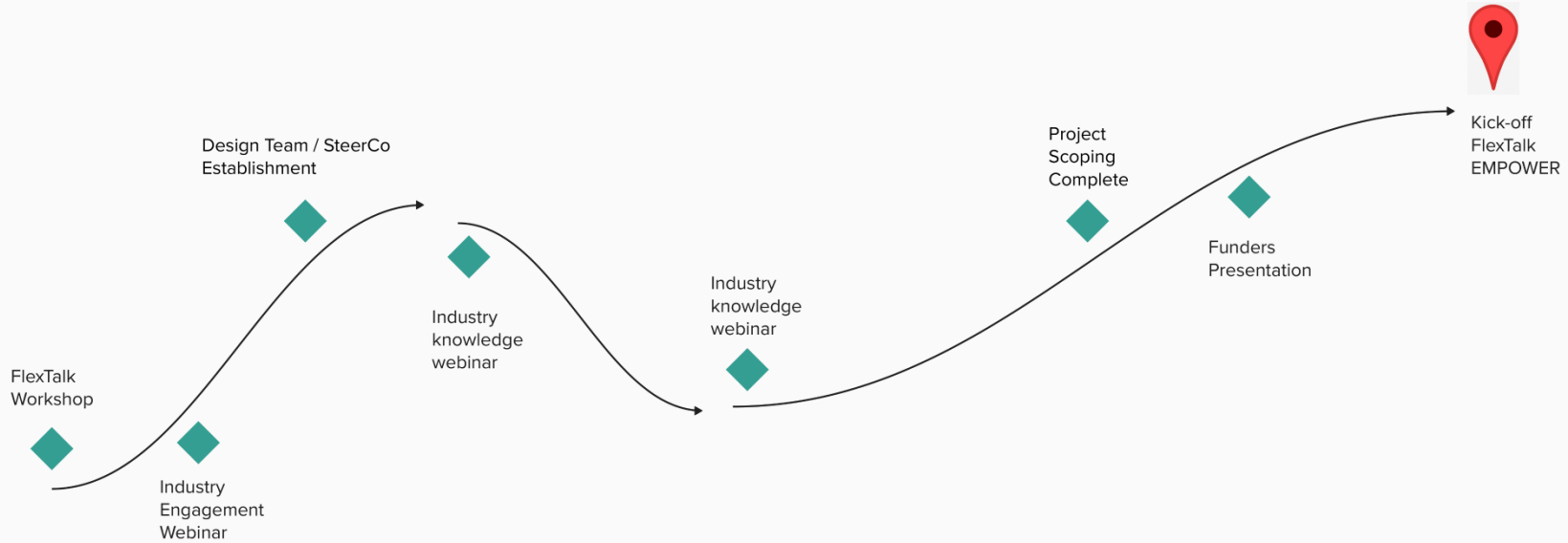- Determine the common system functional requirements for flexibility, including IT systems.

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FlexTalk – EMPOWER – *Draft* Key objectives

TECHNICAL

- Identify and document data access, sovereignty, security and data management requirements (including constraints) for CER integration to enable customer choice and flexibility to change providers

- Document and provide guidance on CER installation and connectivity requirements to electricians

- Determine and document in-field connectivity requirements for CER for inclusion in the EEA technical guides as part of the "streamlining connections programme"

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FlexTalk – EMPOWER Discovery touchpoints

Design Team / SteerCo
Establishment

FlexTalk
Workshop

Industry
Engagement
Webinar

Industry
knowledge
webinar

Industry
knowledge
webinar

Project
Scoping
Complete

Funders
Presentation

Kick-off
FlexTalk
EMPOWER

Establish and continue industry outreach and collaboration per engagement plan - this includes project collaboration, establishment of partnerships, representation on working groups etc.

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Questions?

Scenarios to test under EMPOWER *Exercise 2*

Objective: The following audience interactive exercise seeks to identify variables related to HEMs and community batteries that may be tested under FlexTalk EMPOWER project

Time: 15 mins

Instructions:

1. In groups (per table) identify a scribe

2. Each group has a scenario relating to either a home energy management system or a community battery. Please review the scenario and the accompanying visual, as a team discuss the scenario, and document the people, systems and processes (HEMs) OR the strategies, impacts and potential (community batteries) that would be enabled by this scenario in the real world

Note, you are welcome to depict this as either text or a visual

Strategies

People

Systems

Impact

Processes

Potential

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Priorities for EMPOWER *Exercise 3*

Objective: Audience identification of what are core priorities to address and solve under the FlexTalk EMPOWER project

Time: 5 mins

Instructions:

1. Individually fill in priority cards and post in the mailbox

FlexTalk – Beyond the workshop

- Visit us during the conference at the FlexTalk Stand (99)

- Current state flexibility map to be available and maintained as a knowledge and collaboration resource

- Scenarios will be summarised and shared back with you in summary report

- Scenarios will be used in design sessions for FlexTalk EMPOWER

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FlexTalk EMPOWER – Join us on the journey!

We want you!

- Design team members
- Industry review user group members
- Delivery partners
- Interested parties
- Funders

EEA Project Lead: connie@eea.co.nz
EEA Principal Advisor: stuart@eea.co.nz

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Closing Remarks

Stuart Johnston