

Innovation Investment Proposal

2024-2029 Regulatory Control Period

December 2022



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Executive summary

A significant step change is under way in the electricity supply value chain and the energy industry is following the customer-driven pathway that has been adopted by other service industries. Today, innovation funding for distribution networks is derived primarily from the Demand Management Innovation Allowance (DMIA). This has allowed us to explore transitional concepts through a small but important portfolio of *innovation projects*, as opposed to innovation in the sense of the more traditional productivity or efficiency improvements which return predictable or immediately quantifiable benefits. This paper will refer to innovation in the sense of the former - typically projects that are inherently risky or outside of the traditional value framework but are potentially transformational.

While the DMIA allowance has provided considerable value to our customers and our network, the scope is mostly limited to innovation related to demand management – a one-way view of our customer's future role in the energy system. A step-change in innovation investment is required to transform our business and our network and become an enabler of customers' future energy choices as well as a provider of a resilient network in a changing climate. This paper outlines the context, justification, and governance model of the proposed **Innovation Investment Program** as part of our 2024-2029 Regulatory Proposal.

In keeping with the AER's *Better Resets* process, we have engaged extensively with customers and stakeholders to better understand how to meet future network needs and our customers' preferences and expectations. Through this engagement, we found that customers acknowledge the significant role our network must play in the energy transition and are supportive in principle of increasing investment in a more robust innovation program, which they believe will deliver on their long-term interests. Through both quantitative and qualitative research, there was evidence that most customers (73%) and stakeholders (96%) support higher investment in innovation.

Based on these engagement outcomes, we propose to increase our focus on innovation by establishing an Innovation Investment Program of \$25 million (\$20 million CAPEX + \$5 million OPEX) in addition to the DMIA over the 2024-2029 period. This proposed investment level represents a mid-point in comparison to innovation expenditure programs at other distribution businesses, and we believe this reflects an appropriate restraint that balances customer preferences with affordability and is highly likely to provide customers with a long-term net benefit. The establishment of the program and the proposed amount for 2024-29 of \$25 million received strong in-principle support from the Independent Members Panel of our Regulatory Reference Group (RRG), subject to further details regarding oversight and ongoing engagement (set out herein).

The proposed investment framework will adhere to five governance principles summarised below:

1. Continuity of Engagement

- Establishment of an Innovation Reference Group (IRG), comprising members from our existing Peak Customer and Stakeholder Committee (PCSC) and other stakeholders, at the commencement of the next regulatory period.
- The IRG will meet at least twice per year and help to shape the direction of the innovation program and be asked to contribute to, review and provide feedback on forward plans and updates. In the initial years, we expect more regular meetings (quarterly) would be appropriate.

2. Transparency of plans, findings and failures

- Prior to IRG meetings we will produce reporting of forward plans for the activities in the program, reporting progress, outcomes and lessons learned.
- We will supply the IRG with information that will allow it to perform its role, this may include business cases, decision documents, reports, and other material.

3. Enhanced Customer Value

- Any underspending will be returned to customers, and this will be excluded from the Capital Expenditure Sharing Scheme.

- Endeavour Energy will seek to leverage this the funding by pursuing external funding from other grant and research programs (e.g. ARENA, local, state, and federal government programs, RACE for 2030).
- 4. Clear and adaptable objectives**
- All initiatives in the Innovation Program will reflect nominated investment themes (discussed below) with a clear and an unambiguous objective for each initiative.
 - These themes could change on agreement with the IRG and in line with these principles, foreseeably to adapt to emerging customer needs or industry trends. Some initial objectives include:
 - Lowers costs for customers
 - Gives customers opportunity to make money (e.g., access to new markets)
 - Collaborative opportunities across the market and with stakeholders
 - Has key uniqueness attributes compared to the industry
 - Improves utilisation and economic utility of our service Accelerates the decarbonisation of the economy
 - Improves fairness and equity – noting there are challenges and limitations in subjective judgement of this.
 - Improves community resilience
- 5. Responsibility and Accountability**
- IRG will be welcome to propose additional initiatives for consideration, but Endeavour Energy will remain responsible for expenditure decisions and delivery.
 - Endeavour Energy will pursue and report on agreed actions relating to industry developments and investments between meetings.

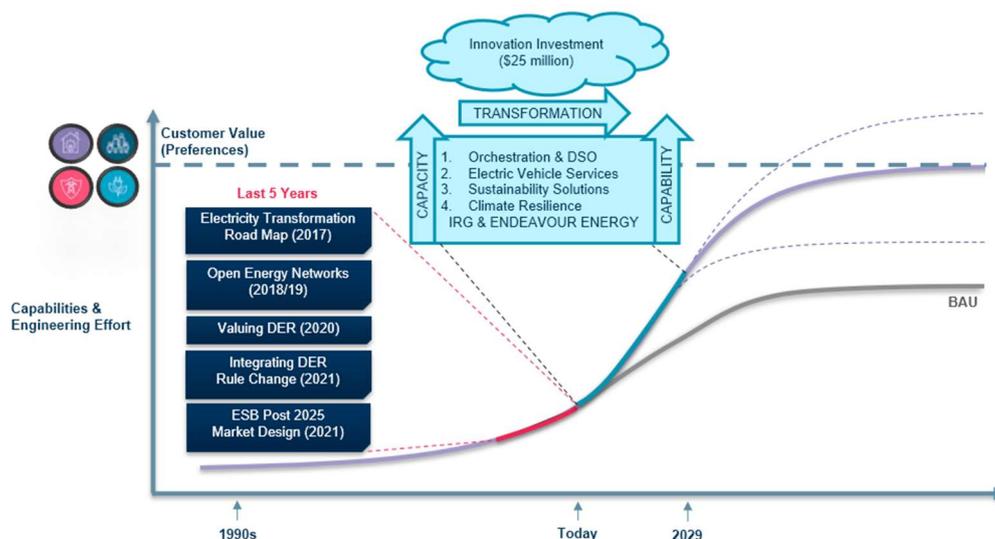


Figure 1 – Stepping up on Innovation

The innovation investment is proposed to support projects and trials under four innovation themes to modernise our network and services which were raised through our customer engagement program established for the regulatory reset proposal:

- Orchestration & DSO (go beyond “poles and wires” to facilitate consumer participation in the energy market rather than building more infrastructure))
- Electric Vehicles Services (enabling grid stability and flexibility as EV uptake rises)
- Sustainability Solutions (sustainable services from renewable-based supply, electrification of emission intensive activities and improvements to energy efficiency)
- Climate Resilience (adopting climate resilience Services measures that contribute to improve electricity access and network services for communities)

We are excited to work with customers and stakeholders in delivering this transformational Innovation Program.

1. Purpose & Outline

The purpose of this document is to outline the context, justification, and governance model of the proposed Innovation Investment Program as part of our 2024-2029 Regulatory Proposal.

The Innovation Investment Framework, described herein, has been developed to complement and address feedback from customers and stakeholders on both the Future Grid and Resilience consultation themes developed for the proposal.

- Section 2 – sets out the external context for strategic innovation explaining the considerable changes we, our customers, and our industry face.
- Section 3 – describes the need for strategic innovation and the justification for a new approach. It explains why strategic Innovation Projects are not funded under the existing regulatory framework.
- Section 4 – explains our customer engagement process, demonstrating that a majority favour an increased investment in innovation.
- Section 5 – then outlines the details of our proposed innovation investment approach, including how it addresses the need, a justifiable quantum was reached and proposed governance principles and mechanisms.

2. External Context

The pace and complexity of change within the energy sector has increased in the recent years as customers increasingly become both generators and consumers of electricity. As we look toward the future, the nature of the energy system and our role within it will continue to evolve, most likely at a faster pace. Further, to realise both our own and our customer’s Net Zero targets will require fundamental changes in the way electricity is distributed, consumed, and generated. These changes will necessitate investment, innovation, new technology, optimisation, additional infrastructure, development of new standards and modification of existing systems, as well as participation in broader industry reforms and adapted policy and regulatory frameworks.

Table 1 summarises the three major themes of change that are occurring within the electrical supply industry and the impact these will have on Endeavour Energy. The remainder of the section explores this in more detail.

Table 1 – Summary of the External Context relevant for strategic network innovation

External Context	Description	What this means for Endeavour Energy
The Energy Transition	<p>The energy transition is a pathway towards transformation of the global energy sector from a fossil-based system to Net-Zero-carbon system by 2050. This can be summarised with four Ds:</p> <ul style="list-style-type: none"> • Decarbonisation • Decentralisation • Digitalisation • Democratisation 	<p>Beyond traditional supply, Endeavour Energy will increasingly need to link distributed and variable renewable generation, as well as flexible demand to balance loads and deliver essential network services.</p> <p>Functioning as a Distribution System Operator – we will need manage two-way energy flow across the suburbs, cities, and regions in real time. This also comes with a responsibility and obligation to ensure this is managed fairly and as equitably as possible.</p>
Electrification	<p>From above, decarbonisation means carbon intensive processes like transportation will need to fuel switch. EVs are an emerging consumption impact on the network leading to changes to the demand profile</p> <p>There will be a shift in customer consumption as both gas and fossil fuels move towards further electrification.</p>	<p>Planning and connection of considerable new load for decarbonisation of industry by providing additional capacity for electrification of sectors</p> <p>This may also mean the production of alternative clean fuels (e.g. green H2) where necessary.</p>
Climate change and extreme weather events	<p>Changes to the climate is leading to an increase of both severity and frequency of climate related network impacts which is not addressed through traditional investment..</p>	<p>These impacts are requiring Endeavour Energy to develop new solutions, to be able to deliver the service level customers require during these major events.</p>

2.1. The Energy Transition & the 4 Ds

2.1.1. Decarbonisation

At a macro level, the energy transition describes the decarbonisation pathway of the global energy sector from a fossil-based system to Net-Zero-carbon system. The primary objective is to reduce energy related carbon emissions to limit climate change, and decarbonisation of the energy sector requires immediate action by all industries, on a global scale.

Last year, the Australian Government updated and enhanced the Nationally Determined Contribution to a target of Net Zero Emissions by 2050. By 2050, under the central *step-change scenario*, the National Electricity Market (NEM) will need to cater for significant investment in generation capacity, storage, firming and augmentations as coal generation withdraws. This will require significant market and technical reforms for system services and protection, and this will impact our customers and our network. Within our state context, the NSW Government has also laid out a climate change policy and electricity infrastructure roadmap in support to drive investment, deliver energy storage infrastructure, renewable energy zones and improve grid resilience.

2.1.2. Decentralisation

As the conduit for connecting increasingly decentralised energy resources, distribution networks will play a foundational role in the achievement of Net Zero emission targets globally. In Australia, our customers have chosen to lead the charge with the highest uptake per capita of rooftop PV and residential battery systems, and this will accelerate with the call for action to both mitigate and adapt to climate change. To safely and efficiently manage this, we will need to work with customers to better optimise our network for this purpose and procure demand side resources – thus increasing capability in line with our role as a Distribution System Operator (DSO). In this role, we will need capabilities to link embedded generation, as well as flexible demand, aggregated as active market participants, to balance loads, deliver essential network services and manage two-way energy flow across the suburbs, cities, and regions in real time. This will also entail planning and connection of considerable new load for decarbonisation of industry by providing additional capacity for electrification or production of alternative clean fuels where necessary.

2.1.3. Digitalisation

The digitalisation of the energy sector involves the increased use of technology, data, and measurements to better manage our energy. It means using all the information at our disposal to make sure we are being as energy efficient as possible. The recent draft recommendations¹ from the AEMC to target universal uptake of smart meter penetration by 2030 and increase DNSP access to data is expected to prove a huge acceleration to digitalisation. The increased use of such technology will allow us to measure energy flows, better plan and operate, and potentially allows customers to access more efficient tariffs and only procure the energy they need, so nothing is wasted.

2.1.4. Democratisation

The advent of low cost technology to generate and store energy will increasingly allow consumers and communities to more freely choose how they participate in the energy value chain – and this movement to empower consumers is referred to as the democratisation of energy. The regulatory framework is also evolving through initiatives like “Better Resets”, with the AER noting “Consumers have gone from being outsiders to an integral part of the regulatory process... it is more important than ever that customer preferences drive outcomes and we continue to evolve how we regulate to ensure the long term interests of consumers are met”². Electrical distribution networks, more so than perhaps any other part of the energy value chain, will be most impacted by the democratisation of energy and are also the best placed to empower customers.

2.2. Electrification

In achieving the energy transition, the electricity industry is in the hot seat. Renewables are replacing coal at an extraordinarily fast pace, which is set to continue as zero-emission generation, much of it distributed, becomes the dominant source of energy for the NEM. This means that for many applications, electrification will be considered the fastest and cheapest way to decarbonise.

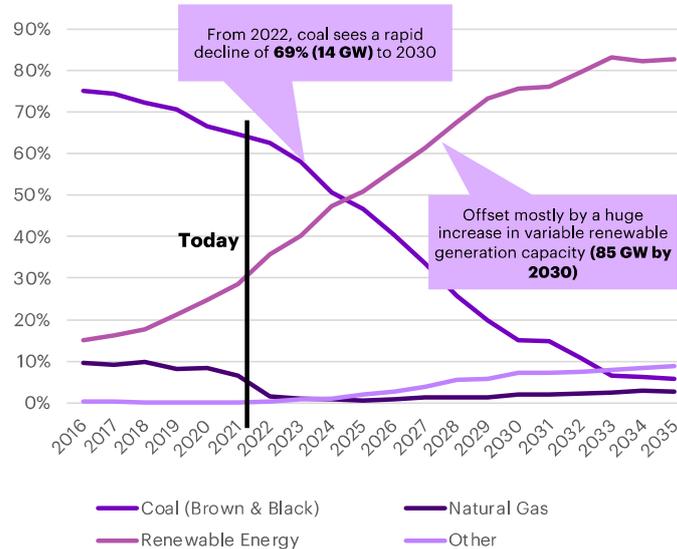


Figure 2 – Australian Generation Mix (%) 2016-2035 (based on Opennem and AEMO 2021 ISP Data)

The pace of change and our customers’ drive for more choice introduces a great deal of uncertainty in forecasting demand for our network and the services our customers may need but also, if managed well, this provides a great opportunity to improve utilisation of distribution networks. Some “fuel switches” to electrification are expected to have an outsized impact on our networks – electrification of transport and the electrification of end user heating and processes especially.

2.2.1. Electric vehicles

While price, model availability and limited charging infrastructure and services are barriers currently in place in Australia, global experience indicates that once these constraints are addressed, the market can shift rapidly. Based on AEMO’s 2022 ISP, 250,000 EVs are expected to be present on the Endeavour Energy network services by 2029, up from ~2,000 currently.

EVs are an emerging consumption on the network and will impact the demand profile. This will result in requests for new connection points, network reinforcements, and require an efficient and effective tariff structure that encourages the efficient energy management of demand. EVs also represent an opportunity for mobile battery storage as EV batteries can rapidly enhance the flexibility of consumption and form an important component of the dynamic architecture of the future network. Policy levers are increasingly being activated to enable EV uptake, the NSW Government is seeking to make NSW a net zero jurisdiction and have presented a 2021 Electric Vehicle Strategy to provide \$500 million in funded actions to increase the uptake of EVs in NSW.

2.2.2. Residential & Industrial electrification

It is reported that the largest remaining source of emissions across Great Sydney’s power system is the 30PJ of gas for space heating, water heating and cooking. About 70% of the gas is used in residential settings, with the remainder in government and commercial settings³. Electrifying the gas appliances and phasing out gas connections in residential homes and apartments is expected to be a

likely pathway to reduce emissions and average household energy costs by an estimated \$150 per year. This will also be the case for greenfield developments, such as those in Western Sydney, with developers increasingly seeking to avoid gas connections.

Businesses will face similar drivers and are expecting a rapid switch from using fossil fuels to using electricity. Partially this takes place in existing industrial locations, but it also involves the enabling and incentivising of decentralised industrial clusters with ready access to renewable energy and the ability to share resources with other co-located industries.

2.3. Climate change and extreme weather events

While decarbonisation works to *mitigate* climate change, the dramatic impacts are already, and increasingly, being felt. It is therefore as important to also consider how we *adapt* to climate change.

An assessment conducted by the Internal Environmental Panel on Climate Change (IPCC) in 2021 shows that the global average temperature has increased by 1.1°C since the industrialisation (1850-1900). On the current trajectories, global temperature is forecast to increase to approximately 1.5°C by around 2030. Climate modelling suggests that extreme weather events will continue to increase in both frequency and intensity over the coming decades as global average temperatures continue to rise. The common changes to the weather currently observed are higher temperatures, longer heatwaves, longer and more intense drought, increased fire weather, changes to rainfall and snow patterns, and changes to storm patterns – all of which impact our ability to continue to supply our customers with a safe and reliable electricity service.

Endeavour Energy has commissioned climate modelling under moderate and high emissions scenarios to assess the risks of climate change and to understand possible future impacts out to both 2050 and 2090. For 2050, some of the most concerning results from the climate modelling shows:

- Bushfire risk: number of average bushfire weather days to increase by between 34% to 69%
- Extreme heat risk: number of extreme heat days increases anywhere in the network between 72% to 222%
- Large scale flood risk: 1-in-20-year extreme rain events to increase between -3% to 13%.

Endeavour Energy is planning for this challenging future environment through our resilience investment program. We see the new solutions that allow our network to adapt to a changing climate also have strong ties to the energy transition (and the 4Ds) mentioned above – and thus see value in planning the innovation and “learning by doing” in step together.

3. The need for an Innovation Investment

A significant step change is under way in the electricity supply value chain and the industry is following a customer-driven pathway that has been adopted by other service industries. In the Australian context, this can be shown in developments of foundational reforms as outlined in the graph below. The external context outlined earlier has created a considerable and building momentum for reform initiatives over the next five years, shown in **Figure 3**. This familiar innovation “S” curve could either be suppressed, enabled or hastened, by our network’s ability to test and prove innovations.

Today, innovation funding for networks is derived primarily from Demand Management Innovation Allowance (DMIA). This has allowed network businesses to explore transitional concepts through innovation beyond the more traditional business productivity or efficiency innovations that return direct and quantifiable benefits⁴. However as the name suggests, the scope is mostly limited to demand management innovation.

This has provided considerable value to our customers through our prior and active programs, but it has still been limited in its application. It should be noted that the term Demand Management is based on the conventional paradigm of one-way energy flow. Given the pace of the energy transition, we do not believe that this will be sufficient to tackle the quantum of innovation needed to facilitate the fast-paced energy transition – leaving a considerable “gap” between BAU and customer preferences.

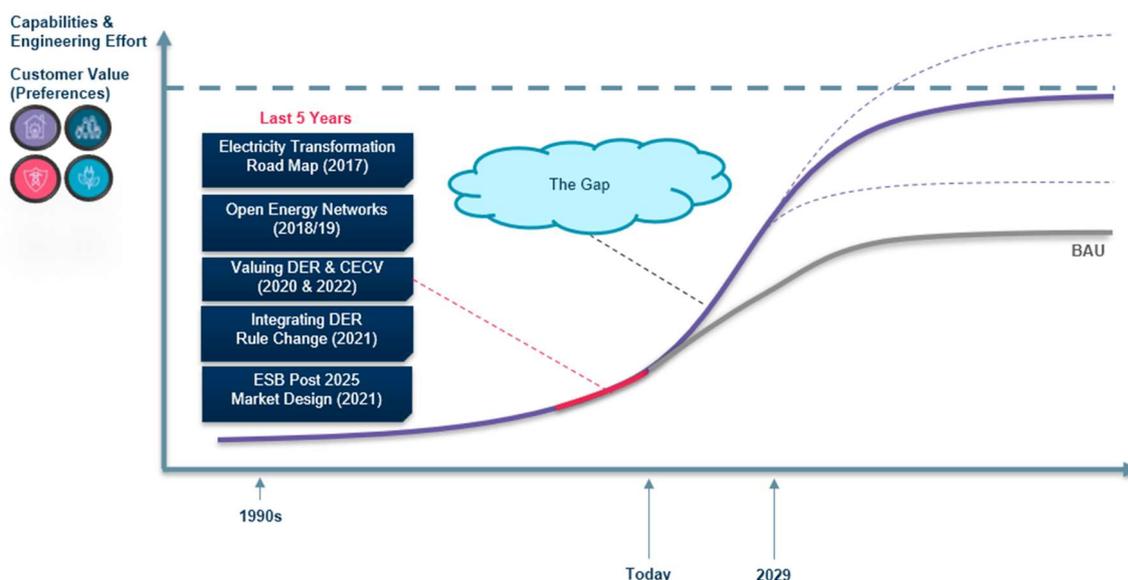


Figure 3 Innovation Investment to fund the projects and trials to cover “The Gap”

Endeavour Energy is committed to enhance the resilience and long-term sustainability of the network in keeping with the priorities of our customers and the shift to a cleaner and lower carbon energy future . A distinction needs to be made between strategic innovation and operationally based innovation that we fund and undertake to improve the efficiency, reliability and safety of distribution



⁴ Examples of innovation Projects which demonstrate transitional concepts could be community planning innovations such as the Bawley Point and Kioloa Community Microgrid, the development of customer engagement platforms or Off peak plus, hot water solar soaking program. Examples of productivity or efficiency innovations could be using new technology such as drones to reduce the cost of line inspections, or automation/digitisation of manual record keeping for field work.

network services⁵. The latter is used to top up our contribution to DMIA-funded projects given the importance we attach to these projects. Using a proven cost-benefit framework is not conducive to the application of strategic innovative initiatives. Often data on a new technology’s performance is not yet available or new service concepts face dependency on customer behaviour and willingness to participate which is unknowable until trialled. This has meant that network businesses such as ours have so far not been able to move quickly to enable the energy transition. If this continues to be the case, it is clear this will hinder network’s ability to keep pace with the changes as well as our customers’ ability to access new services, as well as cleaner and more affordable energy.

In line with the majority of our customers preferences we plan for either a rapid or accelerated energy transition - a dedicated strategic innovation investment framework can help us fill the gap.

3.1.Benefits to having an innovation fund

To be able to unlock long-term customer value with projects which are not facilitated or covered by existing schemes, an Innovation Program will allow Endeavour Energy to hasten and enable our network’s ability to test and prove innovations. Table 2 highlights some of the benefits that can be potentially unlocked through the Innovation Program. This takes a longer-term view than the 5 year regulatory reset process, which focuses more on the mid-term.

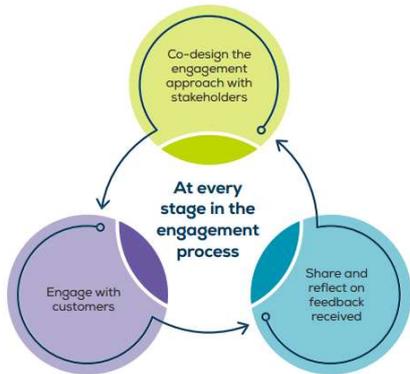
Table 2 – Benefits of an innovation fund

<p>Customer</p>	<ul style="list-style-type: none"> • Long term benefits unlocked which go beyond a regulatory cycle • Reduction in the cost of energy to serve leading to lower energy bills • Enable two-way energy from distributed energy and sharing between different customers. • Maximising customer returns from generating own electricity • Delivering more reliable electrical supply in the face of increasing climate events • Involvement in developing unique solutions • Bring forward customer access to successful trials. • Improve the equity of access to emerging energy solutions for all customers.
<p>Endeavour Energy</p>	<ul style="list-style-type: none"> • Exploring new technologies where benefits are not fully quantified as the technology develops • Exploring low cost solutions • Being able to adapt to customer’s changing preferences • Accelerate our participation in emerging technology in an agile manner. • Maintain the radar for emerging and unforeseen technology and business model innovations.
<p>Community / Society / Industry</p>	<ul style="list-style-type: none"> • Developments will benefit customers external to Endeavour Energy’s franchise area – through the potential to broaden the value proposition to other areas (e.g. environmental outcomes) • Industry benefits for transparency of plans, findings and failures • Consolidate and unlock value stacks in the electricity supply chain to improve supply efficiency. • Incubate fast-growing use cases (that may currently be further away from our core operations), issues and opportunities beyond demand-management such as the benefit that electrical vehicles may have in soaking up excess solar and providing network support under emergencies.

4. Customer Engagement

Endeavour Energy has pursued extensive customer engagement in co-designing the Regulatory Proposal, which included seeking customer preferences on innovation investments, the level of investment and the governance approach.

4.1. Engagement approach of RRG



Endeavour Energy has worked to co-design an engagement approach with the stakeholders that is collaborative, iterative, and responsive, led from the top and to ensure meaningful engagement with the customers and different stakeholders across a variety of engagement activities and channels.

We established the Regulatory Reference Group (RRG) as a subcommittee of the Peak Customer and Stakeholder Committee (PCSC) founded on the principle of co-design, to support the development, over the period 2021 to 2024, of our regulatory proposal to the AER.

The Independent Members Panel of the RRG, acting in an advisory capacity, has been performing the following roles throughout the development of the Regulatory Proposal:

- representing the long-term interests of our customers
- co-designing the engagement program
- participating as key stakeholders in the regulatory proposal engagement
- challenging Endeavour Energy throughout the development of its regulatory proposal and the engagement program

4.2. Deep & broad engagement process leading to Regulatory Proposal

	Phase 1 Discover Apr 2021 – Sep 2021	Phase 2 Explore Oct 2021 – Apr 2022	Phase 3 Prioritise May 2021 – Oct 2022	Phase 4 Refine Nov 2022 – Jan 2023
Purpose	Research to better understand customer and stakeholder needs, preferences to help shape the engagement approach	Exploration of key issues to help inform development of Preliminary Proposal	Identifying aspects of greatest importance to customers with broad and deep engagement	Developing and refining the final proposal
<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">PCSC (RRG)</div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">Customer Panel</div> <div style="flex-grow: 1; position: relative;"> </div> </div>				
Key Deliverables	-Engagement Plan	-Preliminary Proposal	-Draft proposal	-Final proposal

	Phase 1 Discover Apr 2021 – Sep 2021	Phase 2 Explore Oct 2021 – Apr 2022	Phase 3 Prioritise May 2021 – Oct 2022	Phase 4 Refine Nov 2022 – Jan 2023
	-Exploratory customer research report	-Business Narrative	-Draft proposal customer overview	-Final proposal customer overview

Figure 4 - Integration of Customer Panel and RRG engagement across 4 phases in developing the Regulatory Proposal

The purpose of the Customer Panel was to engage with a broad and representative cross-section of residential and small business customers. This was achieved through an extended deliberative online process with a group of 89 participants who collectively spent over 1,513 hours engaging with Endeavour Energy and each other, posting over 10,633 total responses.

The Quantitative Survey provided additional breadth of engagement of residential and small business customer opinion through a statistically representative measure of options, attitude, and preferences for an additional “pillar of evidence” to inform our regulatory proposal.

Trade-off questions were put to the Customer Panel through the deliberative forums, and subsequently to stakeholders at our Deep Dives. These were meticulously revised and crafted in a co-design process with the RRG Independent Members Panel to ensure we were focused on the right issues and presented to Customer Panel members in a balanced and tangible way.

4.3. Customer Preferences

The following question (Question 5) was asked to provide a gauge on both the Customer Panel’s and Stakeholder’s view on both CER integration beyond that economically justified in the regulatory framework as well as enabling innovative trials and technologies.

Question 5: How do we modernise the network to meet emerging and future customer service expectations as technology and markets evolve?

As well as providing the questions, trade-off options were presented (reproduced in Figure 5 below), with the estimated customer bill impact each variation would have.

5 How do we modernise the network to meet emerging and future customer service expectations as technology and markets evolve?

<p>1. Plan for a rapid energy transition by undertaking extensive trials of innovative technology that is ahead of need, further increasing network capacity to support customer technology choices</p> <p>Cost</p> <ul style="list-style-type: none"> The average customer’s bill would increase by \$9 per year, every year. <p>What Endeavour Energy could do</p> <ul style="list-style-type: none"> Plan for scenarios in which customers rapidly adopt new technologies and participate in non-traditional network solutions (such as microgrids) that jointly contribute to rapid decarbonisation of the economy. Invest in new and future-proof operational capabilities and innovation that may have revolutionary potential to coordinate the flow of energy and data for customers and across the grid. <p>Customer impacts</p> <ul style="list-style-type: none"> Customers could have confidence in exporting all excess electricity to the grid and charge their EV when they want to Benefits from innovation technology could be high. All customers could benefit from a network that evolves ahead of change and has the potential to improve services and opportunities for the future. Fairer pricing and deployment of community energy projects. Helps drive Australia’s move to net zero emissions 	<p>2. Plan for an accelerated energy transition by supporting trials that respond to evident trends and have high probability of success, further increasing network capacity to support customer technology choices</p> <p>Cost</p> <ul style="list-style-type: none"> The average customer’s bill would increase by \$3 per year, every year. <p>What Endeavour Energy could do</p> <ul style="list-style-type: none"> As with Option 1, plan for scenarios that reflect momentum in the continuing decarbonisation of the economy and uptake of new technology by customers. As with Option 1, provide capacity and coordination to minimise constraints, e.g. on solar exports, EV charging. Invest in new operational capability and new technologies that are proven in other contexts (differs to Option 1 in the scope of innovation investment). <p>Customer impacts</p> <ul style="list-style-type: none"> Customers could have confidence to export most of the excess electricity to the grid and charge their EV with some limitations. Most innovation investments are likely to yield benefits to customers. More customers would benefit from network investments that keep pace with change and improve services and technology opportunities for the future with fairer pricing and deployment of some community energy projects. Helps underpin Australia’s move to Net Zero emissions 	<p>3. Plan for a gradual energy transition by addressing existing known network constraints, alongside a modest investment in trials whilst maintaining modest levels of network capacity supporting customer technology choices</p> <p>Cost</p> <ul style="list-style-type: none"> The average customer’s bill would remain steady. <p>What Endeavour Energy could do</p> <ul style="list-style-type: none"> Plan for a gradual decarbonation of the economy but at a slower pace than in Options 1 and 2. Respond to demand and provide capacity that avoids most, but not all constraints on solar, EV. Modest investment in innovation targeted to solutions where service limitations are being experienced. <p>Customer impacts</p> <ul style="list-style-type: none"> It is likely that some customers would not be able to export excess capacity to the grid if uptake of technology is faster than expected or due to local network issues. Some areas may suffer interruptions to supply if EV uptake is faster than anticipated meaning some network service issues could emerge Technology deployments are likely to yield benefits to most customers. Supports Australia’s move to Net Zero emissions 	<p>4. Plan for a stalled energy transition by making minimal investment to address network constraints, with small-scale investment in trials and increasing customer technology hosting constraints</p> <p>Cost</p> <ul style="list-style-type: none"> The average customers’ bill would fall in the short term by \$1 per year, every year. <p>What Endeavour Energy could do</p> <ul style="list-style-type: none"> Plan for a slow and conservative decarbonisation of the economy when there is close to 100% certainty there are problems involving customers’ ability to export electricity back into the grid. Invest in small number of trials that react to industry trends and may tailor other distribution companies by 3-5 years. <p>Customer impacts</p> <ul style="list-style-type: none"> It is likely that some customers would not be able to export excess capacity to the grid, particularly if more customers adopt solar or EVs than the network planning accommodates, which could impact the network resulting in interruptions to supply. Network services could be compromised leading to increased curtailment or even failure of supply. May not address likely changes in customer service expectations Provides limited support to move Australia to Net Zero emissions
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Figure 5 - Customer Panel and Stakeholder trade off Question 5

The final respondent results Figure 6 showed:

Customer Panel preferences for an accelerated energy transition (+\$3 a year indicative cost) remained largely unchanged throughout the engagement (52%), while in Wave 3 of our deliberative forums we saw preferences for a rapid transition (+\$9) decrease to 21%. The majority of the Customer Panel (73%) still preferred either an accelerated or rapid transition approach to meeting emerging and future customer service expectations as technology evolves.

Stakeholders expressed even more ambitious expectations at our August Deep Dive, with 64% preferring Endeavour Energy plan for a rapid energy transition and another 32% preferred we prepare for an accelerated energy transition (96% of participants).

5

Key question

Question #5: How do we modernise the network to meet emerging and future customer service expectations as technology and markets evolve?

Preferences for an accelerated energy transition remained largely unchanged throughout the engagement (52%), while in Wave 3 we saw preferences for a rapid transition decrease (21%) and a gradual transition increase (25%). The majority (73%) still preferred either an accelerated or rapid transition, noting this support was higher in Wave 2, at 85%.

How preferences changed over time

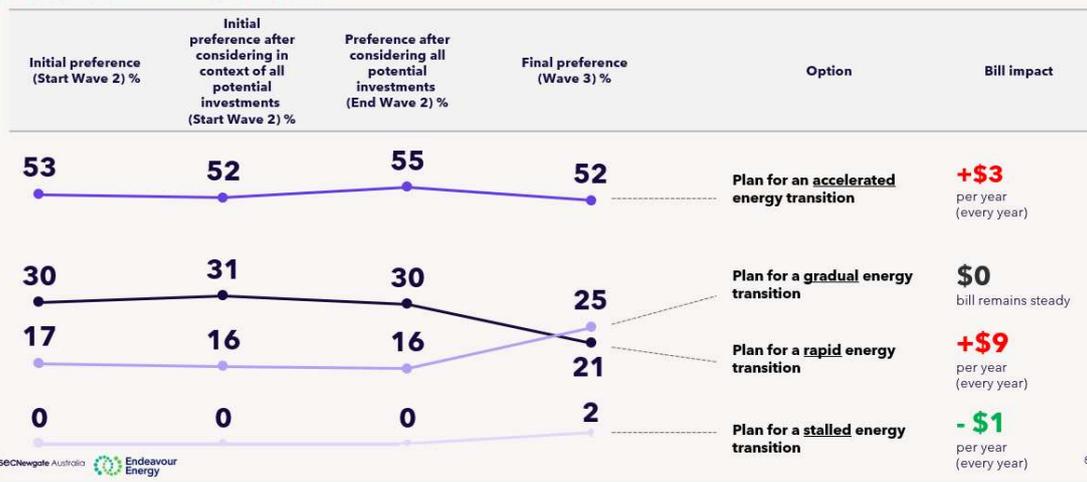


Figure 6 - Customer Panel preferences for modernising the grid

Below is a selection of verbatim responses given by the Customer Panel participants on why they thought Endeavour Energy should take their chosen approach to the energy transition.

"Rapid or accelerated technology risks incurring excessive costs, while stalling means that constraints will tighten and eventually the technology will be too advanced to catch up on."
(Residential, ATSI, Innovator, South Coast)

"It is an investment in technology which has a high probability of success. It allows most excess power generated to be exported to the grid and it is keeping up with other technologies. It is cheaper than option 1 whilst allowing for most excess power to be exported to the grid. Despite the \$3 increase those with solar will likely break even with the exports."
(Residential, CALD, Innovator, South-west Sydney)

"I feel that a rapid transition will bring forward potential savings for customers via connections to community batteries and energy trading. It also allows Endeavour Energy to be at the forefront of new technologies in this area and allows them to assist in shaping it. A modest investment of \$9 a year will unlock many benefits in the near future for customers."
(Residential, Innovator, South-west Sydney)

"I chose the 2nd option because \$3 is a minimal cost, less than 1 cup of coffee a year, but it gives an opportunity for the company to trial and implement new technology. It also gives the customer the opportunity to benefit from the new technology."
(General residential, high-energy user, South-west Sydney)

"Just go for it! What do we have to lose? Growth and expectations often increase faster than planned so no use getting left behind. Innovative work now could actually manifest into potential savings later."
(Residential, under financial pressure, South-west Sydney)

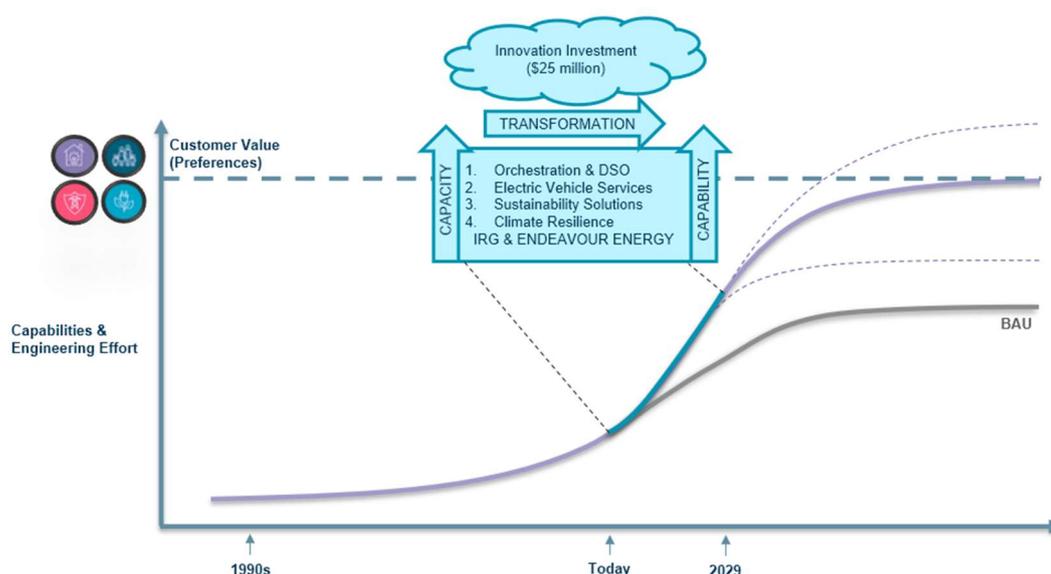
"With the cost of living going up, a gradual energy transition is best for the economy as it allows the addressing of existing known network constraints + a modest investment in trials."
(Residential, CALD, South-west Sydney)

Q. Please describe why you think Endeavour Energy should use the approach you have selected. This is an important question for us so please give us much detail on your thinking as you can. // Base: all participants (n=88).

5. Proposed Innovation Investment Program

5.1. Addressing the need and proposed themes

We consider the Innovation Investment Program a critical catalyst to better enable the energy transition on our network and fill the “gap” between BAU and customer preferences. This is because it will allow some investments that would either be considered risky or may not immediately pass the cost benefit test on their own, but are considered by Endeavour Energy and its IRG to hold significant potential for the long term benefit of our customers. The future of energy that we are working towards is a smarter, flexible, and modernised grid that will allow us to adapt to the evolving customer needs, while operating and maintaining a safe and reliable network. The investment in exploring new technologies based on the four innovation themes addresses the challenges and opportunities to provide customers with more choice and control on how they use and receive energy.



Refer to Appendix A for more detail on these 4 themes and the intent of innovation funding investment

Innovation Themes	Description	Example of types of investments
DSO & Orchestration	Go beyond “poles and wires” to facilitate consumer participation in the energy market rather than building more infrastructure.	<ul style="list-style-type: none"> • Develop a detailed understanding of the network and embedded constraints • Include a clear focus on consumer participation and market-based models rather than network augmentation • Find novel ways to enable bi-directional customer participation in the energy market • Maintain power system security with increasing generation sourced from the distribution network • Offer flexibility services through Virtual Power Plant, Demand Response and Peer-to-Peer programs that require specific dispatch coordination within the distribution system • Develop commercial arrangements and incentives to unlock new value stacks • Solutions to improve equity and convenience of network access
Electric Vehicle Services	Enabling grid stability and flexibility as EV uptake rises	<ul style="list-style-type: none"> • Enable grid stability beyond investing in grid augmentation • Learn how managed charging contributes to grid stability and how it can be relied on for grid control • Learn how customers and vehicle / batteries respond to smart charging • Trial free or low-cost time-of-day incentives for vehicle-to-grid exports

Innovation Themes	Description	Example of types of investments
		<ul style="list-style-type: none"> • Offer EV owners dynamic charging away from the home, including incentives like discounts and free parking • Lower the risk of selecting and installing charging hardware • Focus on large fleet operators (such as buses) and assist in lowering fleet operators' costs • Significantly lower power costs for large customers (shopping centres)
Sustainability Solutions	Sustainable services from renewable-based supply and improve energy efficiency	<ul style="list-style-type: none"> • Support “electrifying everything” as a low hanging fruit in the decarbonisation journey. • Offer more sustainable services from renewables-based supply • Provide end-to-end energy sustainability advice for projects starting with energy (from the grid and within the project) • Develop solutions for on new commercial and industrial, developers, and estates (large scale connection requests) • Share data with residential consumers to help them improve energy efficiency • Advise customers regarding approved sustainability initiatives / smart devices, and intelligently plan for these • Improve access to sustainable energy solutions for customers with limited means i.e. tenants, vulnerable customer
Climate Resilience	Adopting climate resilience measures contributing to improve electricity access and network services	<ul style="list-style-type: none"> • Improve the rigour of measurement and evaluation of impact towards climate resilience and adaption. • Develop solutions and services to reduce the potential damage and loss from climate impact. • Adopting climate resilience measures contributing to improve electricity access. • Share data on climate change risks and impacts with consumers to develop strategies and plans for climate resilience. • Identify resilience measures, physical system hardening, advanced system operation, better co-ordination of recovery efforts and capacity building enhance the climate resilience of network.

In order to best answer to the needs of customers, Endeavour Energy will work on the four innovation themes with an ecosystem of partners when relevant. The Innovation Investment Program will allow us to:

- Accelerate our participation in emerging technology in an agile manner.
- Incubate fast-growing use cases (that may currently be further away from our core operations), issues and opportunities beyond demand-management such as the benefit that electrical vehicles may have in soaking up excess solar and providing network support under emergencies.
- Maintain the radar for emerging and unforeseen technology and business model innovations.
- Consolidate and unlock value stacks in the electricity supply chain, to benefit customers and to improve supply efficiency.
- Bring forward successful trials for productization earlier that could become material drivers of consumer benefits.
- Improve the equity of access to emerging energy solutions for all customers.

5.2. Quantitative Justification

Endeavour Energy has sought to deliver a proposal that responds to the customer preferences to strike the best possible balance between dependability, value for money and implementing innovation that enables the customers’ long-term choices, interests, and affordability.

Innovation is also a key to responding to emerging challenges and opportunities our customers face from the de-carbonisation and decentralisation of the energy industry to managing the impacts of Climate Change. Innovation initiatives can also provide customer access to future markets that may not have a direct link to short-term network efficiency or expenditure.

In setting an appropriate expenditure amount for the innovation component, we have sought to:

- Directly respond to customer feedback and preferences in a prudent and modest manner, this has meant, for an overall portfolio of investment, constraining our investments to ensure we deliver an affordable outcome whilst achieving the long-term interest of our customers
- Build robust bottom-up plans, with an expanded value framework, within the key themes currently observed for our innovation priorities.

This means utilising an approach, consistent with our overall capital governance and forecasting methodology whereby both top-down and bottom-up elements are tested within investment categories and as an overall portfolio to determine an appropriate balance between our investment priorities and the expectations of customers regarding service quality and affordability outcomes.

Given the potentially more speculative nature of this investment, Endeavour Energy seeks exemptions for the proposed innovation investment fund from the Capital Efficiency (CESS) Mechanisms and will operate the innovation investment fund akin to the existing DMIA. This would provide for upfront funding, annual true-up and refund to the customers as Endeavour Energy would bear any overspend risk.

As covered in Section 43, the extensive engagement process left us with a considerable data set of customer and stakeholder preferences in relation to planning for the energy transition. Question 5 presented to both the Customer Panel (n=89) and the stakeholder group posed four options that could be traded off. Each indicated a particular customer annual bill impact ranging from left to right of +\$9, +\$3, \$0 (ie. No change) and -\$1 (i.e. a reduction).

As was shown in **Figure 6**, both groups indicated a posture that leaned towards a higher investment level, though notably with the stakeholder group leaning further towards a rapid energy transition and a higher investment level. Neither group had any respondents elect for a stalled energy transition. While the stakeholder group was much larger and likely well informed of the transition and the need for innovations, it was considered also that they are not necessarily the customers bearing the cost. A further weighting approach was applied based on the preferences and to each respective group (0.60 to Customer Panel, 0.40 to Stakeholder Panel as summarised below).

Option "Plan for.."	Bill impact	Indicative Innovation Component 5yr (\$M)	Customer Panel	Stakeholder Panel
Rapid Energy Transition..	+\$9/yr	46.5	21%	64%
Accelerated Energy Transition...	+\$3/yr	15.5	52%	32%
Gradual Energy Transition...	+\$0/yr	0.0	25%	4%
Stalled Energy Transition...	-\$1/yr	-5.2	2%	0%
Weighted Equivalent (\$M):			\$ 17.7	\$ 34.7

Group Weighting	0.6	0.4
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Total (All Weighting - \$M) 24.5

As a result, Endeavour Energy proposes a \$25 million TOTEX (\$20 million CAPEX and \$5 million OPEX) for the Innovation Investment Program over the period of 2024-29, which is additional to the current DMIA. This equates to \$5 million per annum in innovation investment over the determination period, and with an expenditure profile to favour CAPEX, which delivers a lower bill impact to customers. This is a mid-range investment proposal compared to peer DNSPs and is considered prudent, recognising that the regulatory reset is taking place in an environment of rising cost of living pressure for our residential and business customers.

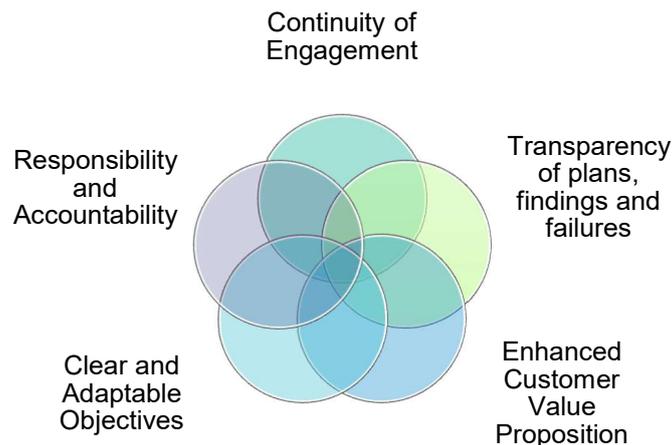
The Independent Members Panel of the RRG has encouraged and expressed strong support for both this proposal and the proposed quantum, subject to further details on the establishment, assessment, and governance of projects.

5.3. Proposed Governance

The proposed governance framework has been developed and a draft copy will be issued to Endeavour Energy's RRG for consultation before submission with our Regulatory Proposal in January 2023.

5.3.1. Principles

Endeavour Energy will engage with customers and stakeholders during the planning and execution of the Innovation Investment Program.



Customer and stakeholder engagement is proposed to adhere to 5 key governance principles:

1. Continuity of Engagement

- While deeply consultative, the regulatory proposal process is only a snapshot of best predictions of customer sentiment on what will come to play over 5 years of the next regulatory period.
- For predictions at the end of the regulatory period these may be some 7 years ahead of time - as such they face a great deal of uncertainty, particularly when seen in the context of sectoral and regulatory reform, emerging climate impacts, the transition to new services and evolving customer choices.
- Beyond the regulatory reset process, we expect our uplifted BAU engagement will develop more continuous customer perspectives in planning, to better keep in step with broader industry reforms and in doing so, to realise greater benefits for customer.

2. Transparency of plans, findings (and failures)

- In periods of sectoral transformation and disruption, the best pathways on innovation may not be evident, but it is important that in any undertakings, objectives, actions and learnings are captured and communicated.
- The innovation plans and lessons we seek to take through this program are expected to be relevant to all regulated network businesses, and so it is important for activities to be reported in advance and transparent in approach.
- Similarly, with so much happening in the sector – we recognise we will also need the capacity, support and engagement processes to remain abreast of the lessons of other industry activities and dedicated time to absorbing knowledge sharing activities.
- Failures will occur - it is critical for activities of building resilience and responding to the energy transition that failures are communicated and shared as much as the successes (else let other networks repeat mistakes and approaches, customers pay twice)

3. Enhanced Customer Value

- Our regulatory engagement has revealed that customers would like to see Endeavour Energy take an approach that is more supportive of the energy transition, and they would like to see

modestly increased support within our business for innovations trials, despite new technologies and services often being inherently risky.

- Often, if we consider only the traditional cost benefit approach, it will favour proven technologies and lead to avoidance of projects or programs that are risky but potentially transformational.
- Additionally, customers value things like environmental value which is emerging in the national electricity objective but is not yet applied and tested in a DNSPs regulatory framework.
- Innovative solutions on the distribution network have the potential to reduce overall energy costs for customers, for instance; by substituting petrol or gas for cheaper electricity, by enabling local CERs that reduce the need for energy infrastructure upstream, and by streamlining access to solutions for the entire customer base.
- With a high renewable energy future, we will also expect to see abundant energy flow at certain times of the day and – electrification could unlock considerable net-value for customers through displacing other costs, such as fuel for transportation, heating and cooking and provide value to customers through decarbonisation.

4. Clear and Adaptable Objectives

- Innovation objectives, and the projects delivering on these objectives adapt to emerging customer needs, industry trends / priorities, changes in regulations etc.
- Process must be in good alignment with business and customer challenges
- Reference points must be informed by credible forecasts
- Collaboration and leveraging the scale/repeatability of other networks
- Focus on delivering projects that are truly innovative and have the potential to revolutionise services for customers
- Agile delivery of innovation – ensuring projects with potential proceed quickly to scale, and unsuccessful solutions fail fast

5. Responsibility and Accountability

- As a critical part of the energy supply chain for our customers, Endeavour Energy has a responsibility to provide a more resilient network, help customers in their evolving energy choices and in their decarbonisation journey.
- Endeavour Energy is responsible for the addressing customer long term interests and is answerable to the results - we will need to balance agility required to be innovative with the consultation process.

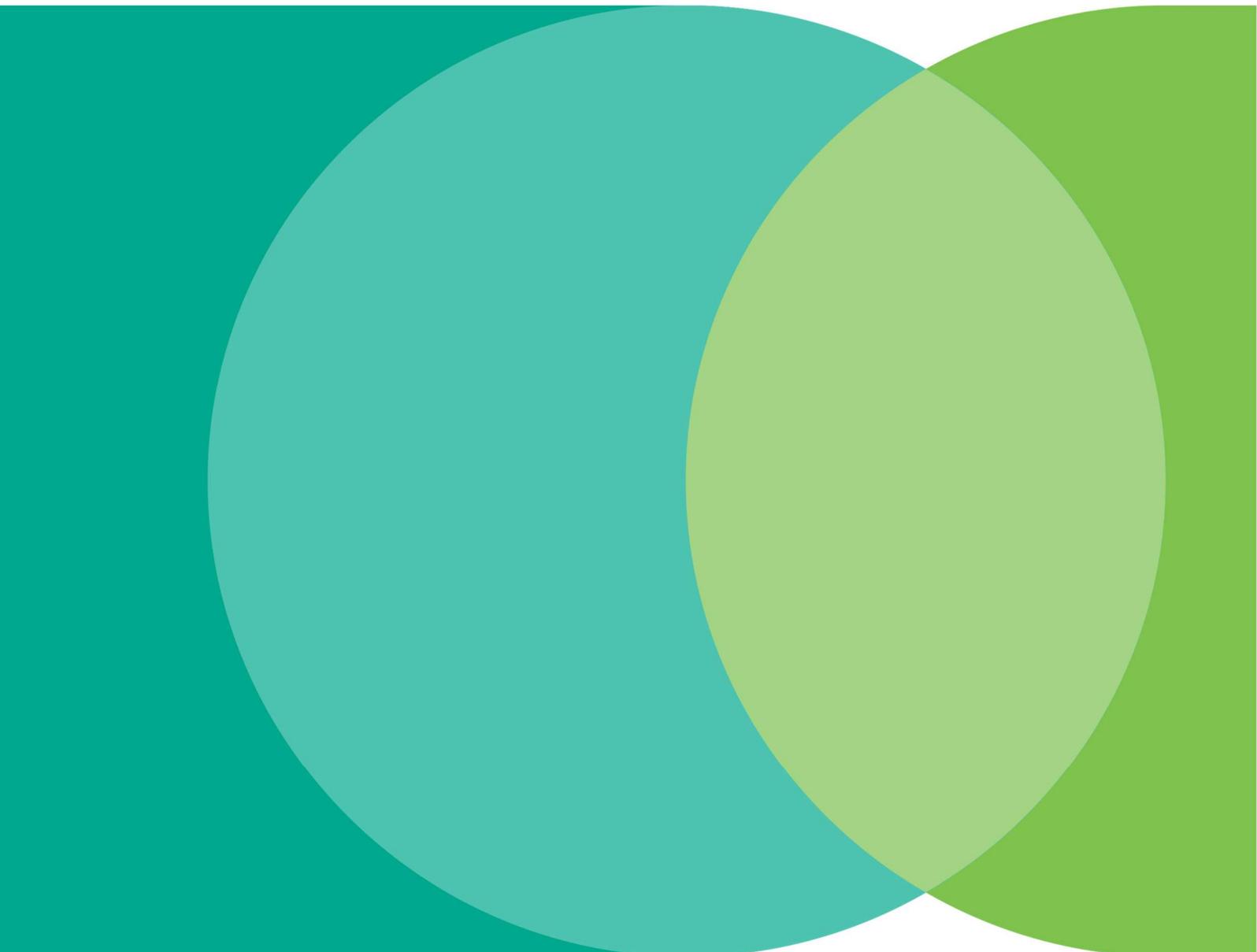
5.3.2. Application of Principles

Table 3 -

Principle	Proposed Application in Governance
1. Continuity of Engagement	<p>1.1 Establishment of an Innovation Reference Group (IRG). For ongoing operation of the process Endeavour Energy would seek that the Peak Customer and Stakeholder Committee (PCSC) will create a sub-committee and be joined by Endeavour Energy experts and leaders, customer advocacy and industry representatives in order to continue the engagement and commitment to place the customers at the heart of what they do.</p> <p>1.2 The IRG will meet at least twice per year and help to shape the direction of the innovation program and be asked to contribute to, review and provide feedback on forward plans and updates. In the initial years, we expect more regular meetings (quarterly) would be most appropriate but subject to further discussion.</p> <p>1.3 When needed, customers will be able to communicate through the company website and dedicated customer forums.</p>

Principle	Proposed Application in Governance
2. Transparency of plans, findings (and failures)	<p>2.1 Prior to IRG meetings we will produce reporting of forward plans for the activities in the program, reporting progress, expected outcomes, results and lessons learned.</p> <p>2.2 We will supply the IRG with information that will allow it to perform its role, this may include business cases, decision documents, reports and other material.</p>
3. Enhanced Customer Value	<p>3.1 Any underspending will be returned to customers, and this will be excluded from the Capital Expenditure Sharing Scheme.</p> <p>3.2 By the nature of innovation, investment proposals should be inclined to favour options that are speculative, and potentially lower NPV than traditional investments offset by long term customer benefits.</p> <p>3.3 Endeavour Energy will seek to maximise leverage on the funding contribution, by pursuing external funding from other grant and research programs (e.g. ARENA, local, state and federal government programs, RACE for 2030). This is aligned with our Network Business Strategy Future Grid objectives to secure at least one innovative grant per year.</p> <p>3.4 The program should seek additionality to other network pilots, and inclusive of time and resources to conduct appropriate industry scans.</p> <p>3.5 Investment opportunities should seek to progress the evolution of the regulatory framework and government policy and will seek IRG feedback on ways to influence in the best interest for customers.</p>
4. Clear and Adaptable Objectives	<p>4.1 All initiatives in the Innovation Program will have application under nominated investment themes but need to be clear and unambiguous on their objectives.</p> <p>4.2 These themes could change on agreement with the IRG and in line with these principles, foreseeably to adapt to emerging customer needs or industry trends. Some initial objectives include:</p> <p><i>4.2.1 Lowers costs for customers</i></p> <p><i>4.2.2 Gives customers opportunity to make money (e.g., access to new markets)</i></p> <p><i>4.2.3 Collaborative opportunities across the market and with stakeholders</i></p> <p><i>4.2.4 Has key uniqueness attributes compared to the industry</i></p> <p><i>4.2.5 Improves utilisation and economic utility of our service</i></p> <p><i>Accelerates the decarbonisation of the economy</i></p> <p><i>4.2.6 Improves fairness and equity</i></p> <p><i>4.2.7 Improves community resilience</i></p>
5. Responsible and Accountable	<p>5.1 IRG can propose additional initiatives for consideration, however, Endeavour Energy will remain responsible for expenditure decisions and delivery.</p> <p>5.2 Endeavour Energy will pursue and report on agreed actions relating to industry developments and investments between meetings.</p>

Appendices



Appendix A: Innovation Investment Themes

Innovation theme 1 – Orchestration and Distribution System Operator (DSO)

Networks need to be future-ready for customers – and this means having the capabilities to ensure high penetrations of distributed storage and generation can work simultaneously and safely for all customers. Additionally, it's critical to develop these capabilities in advance of the issues being felt on service levels. Endeavour Energy see one of the most significant innovation opportunities is to ensure we lean into new capabilities which help us develop a platform that can effectively orchestrate these CERs include demand flexibility and non-network resources. There is a great deal of international precedent with many DSO's (particularly in Europe) that have a very active role in managing production and demand. We can expect complexity and congestion on the distribution grid level to increase (for example through the rapid growth of EVs), which will further increase the need for curtailment or other measures which DSO's would need to take, such as activation of local / regional flexibility and insight-driven proactive network and asset management. Several projects are already evaluating how DSO's can use small scale flexibility (with active interaction of prosumers) to stabilize the grid.

DSO's will also need to have a shared responsibility for system reliability with TSOs, enabled by ancillary services (supply and demand balancing, transient stability, and frequency control).

This would mean that DSOs could operate at the intersection between (i) flexibility on the distribution grid level and (ii) system stability. They would need to coordinate the flexibility provision on the distribution grid, provide ancillary services, increase interaction with the network users, and potentially even host a market platform for regional flexibility.

As an indication of intent, Endeavour would expect innovation investment funding will support trials that go beyond those in DER integration strategy and those that explicitly seek to:

- Enhance our understanding of the network and embedded constraints
- Focus on consumer participation and market-based models rather than network augmentation
- Find novel ways to enable bi-directional customer participation in the energy market
- Increase or maintain power system security with increasing generation sourced from the distribution network
- Offer flexibility services through Virtual Power Plants, Demand Response and Peer-to-Peer programs that require specific dispatch coordination within the distribution system
- Develop commercial arrangements and incentives to unlock new value stacks for distribution connected energy resources
- Solutions to improve equity and convenience of network access

Innovation theme 2 – Electric Vehicle (EV) Services

Endeavour Energy forecast that Australia is in its early stage of rapid growth in transport electrification, due to pent-up demand and active policy support for EV's and emissions reduction. With strong policy support, there are forecast to be 250,000 EVs on our network by 2030, and nationally ~8.1 TWh / year of additional EV electricity usage by 2030. Internationally this has proven to be a well-established trend supported by data from similar countries. Considering the EV value chain below, there is a wide range of opportunities of innovation, either in infrastructure or services side. From V2G, to charging infrastructure or smart charging – there are host of partners and opportunities that will require network trials and enablement.

As an indication of intent, we would expect innovation investment funding will support trials that seek to:

- Learn how managed charging contributes to grid stability and how it can be relied on for grid control
- Partnerships with large fleet operators (such as trucks and buses) and assist in lowering fleet operators' costs
- Develop advanced decision support tools and tailored algorithms for planning electrification of fleets.
- Enable grid stability beyond investing in grid augmentation
- Customer research into barriers to V2G uptake and enabling connection or incentive policies.
- Trial tariff incentives (free or low-cost time-of-day) incentives for vehicle-to-grid exports

- Lower the risk of selecting and installing charging hardware
- Significantly lower power costs for large customers (shopping centres) through hybridising connections.

Innovation theme 3 – Sustainability Solutions

As renewable energy such as wind and solar becomes increasingly cost effective and provide an increasingly large share of the supply mix, electrification is considered one of the surest pathways to decarbonisations.

Enable customers to participate in the transition to cleaner energy by offering them: Advice, Products, Smart metering to advice on efficiency (to help customers manage energy usage and conducting energy audits to help customers identify energy-efficiency improvements), Apps, Services, Digital – utilize the cloud- greater power and flexibility; they unlock improved customer experience, as well as operational agility and efficiency. Importantly, they provide a secure environment in which to build a digital business model.

Renewables-based supply to home improvements and e-mobility

The key will be to offer simple, user-friendly products and services that enable customers to make smarter energy decisions with minimal effort

As an indication of intent, we would expect innovation investment funding will support trials that seek to:

- Support energy efficiency and “electrifying everything” as low hanging fruit in the pathway to decarbonisation
- Offer more sustainable services from renewables-based supply
- Provide end-to-end energy sustainability advice for projects starting with energy (from the grid and within the project)
- Develop solutions for on new commercial and industrial, developers, and estates (large scale connection requests)
- Share data with residential consumers to help them improve energy efficiency
- Advise customers regarding approved sustainability initiatives / smart devices, and intelligently plan for these
- Improve access to sustainable energy solutions for customers with limited means i.e. tenants, vulnerable customer
- Proactively support integrating green hydrogen electrolysis in emission intensive industries connected to the distribution network, beginning with a feasibility study in of distribution level impacts.

Innovation theme 4 - Climate Resilience

Climate resilience is the ability to anticipate, prepare for, and respond to hazardous events, trends, or disturbances related to climate. Improving climate resilience involves assessing how climate change will create new, or alter current, climate-related risks, and taking steps to better cope with these risks.

As an indication of intent, we would expect innovation investment funding will support trials that seek to:

- Improve the rigour of measurement and evaluation of impact towards climate resilience and adaption.
- Develop solutions and services to reduce the potential damage and loss from climate impact.
- Adopting climate resilience measures contributing to improve electricity access.
- Share data on climate change risks and impacts with consumers to develop strategies and plans for climate resilience.
- Identify resilience measures, physical system hardening, advanced system operation, better co-ordination of recovery efforts and capacity building enhance the climate resilience of network

Appendix B: Definitions and Abbreviations

Term	Description
Community Resilience	The ability of communities to withstand and recover from the impacts of natural disasters.
Resilient Network	The ability to anticipate, withstand, quickly recover and learn from disruptive events to the power network.
PCSC	Peak Customer and Stakeholder Committee
DMIA	Demand Management Innovation Allowance
RRG	Regulatory Reference Group
CAPEX	Capital Expenditure
OPEX	Operational Expenditure
IRG	Innovation Reference Group
DSO	Distribution System Operator
CER	Customer Energy Resources
BAU	Business As Usual
EV	Electrical Vehicles
CESS	Capital Expenditure Sharing Scheme
NPV	Net Present Value
DERMS	Distributed Energy Resource Management System
NEM	National Electricity Market
STPIS	Service Target Performance Incentive Scheme