

Analysis of approaches for funding innovation in energy networks

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Introduction

The Commerce Commission's [Draft] Electricity Distribution Services Default Price-Quality Path Determination 2020 incorporates a new mechanism to help incentivise innovation in EDBs. In the context of this proposed new mechanism, Sapere was engaged by First Gas to consider the following:

- The mechanism for providing innovation funding, and comparing its advantages and disadvantages relative to other options, particularly those seen in gas and electricity distribution networks internationally
- The level of funding being made available through the new mechanism relative to the levels of innovation in utilities in other countries and other suitable benchmarks.

The approach adopted for the preparation of this analysis was the following:

- A desktop review of the published literature on the strategic policy drivers for incentivising innovation in gas and electricity distribution businesses globally
- A review of the approaches adopted for incentivising innovation in gas and electricity distribution businesses in the following jurisdictions:
 - (i) Australia
 - (ii) United Kingdom
 - (iii) European Union
 - (iv) United States
 - (v) Canada
- An assessment of the relative advantages and disadvantages of the different approaches based on information available on progress from other jurisdictions and the specific characteristics of the New Zealand geographic market.

1. Enabling innovation in energy networks

There is recognition globally of the need to ensure that regulated gas and electricity network businesses can respond to the rapidly changing dynamics in energy markets. Whilst the strategic policy drivers and market context may differ across jurisdictions, the primary drivers for innovation in gas networks include the following:¹

- **Network flexibility** – enabling low cost and simpler access to the gas network for new gas sources
- **Decarbonisation** – providing for new sources of low carbon gas
- **Enable customers and markets** – adoption of new technology for demand management

There is also a recognition that there will be the need for significant investment and innovation by energy network businesses over the coming years to meet emerging market demands and challenges. However, as noted by both industry² and regulatory bodies³ internationally, the regulatory frameworks applying to energy network businesses have the potential to limit efficient network investment in innovation through the following:

- **Regulatory approval processes** – uncertainty over the regulatory outcomes associated with proposed expenditures on investment in network innovation
- **Risk-reward ratio** – innovative projects will by their nature typically be riskier than business as usual investments, but as this new investment may be limited to a regulated rate of return, this represents a disincentive to investment in innovation.

In the context of the above, the approach to innovation energy regulators internationally appear to take either a *direct* or *indirect* approach (or combination of both) to the issue of innovation in energy networks:

- Direct approaches aim to encourage companies to innovate explicitly
- Indirect approaches treat innovation as one of many possible instruments to reach a particular regulatory aim⁴

The direct approaches to encouraging innovation are undertaken by making funding explicitly available for the development of innovative new technologies, operating and commercial arrangements. This approach aims to promote innovation by funding a defined level of expenditure typically through the following mechanisms⁵:

- *Allowance* – a specified amount identified as part of the total expenditures that a energy distribution business is permitted to spend on innovative projects

¹ <http://www.energynetworks.org/assets/files/Gas%20Network%20Innovation%20Strategy%20Final%202018.pdf>

² https://www.energynetworks.com.au/sites/default/files/network_innovations_26072017.pdf

³ https://www.ofgem.gov.uk/system/files/docs/2017/03/the_network_innovation_review_our_policy_decision.pdf

⁴ https://comcom.govt.nz/_data/assets/pdf_file/0011/112007/FTI-Consulting-on-behalf-of-Vector-Regulatory-Blueprint-to-meet-todays-customer-expectations-9-November-2018.pdf

⁵ <http://coagenergycouncil.gov.au/publications/optimising-network-incentives-report>

- *Tender* – a competitive process where energy network businesses apply for funding for innovative projects or to provide alternative ways to solve a defined problem.
- *Rate of return* – a higher regulated rate of return is allowed for specified projects

A comparison of the approaches to innovation funding in a selection of comparable jurisdictions is detailed in Appendix 1 and Appendix 2. A summary of mechanisms adopted is provided in Table 1 below.

Table 1 Summary of innovation funding mechanisms in other jurisdictions

Jurisdiction	Innovation Funding Model
Australia	<p><i>Allowance</i></p> <p>Demand management innovation allowance mechanism – an ex ante allocation of a fixed amount plus a percentage of revenue with an ex post review of expenditure claimed</p> <p>Demand management incentive scheme – ex ante application process, funds 50% of an eligible project up to a maximum percentage of revenue</p>
United Kingdom	<p><i>Allowance</i></p> <p>Network innovation allowance – an ex ante allowance to fund smaller projects and the preparation of submissions to the NIC. The amount of funding is a percentage of revenue based on the quality of the innovation strategy proposed by the business.</p> <p><i>Tender</i></p> <p>Network innovation competition (NIC) – a competitive process to access funds for larger projects.</p>
Canada	<p><i>Tender</i></p> <p>The Natural Gas Innovation Fund was a gas industry self-funded contestable fund which has received co-funding from government and industry.</p>
US – California	<p><i>Tender</i></p> <p>The Electric Programme Investment Charge (EPIC) is a contestable funding programme for investments in clean energy.</p>
European Union – Ireland	<p><i>Tender</i></p> <p>The Gas Innovation Fund is a contestable fund for research and demonstration projects that are expected to increase efficiency or lower carbon or otherwise provide value to customers.</p>

2. Advantages and disadvantages of different approaches for funding direct incentives for innovation

When comparing the advantages and disadvantages of the different approaches for funding direct incentives for innovation, it is necessary to consider both:

- **Strategic objectives** — being clear on the purpose of the funding mechanism and what it is trying to achieve
- **Market context and characteristics** — acknowledging there is no “one-size-fits-all” model and the appropriateness of the mechanism will depend on the circumstances in which the regulated businesses operate.

While there are several incentive mechanisms already available to distributors for innovation investment, Commerce Commission (the Commission) has acknowledged there is some evidence suggesting the level of innovation is currently insufficient to realise all the potential benefits.⁶ The objective of the mechanism proposed by the Commission is to:

“... promote further innovation in a relatively low-cost way by proposing a new limited recoverable cost term as a change to the IMs. [The Commission] consider that having some of the cost of a potential innovation practice covered by a recoverable cost will encourage greater innovation by distributors”.

We note that the specific contexts of the electricity and gas distribution sectors are quite different in New Zealand—for example:

- there are a relatively high number of market participants in the electricity distribution sector, with twenty-seven lines companies distributing electricity throughout the country.
- there is only a small number (five) of market participants in the gas distribution sector.

The table below provides a summary of the potential advantages and disadvantages of the different approaches to funding direct incentives for innovation, based on our review of the literature and analysis.

Table 2 Summary analysis of different approaches to funding direct incentives for innovation

	Advantages	Disadvantages
Allowance	<ul style="list-style-type: none"> • Investment expenditures on innovative projects are separated from other capital expenditures 	<ul style="list-style-type: none"> • There are limitations to the extent that innovation funding schemes can balance commercial risk with

⁶ Commerce Commission (019, pg. 61) *Default price-quality paths for electricity distribution businesses from 1 April 2020 – Draft decision*

	<p>that should be included in the revenue model.</p> <ul style="list-style-type: none"> • Innovation allowances can be tailored to target particular areas of innovation or allow for business flexibility to determine innovation priorities • Investment expenditures are limited only by the total amount of innovation funding made available within the regulatory parameters • Purpose-built tools with the sole objective of encouraging innovation • Both innovation allowances and tenders provide for flexibility over time and can be easily adjusted • Provides an incentive for network energy businesses to identify the best means of delivering innovative projects and processes • Individual businesses can better target innovative projects to their market and geographical circumstances. • Lower regulatory compliance and transaction costs. 	<p>consumer outcomes (especially for higher risk projects)</p> <ul style="list-style-type: none"> • May just replace investment expenditures that would have happened anyway, resulting in increased costs for consumers without any new or additional long-term benefit. • May only provide partial motivation to undertake innovative activities • Funding available may be too small to be useful for smaller distributors and/or compliance costs may be too high for it to be worthwhile. • Relatively small amounts of funding can be of limited use for the development and trialling of new approaches and solutions
<p>Tender</p>	<ul style="list-style-type: none"> • Can encourage competition of ideas between market participants for limited funding resources. • Can be tailored to meet specific or changing strategy policy objectives • Information sharing reduces costs to customers by allowing other businesses to either learn from or adopt new approaches 	<ul style="list-style-type: none"> • Tenders are more effective in industries with a high number of market participants. • Greater regulatory compliance costs. • As the total level of funding increases this may also result in an increase in the level of regulatory compliance costs • The duration of the regulatory control period may limit the number and type of innovative projects • A fixed fund can also limit the total number of projects that can be pursued

Rate of return	<ul style="list-style-type: none">• Businesses have equal flexibility in selecting innovative projects as funding levels aren't a function of allowed revenue.	<ul style="list-style-type: none">• Information sharing and the dissemination of innovative ideas may be more costly than Tenders.
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3. Funding levels

Whilst there is a relatively comprehensive commentary available on the different mechanisms for encouraging innovation in energy network businesses globally, there is only relatively limited analysis on the funding levels for innovation in energy networks. Given this, the options for considering the proposed level of funding include:

- Comparison to the innovation funding levels that have been adopted in other jurisdictions
- Innovation benchmarks from other sectors.

3.1 Comparison to other jurisdictions

The innovation funding levels within the Commerce Commission's proposal are the following:

- is limited to 0.1% of forecast allowable revenue (excluding pass-through and recoverable costs), which equates to approximately \$5m across all non-exempt distributors over the next regulatory period, excluding those currently under CPPs; and
- requires at least 50% contribution from the distributor.

As detailed in Appendix A and Appendix B, the proposed innovation funding levels in NZ are at the low end of the continuum for incentive models observed in other jurisdictions—the smaller size of our distributors compounds this effect. For example:

- Australia provide all electricity distribution companies with a fixed \$200,000 AUD allowance per year *plus* 0.075% of forecast allowable revenue for innovation expenditures.
- United Kingdom typically provides all electricity distribution companies with innovation funding levels equal to between 0.5% and 1.0% on regulated base revenue.

The Commerce Commission also notes that the CPP process can accommodate more significant innovations if for example an EDB were to *propose substantial changes to the way it manages its network*. *A CPP allows us the ability to apply greater scrutiny, and to vary the way the price-quality path functions to account for innovative approaches.*

3.2 Comparison to other sectors

The measurement of innovation is an emerging field and subject of significant academic research and policy development globally. Measurement of innovation is currently focused on high level indices comparing countries' R&D spending. However, these benchmarks are recognised as being limited in their ability to capture the extent to which businesses and/or sectors are successful in developing and adopting innovations.

Another relevant factor is the nature of innovation itself and how it can vary across industry sectors and also regulated industries compared to non-regulated sectors. For example, innovation in the agriculture sector has broadly focused on improving productive yields through the adoption of new technologies/research and development of new products in the context of international competitiveness. In contrast, the innovations in the retail sector have focused more on improving customer experience and engagement and newer models for supply, logistics and fulfilment. The

nature of how these innovations are developed, adopted and applied differ to such an extent that is difficult to draw meaningful comparisons between them.

3.2.1 Some observations

There is currently no ideal way of determining what an optimal level of innovation expenditure should be either at a firm or industry sector level. The key consideration will be to ensure that the proposed innovation mechanism for the EDBs provides for flexibility in the optimal level of innovation expenditures (to the benefit of consumers) and most importantly enables the timely adoption of new innovations of benefit to the network and consumers (noting that most innovations will be “new to the firm” rather than “new to the world”).

Appendix A: Innovation mechanisms in the electricity distribution industry

Jurisdiction	Innovation Funding Mechanism	Funding Level
New Zealand (proposed)	<p>The Commerce Commission is proposing a new recoverable cost term in the EDB IMs that:</p> <ul style="list-style-type: none"> • is targeted for expenditure on innovative projects; • requires a report from an independent engineer that the planned expenditure meets a simple list of criteria to show that the proposed project is expected to be innovate and potentially benefit consumers; • applies to DPPs and future CPPs; and • can be treated as capital or operating expenditure <p>The recoverable expenditure is to be focussed on a technology, process, or approach that could support the distribution service, which is novel for use in that type of situation for a New Zealand distributor.</p>	<p>The new recoverable cost term:</p> <ul style="list-style-type: none"> • requires at least 50% contribution from the distributor; • is limited to 0.1% of forecast allowable revenue (excluding pass-through and recoverable costs), which equates to approximately \$5m across all non-exempt distributors over the next regulatory period, excluding those currently under CPPs.
Australia	<p>The Australian Energy Regulator (AER) has established two innovation funding mechanisms:</p> <ol style="list-style-type: none"> 1. Demand Management Incentive Scheme 2. Demand Management Innovation Allowance Mechanism <p>The Scheme and Mechanism are intended to be “targeted, achievable solutions that form a bridge between the current</p>	<p><i>Demand Management Incentive Scheme</i></p> <ul style="list-style-type: none"> • The magnitude of the cost multiplier is set to 50%.

	<p>regulatory framework and a framework more focussed on efficient pricing of network services”.</p> <p>The <i>Demand Management Incentive Scheme</i> was designed to incentivise distribution providers to undertake efficient expenditure on relevant non-network options relating to demand management.</p> <p>The Scheme:</p> <ul style="list-style-type: none"> • calculates a ‘cost multiplier’ incentive as a proportion of expected demand management expenditure • requires the distributor to complete a RIT-D or ‘minimum project evaluation requirements’ for a project to be eligible to receive funding. <p>The <i>Demand Management Innovation Allowance Mechanism</i> provides an allowance to distribution network service providers to undertake innovative projects related to demand management.</p> <p>The Mechanism consists of three elements:</p> <ul style="list-style-type: none"> • Th allowance itself—a fixed amount, set ex-ante, common amongst all distributors, with an additional percentage of the distributor’s annual revenue requirement. 	<ul style="list-style-type: none"> • The total financial incentive per annum is capped at 1% of the distributor’s annual smooth revenue requirement for the regulatory year.⁷ <p><i>Demand Management Innovation Allowance Mechanism</i></p> <ul style="list-style-type: none"> • A \$200,000 AUD annual fixed base • The scaling component of the allowance is 0.075% of the distributor’s annual revenue allowance.⁸
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⁷ <https://www.aer.gov.au/system/files/AER%20-%20Explanatory%20statement%20-%20Demand%20management%20incentive%20scheme%20-%202014%20December%202017.pdf>

⁸ <https://www.aer.gov.au/system/files/AER%20-%20Explanatory%20statement%20-%20Demand%20management%20innovation%20allowance%20mechanism%20-%202014%20December%202017.pdf>

	<ul style="list-style-type: none"> • Project eligibility requirements—requiring projects to be innovative and have potential to reduce long-term network costs. • Compliance reporting requirements—distributors must submit an annual report to the AER setting out the amount of allowance claimed, along with specifics of each project funded by the allowance. 	
<p>United Kingdom</p>	<p>The Office of Gas and Electricity Markets (Ofgem) have established two distinct mechanisms for funding innovation:</p> <ol style="list-style-type: none"> 1. Network Innovation Allowance (NIA) 2. Network Innovation Competition (NIC) <p>The NIA is a set allowance each RIIO-Network Licensee receives as part of their price control allowance. It is a percentage of base revenue—set according to the NIA Licence Condition—allowed on a use-it-or-lose it basis. The allowance is provided for two purposes:</p> <ul style="list-style-type: none"> • To fund smaller technical, commercial, or operation projects directly related to the licensees’ network that have the potential to deliver financial benefits to the licensee and its customers; and/or • To fund the preparation of submissions to the NIC <p>The NIC is an annual competition to fund ‘flagship innovative projects’ that can deliver financial and environmental benefits for</p>	<p><i>Network Innovation Allowance (NIA)</i></p> <ul style="list-style-type: none"> • The amount of funding available to each Network Licensee under the NIA is calculated using the formulae in the NIA Licence Condition. The allowance is set at the start of the price control based on the quality of the innovation strategy proposed.⁹ Under RIIO-ED1, two out of the six businesses received 0.7% and 0.6% of base revenue as allowances, where the rest received 0.5%. • A maximum of 90% of NIA expenditure can be covered by the set allowance¹⁰. • £61 million of funding is available each year (for electricity and gas networks).¹¹ <p><i>Network Innovation Competition (NIC)</i></p> <ul style="list-style-type: none"> • Ofgem have committed to making £70 million available each year through the Electricity NIC annually until March 2021.¹²

⁹ https://www.ofgem.gov.uk/system/files/docs/2017/07/final_gas_nia_gov_doc_v3.pdf

¹⁰ https://www.ofgem.gov.uk/sites/default/files/docs/2013/02/riioed1decoutputsincentives_0.pdf

¹¹ https://www.ofgem.gov.uk/system/files/docs/2017/03/the_network_innovation_review_our_policy_decision.pdf

¹² https://www.ofgem.gov.uk/system/files/docs/2017/07/electricity_network_innovation_competition_governance_document_version_3.0.pdf

	<p>electricity and gas customers. To be eligible for funding, projects should:</p> <ul style="list-style-type: none"> • accelerate the development of a low-carbon energy sector • deliver value for money for electricity and gas customers • create knowledge that can be shared across energy networks in Great Britain • be innovative and have an unproven business case <p>Funding is provided for projects based on Ofgem’s assessments.</p>	<ul style="list-style-type: none"> • The NIA Licence Condition permits up to £175,000 or 5% of the funding requested under the NIC Licence Condition (whichever is smaller) from its NIA to cover expenditure it incurred submitting bids to the NIC.¹³
<p>European Union</p>	<p>The European Union—guided by the Council of European Energy Regulators—emphasise that there is no “one model that fits all” to innovation funding. Each Member State has different characteristics and each regulatory authority must determine the appropriate mechanism/s based on the circumstance that they operate in.</p> <p>A shared view is the innovation funding mechanism/s should not dictate investment in particular technologies/solutions, rather it is up to the distributor to decide on suitable solutions (which may vary according to the individual situation of the distributor).</p>	
<p>United States</p>	<p><i>Example – California</i></p> <p>The Electric Programme Investment Charge (EPIC) Program was created by the California Public Utilities Commission (CPUC) to support investments in clean energy technologies. The</p>	<p>The EPIC Program provides circa \$162 USD million annually (from 2012-2020). Of this, the California Energy Commission administers circa \$130 USD million per</p>

¹³ https://www.ofgem.gov.uk/system/files/docs/2017/07/final_elec_nia_gov_doc_v3_0.pdf

	<p>programme is administered by three investor-owned utilities and the Energy Commission. It funds “clean energy research, demonstration and deployment projects that support California’s energy policy goals and promote greater electricity reliability, lower costs, and increased safety”.¹⁴</p> <p>EPIC Program funds come from rates charged to the electricity customers of the three administrative utilities. Investments are selected based on the level of benefit expected to the investor-owned utilities’ ratepayers.</p>	<p>year—and the other \$32 USD million is administered by the investor-owned utilities.¹⁵</p>
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¹⁴ <https://ww2.energy.ca.gov/research/epic/faq.html>

¹⁵ Ibid.

Appendix B: Innovation mechanisms in the gas industry

Jurisdiction	Innovation Funding Mechanism	Funding Level
NZ (proposed)	TBC	TBC
Australia	As above.	As above.
United Kingdom	As above.	<p><i>Network Innovation Allowance (NIA)</i></p> <p>As above.</p> <p><i>Network Innovation Competition (NIC)</i></p> <ul style="list-style-type: none"> Ofgem have committed to making £20 million available each year through the Gas NIC annually until March 2021.¹⁶ The NIA Licence Condition permits up to £175,000 or 5% of the funding requested under the NIC Licence Condition (whichever is smaller) from its NIA to cover expenditure it incurred submitting bids to the NIC.¹⁷
European Union	<p><i>Example — Ireland</i></p> <p>Gas Networks Ireland (GNI) has established the Gas Innovation Fund to "...promote and encourage an environment of innovation in the gas industry". The aim of the fund is to support</p>	<p><i>Example — Ireland</i></p> <p>Contestable funds of circa €4.2 million are made available annually through the Gas Innovation Fund.</p>

¹⁶ https://www.ofgem.gov.uk/system/files/docs/2017/06/gas_network_innovation_competition_governance_document_version_3.0.pdf

¹⁷ https://www.ofgem.gov.uk/system/files/docs/2017/07/final_gas_nia_gov_doc_v3.pdf

	<p>research and demonstration projects. It has several key priorities including:</p> <ul style="list-style-type: none"> • increase throughput through the gas system; • assist in the transition to a low carbon economy; • deliver significant carbon savings; and • provide measurable value to all gas customers. <p>The Gas Innovation Fund has been divided into the following two broad categories:</p> <ol style="list-style-type: none"> 1. Research; 2. Strategic projects <p>GNI carry out a high-level assessment of project applications and then eligible applications are sent to the Gas Innovation Advisory Group (GIAG). GIAG are comprised of representatives from academia, industry and policy backgrounds.</p>	<p>These funds are divided by category:¹⁸</p> <ul style="list-style-type: none"> • Research — €1.0 million • Strategic — €3.17 million
<p>Canada</p>	<p>The Natural Gas Innovation Fund (NGIF) was created by the Canadian Gas Association (CGA) to support the funding of cleantech innovation in the natural gas. The NGIF is funded by the natural gas industry—however, federal/provincial government and industry collaboratives have agreed to co-fund successful applicants.¹⁹</p>	<p>Since 2016, NGIF has approved funding for \$8.9 CAD million project investments into companies across Canada, with another \$70 CAD million in eligible project costs from industry, provincial and federal government project funding.²¹</p>

¹⁸ <https://www.gasnetworks.ie/business/renewable-gas/innovation-fund/>

¹⁹ <https://business.financialpost.com/sponsored/business-sponsored/natural-gas-innovation-fund-signs-on-seven-leading-natural-gas-producers-launches-a-cleantech-funding-call-and-leads-a-historic-federal-provincial-and-industry-co-funding-collaboration>

²¹ <http://cem-mi-vancouver2019.ca/natural-gas-innovation-fund/>

	<p>The investment process involves a three-stage model:²⁰</p> <ul style="list-style-type: none"> • <i>Intake Stage</i> — applications are pre-screened for eligibility and a short-list is developed with industry consensus. • <i>Evaluation Stage</i> — investment proposals are developed with the short-list applicants that satisfy NGIF's goals of emission reduction, creating value, affordability and resiliency. • <i>Management Stage</i> — contribution agreements are negotiated with recipients of approved funding and is managed over the life of the project through disbursements at key milestones. 	
<p>United States</p>	<p><i>Example — California</i></p> <p>The California Energy Commission's Natural Gas Research and Development Program was created by the California Public Utilities Commission (CPUC) to "support investments in improving natural gas energy efficiency and environmental equality, develop renewable technologies, and otherwise provide benefits to the public".²²</p> <p>The California Energy Commission is the administrator for the research funds—with all funds being administered under CPUC oversight. Each year, the Energy Commission submits a proposed</p>	<p>The level of annual funding is subject to CPUC approval. For the fiscal year 2016-17, the research budget made available was \$24 USD million.</p>

²⁰ <http://www.ngif.ca/process/>

²² https://www.energy.ca.gov/sites/default/files/2019-05/naturalgas_faq.pdf

	<p>program plan and funding request to the CPUC for review and approval.</p> <p>The Natural Gas R&D Program is funded by a ratepayer surcharge on all natural gas consumed in California.</p>	
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About Us

Sapere Research Group is one of the largest expert consulting firms in Australasia, and a leader in the provision of independent economic, forensic accounting and public policy services. We provide independent expert testimony, strategic advisory services, data analytics and other advice to Australasia's private sector corporate clients, major law firms, government agencies, and regulatory bodies.

'Sapere' comes from Latin (to be wise) and the phrase 'sapere aude' (dare to be wise). The phrase is associated with German philosopher Immanuel Kant, who promoted the use of reason as a tool of thought; an approach that underpins all Sapere's practice groups.

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