



Australian Government

Department of Climate Change, Energy,  
the Environment and Water

# Background Paper

## Options for electricity generation and storage capacity

Department of Climate Change, Energy, the Environment and Water



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This publication (and any material sourced from it) should be attributed as: DCCEEW 2022, *Our food future: trends and opportunities*, Department of Climate Change, Energy, the Environment and Water, Canberra, February. CC BY 4.0.

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**Acknowledgement of Country**

We acknowledge the Traditional Owners of Country throughout Australia and recognise their continuing connection to land, waters and culture. We pay our respects to their Elders past and present.

# Glossary

**AEMO** – The Australian Energy Market Operator.

**CDC** – Clean dispatchable capacity.

**CEFC** – The Clean Energy Finance Corporation.

**CER** – The Clean Energy Regulator.

**CfD** – Contract for difference.

**CIS** – Capacity Investment Scheme

**Dispatchable capacity** – On-demand generation from energy sources such as pumped hydro and batteries.

**DER** – Distributed energy resources such as rooftop solar.

**ESB** – The Energy Security Board.

**FID** – Final investment decision.

**Firm Capacity** – A guaranteed level of power supply committed to by a supplier, to be available at all times during the period covered by the commitment.

**GW** – Gigawatt.

**IA** – Impact Analysis.

**ISP** – The Integrated System Plan produced by AEMO.

**LRET** – Large-scale Renewable Energy Target.

**LGC** – Large-scale Generation Certificates.

**MW** – Megawatt.

**MWh** – Megawatt-hour.

**Mt** – Megatonne.

**NEM** – The National Electricity Market that operates in the eastern and south-eastern states of Australia.

**REGO** – Renewable Energy Guarantee of Origin scheme to certify renewable electricity.

**Reverse auctions** – Type of tendering process used to obtain the best price by encouraging competition among bidders.

**Scope 1 Emissions** – Direct emissions that are owned or controlled by a company.

**TWh** – Terawatt-hour.

**VRE** – Variable renewable energy from intermittent renewable energy sources such as wind and solar.

**WEM** – Western Australia's Wholesale Electricity Market.

# Contents

<b>Glossary</b> .....	<b>iii</b>
<b>Executive Summary</b> .....	<b>vi</b>
<b>Introduction</b> .....	<b>7</b>
<b>What is the policy problem?</b> .....	<b>8</b>
1.1    Rapid transformation of Australia’s electricity sector is required to ensure reliability, manage costs, and achieve emissions reduction targets.....	8
1.2    However, the current pace of investment appears insufficient to meet these goals.....	8
1.3    This would have significant negative consequences for consumers, businesses, and society	9
<b>Why is government intervention needed and what are its objectives?</b> .....	<b>11</b>
2.1    Government action is required to increase investment certainty and rapidly accelerate investment in new VRE and dispatchable capacity.....	12
<b>What policy options are being considered?</b> .....	<b>13</b>
3.1    A range of policy approaches could be considered to drive timely increased investment in VRE and CDC.....	13
3.2    Three integrated options have been prioritised for detailed assessment in Section 4 ..	19
<b>What is the likely net benefit of each option?</b> .....	<b>20</b>
4.1    The CIS and LRET options are expected to better meet the Government’s objectives to accelerate renewable investment and reduce emissions, manage system costs, and ensure reliability	23
4.2    A well-executed CIS is expected to achieve policy objectives at lower cost to government, while maintaining efficient investment incentives and flexibility to align these to emerging system needs.....	26
4.3    An expanded LRET would be more familiar to market participants, but an expanded CIS could be implemented more quickly .....	28
4.4    An expanded CIS or LRET is expected to benefit energy users, retailers, and new renewable energy generators, while BAU may be more favourable to incumbent energy suppliers..	29
<b>Who was consulted, and how was their feedback incorporated</b> .....	<b>31</b>
<b>How will you implement and evaluate your chosen option?</b> .....	<b>33</b>
6.1    CIS implementation will involve bi-annual tenders beginning in 2023-24.....	33
6.2    The success of the program will be measured against key objectives.....	33
<b>Appendix 1: Examples of domestic and international revenue underwriting schemes</b> .....	<b>35</b>
<b>Appendix 2: Regulatory burden calculations</b> .....	<b>37</b>
<b>References</b> .....	<b>39</b>

## Tables

Table 1: Energy market stakeholders.....	10
Table 2: Range of policy approaches considered.....	13
Table 3: Prioritisation of long list policy options for detailed analysis.....	20
Table 4: Summary comparison of prioritised policy options .....	22
Table 5: Stakeholder impacts of alternative options .....	30
Table 6: Measuring the success of the CIS.....	34
Table 7: Estimate of administration costs per tender round (VRE and CDC).....	37
Table 8: Total administration costs (life of CIS).....	37

## Figures

Figure 1: Commissioned (completed) renewable energy generation projects since 2017 .....	9
Figure 2: Proposed approach to revenue underwriting.....	15
Figure 3: NEM renewable share and emissions to 2030 .....	24
Figure 4: Modelled NEM wholesale prices under CIS and LRET options vs. BAU .....	25
Figure 5: Sensitivity of NEM wholesale prices to system shocks under CIS/LRET vs. BAU .....	26

# Executive Summary

Australia is in the midst of an energy transformation, driven by ageing and increasingly unreliable coal-fired generation assets, the need to decarbonise in the face of climate change, the falling cost of renewable energy and rapid deployment of innovative technologies across electricity supply, storage and use. Significant investment in new generation and storage capacity is needed to ensure the continuing reliability and affordability of Australian electricity supply and secure a smooth transformation that delivers economic benefits to Australian households, businesses and communities.

This Impact Analysis considers a wide range of potential options for government intervention to accelerate investment in variable renewable energy (VRE) generation and clean dispatchable capacity (CDC), to support ongoing reliability and mitigate risks of a disorderly transition, support lower electricity prices, and help achieve the Government's 82 per cent renewable energy target by 2030, and thereby contribute to reducing emissions by 43 per cent by 2030.

The assessment identifies two options that would be capable of incentivising the additional investment in renewable generation and dispatchable capacity necessary to minimise reliability risks, achieve the 82 per cent renewable energy target, and reduce avoidable costs to electricity users relative to a business-as-usual (BAU) approach without additional government action:

- an expanded Capacity Investment Scheme (CIS) covering both VRE and CDC; and

- an expanded Large-scale Renewable Energy Target (LRET) for VRE, combined with a CIS for CDC.

The analysis finds that an expanded LRET could incentivise new VRE projects through additional certificate revenue and would be familiar to market participants.

The analysis also finds that an expanded CIS – which would underwrite the revenues of VRE and CDC projects selected via a series of competitive tenders – could be implemented more quickly, that the competitive price discovery process is likely to achieve the Government's objectives at materially lower cost, and that the structure of the CIS tenders would allow more flexibility to provide efficient investment incentives and to align implementation to emerging system needs over time. Moreover, while in principle the costs of both the CIS and LRET approaches could be borne by government rather than electricity consumers, in practice this is simpler to achieve under a CIS. In contrast to an expanded LRET, the CIS also provides a natural link between the scale and pace of rollout and aggregate cost to government.

Implementing the expanded CIS for 23 GW of VRE and 9 GW of CDC will complement other Australian Government initiatives driving the energy transformation, such as the Rewiring the Nation program and the existing LRET, as well as a range of state and territory government programs and initiatives.

This assessment finds that an expanded CIS will support lower electricity prices, improved reliability, and the transition to 82 per cent renewable electricity needed to support achievement of the Commonwealth's emissions reduction target of 43 per cent by 2030.

# Introduction

This Background Paper presents the analysis that informed the Australian Government's decision, announced on 23 November 2023, to expand the Capacity Investment Scheme (CIS) to cover:

23 GW of new variable renewable energy (VRE) generation capacity; and

9 GW of new clean dispatchable capacity (CDC).

It also outlines additional analysis undertaken as part of the deliberative process that underpinned the Government's decision following the certification of the Second Pass Impact Analysis. The announcement in November initiated further consultation and design, with the announcement of final design expected before the CIS's inaugural tender in May 2024. This report serves as a supplementary document to the Second Pass Impact Analysis and is referred to as the Addendum.

Furthermore, certain sections of the Impact Assessment document were required to be redacted due to their commercial-in-confidence nature. These redactions have affected the readability and may affect readers' comprehension of the document. The addendum offers an evaluation of the chosen policy option's implications and benefits, as well as alternative options considered in order to address readability issues in the Impact Analysis.

This is consistent with the Government's commitment to transparent decision-making and the general principle that impact analyses should be published. Where necessary to support implementation, particularly in relation to future tender processes, some commercially sensitive information has been withheld to support achieving the best possible value-for-money in implementing the CIS.

# What is the policy problem?

## **1.1 Rapid transformation of Australia’s electricity sector is required to ensure reliability, manage costs, and achieve emissions reduction targets**

The Australian electricity sector is undergoing a once-in-a-century transformation. While electricity demand continues to rise, the falling cost of renewable generation, expected closures of ageing and increasingly unreliable coal-fired generation, combined with national and global commitments to reduce emissions, are driving increased renewable penetration.

The Australian Energy Market Operator’s (AEMO) 2022 Integrated System Plan (ISP) Step Change Scenario (AEMO, 2022) has forecast that electricity demand could double by 2050 – driven partly by increased electrification of transport, industry and residential energy use. Meeting this demand could require in the order of 141 GW utility scale variable renewable energy (VRE) and over 60 GW of firming capacity to be in place by 2050. Already by 2030, AEMO estimates that around 6 GW of new utility-scale firm dispatchable capacity will need to be built to replace 14 GW of coal capacity that is expected to retire over this time, with the remaining coal capacity expected to exit in the following two decades.

Governments at all levels are responding to this need for investment in new electricity generation, storage and transmission infrastructure. This includes state-level initiatives such as the New South Wales (NSW) Energy Roadmap, the Queensland Jobs and Energy Plan, Victoria’s renewable and storage targets, and Western Australia’s (WA) Energy Transformation Strategy, as well as Commonwealth support for major investments, such as through the existing LRET certificate scheme, and financing for clean energy projects provided through Rewiring the Nation and the Clean Energy Finance Corporation (CEFC).

*Note: Unless otherwise noted, references to the ISP are to the 2022 Step Change Scenario.*

## **1.2 However, the current pace of investment appears insufficient to meet these goals**

Despite these measures, current progress appears insufficient to deliver a smooth transformation and safeguard reliability, or to achieve the 82 per cent renewable penetration that would facilitate achieving a 43 per cent reduction in emissions by 2030.

Analysis indicates that there remains a significant gap between current efforts and commitments, and new VRE and CDC investments required to achieve 82 per cent renewables by 2030. This gap is estimated to be in the order of 23 GW new VRE build and 9 GW additional clean dispatchable capacity by 2030.

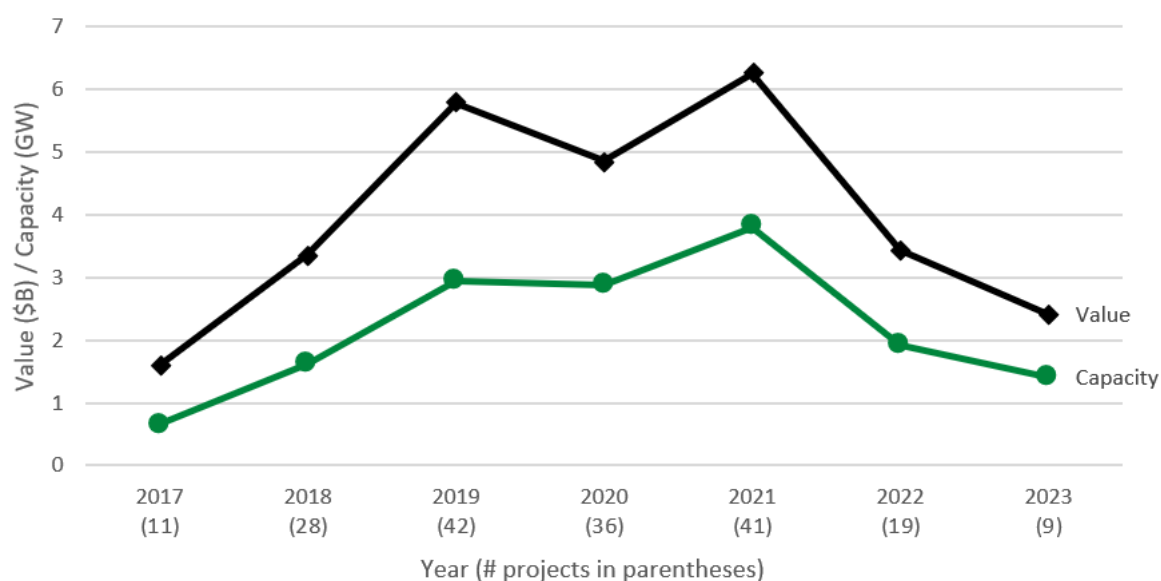
*Note: The 23 GW estimate was based on the Step Change Scenario in the 2023 IASR. The 9 GW estimate was based on the AEMO ISP 2022, and included a ‘buffer’ of additional capacity to allow for*



*demand uncertainty. Note that these estimates are consistent with projections in the more recent draft 2024 ISP.*

While there has been significant VRE investment to date (around 14 GW between 2017 and 2022), there are signs of a significant slowdown in the number, value, and capacity of renewable energy projects commissioned (completed) since 2021 (shown in Figure 1 below). Since the initial Impact Analysis (IA) was completed, data for 2023 has become available, and confirms the downward trend seen in 2022.

**Figure 1: Commissioned (completed) renewable energy generation projects since 2017 (CEC, 2024)**



Furthermore, only 1 GW of new clean firm capacity has been delivered over the past ten years as of July 2023, and the Clean Energy Regulator (CER) reports that only 526 MW of new VRE capacity reached final investment decision in the first half of 2023 (CER, 2023).

Without a significant increase in the pace of VRE and CDC investment to ensure reliability and achieve the Government's 82 per cent renewable energy target by 2030, electricity prices will remain higher than they need to be, risks to reliability will increase, and Australia's legislated 43 per cent emissions reduction target may not be met. The urgency of the challenge is heightened by the long-lead times associated with new energy projects, which often take several years to develop, finance and construct.

### **1.3 This would have significant negative consequences for consumers, businesses, and society**

The imbalance between demand and supply that would result from insufficient investment in new clean generation and dispatchable capacity (too little, too late) or the wrong mix of investment (including insufficient dispatchable capacity to back up intermittent renewable generation) would have significant negative consequences for consumers, businesses, and society more broadly – including increased system vulnerability, reduced reliability, and higher prices.

Australia’s energy markets involve a range of stakeholders. The following are considered in this Impact Analysis in assessing the impacts of options to address electricity generation and storage issues, displayed in Table 1.

**Table 1: Energy market stakeholders**

Stakeholder group	Stakeholder role and potential considerations
Consumers, including households	Increases in retail electricity bills are contributing to cost-of-living pressures for Australian households, and increased operational costs for business consumers. They will also feel the impact of potential future reliability challenges.
Energy intensive users	Energy-intensive electricity users are exposed to higher energy costs. While these users can negotiate with retailers over prices, they too are facing increased electricity costs as retailers pass on higher wholesale costs, and they may also be particularly affected by reliability challenges.
Energy retailers	Energy retailers sell electricity to residential and business customers. The retail sector is the final link in the electricity supply chain, providing energy services and final retail energy bills to end-user customers.
Renewable energy generators	Renewable energy generators use renewable sources (e.g. wind, solar, and hydro) to generate electricity, and then offer to supply the wholesale market with a certain volume of electricity for a bid price. Renewable generators do not create emissions when generating electricity, and are essential to reducing Australia’s carbon emissions.
Fossil fuel generators	Fossil fuel generators use fossil fuel sources (e.g. coal, gas) to generate electricity and then offer to supply the wholesale market with a certain volume of electricity for a bid price. Fossil fuels produce carbon emissions when generating electricity.
Taxpayers	Taxpayers will ultimately bear the cost of government interventions in the market.

# Why is government intervention needed and what are its objectives?

Against the backdrop of rapid energy market transformation and in anticipation of future government intervention to support investment in the market, the former Energy Security Board (ESB) noted a high level of investment uncertainty (DCCEEW, 2022), leading many investors to adopt a 'wait and see' approach as a rational response to such uncertainty.

The economics of variable renewable energy (VRE) and clean dispatchable capacity (CDC) investments differ in key ways: while the return on VRE investments is largely determined by cost of supply versus annual volume weighted wholesale prices, the profitability of CDC investments depends on the margin – or difference – between electricity purchased when supply volumes are high relative to demand, and despatch when supply is low relative to demand. Nonetheless, both are subject to significant uncertainties in the current (pre-CIS expansion) environment, creating a significant risk that too little investment is being committed, and that new renewable generation and clean dispatchable capacity will arrive too late.

Key drivers of elevated investment uncertainty include:

**Policy uncertainty** due to the gap between announced Commonwealth, state, and territory targets and existing policy settings, which can delay investment decisions as proponents wait for additional policy announcements;

**Demand uncertainty** related to the transition of major electricity users such as smelters, the timing and scale of trends such as electrification, energy efficiency, and the uptake of distributed generation and storage solutions;

**Timing uncertainty** over large generator closures and associated demand for new generation sources and resulting price effects;

**Planning and implementation risks** associated with lengthy and complex environmental and regulatory approval processes, community attitudes and social licence issues associated with the generation and transmission build, skills shortages, and supply chain constraints and challenges; and

**Geopolitical and other risks** including the impact of geopolitical events on global energy prices and the risk of transmission congestion and curtailment.

As well as driving a 'wait and see' approach from investors, these risks lead to elevated risk premia and higher costs of capital for both VRE and CDC projects, which may make them uneconomic. With wholesale prices expected to fall as the share of renewables in the generation mix grows, the combined effect of these dynamics is a forecast 'viability gap' for the VRE and CDC projects required to meet the Government's 82 per cent renewable energy target by 2030.

## **2.1 Government action is required to increase investment certainty and rapidly accelerate investment in new VRE and dispatchable capacity**

These dynamics create a strong case for additional government policy measures to incentivise accelerated VRE and CDC investment, and avoid the risks associated with a disorderly energy market transformation.

There is a clear need for government to provide long-term policy clarity to the market that can address the perceived gap between the rapid transformation of the electricity market needed to ensure reliability and achieve the Government's target of 82 per cent renewables by 2030 and current policy, and overcome the current 'wait and see' dynamic.

There is a role for government to address policy uncertainty and coordination failures, and to reduce project risk premia and costs of capital.

In 2021, Commonwealth, state and territory Energy Ministers tasked the ESB to provide recommendations on the design of a capacity market mechanism for the National Electricity Market (NEM), in which market providers of capacity would be paid to have capacity available during certain periods. However, Energy Ministers judged based on stakeholder feedback that such a capacity mechanism would not be sufficiently timely or targeted to address the rapid transformation of Australia's electricity system that is required.

On 12 August 2022, Commonwealth, state and territory Energy Ministers tasked government Senior Officials to propose further options for a new framework that (DCCEEW, 2023):

- Delivers adequate capacity;
- Ensures orderly transition; and
- Incentivises new investment in firm renewable energy to ensure the system can meet peak demand at all times.

On 8 December 2022, Ministers then endorsed in principle a new Commonwealth Capacity Investment Scheme, which provides a national framework to drive new clean dispatchable capacity and ensure reliability in Australia's rapidly changing energy market.

Following further consultation with jurisdictions and key energy market stakeholders, and consideration of stakeholder submissions to the ESB Capacity Market consultation process, the following key objectives were identified for potential government intervention, and form the basis of the assessment of policy options set out in Sections 3 and 4 of this Impact Analysis.

- Fill expected reliability gaps as ageing coal power stations exit.
- Provide long-term certainty to investors that will accelerate the investments in VRE and CDC needed to achieve the Government's target of 82 per cent renewable energy by 2030 and contribute to reduced emissions.

- Minimise avoidable costs to electricity users.
- Achieve value-for-money from public expenditure.
- Maintain efficient incentives in the electricity market.
- Provide flexibility to adjust to emerging system needs.
- Be capable of being implemented effectively.
- Minimise time to implementation to ensure rollout targets can be achieved.

Any additional policy measures should also be consistent with existing policy architecture, including the roles and responsibilities of different levels of government and energy market bodies.

## What policy options are being considered?

A range of options could be considered to incentivise timely additional investment in 23 GW of variable renewable energy (VRE) capacity and 9 GW of clean dispatchable capacity (CDC). The analysis for this paper adopted a staged approach: identifying and assessing a wide range of potential approaches, narrowing this range down to a shortlisted set of the most prospective options for more detailed analysis and assessment, including scenario-based sensitivity analysis.

This section describes the first stage of this process, including the range of options considered, the results of the high-level assessment, and shortlisting of specific options for further analysis. The more detailed assessment of these shortlisted options is described in [Section 4](#).

### 3.1 A range of policy approaches could be considered to drive timely increased investment in VRE and CDC

As set out in Table 2, most of the broad approaches that could be considered to achieve the Government's objectives could be targeted at either or both of VRE generation and CDC. In addition to a no intervention option (which, even though it cannot achieve the 82 per cent, is considered to provide a baseline), these include: revenue underwriting, certificate schemes, discounted finance, and direct investment.

In addition, two further options were considered that could specifically target increased investment in CDC: a capacity market mechanism of the sort proposed by the ESB in 2021-22 and a strategic reserve mechanism. However, while in principle a strategic reserve could include clean sources of dispatchable capacity, in practice it is more likely to involve fossil-fuel based generation.

**Table 2: Range of policy approaches considered**

Options	VRE	CDC
No intervention / 'business-as-usual'	Yes	Yes

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Revenue underwriting (e.g. CIS/CfD)	Yes	Yes
Certificate scheme (e.g. LRET)	Yes	Yes
Discounted finance	Yes	Yes
Direct investment	Yes	Yes
Capacity market (e.g. ESB proposal)	No	Yes

VRE investments would include intermittent renewable energy sources such as solar and wind, but the precise definition of eligible technologies may be refined following further consultation. CDC investments would include new battery systems, hydrogen, pumped hydro, emerging technologies, and renewable generation projects that contribute to improved system reliability.

### 3.1.1 No government intervention / business-as-usual

Under a business-as-usual approach, current Commonwealth, state and territory policies and initiatives would continue, including among others:

- Long-term Energy Service Agreement (LTESA) procurements planned under the NSW Energy Roadmap, and other state-level procurements;
- The existing LRET certificate scheme; and
- Financing for clean energy projects provided through the CEFC (including e.g. Rewiring the Nation).

However, there would be no further changes to existing market settings and no additional Commonwealth, state or territory measures introduced between now and 2030.

The business-as-usual approach is not consistent with achieving the Government's objectives. However for both VRE and CDC, this option provides a base case against which other alternatives can be considered.

### 3.1.2 Revenue underwriting, including an expanded Capacity Investment Scheme (CIS) for VRE and CDC

A revenue underwriting model would involve a series of competitive tenders for new VRE or CDC projects that could increase investment in VRE generation or clean dispatchable capacity. Successful projects would receive long-term revenue underwriting, aimed at reducing financial risks for investors, lowering projects' weighted average cost of capital (WACC) and encouraging investment. Payments and fiscal costs would be contingent on actual project revenues in the contracted period.

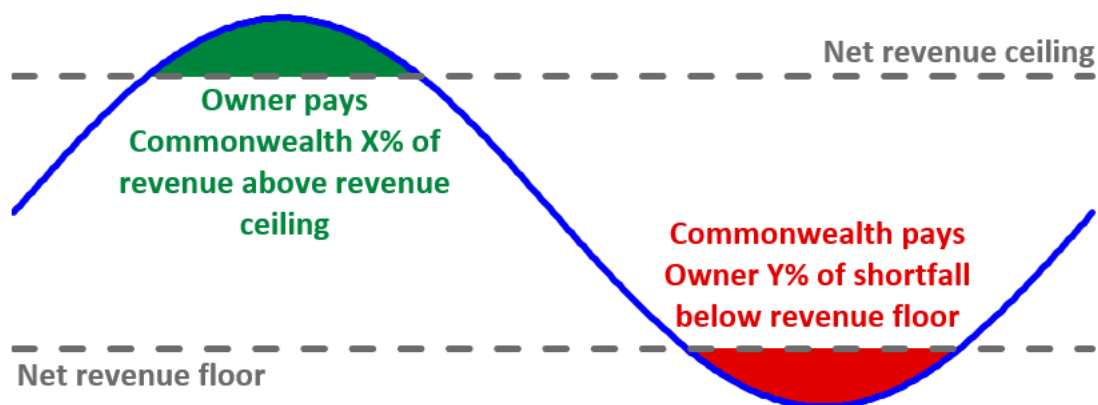
There are a range of domestic and global precedents for the use of such revenue underwriting mechanisms to support renewables investment, including the NSW LTESAs and the use of contracts for difference (CfDs) by the Victorian, Australian Capital Territory (ACT), United Kingdom (UK) and other European governments (see Appendix 1 for further details). In the UK, for example, CfDs have supported 11 GW of renewable capacity across the first three tenders, with a recent program evaluation indicating that the scheme represents value for money over the UK's previous Renewables Obligation (RO) certificate scheme, and has led to a reduction in consumer costs (BEIS, 2021).

By guaranteeing either a fixed level of revenue (under a CfD), or a revenue floor (under a CIS-style ‘cap and floor’ arrangement) revenue underwriting mechanisms de-risk new investments and reduce their required costs of capital (Newbery, 2016) (Gohdes, et al., 2022).<sup>1</sup> Under both models, projects would remain incentivised to manage construction and other cost risks which they are best placed to manage. Overseas, CfDs have typically been used to motivate investment in new VRE generation in place of new fossil fuel-based generation (typically gas), which would otherwise be more financially attractive. They can also be used to accelerate investment in renewables options that may be (close to) financially attractive, but not currently attracting investment due to a range of uncertainties around policy settings and other factors described in [Section 2.1](#).

A CIS-style biddable ‘cap and floor’ model (illustrated in Figure 2) is an alternative to a pure CfD approach. This offers the potential to achieve a more tailored risk allocation and to incentivise new investment at lower cost to government than a pure CfD approach. If appropriately designed, a CIS cap and floor approach would also increase incentives for proponents to participate in contract markets relative to the incentive effects of CfDs, which fully insulate projects from market price risk.

While in theory, prices (under either a CfD or a ‘cap and floor’ approach) could be set administratively, competitive price discovery is more likely to achieve the minimum level of additional support required to deliver the relevant projects, with less risk of setting prices that are either higher than necessary, or insufficient to incentivise investment (Newbery, 2016).<sup>2</sup> In practice, to simplify implementation it is envisaged that the revenue share percentages (X and Y in Figure 2) would be set prior to bidding, and that bids would focus on the level of the net revenue floor and ceiling.

**Figure 2: Proposed approach to revenue underwriting**



The tender process also allows government to target the type and location of investments that best align with evolving forecast system needs (for either generation or dispatchable capacity). Following consultation with relevant stakeholders, a generation or dispatchable capacity target would be set

<sup>1</sup> While estimates vary, evidence suggests these reductions can be material with potential for up to ~330bp WACC reduction from CfDs, (vs. either PPAs or a certificate scheme) (Gohdes, et al., 2022) (Newbery, 2016)

<sup>2</sup> “Towards a green energy economy? The EU Energy Union’s transition to a low-carbon zero subsidy electricity system – Lessons from the UK’s Electricity Market Reform” finds evidence that reverse auctions for CfDs in the UK led to significant cost reductions vs. administratively set prices. (Newbery, 2016)

for each tender, taking into account demand and supply forecasts based on the existing investment pipeline and anticipated thermal exits, as well as regional reliability risks. The ability to calibrate tender targets, assessment criteria, location, and other parameters on an ongoing basis is expected to be valuable given that the contribution of generation and dispatchable capacity is influenced by significant uncertainties in the future requirements of the energy transition, and their sensitivity to the future path of energy demand, technological developments, and the status and progress of current and future generation, transmission, and storage projects.

Projects receiving revenue support would still be subject to electricity market rules, and with appropriate settings, the scheme would not interfere with the efficient operation of the short-term dispatch market or other market settings. It would be complementary to other revenue sources and government policies, including the existing LRET, state grants, loans provided by the CEFC, and Renewable Energy Guarantee of Origin (REGO) certificates.

For these reasons, a CIS approach to revenue underwriting is considered superior to a pure CfD approach, and is prioritised for further analysis.

### **3.1.3 Certificate scheme for VRE, including an expanded Large-scale Renewable Energy Target (LRET)**

A certificate scheme would involve issuing tradeable certificates for renewable generation and/or clean dispatchable capacity (CDC) to accredited projects based on discharge of that capacity to the grid. Retailers and directly connected large customers ('liable entities') would be liable to surrender a targeted volume of certificates annually, depending on how much capacity they buy or sell, with failure to do so attracting a penalty. Demand for certificates from liable entities, as well as potential voluntary demand (such as from companies looking to support their claims about reducing emissions using renewable electricity) would provide an additional revenue stream to VRE and CDC projects and thereby provide incentives for increased investment.

Such a scheme could be implemented as an expansion of the existing Large-scale Renewable Energy Target (LRET), which was designed to deliver 33 TWh of additional electricity (corresponding to a renewable power percentage of approximately 19 per cent in 2023) annually until 2030, at which point it will expire. The LRET has so far been successful in incentivising new renewable investment, reaching the 33 TWh target in 2019, and is similar to other schemes employed overseas, including in Sweden and Norway, and in the UK (though the UK's Renewable Obligation scheme is now being phased out in favour of CfDs).

A certificate scheme that expands on the existing LRET is a natural option to consider for incentivising additional VRE investment, and was prioritised for more detailed analysis. Undertaking this analysis raises questions about a number of specific design choices for the potential implementation of a suitable LRET approach.

**Both the revenue underwriting and certificate schemes should minimise additional costs to consumers, implying that the certificate scheme should use rebates to ensure comparable retail prices.** Under a revenue underwriting model, government would directly underwrite the revenue risk to the extent required to secure the aggregate new investment target, as determined by the competitive tender process. In contrast, under an LRET, the 'clearing price'



of certificates will be set by the highest cost marginal producer, and would typically be passed on to electricity consumers through higher bills. Given the Government's desire to achieve the best outcome for electricity users, including lowest practical electricity prices, some form of budget-funded rebate would be required to offset these increased costs to consumers.

**The scheme would apply to both new and existing capacity.** While any existing investments in VRE or CDC capacity have been made without requiring the additional incentive provided by an expanded certificate scheme, excluding existing capacity from the scheme would be practically challenging, and risk distorting dispatch decisions and allocative efficiency in the wholesale market.

**An option to underwrite certificate prices could be considered.** One challenge with a certificate scheme is that investors remain exposed to (potentially significant) revenue risk, based on fluctuating certificate prices. A possible response to this would be for government to adopt a 'hybrid' certificate plus underwriting model in which it would establish a price floor for certificates (in addition to the effective price cap provided by the penalty for liable entities who fail to surrender them). In contrast to the CIS, however, this floor would likely need to be set administratively at a single level, rather than through a competitive process. Both 'pure' and underwritten options are considered in the analysis in [Section 4](#).

### 3.1.4 Certificate scheme for CDC

While the parameters of a VRE-focused LRET are relatively well-understood, the analysis was not able to identify existing examples of using a certificate approach to clean dispatchable capacity (CDC) development. Designing and implementing such an approach would involve a range of potentially significant additional complexities. These include:

The more complicated operational model that underpins CDC projects, where profit is based on the margin between purchase (at times when supply is high relative to demand) and dispatch prices (when demand is high relative to supply), and the volume of storage and dispatch, both of which are shaped by electricity supply and demand dynamics that are largely beyond the control of CDC project proponents.

Establishing a priori legislated targets or an alternative legislative framework for dispatchable capacity that accounts for system context (including locational priorities) and evolving interactions with voluntary demand, VRE generation profiles and the transmission system; and

Challenges involved in passing legislation within the required implementation timeframes.

For these reasons, and in the context of the Government's decision in December 2022 to proceed with a pilot Capacity Investment Scheme for CDC, a certificate mechanism was not considered practical to develop and implement an LRET approach to CDC in the timeframes required to achieve the Government's 2030 objectives. This option was therefore not shortlisted for further analysis.

*Note: the subsequent analysis in Section 4 also favoured the CIS over the LRET for VRE, and that the reasons for this would also apply to a CDC certificate mechanism.*

### **3.1.5 Discounted Finance**

Government could also seek to lower the cost of capital for VRE and/or CDC investments by providing discounted financing. This approach is used in other contexts in Australia, including the \$20 billion Rewiring the Nation Fund announced in 2020.

Discounted financing is typically deployed where risk adjusted investment returns are unattractive to commercial entities, but the investment provides wider economic or other benefits, such as ‘first-of-a-kind’ attempts to commercialise a technology with relative high innovation risks but also other externalities that are considered to warrant government support.

Compared to a revenue underwriting mechanism, a discounted finance approach would involve government compensating or shielding investors from a range of risks beyond price and revenue, such as project implementation costs. In addition, the level of support provided through discounted finance arrangements are typically agreed in advance, and not calculated on the basis of future outcomes. As a result, this approach is not as well-targeted at the specific issues and uncertainties identified in [Section 2](#). For these reasons, this option was not shortlisted for further analysis or consideration.

### **3.1.6 Direct investment / government ownership**

Direct investment would involve government ownership of VRE and/or CDC assets, with a variety of potential structures possible, including full and partial ownership.

These would require government to take on additional new responsibilities for delivery and ongoing operation of the required VRE or CDC capacity, and a commensurately greater degree of risk. The Federal Government taking a substantial equity position in new electricity generation assets at the scale required to deliver the 82 per cent renewables target would represent a major break from established policy practice, and would raise a series of complex issues around market governance. It would also be likely to exacerbate, rather than reduce, investor concerns and perceived uncertainties. These risks and considerations were considered to outweigh the potential advantages of direct government investment in this context.

For these reasons, government ownership is not shortlisted for further analysis or consideration.

### **3.1.7 ESB-style capacity market**

In 2021, the ESB initiated a project to progress detailed design of a ‘Capacity Mechanism’ that would explicitly value capacity in the NEM, in addition to electricity supply. Consultation on a high-level design for the proposed mechanism was conducted in 2022. Feedback to that consultation raised concerns about the complexity and timeframe for implementation of the proposed mechanism, as well as the proposed eligibility of thermal coal plants for support, which was considered to risk reliability and delaying the transition to clean energy. In December 2022, The Energy and Climate Change Ministerial Council (ECMC) decided to instead pursue a more targeted Capacity Investment Scheme for clean dispatchable capacity, that could be implemented in the required timeframes. Given this previous consideration and decision, an ESB-style capacity mechanism is not considered further in this analysis.

## **3.2 Three integrated options have been prioritised for detailed assessment in Section 4**

On the basis of the considerations set out above, in addition to the 'business as usual' scenarios which were prioritised for detailed analysis to serve as baselines, two options to incentivise increased investment in VRE and one options to incentivise increased investment in clean dispatchable capacity (CDC) were prioritised for further analysis, as summarised in Table 3.

For VRE, these were an expanded CIS, and an expanded LRET, and for CDC, this was an expanded CIS.

As investments in VRE and CDC are complementary, only combinations that aim to address both (or neither) are considered further. Together, these yield the following combined options for further analysis:

- No government intervention / 'business-as-usual';
- An expanded CIS for VRE, plus and expanded CIS for CDC; and
- An expanded LRET for VRE, plus an expanded CIS for CDC.

**Table 3: Prioritisation of long list policy options for detailed analysis**

Options	VRE	CDC	Rationale
No intervention / 'business-as-usual'	Yes	Yes	Base case for comparison against other options
Expanded CIS (revenue underwriting)	Yes	Yes	Potential to meet VRE and CDC objectives
Expanded LRET (certificate scheme)	Yes	No	Potential to meet VRE objectives, but adapting design to CDC adds complexity and risks timely delivery
Discounted finance	No	No	Already provided via CEFC (and included in BaU), and less well-targeted to current government objectives
Direct investment	No	No	May be part of overall policy mix, but unlikely to be viable at scale required to meet current government objectives
ESB capacity market mechanism	N/A	No	Unlikely to meet government objectives within required timeframes. Deprioritised under previous government decisions in favour of CIS.

## What is the likely net benefit of each option?

The analysis compares the three prioritised options based on a combination of quantitative modelling of key outcomes, and further qualitative analysis of each option against the objectives set out in [Section 2](#).

The quantitative modelling assesses each option's:

- Ability to support achievement of the Government's target of 82 per cent renewable energy by 2030 and thereby contribute to emissions reductions, assuming that the Capacity Investment Scheme (CIS) and Large-scale Renewable Energy Target (LRET) would both increase long-term certainty to investors;
- Potential impact on wholesale and retail electricity prices;
- Impact on system reliability risks, as indicated by price volatility in response to system shocks; and
- Cost to government.

*Note: Consistent with normal practice in electricity market modelling, it is assumed that existing reliability standards are met as a constraint. As a result, the quantitative analysis does not differentiate between the options in this respect. Instead, the impact of reliability challenges will be*

Department of Climate Change, Energy, the Environment and Water

*reflected in increased prices in response to system stress events, including the illustrative shocks explicitly modelled here as sensitivities.*

The quantitative analysis models the CIS and LRET options as equivalent in terms of incentivising variable renewable energy (VRE) and clean dispatchable capacity (CDC) investment, and their impact on emissions and reliability – the primary distinction between them being cost pass through to prices, and the level of government investment required to achieve these outcomes.

Further comparative analysis assesses the degree to which the CIS and LRET options:

- Maintain efficient incentives in the electricity market;
- Provide flexibility to adjust the scale, technology, timing, and location of investment in response to emerging system needs;
- Are simple to implement effectively; and
- Can be implemented in a timely fashion.

The outcomes of the combined quantitative and qualitative analysis are summarised in Table 4 below.

**Table 4: Summary comparison of prioritised policy options**

Options	BAU / Realistic baseline	Expanded CIS (for VRE and CDC)	Expanded LRET (for VRE + CIS for CDC)
Forecast operational demand (Generation dispatched, excluding DER) (2030 TWh, NEM only)	202 TWh*	202 TWh*	202 TWh*
Provides long-term certainty to investors	<b>No*</b>	<b>Yes**</b>	<b>Yes**</b>
Accelerates investment (2030 % renewable energy, NEM)	<b>65%</b>	<b>82%**</b>	<b>82%**</b>
Reduces emissions (2030 Mt CO <sub>2</sub> -e, NEM)	<b>75 Mt</b>	<b>34 Mt#</b>	<b>34 Mt#</b>
Average wholesale prices (Δ% vs. BAU in 2030, NEM, only)	<b>0</b>	<b>-10 to -20%#</b>	<b>-10 to -20% (subject to effective rebate scheme) #</b>
Retail prices (Δ vs. BAU in 2030, NEM only)	<b>0</b>	<b>Lower than BAU#</b>	<b>Lower than BAU# (subject to effective rebate scheme)</b>
Level of reliability risk, as measured through wholesale price volatility (in response to system shocks)	<b>High</b>	<b>Medium#</b>	<b>Medium#</b>
Cost to government	N/A	<b>Significantly lower than LRET#</b>	<b>Significantly higher than CIS</b>
Maintains efficient incentives in the electricity market	N/A	<b>Limited impact on market incentives#</b>	<b>Some impact on market incentives</b>
Provides flexibility to adjust to emerging system needs	N/A	<b>Yes#</b>	<b>Limited</b>
Can be implemented effectively	N/A	<b>Requires effective execution</b>	<b>Simpler to implement and more familiar#</b>
Minimises time to implementation	N/A	<b>By mid-2024#</b>	<b>Dependent on legislation</b>
*Indicates a modelling assumption. <b>Green</b> and # indicates relative strength. <b>Red</b> text indicates relative weakness.			

Overall, the analysis indicates that while BAU has no additional cost to government, it is unlikely to meet the Government's renewable energy, emissions, or reliability objectives, and while wholesale prices are expected to fall slightly, the potential effect on retail prices will be offset by higher network costs (with variations in impact across states).

As modelled, the CIS and LRET options are more likely to meet the Government's renewable energy and emissions-reduction objectives, and, compared to BAU, to reduce both average wholesale and retail prices and price volatility in response to shocks.

While an LRET may be simpler to implement and more familiar to market participants, this simplicity may also reduce its flexibility. A CIS could begin implementation leveraging existing infrastructure, prior to new legislation being passed. If well-executed, the competitive tender process in the CIS could lead to more efficient price discovery and is expected to achieve policy objectives at lower cost. Moreover, a CIS provides greater flexibility in offering efficient investment incentives and aligning them with emerging system needs over time.

The detailed electricity market modelling undertaken for this paper focuses on the NEM. While the Western Australian Wholesale Energy Market's (WEM) capacity market creates unique dynamics, the specific characteristics and context of the WEM are being considered in the ongoing development of detailed scheme design and implementation for the CIS in the WEM, and are expected to lead to similar results.

Overall, the analysis therefore suggests that an expanded CIS covering both VRE and CDC is the preferred option.

## **4.1 The CIS and LRET options are expected to better meet the Government's objectives to accelerate renewable investment and reduce emissions, manage system costs, and ensure reliability**

### **4.1.1 CIS and LRET options are expected to drive increased renewable investment and emissions reductions vs. BAU**

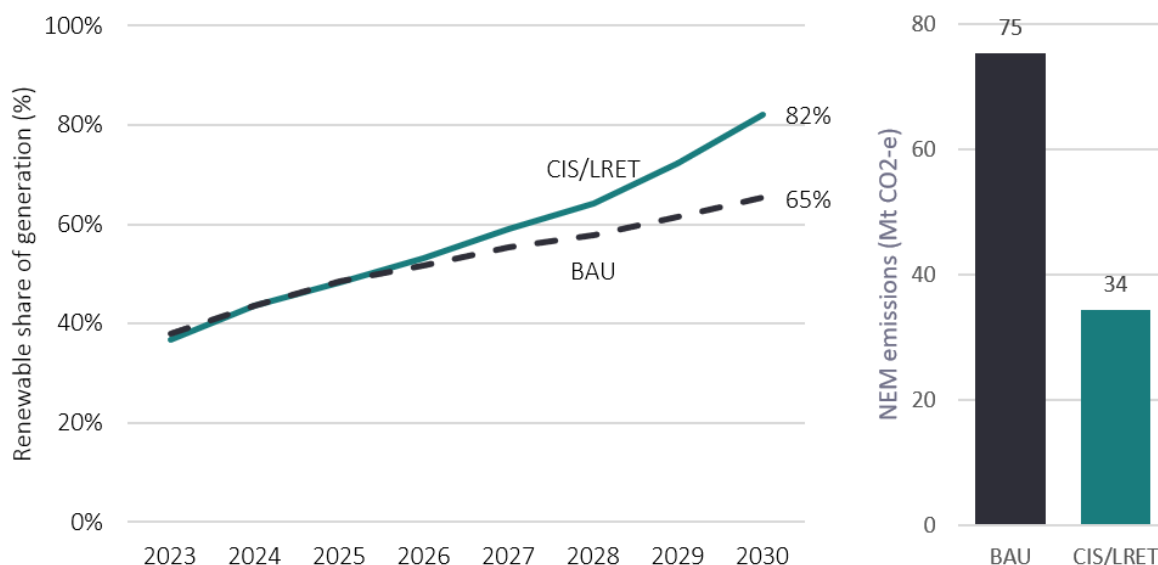
In terms of renewable penetration, the BAU scenario assumes that while existing policies will incentivise continued investment in VRE and CDC, the uncertainties outlined in [Section 2.1](#) will persist, and result in continued delays of the sort currently being observed. As a result, this scenario sees 65 per cent renewable penetration by 2030.

Both the CIS and LRET options provide long-term certainty to investors, and are modelled assuming that the increased revenue certainty from CIS contracts, or increased certificate revenue under an LRET will incentivise the investment needed to achieve 82 per cent renewable penetration by 2030.

As a result of these differing renewable rollout profiles (shown in Figure 3 below), the CIS and LRET options drive significantly lower emissions, with modelled NEM emissions by 2030 less than half those under BAU.

*Note: Figures shown are for the 'Medium' modelled scenario. A number of different scenarios and sensitivities were modelled, but do not materially affect the results or conclusions shown here.*

**Figure 3: NEM renewable share and emissions to 2030**



#### **4.1.2 CIS and LRET options are expected to result in moderately lower wholesale and retail prices vs. BAU**

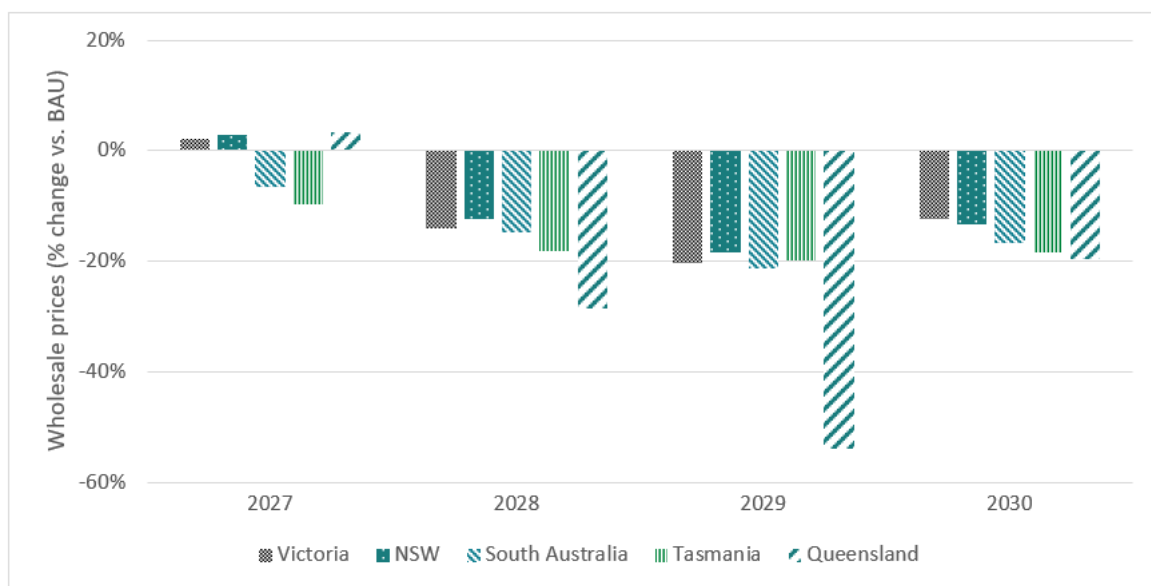
Under all modelled scenarios, the increase in renewable penetration over time is expected to reduce the marginal cost of generation, and lead to reductions in average wholesale prices.

Under the BAU scenario, modelled wholesale prices reduce slightly over time from today’s elevated levels. After allowing for increases in network costs, the impact on retail costs may be broadly neutral overall, but is likely to vary across states, with the potential for small increases or decreases depending on context.

In contrast, as shown in Figure 4, the accelerated rollout of renewables under the CIS and LRET scenarios is modelled to reduce wholesale prices by 10-20 per cent vs. BAU by 2030. Even allowing for increased network costs, these could be expected to result in lower retail prices vs. BAU. These estimates are subject to significant uncertainties, and under the LRET, are highly dependent on the design and implementation of an effective rebate scheme.



**Figure 4: Modelled percentage changes in NEM wholesale prices under CIS and LRET options compared to BAU**

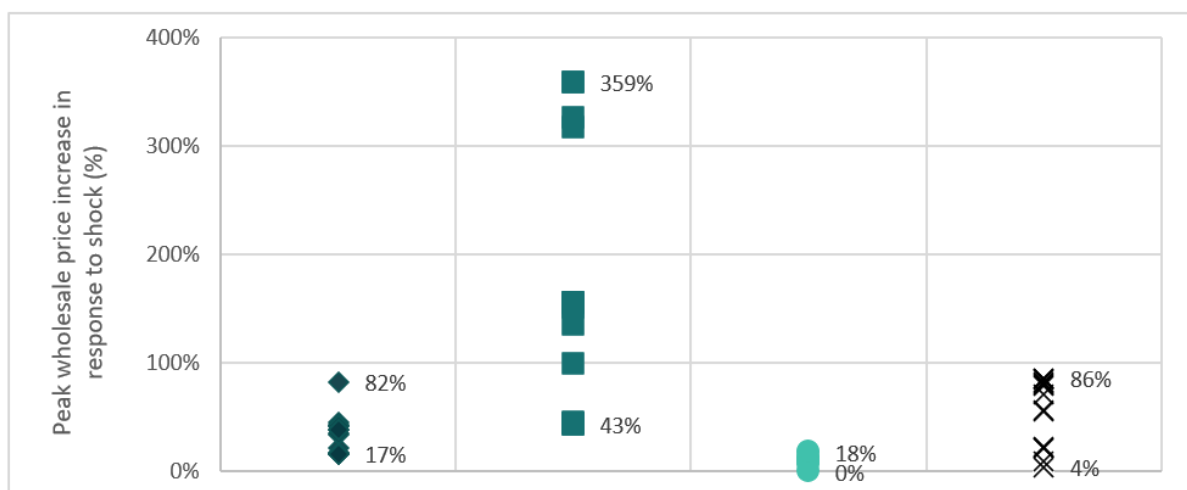


### 4.1.3 CIS and LRET options are expected to result in lower reliability risks vs. BAU

Consistent with normal practice in electricity market modelling, the quantitative modelling assumes that existing reliability standards are met, implying that, under current market settings, underlying reliability challenges will be reflected in the modelling results as a combination of higher average prices and increased price volatility.

To explore this more explicitly, the analysis assessed the response of wholesale prices to illustrative unanticipated shocks, as a series of sensitivities – including both unexpected failures of existing coal plants, and delays to major enabling projects (e.g. Snowy Hydro or Marinus Link). Across these scenarios (shown in Figure 5) the accelerated rollout of VRE and CDC under the CIS and LRET models reduces the susceptibility of the system to price volatility – providing evidence that they are also likely to reduce reliability risks relative to BAU.

**Figure 5: Sensitivity of NEM wholesale prices to system shocks under CIS/LRET vs. BAU**



CIS/LRET	BAU	CIS/LRET	BAU
Coal plant failure		Delay to major enabling project	

*Note: For each illustrative shock, the response of wholesale prices over time was modelled for each state in the NEM, and summarised by its peak price increase (i.e. the price increase in the year that saw the highest increase before returning to baseline). The chart shows the range of these peak price increases for each modelled shock for each state (e.g. peak increase for State A if Plant X fails, or peak increase for State B if Project Y is delayed).*

## 4.2 A well-executed CIS is expected to achieve policy objectives at lower cost to government, while maintaining efficient investment incentives and flexibility to align these to emerging system needs

### 4.2.1 An expanded CIS is expected to achieve the Government’s objectives at materially lower cost than an expanded LRET

Without government intervention, the wholesale prices that occur at high levels of renewable penetration under the CIS and LRET scenarios would be insufficient to deliver the corresponding VRE and CDC investments. However, the two options differ in how they address this viability gap.

Under the CIS, the gap is addressed by government directly underwriting project revenue (which both increases project revenue, and reduces financing costs), with the competitive tender process expected to address information asymmetries and find the efficient mix of price and risk reduction required to motivate the required investment and make each project viable.

In contrast, under the LRET, the gap for VRE investments is closed by additional certificate revenue from retailers and other liable entities, the ‘clearing price’ of which will – in a competitive market –

be determined by the incentive required by the highest cost marginal producer, and is paid to all eligible generators.

Furthermore, while revenue support provided under the CIS can be designed in a way that is additional to existing state effort and to cover only the gap between announced state targets and the 82 per cent target, the LRET would need to cover all new and existing renewable capacity associated with achieving the Government's 82 per cent renewables target. This results in a modelled cost to government of LRET certificate rebates that is substantially higher than the modelled cost of direct support provided under the CIS. (Note that this conclusion would still hold, even if it were viewed as feasible to exclude existing capacity from the scheme.)

In practice, there is also a risk that LRET prices, and therefore cost to government, could be higher than estimated under 'competitive market' assumptions. Evidence suggests that secondary trading of LRET certificates appears to drive their prices above the marginal price necessary to support the economic viability of renewable energy projects, potentially due to voluntary demand.

The finding that LRET would involve higher costs to government to achieve similar policy benefits and outcomes is likely to hold for alternative LRET design choices, including the option of government underwriting a 'floor' price for certificates to reduce investment uncertainty (as discussed in [Section 3.1.3](#) above).

Differences in CIS and LRET market dynamics result in these options having different risk profiles for government and taxpayers, as CIS and LRET costs would be expected to behave differently if the rollout of renewables were slower (or faster) than targeted. Under either model, a delayed renewables rollout is likely to result in higher wholesale prices. Under the CIS, this would reduce revenue underwriting payments and therefore reduce the cost to government. In contrast, under an LRET, a delayed rollout could drive excess demand for LRET certificates (relative to supply) and put upward pressure on prices and government costs. A renewables rollout that was more rapid than the deployment rate targeted by government would have the opposite effect to a delayed rollout.

The net effect of these dynamics is that the CIS can be seen as offering an insurance or hedging benefit whereby it costs government less when it is less successful in achieving sustainability, reliability and consumer affordability objectives, and more when it is more successful. This contrasts with the LRET, which has the opposite characteristic, and is more expensive for government when it is less successful.

#### **4.2.2 An expanded CIS more likely to maintain efficient incentives for investment**

Compared to BAU, both the CIS and LRET have the potential to result in distortions to market incentives. However, the CIS tender process is likely to be better able to manage these than a certificate model.

The LRET has been successful in incentivising new investment at low levels of renewable penetration. However, target mechanisms are typically 'blunt' instruments that lack flexibility to take into account energy mix or geographic considerations, and do not provide the coordination to

ensure the right types and amounts of generation are built in the right places at the right time to best address reliability and other factors.

These incentive issues with the LRET will become increasingly important as the share of renewables rises and wholesale electricity prices fall, increasing revenues from certificates relative to receipts from selling electricity in the wholesale market, and potentially weakening responsiveness to wholesale price signals and associated incentive effects on generation technology and location decisions.

For example, it is possible that certificate revenue could distort the outcomes of the energy-only market and result in more solar and less wind generation than would be optimal. This is because the revenue from certificates would become more important to overall project commerciality than the projected dispatch-weighted price. In general, wind projects tend to receive higher dispatch-weighted prices than solar.

A CIS also provides projects with a degree of insulation from wholesale price incentives outside the cap and floor established under the tender process. However, the nature of the tender mechanism makes any resulting distortions to technology and location decisions easier to manage. Tenders can provide price or non-price incentives for proponents to optimise system build and enhance overall system efficiency. Achieving the same outcome under the LRET scheme would require additional regulation or market rules and would be likely to significantly increase the complexity of the scheme.

#### **4.2.3 An expanded CIS could be more easily adapted to respond to emerging system needs**

The CIS tender process also allows government to adapt the scale, type and location of investments to best align with forecast system needs over time. This ability to calibrate flexibly on an ongoing basis contrasts with the LRET. Setting an up-front VRE target for the market has benefits in providing certainty and a stable trajectory for investors to plan against. However, due to uncertainty around electrification and other demand drivers, there is currently a high level of uncertainty over electricity demand forecasts. In this context, the need to set an up-front generation target in absolute terms increases the risk that the desired mix of VRE in the system may not be achieved if total demand evolves in a different way than forecast.

### **4.3 An expanded LRET would be more familiar to market participants, but an expanded CIS could be implemented more quickly**

#### **4.3.1 An expanded LRET is likely to be simpler to implement and more familiar to market participants**

Key benefits of an extended LRET include that it is tried-and-tested, familiar to market participants, and relatively simple to implement – although the policy requirement to provide a rebate scheme is novel and likely to involve significant design and implementation challenges.

In contrast, an expanded CIS is expected to be more administratively complex and require greater development of administrative capability. However, there are a range of precedents both domestically and internationally that demonstrate the feasibility of such a scheme to deliver significant increases in VRE and CDC (as summarised in [Section 3.1.2](#) and Appendix 1).

Under either option, detailed design will also need to resolve issues of coordination and harmonisation with existing state or territory policies, and in particular, will need to avoid duplication and address interactions with the WEM's Reserve Capacity Mechanism.

### **4.3.2 An expanded CIS could be implemented more quickly**

Given typical construction times, final investment decisions for the last tranche of new investments will need to be taken by around 2027 for new VRE and CDC projects to be operational by 2030. This means there are roughly four years to incentivise the renewable generation investment needed to reach 82 per cent by 2030. Speed to implementation is therefore critical to achieving government's objectives.

Both a CIS and an LRET will require development of new institutional architecture. For the LRET, the rebate required to offset the cost of mandatory certificate purchases would likely be complicated to design and administer, especially as certificate prices are typically bundled with PPAs at present and not readily observable. For the CIS, a significant investment in delivery capacity (over and above the existing CDC pilots) will be required to ensure the scheme will motivate participation and deliver a portfolio of investments that optimises the mix of new renewable energy generation (and clean dispatchable capacity (CDC)– though the latter will be required under both options).

However, the LRET is more dependent on the passage of new legislation than the CIS. An LRET expansion would require new legislation, and until such legislation was passed, would be unlikely to provide the certainty required to incentivise new investment. In contrast, an infrastructure could be used to commence CIS auctions, enabling the first auction to be conducted in April/May 2024.

## **4.4 An expanded CIS or LRET is expected to benefit energy users, retailers, and new renewable energy generators, while BAU may be more favourable to incumbent energy suppliers**

Based on the analysis above, Table 5 summarises the expected impact of the alternative options (BAU, CIS and LRET) on the key stakeholder groups identified in [Section 2](#). Overall:

- Both the CIS and LRET options are expected to benefit energy users, retailers, and new renewable energy generators relative to BAU;
- The LRET imposes additional requirements on retailers to participate in the certificate scheme, and can provide revenue benefits to both new and incumbent renewable energy generators, but at higher cost to consumers or taxpayers;
- BAU may be more favourable to incumbent fossil fuel and renewable energy generators, who benefit from less competition from new investment.

**Table 5: Stakeholder impacts of alternative options**

Stakeholder group	BAU	Expanded CIS	Expanded LRET
Consumers, including households	Relative to 2023, consumers may face slightly lower or higher retail electricity prices, depending on individual context.	Relative to BAU, consumers are expected to face lower retail electricity prices on average, and a reduction in reliability risks.	Similar to an expanded CIS, but dependent on the design and implementation of an effective rebate mechanism.
Energy intensive users	Relative to 2023, energy intensive users may face slightly lower or higher electricity prices, depending on individual context.	Relative to BAU, energy intensive users are expected to face lower electricity prices, and a reduction in reliability risks.	Similar to an expanded CIS, but dependent on the design and implementation of an effective rebate mechanism.
Energy retailers	Relative to 2023, energy retailers are expected to face slightly lower wholesale costs, and pass these on to energy users.	Relative to BAU, energy retailers are expected to face lower average wholesale prices to 2030, and pass these on to energy users.	Similar to an expanded CIS, but retailers face additional requirements to participate in the certificate market and associated rebate scheme.
Renewable energy generators	Relative to a CIS/LRET, there is less policy and investment certainty, and fewer investment opportunities and new entrants into wholesale markets, which may improve profitability for some incumbents.	Relative to BAU, there is greater certainty, and more investment opportunities and new entrants into wholesale markets, which may reduce profitability for some incumbents.	Similar to an expanded CIS, but incumbent generators may also benefit from additional certificate revenues.
Fossil fuel generators	Relative to a CIS/LRET, there are fewer new investments and new entrants into wholesale markets, which is expected to improve profitability for incumbents.	Relative to BAU, there are more new investments and new entrants into wholesale markets, which is expected to reduce profitability for incumbents as a result of lower wholesale prices.	Similar to an expanded CIS.
Taxpayers	No direct additional costs vs. current policy settings.	Additional cost vs. current policy settings, but significantly lower than an expanded LRET.	Significantly higher cost relative to an expanded CIS under a rebate scheme that shields consumers.

Both a CIS and an LRET will impose regulatory costs on businesses, including proponents who elect to participate in the CIS tenders (thereby incurring bidding costs), and generators and retailers who would incur costs associated with participation in an LRET certificate market. Tender participation costs have been estimated for CIS participants at approximately \$5.8 million per tender round (see Appendix 2 for details). This cost appears to be at least an order of magnitude lower than the potential benefits.

## Who was consulted, and how was their feedback incorporated

This Impact Analysis has been informed by extensive consultation with a wide range of energy market stakeholders, including formal public consultations on the ESB's Capacity Mechanism proposal and the design of the CIS, and additional consultations with energy market regulators, experts and industry groups. These have informed all elements of this analysis, including the nature of the problem to be addressed, the rationale for, objectives of, and design of options for government's potential responses, as well as the assessment of options against these criteria.

As noted above, in 2021 Energy Ministers tasked the ESB to provide recommendations on the design of a capacity market mechanism for the NEM. The broad proposed approach involved a market through which providers of capacity would be paid to have capacity available during certain periods. However, in the consultations on the high-level design in mid-2022, some stakeholders raised concerns that the mechanism would not be sufficiently timely or targeted to address the rapid transformation required of Australia's electricity system.

This feedback informed the Government's subsequent decision to proceed with a pilot CIS for Clean Dispatchable Capacity (CDC), and stakeholders were invited to provide feedback on a CIS Public Consultation Paper in mid-2023. The Consultation Paper discussed the CIS objectives, design elements, delivery stages and the tender process for the upcoming South Australia and Victoria tender.

Approximately 70 submissions were received from respondents including industry associations, project developers, technology providers, energy intensive industries, retailers, generators, and private citizens. As part of the consultation, a public webinar was held on 15 August 2023 and was attended by more than 350 stakeholders who engaged in a question-and-answer session.

Following the release of the Consultation Paper, officials also met with peak bodies and experts (including the Australian Energy Council, the Clean Energy Investor Group, the Smart Energy Council, the Investor Group on Climate Change, and the Clean Energy Council) to further discuss the CIS.

Key insights from these consultations have informed various elements of the analysis in this document and are summarised below.

**Scope and scale:** There was support for measures to incentivise new VRE investments in addition to investments in CDC, as well as suggestions that the original CDC target of 6 GW be increased.

**Objectives:** Consultation suggested that objectives for a new policy mechanism should include:

- Delivering the required investment to meet reliability and emissions targets;
- Accelerating investment in new capacity;
- Targeting new investment only (rather than incentivising ageing plants to remain in the market);
- Providing greater long-term certainty for new capacity investment;
- Ability to be implemented in the near term to meet urgent needs;
- Flexibility to adjust for the right mix and volume of capacity, and by region;
- Avoiding increases in electricity prices;
- Achieving policy goals at minimum overall cost; and
- Avoiding or minimising disruption and risk to the market.

**Options:** There was support for consideration of both a CIS and expanded LRET as policy options, with different stakeholders favouring different options.

**Design:** Stakeholders were broadly supportive of the key design features of the CIS, but raised a range of considerations related to detailed design. These included:

**Transparency** – strong support for the need for transparency and clarity across all aspects of the CIS design and tender implementation;

**Consumer cost impact** – support for costs to be carried through the Government’s budget rather than passed through to consumers;

**Revenue underwriting** – mixed views on the detail of the underwriting mechanism, with some stakeholders supportive of moving beyond the provision of ‘insurance revenue’, and others more supportive of fixed grant mechanisms or options that would reduce exposure to a government ‘clawback’ mechanism;

**Social licence** – interest in additional information on social licence obligations and its evaluation as part of the tender process;

**Technology eligibility** – strong interest in understanding how the CIS could support the development and commercialisation of new and emerging technologies over time;

**Emissions reduction** – broad support for a requirement that projects have zero (or only trace) Scope 1 emissions in order to be eligible;

**Storage duration requirement** – varying views on the preferred minimum storage duration requirement for CDC projects (with views and commentary largely aligned to the particular technology proposed to be deployed by each respondent); and

**Derating factors** – broad support for the use of derating factors to assess a project’s contribution to energy system reliability;



In addition to the analysis of alternative policy options, stakeholder views will also help inform further detailed design and implementation of the CIS, including:

- Development of Tender Guidelines, in particular finalisation of eligibility and merit criteria used to assess tender bids and recommend successful projects for underwriting; and
- Development of the CIS Agreement that will be executed by successful proponents, to ensure it is fit for purpose and aligned with market expectations.

Lessons learnt from each tender process will help refine future CIS tenders, and government will continue to release tender documents for public consultation prior to tender opening dates to ensure market feedback is incorporated in the future design of CIS, and to provide timely information to the market to maximise participation.

## How will you implement and evaluate your chosen option?

### **6.1 CIS implementation will involve bi-annual tenders beginning in 2023-24**

Commencing in 2023-24, the national roll out of the CIS is expected to run from 2024 to 2027 and involve bi-annual tenders for renewable generation and clean dispatchable capacity (CDC) in energy markets across Australia.

Ahead of being released, consultation will occur on each set of tender guidelines to ensure they are fit for purpose, achieve the intended policy objectives, and are likely to deliver value for money from Commonwealth expenditure. Lessons learnt from each tender and potential improvements and refinements will be incorporated into the design of subsequent tenders on a rolling basis.

Periodic tenders will provide the flexibility to adjust procurement targets and criteria as the market evolves and circumstances change, and the type, timing and location of new generation and dispatchable capacity can be specified to match identified shortfalls to ensure reliability and emissions objectives are met.

### **6.2 The success of the program will be measured against key objectives**

A full evaluation framework will be developed to measure the success of the program against the key objectives set out in [Section 2](#). This is expected to include both ongoing tracking of progress and impact, and more detailed evaluation(s) at a specific point (or points) in time.

Table 6 below proposes two types of potential metrics that could, subject to further consideration, be included in this evaluation:

- ‘System outcomes’, including the share of renewables in energy generation, emissions reductions, wholesale and retail electricity prices, and reliability standards. These are important to track, but will be influenced by a range of external factors and other government policies, and are therefore difficult to directly attribute to the impact of the CIS.
- Other ‘outputs’ that more directly reflect the performance of the CIS.

**Table 6: Measuring the success of the CIS**

Key objectives	Potential CIS performance measures
Provide long-term certainty to investors that will accelerate the investments in VRE and CDC needed to achieve the Government’s target of 82 per cent renewable energy by 2030	<ul style="list-style-type: none"> <li>• Lower cost of capital for CIS-supported projects</li> <li>• Meet CIS capacity targets (currently set at 23 GW VRE and 9 GW CDC*)</li> <li>• Increase annual average projects reaching final investment decision (FID), commencing, and completing</li> <li>• <i>Increase share of renewable energy in generation</i></li> </ul>
Minimise avoidable costs to electricity users	<ul style="list-style-type: none"> <li>• <i>Reduce wholesale and retail electricity prices</i></li> </ul>
Fill expected reliability gaps as ageing coal power stations exit	<ul style="list-style-type: none"> <li>• <i>Meet system reliability standards</i></li> </ul>
Achieve value-for-money from public expenditure	<ul style="list-style-type: none"> <li>• Portfolio of tenders within projected demand schedules (e.g. on a capacity/\$ or other basis)</li> <li>• Sufficient participation in tenders to ensure competition</li> </ul>
Maintain efficient incentives in the electricity market	<ul style="list-style-type: none"> <li>• Evidence that there is little or no unintended impact on functioning of the electricity market</li> </ul>
Provide flexibility to adjust to emerging system needs	<ul style="list-style-type: none"> <li>• Evidence that each tender has been scoped to target known generation and reliability gaps</li> </ul>
Be capable of being implemented effectively	<ul style="list-style-type: none"> <li>• Evidence (e.g. from process evaluation and/or market feedback) that tenders are implemented effectively</li> </ul>
Minimise time to implementation to ensure rollout targets can be achieved	<ul style="list-style-type: none"> <li>• First tranche of CIS tenders commenced by mid-2024</li> <li>• Subsequent tenders occur on a bi-annual basis</li> </ul>

Regular text indicates an ‘output’ metric that more directly reflects CIS performance

*Italics* indicate a ‘system outcome’ metric that will be influenced by factors beyond the CIS

\*Noting that these may be adjusted over time to best align to system needs

# Appendix 1: Examples of domestic and international revenue underwriting schemes

There has been a global trend towards the use of underwriting to support renewable energy and renewable energy integration, allocated via competitive tenders (Aurora Energy Research, 2022) (including schemes in NSW, ACT and Victoria) and auction-based underwriting schemes are now well understood by industry.

Underwriting schemes can reduce finance costs for capital intensive technologies such as renewables (IRENA, 2022), while auctions benefit governments by enabling competitive price discovery, particularly in the context of steadily decreasing technology costs (IRENA, 2019).

Many European countries, as well as Victoria and the ACT, use ‘contracts for difference’ (CfDs) which guarantee a single stable price for renewable energy generators.

Aurora Energy Research reports that most countries are shifting from direct subsidies to CfD type schemes to incentivise renewables investment. Aurora reports that CfD arrangements are now in place in nine European countries and the UK (Aurora Energy Research, 2022).

Global Law Firm, Pinsent Mason states that “CfDs have been extremely effective in encouraging the growth of low carbon electricity generation in the UK. They have played a critical role in encouraging developers to invest in complex and challenging projects, using technologies which were novel or required market intervention at the time the CfDs were issued, such as offshore wind. The success of the CfD model in supporting a huge increase in renewables in the last decade has been seized upon by the UK Government and CfDs are now at the heart of emerging business models for other industries and technologies” (Gödeke & Lambe, 2021).

Among EU member states, Croatia and Bulgaria conduct tenders for storage capacity, and the UK is considering the extension of the use of CfDs to long duration storage.

The ACT and Victoria have both underwritten renewable and storage projects via reverse auction.

The ACT scheme involved 5 reverse auctions from 2012 to 2016 resulting in 840 MW of wind and solar projects receiving CfDs.

The Victorian scheme, the Victorian Renewable Energy Target (VRET1) has delivered 5 projects with 800 MW of new wind and solar capacity. VRET1 used technology-specific tariff prices for wind (\$56/MWh), solar PV (\$53/MWh) and tracked solar PV (\$56/MWh).

South Australia and Victoria have also held several tenders for battery storage.

Relative to a ‘cap and floor’ mechanism, CfDs provide more benefit to renewable generators in terms of de-risking investment. However, they are likely to increase costs to government, and their widespread use can reduce contract market liquidity (Nelson, et al., 2021).

The closest domestic analogue to the Capacity Investment Scheme is the Long-Term Energy Service Agreement (LTESA) scheme in NSW, which uses a ‘cap and floor’ approach to underwrite both

renewable generation and long duration storage. This 'cap and floor' approach retains some price and market risk with operators, which maintains their incentives to participate in contract markets, and reduces government's financial exposure.

The LTESAs aim is to incentivise new investment in generation and storage via a long-term underwriting agreement providing protection against low wholesale electricity prices. LTESA contract terms are of various lengths depending on the type of technology (e.g. up to 20 years for renewable generation, up to 14 years for chemical batteries, and up to 40 years for pumped hydro).

The Commonwealth scheme is proposed to operate similarly to the NSW Electricity Infrastructure Investment scheme, which involves competitive tenders for LTESAs and Access Rights connections to Renewable Energy Zones. However, the Commonwealth scheme would only focus on the LTESA-type arrangements.

## Appendix 2: Regulatory burden calculations

The regulatory burden calculations set out in Table 7 and Table 8 are based on assumptions made regarding the likely number of stakeholders involved each CIS tender round and the number of hours each step of the tender process is expected to take.

**Table 7: Estimate of administration costs per tender round (VRE and CDC)**

Stage	Description	Stakeholders	Total hours	Wage (\$)	Cost (\$)
1	Consultation	60	60	79.63	\$286,668
2	Term Sheet Consultation	60	60	79.63	\$286,668
3	Registration	60	5	79.63	\$23,889
4	Stage A Bid	50	480	79.63	\$1,911,120
5	Stage B Bid	25	480	79.63	\$955,560
6	Contract Signing	16	320	79.63	\$407,706
7	Contract Management	16	1500	79.63	\$1,911,120
Total					\$5,782,731

**Table 8: Total administration costs (life of CIS)**

Administration costs per tender round	\$5,782,731
Tender rounds per year	2
Years of program	3
Total Administration Costs (life of CIS)	\$34,696,384

Stakeholders participating in the CIS are assumed to be businesses due to the large-scale nature of potential CIS projects.

Wage rates have been gathered from the Office of Impact Analysis (OIA, 2023). The default hourly cost is based on average weekly earnings, but adjusted to include income tax. This provides an economy-wide value for employees of \$45.50 per hour. This value needs to be scaled up using a multiplier of 1.75 to account for the non-wage labour on-costs (for example, payroll tax and superannuation) and overhead costs (for example, rent, telephone, electricity, and information

technology equipment expenses). This results in a scaled-up rate of \$79.63 per hour (\$45.50 multiplied by 1.75).

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