



Australian Government

Department of Climate Change, Energy,
the Environment and Water

Options for electricity generation and storage capacity

Impact Analysis



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Glossary

AEMO - The Australian Energy Market Operator.

AER - The Australian Energy Regulator.

CER - The Clean Energy Operator.

CfD – Contract for difference

Dispatchable capacity - On-demand generation from energy sources like pumped hydro and batteries.

ECMC - The Energy and Climate Change Ministerial Council.

FID - Final investment decision

Firm Capacity - A guarantee of a level of supplied power committed to by a supplier to be available at all times during a period covered by a commitment.

GW – Gigawatt.

LRET - Large-scale Renewable Energy Target.

LGC - Large-scale generation certificates

MW - Megawatt

MWh - Megawatt-hour

Mt – Mega tonne

NEM – The National Electricity Market

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

Scope 1 Emissions - Scope 1 emissions are direct emissions that are owned or controlled by a company.

TWh – Terawatt-hour

Variable Renewable Energy (VRE) - Variable Renewable Energy refers to intermittent renewable energy sources such as wind and solar.

Executive Summary

Australia is in the midst of an energy transformation driven by the need to decarbonise in the face of climate change, ageing coal-fired generation assets and growth in innovative technologies driving reforms in the electricity sector. Significant investment in new generation and storage capacity is needed to ensure the continuing reliability and affordability of electricity supply and secure a smooth transformation that delivers economic benefits to Australian households, businesses and communities.

This document considers potential options for government intervention to accelerate investment in clean dispatchable capacity and renewable generation to mitigate risks of a disorderly transition and contribute to the Australian Government's legislated target to reduce emissions by 43 per cent by 2030. All options are evaluated against assessment criteria such as value for money, timeliness and certainty etc. Of the options, the Capacity Investment Scheme (CIS) is determined to be the most feasible option.

The CIS will incentivise the additional investment in clean dispatchable capacity and renewable generation necessary to achieve the Government's 82 per cent renewable energy target by 2030. This is critical to achieve the legislated 43 per cent emissions reduction target at lowest cost, support decarbonisation in other sectors such as industry and transport, and necessary to ensure reliability as Australia's electricity market transitions. It will involve competitive tenders seeking bids for clean renewable generation and storage projects to fill expected reliability needs. Projects selected through open tenders will be offered long-term Commonwealth underwriting agreements for an agreed revenue 'floor' and 'ceiling'. The CIS complements current market settings and is flexible to adjustment as the market evolves and circumstances change, allowing for the type, timing and location of new generation and storage to be specified to match identified shortfalls.

On 8 December 2022, Commonwealth, state, and territory ministers provided unanimous endorsement for the design principles of the CIS as a priority national reform for Australia's electricity sector. The CIS will complement other Commonwealth government initiatives driving the energy transformation, such as the Rewiring the Nation program and the Large-scale Renewable Energy Target, as well as a range of State and Territory government programs and initiatives.

A comparative assessment of the CIS option indicates it will drive lower electricity costs and a reduction in reliability risks due to a greater certainty of investment in storage and generation. [REDACTED]
The CIS makes tangible the transition to 82 per cent of electricity coming from renewable sources to achieve the Commonwealth's emissions reduction target of 43 per cent by 2030.

What is the policy problem?

Rapid transformation of the electricity sector is needed

The Australian electricity sector is undergoing a once-in-a-century transformation. The Australian Energy Market Operator's (AEMO) 2022 Integrated System Plan (ISP)¹ indicates that over the next two decades the bulk of Australia's coal fleet is expected to retire, with 60 per cent retiring by 2030. Concurrently, AEMO has forecast that electricity demand could double by 2050 (including through increased electrification of transport, industry and residential uses).

AEMO's 2022 ISP projects that around 16 GW of new firm dispatchable capacity, will need to be built over the next eight years to replace 14 GW of coal capacity that will become uneconomic over this time. Yet only 1 GW of new firm capacity has been delivered over the past ten years. The Clean Energy Regulator (CER) reports that only 526 MW of new capacity reached final investment decision in the first half of 2023² - in the current highly uncertain market environment - project revenue uncertainty is a key contributing factor

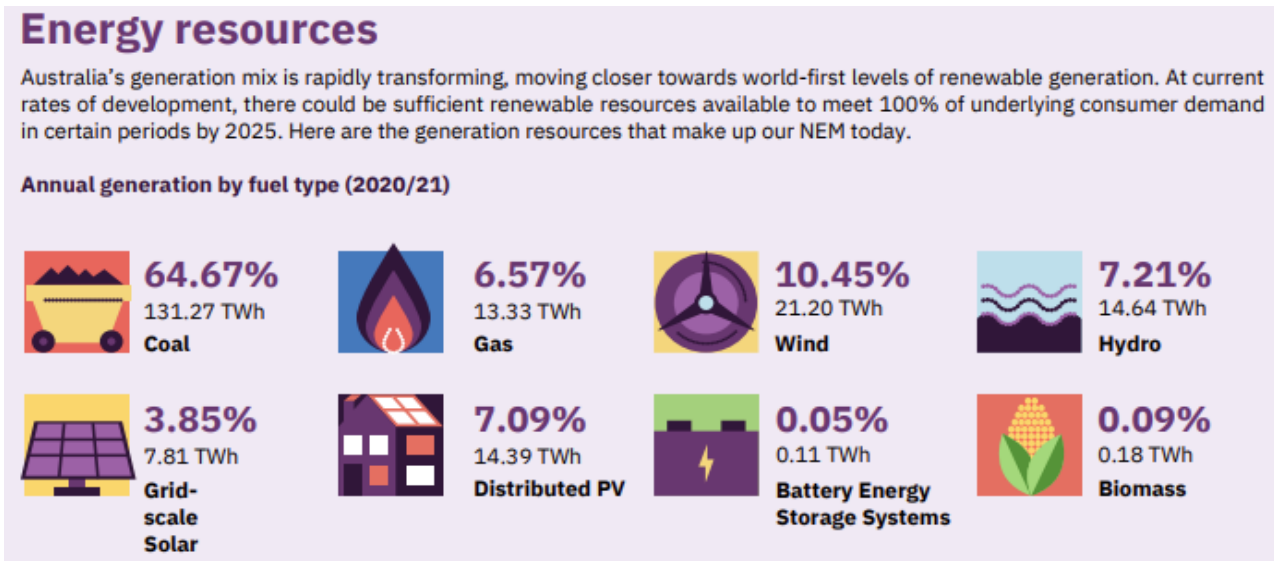
Unless the pace of investment is significantly increased over the coming years, there will be a supply-demand imbalance, leading to increasing system vulnerability, and poor outcomes for industry and consumers via increased electricity prices and decreased electricity system reliability. The urgency of the challenge is heightened by long-lead times of new energy projects, often taking several years for development, financing and construction.

Without a significant and urgent increase in new dispatchable capacity and generation Australia's legislated 43 per cent emissions reduction target will not be met. The electricity sector is a key enabler to reach Australia's emissions goals with broader benefits beyond the electricity sector. Relying on the market response alone to secure the pathway to meet emissions target would stall Australia's energy transition ambition to reach 82 per cent renewables by 2030. Clear government policy and financial commitment is required to deliver Australia's clean energy transition to support our emissions reduction targets and position Australia as a super power in clean energy.

¹ [AEMO | 2022 Integrated System Plan \(ISP\)](#)

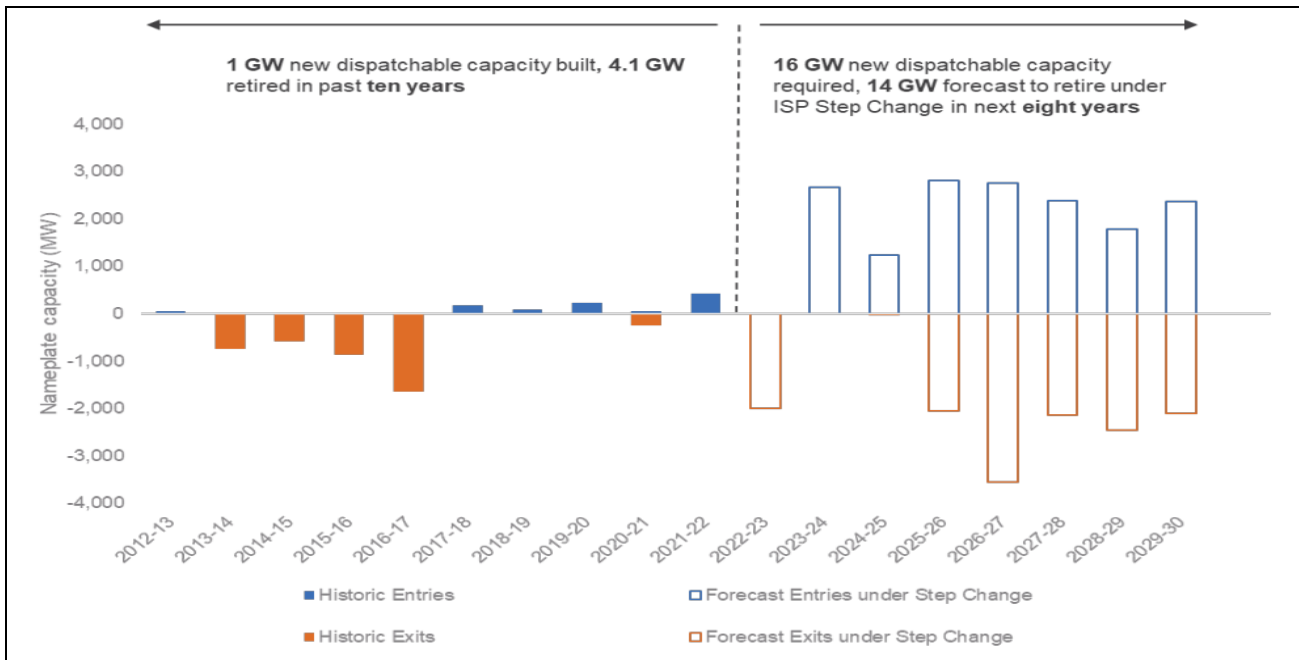
² [Large-scale generation certificates \(LGCs\) \(cleanenergyregulator.gov.au\)](#)

Figure 1: Electricity generation by fuel type in the NEM



Source: Market Fact Sheet - 31 May 2023.pdf (aemo.com.au)

Figure 2: Dispatchable capacity entry and exit (historic and forecast under ISP Step Change scenario)



Source: Energy Security Board Capacity Mechanism High-level Design Paper

Risk of supply and demand imbalance

Insufficient new generation and storage capacity to replace exiting generation will result in a supply-demand imbalance from either suboptimal timing for new investment (too little, too late) or the wrong mix of investment (not enough dispatchable capacity, including long-duration storage, to back up intermittent renewable generation). This would have a negative impact on all energy consumers, including households, small and medium businesses, commercial and industrial users, energy sector businesses such as retailers, for example, and governments. These consumers would face increased electricity prices and greater frequency of supply disruptions and blackouts. Households are particularly concerned about increased electricity prices impacting electricity bills and further exacerbating cost of living pressures.

Key stakeholder groups impacted

Australia's energy markets involve a range of stakeholders. The following are considered in this Impact Analysis in determining the impacts of options to address electricity generation and storage issues.

Stakeholder group	Role in the problem
Consumers, including households	Increase in retail electricity bills are contributing to cost-of-living pressures for Australian households and increased operational costs for business consumers.
Energy intensive users	While energy intensive users can negotiate with retailers as to the price they should pay for electricity, they too are facing increased electricity costs due to energy retailers facing higher wholesale costs.
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, 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 fuel produce carbon emissions when generating electricity.

Existing government support for energy transformation

In response to the rapid transformation of the electricity sector, governments at all levels are responding in various ways. This includes planning and investment through initiatives such as the New South Wales (NSW) Energy Roadmap, the Queensland Jobs and Energy Plan, and Victoria's renewable and storage targets. The Commonwealth is also contributing through major investment in new generation, storage and transmission infrastructure.

While these measures will substantially assist, they are unlikely to be sufficient to deliver a smooth transformation, nor achieve 82 per cent renewables to facilitate the 43 per cent emissions reduction target by 2030. [REDACTED]

Why is government intervention needed?

Investment uncertainty is putting pressure on electricity reliability and affordability

The pace at which electricity markets have been responding to the need to deliver new dispatchable capacity and renewable generation investments is straining market settings and is likely to cause supply shortfalls, placing risks on electricity affordability and reliability.

Drivers of investment uncertainty include:

- 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 orchestration as well as 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.
- Policy uncertainty - investors are aware of the gap between announced jurisdictional targets and existing policies as well as the gap between jurisdictional targets and the Commonwealth's 82 per cent renewable target. This is contributing to delays in investment decisions as proponents wait for additional policy announcements.
- The impacts of geopolitical events on global energy prices, the risk of transmission congestion and curtailment, skills shortages and supply chain disruptions and shortages.
- Lengthy and complex environmental and regulatory approval processes, as well as social licence challenges associated with the generation and transmission build.

The Energy Security Board (ESB) also noted in its 2022 Capacity Mechanism High-Level Design Paper³ that against the backdrop of rapid transformation, investment uncertainty has never been greater, with challenges on both the demand and supply side. The ESB considers that investors have adopted a 'wait and see' approach as a rational response to such uncertainty. But widespread 'waiting and seeing' has resulted in significant risk that too little investment is being committed and new clean dispatchable capacity and renewable generation will arrive too late.

Objectives of Government action

Given the investment uncertainty and the downside risks of a disorderly transformation, there is a strong case for additional government policy measures to incentivise new investment in both storage capacity and renewable generation across Australia.

In 2021, Commonwealth, state and territory Energy Ministers tasked the Energy Security Board (ESB) to provide recommendations on design of a capacity market mechanism for the National Electricity Market, in which market providers of capacity are paid to have their capacity available during certain periods. Some stakeholders raised concerns that a capacity mechanism would not be sufficiently timely, nor targeted to address the rapid transformation of Australia's electricity system that is required.

On 12 August 2022, Commonwealth, state and territory Energy Ministers⁴ tasked government Senior Officials to propose further options for a new framework that delivers:

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

Detailed consultation with jurisdictions and key energy market stakeholders, combined with analysis of stakeholder submissions to the ESB Capacity Market consultation process, raised that a new policy mechanism should:

- Deliver the required investment to meet reliability (and emissions) targets.
- Accelerate investment in new capacity.
- Target new investment only (rather than incentivising ageing plant to remain in the market).
- Provide greater long-term certainty for new capacity investment.
- Be able to be implemented in the near term to meet urgent needs.
- Be flexible to adjust for the right mix and volume of capacity, and by region.
- Avoid increasing electricity prices.
- Achieve policy goals at minimum overall cost.

³ [Capacity mechanism high-level design paper released | energy.gov.au](#)

⁴ [Meetings and communiques | energy.gov.au](#)

- Avoid or minimise disruption and risk to the market.

Based on the above broader framework and consultation feedback, potential options for a new policy mechanism were developed (summarised in the next section) and assessed against the following key objectives to meet emissions targets and improve electricity reliability:

- Accelerates investment in new capacity.
- Provide long term investment certainty to market.
- Timeliness of implementation.
- Flexibility to adjust type of technology, timing and geographical location to improve reliability.
- Minimises cost to consumers.
- Minimise impact on electricity market settings.

On 8 December 2022, Commonwealth, state and territory Energy Ministers provided unanimous endorsement for the design principles of the Capacity Investment Scheme, which provides a national framework to drive new renewable dispatchable capacity and ensure reliability in Australia’s rapidly changing energy market.

What policy options are being considered?

A range of policy options and levers could be considered to help incentivise additional investment in clean dispatchable capacity and renewable generation and contribute to the Government’s 43 per cent emissions reduction target by 2030.

Option 1 – No Government Intervention – business as usual

A business-as-usual approach assumes current Commonwealth, state and territory policies and initiatives will be sufficient to incentivise the market to deliver sufficient storage capacity and generation in a timely manner to replace exiting generation and capacity. Under this approach there would be no disruption to current market-based incentives for private investment in new storage and generation.

A business-as-usual approach presents a significant risk that the market will be unable to deliver the pace and scale of investment before expected coal-fired generator closures. The private sector would need to finance vast amounts of new generation and storage in a timely and coordinated manner, taking into consideration generators’ exit decisions. Investors would need to be confident that wholesale prices would stay sufficiently high for long enough to achieve forecast returns on investment, without the risk of government intervention to lower prices.

As existing generators deteriorate, and Australia requires more electricity supply, if not enough new generation and capacity enter the market to meet demand, Australian energy consumers would face increased retail electricity bills and increased risks of supply disruption through load shedding and blackouts.

Option 2 – Expanding the Large-scale Renewable Energy Target (LRET)

Expanding the existing LRET would involve certificates being issued based on discharge of capacity available to the grid. Retailers and directly connected large customers would need to surrender a volume of certificates annually, depending on how much capacity they buy or sell. Failure to do so could attract a penalty, and voluntary surrender of certificates could be allowed. Similar to existing renewables scheme, certificates could be traded freely.

The key benefit of this option is that it is tried and tested and is familiar to market participants. Setting a centralised target for the market can deliver certainty and a stable trajectory to ensure reliability needs are met.

However, target mechanisms are typically ‘blunt’ instruments that lack flexibility to take into account the 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.

Expansion of the LRET scheme could push the costs of certificates, which are typically passed onto electricity consumers through higher electricity bills. To achieve reduction in consumer retail electricity prices under this scheme, a government rebate maybe required to offset the costs of mandatory LRET certificate purchases, which would be complicated to design and administer.

The LRET has been a successful in incentivising new investment while at low levels of renewable penetration. However, with increase in the share of renewables and downward pressure on wholesale electricity prices, competition for LRET certificate revenues could become more important for renewable generators than competing in the wholesale market to sell electricity, undermining price signals and reducing efficiency in the electricity market.

Option 3 – Strategic Reserve

This option would involve payments to move and preserve existing capacity out-of-market that may have otherwise fully exited (e.g. paying maintenance costs). Such a reserve can be called upon to guard against worst-case scenarios (loss of other plants or transmission, catastrophic weather events). The reserve capacity would only enter the market under limited circumstances – e.g. when market reserves are low and prices are at the market cap.

The Strategic Reserve is likely to be effective as an insurance measure to support increased system volatility, as more renewables are introduced, and climate risks escalate. Keeping the reserves out of market ensures that other plants remain profitable – if reserves always operated in the market, power prices may become too low or distorted to incentivise new investment.

However, the Strategic Reserve may only be beneficial as a complementary measure in specific locations as it is difficult to identify the right assets that are appropriate to keep in reserve. This is because existing plants close to end-of-life may not be sufficiently reliable, and newer plants should not waste their prime operating

years sitting idle. It may also be expensive to maintain a plant that is mostly idle and can be difficult to justify idle plant if market prices are high (but not high enough for the plant to participate).

Additionally, the Strategic Reserve would not accelerate investment in lower emissions technologies and therefore fail to contribute to the government's renewable generation and emissions reduction targets. As the capacity kept in reserve would not be operational most of the time, the Strategic Reserve would not assist day-to-day operations of a grid increasingly dominated by variable renewable energy.

Option 4 – Capacity Investment Scheme (CIS)

The Capacity Investment Scheme involves competitive tender bids for renewable energy generation and storage projects that can fill expected reliability gaps. Successful projects from tenders are provided with long term revenue support, with an agreed revenue 'floor' and 'ceiling'. This support will decrease financial risks for investors and encouraging more investment in capacity.

The CIS will support clean dispatchable technologies. This includes new battery systems, hydrogen, pumped hydro, emerging technologies and renewable generation projects that contribute to improved system reliability. Following consultation with relevant stakeholders, a capacity and generation target will be set for each tender, taking into account anticipated thermal exits, regional reliability risks and the investments pipeline.

The design of the CIS draws on a large number of global and domestic precedents for the use of revenue underwriting to support renewables investment, including the New South Wales Long-term Energy Service Agreements (LTESA) and the use of contracts for difference (CfDs) by the Victorian and Australian Capital Territory (ACT) governments. The United Kingdom's government has supported 11GW of renewable capacity through CfDs across the first three tenders, with a recent program evaluation report indicating that the scheme represents value for money and has caused a reduction in consumer costs.

By guaranteeing a revenue floor, the CIS de-risks new investment in a highly uncertain market environment during the transition, allowing these new investments to be funded with a lower overall cost of capital. Through competitive price discovery, CIS tenders provide the minimum level of additional subsidy required to deliver projects. This contrasts with mechanisms such as the LRET, where the 'clearing price' is set by the highest cost marginal producer and may result in producer surplus.

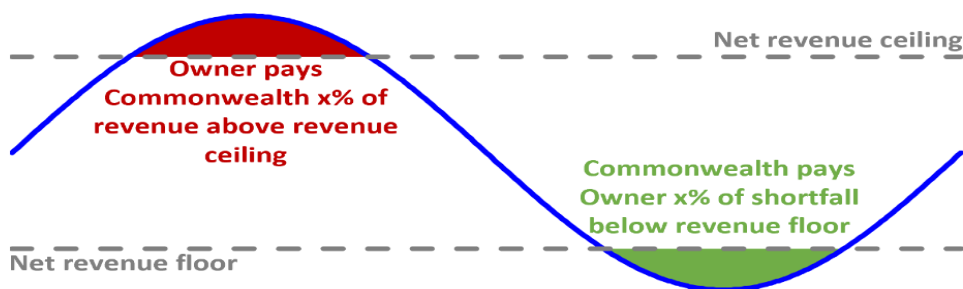
CIS tenders can target capacity by the type and location that is best aligned with forecast system reliability needs. This contrasts with mechanisms such as the LRET, where LGC revenue may distort the outcomes of the energy only market and result in more solar and less wind generation than may be optimal. Tender targets, assessment criteria, and location can be calibrated year-on-year to respond to the changing environment. This is critical given the inherent uncertainty of the energy transition where outcomes are sensitive to a wide range of assumptions around energy demand, technological change, and project delay.

Projects supported by the CIS would still be subject electricity market rules, and as the CIS is an out-of-market scheme, it does not interfere with the efficient operation of the short-term dispatch market of other market settings in the NEM. It is complementary to other government subsidies, including the LRET, state grants, or loans provided by the CEFC. Revenue streams from Renewable Energy Guarantee of Origin

certificates would also be complementary to CIS underwriting and would reduce costs borne by the Commonwealth.

Given the CIS provides revenue underwriting only, the scheme does not expose the Commonwealth to construction risks or cost-overruns, for example. As a revenue underwriter the Commonwealth only takes on some revenue risk once projects are operational, and costs are estimated to be spread out across the years of underwriting.

Figure 4: Capacity Investment Scheme Revenue Underwriting Instrument



Comparative assessment of options against key objectives

All options were assessed against the key objectives required to meet emissions targets and improve electricity reliability.

Table 1: Comparative assessment of options

Options	Accelerates investment	Long term investment certainty	Timeliness of implementation	Flexibility to target gaps and recalibrate	Minimise costs (consumers or taxpayers)	Market risks
1: No Intervention	✗	✗	N/A	N/A	\$\$\$\$	High
2. LRET	✗	✓	~	✗	\$\$\$\$	Low
3: Strategic Reserve	N/A	N/A	✓	✗	\$\$	Low
4: CIS	✓	✓	✓	✓	\$\$	Low

Strategic Reserve option is not further considered in this Impact Analysis as it fails to meet most of the Government’s objectives. In-depth benefit analysis for the CIS and LRET is discussed in the next section and is compared to the ‘base case’ of No Government Intervention.

What is the likely net benefit of each option?

Due to the broad nature and complex interactions of the proposed policy options, a full quantitative cost benefit analysis of all options has not been completed as part of this Impact Analysis. Analysis is based on indicative modelling that compares a 'base case' scenario of no government intervention with the CIS and LRET options on their ability to achieve the Government's target of 82 per cent renewable energy by 2030 and the 43 per cent emissions reduction by 2030.

No Government Intervention

Renewable generation

A base case scenario has been modelled to estimate potential outcomes for the electricity sector under current policy setting and assuming no additional Commonwealth, state or territory measures between now and 2030. In this scenario, existing state policies are assumed to pull through additional renewable and storage capacity, but renewables, storage and transmission are all affected by project delays proportional to what is being experienced across the electricity sector today, as well as declining coal reliability in the NEM. Coal-fired power stations are assumed to close as per their currently announced schedule, and new entrant generation incurs a higher cost of capital due to increased market uncertainty.

Indicative modelling [REDACTED] provides two trajectories to estimate potential outcomes for the electricity sector under existing policy settings. [REDACTED]

Prices

In the base case scenario, NEM wholesale prices are expected to fall slightly from today's levels [REDACTED]

The benefit to consumer prices from the decrease in the wholesale price under the base case scenario could be largely offset by the potential increases in network costs. This can be illustrated by the make-up of the electricity price for a typical household (as used by the Australian Energy Market Regulator). For instance, in 2023-24 this includes wholesale costs (around 30-40%), network costs (around 40-55%), environmental scheme costs (around 5-10%) (federal and state), and other retail costs (around 10-15%).

Any impact felt by consumers will vary state to state with some experiencing small net benefits while others potentially marginally worse off.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Stakeholder impacts

Table 2 illustrates the impacts on the various stakeholder groups under the base-case or No Government Intervention option.

Table 2: Stakeholder impacts of no government intervention

Stakeholder group	Impact
Consumers, including households	Consumers are expected to face an overall neutral effect on retail electricity costs.
Energy Intensive users	Energy intensive users are expected to face an overall neutral effect on electricity costs after negotiating with retailers.
Energy retailers	Energy retailers are expected to pass slightly lower wholesale costs onto consumers that are expected to be offset by higher network costs.
Renewable energy generators	Less new entrants into wholesale market expected to improve profitability for incumbents. Less investments undertaken.
Fossil fuel generators	Less new entrants into wholesale market expected to improve profitability for incumbents.

Benefits of Capacity Investment Scheme and LRET

Accelerating investment through the CIS or LRET to achieve 82 per cent is expected to drive wholesale electricity prices [REDACTED]. The following assumptions have been made in arriving at this conclusion:

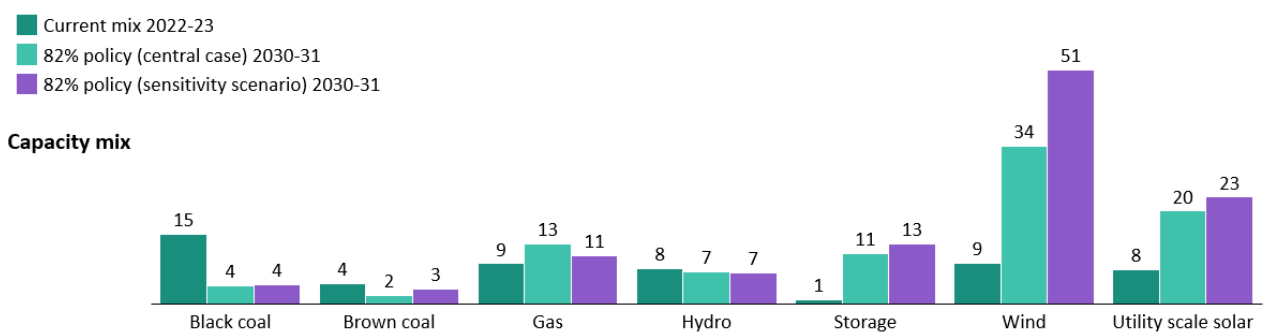
- Renewable projects receive financial support through a market mechanism.
- New renewable and storage capacity begins ramping up as early as 2025.
- Lower wholesale prices result in accelerated coal closures.
- Government action is assumed to increase investor confidence in the sector, resulting in a lower weighted average cost of capital for new renewables projects supported through the policy.

Additional VRE build is supported by either an efficient CIS or LRET, that de-risks the future revenue profile and reduces the capital costs of new renewable energy investment.

As illustrated below in Figure 9, in the central scenario, new VRE build will include an increase of 26GW from wind and 13GW from utility scale solar and decrease in coal generation of 14GW from the current 2022-23 NEM generation mix. In the sensitivity scenario, more VRE is built due to increased demand and higher renewable curtailment. This leads to approximately a 30 per cent curtailment of wind and solar in 2030-31 across the NEM and greater build of VRE totalling 42GW from wind and 18GW from solar in the system, and approximately a 12GW decrease in black coal and gas in the NEM compared to a baseline scenario.

Figure 9: 2022-23 vs 2030-31 NEM capacity mix – 82 per cent policy scenarios

FY31 NEM capacity mix under 82% policy case, GW



FY 2031 Extra build from current

	Coal	Gas	Storage	Wind	Solar
Central case	-14 GW	4 GW	10 GW	25 GW	12 GW
Sensitivity scenario	-12 GW	1.8 GW	12 GW	42 GW	5 GW

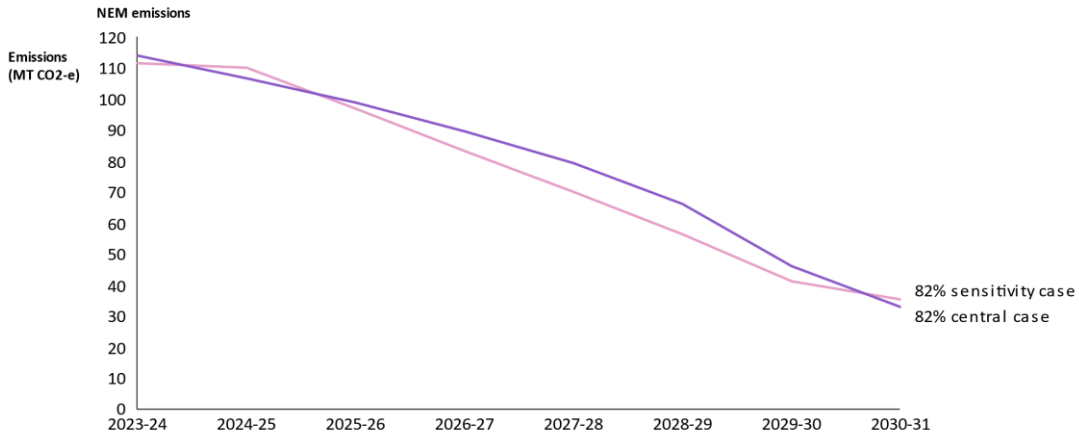
Source: EY ROAM, ACIL Allen, OpenNEM

Emissions

With the introduction of the CIS or LRET, NEM emissions in 2029-30 are projected to be nearly half those in the base case scenario (41 Mt CO₂-e compared to 76 Mt CO₂-e – see Figure 10).

Figure 10: NEM emissions 82 per cent policy scenario vs base case, 2024-2030

NEM annual emissions under 82% policy scenarios, 2024 -30, MTCO2-e



Source: 82% policy case modelling

Prices

[REDACTED]

[REDACTED]

As wholesale prices currently constitute 30-40 per cent of a consumer's bill, a reduction in wholesale prices could result in significant net benefits for household bills, even if other components such as network costs increase.

Across the components of consumer prices, the following shifts may be expected:

- Decrease in wholesale costs of the DMO from today's costs as there are more renewables in the system and average wholesale prices will be lower.
- Increase in network costs to account for significant increase in new transmission projects between now and 2030.

[REDACTED]

Revenue gap

Under the 82 per cent scenarios, which assumes VRE build is supported by either an efficient CIS or LRET, due to expected suppressed wholesale prices, the additional wind and solar electricity generation projects required to achieve the targets are projected to face a shortfall of revenues necessary to make them economically viable. This means investment in these projects is unlikely to occur without an intervention that delivers certainty that this revenue shortfall will be met, to support investment through an uncertain transitional period.

Comparative analysis

Economic and system efficiency

A CIS style mechanism can be more efficient than the LRET in de-risking investment because it directly addresses revenue uncertainty at the individual project level through competitive auctions for new renewables investment, whereas the LRET provides a second source of revenue accessible by all renewable generators (both existing and new) that is itself uncertain due to the uncertainty of future LRET certificate prices.

The nature of the large-scale generation certificates (LGCs) market also creates a risk of lower economic efficiency than a revenue underwriting mechanism. Secondary trading of LRET certificates appears to drive their prices above the minimum necessary to support the economic viability of renewable energy projects, either due to voluntary demand or market power, increasing the efficiency gap.

The LRET was a successful instrument for incentivizing new investment while at low levels of renewable penetration. However, as the share of renewables approaches 82 per cent and wholesale electricity prices fall, competition for LRET certificate revenues could become more important for renewable generators than competing in the wholesale market to sell electricity, undermining price signals and reducing allocative efficiency in the electricity market.

While a straight-forward contract for difference (CfDs) mechanism also insulates developers from price signals, design of CIS auctions provides the ability to adjust over time to optimise system build, including optimisation of co-located storage and generation, locational considerations, and other factors to enhance overall system efficiency. Achieving the same outcome under the LRET scheme would require additional regulation or market rules, undermining two of the key arguments for expanding the LRET, which are its simplicity and market familiarity.

Fiscal costs and risks

Achieving the same reduction in consumer retail electricity prices under the LRET as the CIS would require the costs to electricity retailers of mandatory LRET certificate purchases to be rebated by the Government.

This could occur if renewables did not reach 82 per cent by 2030 due to non-market constraints and there were not sufficient LRET certificates being produced to meet the mandatory purchase requirements of the LRET. Similarly, the cost of the CIS scheme could be significantly higher if it succeeds in driving wholesale prices significantly lower than projected or electrification increases total demand and hence the required additional renewable generation is significantly higher to meet 82 per cent. However, a key difference between the two schemes is that the scale of CIS auctions can be adjusted over time to reflect the evolving energy system, reducing fiscal and broader risks.

Implementation challenges and time to impact

For new renewable energy projects to be generating by 2030, final investment decisions will need to be taken by around 2027 for the last tranche of new capacity, given average construction times for wind and solar farms. This means there are roughly four years to incentivise the renewable generation investment needed to reach 82 per cent by 2030, leaving little room for further delay.

An extension of the LRET requires new legislation. Until legislation passes, there is unlikely to be the certainty required to incentivise new renewables investment. Legislation for the CIS for VRE would provide a standing appropriation and enshrine strong governance and financial control over the life of the scheme, but current arrangements and delivery infrastructure could be used to commence CIS VRE auctions, enabling the first auction to be conducted in April 2024.

Delivery of either scheme would require investment in new institutional architecture. For the LRET, the rebate to electricity generators required to offset the cost of mandatory certificate purchases would be complicated to design and administer, including because certificate prices are typically bundled with PPAs and therefore not currently readily observable. For the CIS, a significant investment in delivery capacity is required to ensure the scheme will deliver frequent auctions with criteria that optimises the mix of new renewable energy generation.

Preferred option

A well-executed CIS would be more economically efficient and flexible, less distortionary in the medium-term, involve lower fiscal costs and have a more immediate impact on renewable energy investment than a fully rebated LRET.

Stakeholder impacts

Table 3 illustrates the impacts on the various stakeholder groups of the CIS relative to the base-case of No Government Intervention.

Table 3: Stakeholder impacts of the CIS

Stakeholder group	Impact
Consumers, including households	Households are expected to face retail electricity costs that are [REDACTED] lower on average to 2030, and a reduction in reliability risks due to a greater certainty of investment in storage and generation.
Energy Intensive users	Energy intensive users are expected to have lower electricity costs as they can negotiate with retailers and retailers are expected to pass lower wholesale costs on to consumers.
Energy retailers	Energy retailers are expected to face wholesale prices that [REDACTED] lower on average to 2030, that will pass on to consumers.
Renewable energy generators	More new entrants into wholesale markets are expected to decrease profitability for incumbents. Greater investments undertaken and expansion opportunities for existing and new firms. Greater certainty when making investment decisions.
Fossil fuel generators	Closures may be brought forward as additional new generation puts downward pressure on prices. Reduced profitability for incumbents and remaining fossil fuel generators due to increased competition in wholesale markets. [REDACTED]

Regulatory burden estimate (RBE)

While the CIS is a voluntary scheme that will provide revenue support and likely underwriting payments to successful participants at some time during the life of the scheme, participation will require proponents to effectively take part in the tender process at a cost to themselves. Table 4 below provides an estimate of the regulatory burden that would be placed on businesses to take part in a CIS tender. The regulatory burden estimate value calculates the number of hours it would take an assumed number of stakeholders (in this case businesses) participating in the CIS to engage with each step of the tender. It is assumed that two tenders will be conducted each year for three years.

Table 4: Regulatory Burden of the CIS per tender round

Average regulatory cost per tender round				
Change in costs	Individuals	Business	Community organisations	Total change in cost
Total (per CIS tender)	\$0	\$5.8M	\$0	\$5.8M

Further detail on the regulatory burden is at [Appendix 1](#).

The RBE of the CIS must be compared to the RBE of No Government Intervention which would be \$0. As such, the CIS is estimated to cost businesses (collectively) \$5.8 million more per tender round compared to if

No Government Intervention was to be undertaken. However, under the CIS any cost burden will be offset for successful tenders by the benefits revenue underwriting by the Commonwealth.

Comparable international schemes

Applicable international and domestic schemes have outlined at Appendix 2. To summarise, the use of underwriting to support renewable energy and renewable energy integration, allocated via competitive tenders, has been increasing both internationally and domestically.

The closest domestic model to the Capacity Investment Scheme is the Long-Term Energy Service Agreements (LTESA) scheme in LTESA in NSW, which uses a 'cap and floor' approach to underwrite both renewable generation and long duration storage.

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. CfDs provide the most benefit to renewable generators in terms of de-risking investment. However, their widespread use can reduce contract market liquidity.

The success of the CfD model in supporting huge increases 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.

Stakeholder consultation

Extensive consultation with a wide range of energy market stakeholders has been undertaken on the Capacity Investment Scheme to help inform its design and ensure implementation is well aligned to market needs.

Public Consultation Paper

Stakeholders were invited to provide feedback on the CIS Public Consultation Paper that closed on 31 August 2023⁵. The Consultation Paper discussed the CIS objectives, design elements, delivery stages and the tender process for upcoming South Australia and Victoria tender.

Approximately 70 submissions were received. Respondents included industry associations, project developers, technology providers, energy intensive industries, retailers, generators, and a small number of private citizens.

As part of the consultation, a public webinar was also held on 15 August 2023 and was attended by more than 350 stakeholders who engaged in a question-and-answer session.

Key insights from the public consultation were:

⁵ [Consultation hub | Capacity Investment Scheme – Public Consultation paper - Climate \(dceew.gov.au\)](#)

- Transparency – strong support for the need for transparency and clarity across all aspects of the CIS design and tender implementation.
- Social licence – interest in seeking additional information on social licence obligations and its evaluation as part of the tender process.
- Technology eligibility – strong interest in understanding how the CIS can support the development and commercialisation of new and emerging technologies over time.
- Emissions reduction - broadly supported requirements for projects to have zero (or only trace) Scope 1 emissions in order to be eligible.
- Storage duration requirement – views varied on the preferred minimum storage duration requirement for projects with views and commentary largely aligned to the particular technology being used or deployed by each respondent.
- Derating factors – broad support for use of derating factors to assess a project’s contribution to energy system reliability.

Stakeholder views will help inform the design and implementation of the CIS. Comments and feedback will guide the development of the Tender Guidelines, in particular the finalisation of the eligibility and merit criteria which will be used to assess tender bids and recommend successful projects for underwriting.

Stakeholder input will also guide the 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. DCCEEW will continue to undertake public consultation to refine and improve the CIS over its life as well as provide essential and timely information to the market to maximise participation.

Consultation with industry groups and experts

Following the release of the Consultation Paper, DCCEEW also met with peak bodies and experts to further discuss the CIS. Peak bodies consulted included, but were not limited to, the Australian Energy Council, the Clean Energy Investor Group, the Smart Energy Council, the Investor Group on Climate Change, and the Clean Energy Council.

Peak bodies were supportive of the CIS in general and highlighted the need for transparency with the CIS tender process. DCCEEW will continue to release various tender documents for public consultation prior to tender opening dates to ensure market feedback is incorporated in the future design of CIS.

How will you implement and evaluate your chosen option?

Implementation and Measuring Success

Commencing in 2023-24, the national roll out of Capacity Investment Scheme (CIS) is expected to be implemented from 2024 to 2027 and will involve bi-annual tenders for clean dispatchable capacity and renewable generation capacity. These tenders will be 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 and maximise use of Commonwealth funds while achieving policy objectives. Lessons learnt and improvements from each tender will be incorporated into the design of subsequent tenders on a rolling basis. This will ensure ongoing improvement and refinement to maximise market participation and ensure maximum reliability benefits.

As the first CIS projects are expected to come online and provide capacity from 2026-27, from that date on, the MW of capacity and MWh of generation added to the market will be measured on a quarterly and yearly basis to track the effectiveness of the CIS.

As discussed in above sections, periodic tenders will provide the flexibility to adjust procurement targets as the market evolves and circumstances change as well as the type, timing and location of new generation and storage can be specified to match identified shortfalls through a tender process to ensure reliability and emissions objectives are met.

The Table 5 below describes how success will be measured against the key objectives.

Table 5: Measuring the success of the CIS

Key objectives	CIS success metric
Accelerates investment	Projects secure investment and reach commercial operation quicker (exact length will vary for each type of project).
Long term investment certainty	CIS revenue underwriting support sufficiently de-risks projects to lower overall cost of capital and thereby encourages new investments.
Timeliness of implementation	First tranche of CIS tenders commenced by mid-2024. Subsequent tenders will occur on a bi-annual basis.
Flexibility to target gaps and recalibrate	Each tender rescoped (where needed) to target known reliability gaps. The size and location of tenders meets the target gaps for clean dispatchable capacity and renewable generation to improve reliability.
Cost (consumers or taxpayers)	Electricity prices fall and the cost of the scheme to taxpayers declines over time through smoother transition of sector.

Minimises impacts on electricity market settings

CIS objectives and scope is clear to the market and has no or minimal unintended impacts on the electricity market.

Risks to implementation

There are potential risks that could impede successful implementation of the CIS. These are identified in Table 7 below and rated in terms of their likelihood and consequence in accordance with Table 6.

Table 6: Likelihood and consequence ratings

Risk Matrix					
Likelihood	Insignificant	Minor	Moderate	Major	Catastrophic
Highly Likely	Medium	Medium	High	Severe	Severe
Likely	Low	Medium	High	High	Severe
Possible	Low	Low	Medium	High	High
Unlikely	Low	Low	Medium	Medium	High
Remote	Low	Low	Low	Medium	Medium

Source: DCCEEW Enterprise Risk Management Framework

Table 7: Risk rating and mitigation strategies

Risk	Likelihood	Consequence	Risk rating	Management
<p>Delivery risks Tender implementation timelines are not met Insufficient interest or take-up of scheme</p>	Possible	Moderate	Medium	<ul style="list-style-type: none"> • Robust project planning • Engagement of skilled staff and experts via a delivery partner to support project delivery • Development of stakeholder communication plan to communicate the CIS, consultation timing and forums for communication
<p>Financial risks Underwriting projects exposes the Commonwealth to long-term financial risks</p>	Possible	Major	High	<ul style="list-style-type: none"> • The CIS design includes safeguards and caps to mitigate downside risks to government, and underwriting payments only commence once projects are built and operational • Ongoing monitoring and evaluation, with lessons learnt from previous tenders incorporated into broader national roll out of scheme • Detailed due diligence and assessment of prospective projects • CIS Agreements designed to help mitigate financial risks
<p>Market risks Investment in the market becomes 'lumpy' as potential investors wait for CIS tenders before committing to investments</p>	Possible	Moderate	Medium	<ul style="list-style-type: none"> • Contracts will be designed to minimise the risk of distorting bidding behaviour. The 'cap and floor' approach to underwriting retains some price and market risk with operators, which maintains incentive to participate in contract markets. • Ongoing monitoring to ensure the CIS does not have any unintended impact on market's investment behaviour • CIS design is flexible and can be adjusted at each tender to account for any unintended consequences
<p>Project risks Projects that receive underwriting contracts are not viable or delayed</p>	Possible	Moderate	Medium	<ul style="list-style-type: none"> • Competitive tender and rigorous tender assessment by experts will reduce the risk of supporting non-prospective projects. • Detailed due diligence and assessment of proposed projects • Ongoing monitoring of projects progress and development • CIS Agreements design to help minimise overall project risks

Appendix 1: Regulatory burden calculations

The below calculations 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.

Estimate of administration costs per tender round (dispatchable capacity and renewable generation)					
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

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 only due to the large scale nature of potential CIS projects.

Wage rates have been gathered from the Office of Impact Assessment⁶. 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).

⁶ [The Office of Impact Analysis regulatory burden measurement framework](#)

Appendix 2: Examples of comparable domestic and international underwriting schemes

There has been a global trend towards the use of underwriting to support renewable energy and renewable energy integration, allocated via competitive tenders⁷. This includes schemes in NSW, ACT and Victoria.

Auction based underwriting schemes are now well understood by industry.

The benefits of auctions to policymakers are their ability to reveal competitive prices, particularly in the context of steadily decreasing technology costs⁸.

Underwriting schemes are seen to minimise finance costs for capital intensive technologies such as renewables⁹.

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. CFDs provide the most benefit to renewable generators in terms of de-risking investment. However, their widespread use can reduce contract market liquidity¹⁰.

- 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.
- Aurora Energy Research reports that most countries are shifting from direct subsidies to CFDs type schemes to incentivise renewables investment. Aurora reports that CFD arrangements are now in place in nine European countries and the UK.¹¹
- 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".¹²

The closest domestic model to the Capacity Investment Scheme is the Long Term Energy Service Agreements (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. It also reduces the financial exposure to government.

⁷ Aurora Energy Research, European market and policy outlook, October 2022.

⁸ International Renewable Energy Agency, Recent Trends in Renewable Energy Auctions, 2019.

⁹ International Renewable Energy Agency, Power Market Design, 2022.

¹⁰ Nelson, T., Nolan, T. and Gilmore, J. (2022), What's next for the Renewable Energy Target – resolving Australia's integration of energy and climate change policy?. Aust J Agric Resource Econ, 66: 136-163.

¹¹ Aurora Energy Research, European market and policy outlook, October 2022.

¹² <https://www.pinsentmasons.com/out-law/analysis/contracts-for-difference-industry-cleantech>

- The Commonwealth Scheme is proposed to operate similarly (but with some differences) to the NSW Electricity Infrastructure Investment scheme, which involves competitive tenders for LTESAs and Access Rights connections to Renewable Energy Zones. The Commonwealth scheme would only focus on the LTESA arrangements.
 - The LTESAs aim is to incentivise new investment in generation and storage by providing a long term underwriting agreement providing protection against low wholesale electricity prices. LTESAs 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 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 800MW 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.