Australian Government
Clean Energy Regulator

CLEAN ENERGY REGULATOR

Quarterly Carbon Market Report

December Quarter 2021

Australian Government
Clean Energy Regulator

The Hon Chris Bowen MP
Minister for Climate Change and Energy
Parliament House
Canberra ACT 2600

Dear Minister

I am pleased to submit the *December 2021 Quarterly Carbon Market Report* as the 2021 administrative report (the report) for the operation of the *Renewable Energy (Electricity) Act 2000* (the Act). The *December 2021 Quarterly Carbon Market Report* includes key information and metrics covering the operation of the Act for both the large-scale and small-scale schemes, and investment in renewables over the course of the year. The report is submitted for presentation to the Parliament in accordance with section 105 of the Act.

In the 2015 calendar year, during which the Large-scale Renewable Energy Target was amended to 33,000 GWh, eligible generation was only 15,200 GWh. In 2021, eligible generation has grown to 39,000 GWh and now materially exceeds the legislated target.

2021 was a big year for renewable energy. Across the year, the large and small-scale renewable energy schemes delivered an average of nearly one-third of all electricity in the National Electricity Market (NEM), peaking at a record 36% in the fourth quarter.

Rooftop solar PV led the way for renewable energy with a record 3.2 gigawatts (GW) of installed capacity in 2021, despite extensive lockdowns which reduced installations across a number of markets.

Australia's uptake of rooftop solar PV at the end of 2021—at over 3 million systems and more than 16GW of capacity—is world leading, with one in three suitable homes now having rooftop solar.

Additionally, almost 3GW of new large-scale renewable energy projects received the investment green light in 2021. This continues a modest upward trend that started in 2019. While there is a very large pipeline of wind and solar projects with development approval, and both a need and demand for a significant increase in additional large-scale renewables, transmission constraints continue to be the key factor limiting a material increase in projects reaching a final investment decision.

Finally, there was a record 5.8 million large-scale generation certificates (LGCs) cancelled in support of voluntary ambition to prove the use of renewable energy in 2021, a big step up from 2020. Interest in LGCs for their carbon value is expected to grow as corporations seek to demonstrate their commitment to climate action.

We expect a big increase in demand for renewable energy in coming years. Retirements of an ageing coal fleet, increased electricity demand as a result of fuel switching, corporate demand to meet 100% renewable energy commitments and exporting clean energy, including hydrogen and metals, will be strong drivers for investment.

Yours sincerely

Mr David Parker AM
Chair and CEO
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3 August 2022

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Table of Contents

2021 market outcomes and tracking against estimates

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Market outcomes

	2021 results	Year on year change	Tracking towards 2021 estimate	2022 estimate
ACCUs issued	17.0m	▲ 6%	✓	18-18.5m
Renewable capacity installed - LRET	2.3GW	▼ 45%	✓	2.5-3GW
Renewable capacity installed - SRES	3.2GW	▲ 7%	✓	–

Voluntary ambition

	2021 results	Year on year change	Tracking towards 2021 estimate	2022 estimate
Voluntary surrender (domestic unit) - ACCUs	950,000	▲ 13%	✓	1.1-1.2m
Voluntary surrender (domestic unit) - LGCs	5.8m	▲ 43%	✓	6-6.5m
Voluntary surrender (international unit) - CERs	12.0m	▲ 108%		

Tracking market dynamics

LIST OF ACRONYMS

ACCU	AUSTRALIAN CARBON CREDIT UNIT	**RPP**	RENEWABLE POWER PERCENTAGE
CER	CERTIFIED EMISSION REDUCTION UNIT	**SRES**	SMALL-SCALE RENEWABLE ENERGY SCHEME
LGC	LARGE-SCALE GENERATION CERTIFICATE	**STC**	SMALL-SCALE TECHNOLOGY CERTIFICATE
LRET	LARGE-SCALE RENEWABLE ENERGY TARGET	**STP**	SMALL-SCALE TECHNOLOGY PERCENTAGE

Report objective

Carbon markets play a key role in Australia's efforts to reduce emissions. The Clean Energy Regulator has prepared this report to support the effective operation of Australia's carbon markets.

This report consolidates information across the three national carbon markets that the Clean Energy Regulator administers for the December Quarter 2021 (October 2021 to December 2021), providing information on supply and demand trends, and opportunities to inform market decisions.

In accordance with section 105 of the Renewable Energy (Electricity) Act 2000 this report covers the operations of the large-scale and small-scale schemes for the 2021 calendar year for presentation to Parliament.

Detailed information and metrics are available in the following sections:

- 2021 market outcomes and tracking against estimates,
- Executive summary – 2021 in Review and Outlook for 2022,
- Chapter 2 Large-scale generation certificates, and
- Chapter 3 Small-scale technology certificates.

Report disclaimer

All figures are sourced from the Clean Energy Regulator unless otherwise referenced. All statements in this report reflect current policy settings, other than in specific instances where the Australian Government has announced or is consulting on proposed policy changes.

This Quarterly Carbon Market report represents the views of the Clean Energy Regulator at the date of publication. The Clean Energy Regulator is providing this information to the market to increase market transparency, help identify genuine low-cost carbon abatement opportunities, and assist entities that produce or need to source units and certificates under the schemes the Clean Energy Regulator administers. The Clean Energy Regulator has used its best endeavours to ensure the quality of the information in this document but cannot guarantee its accuracy or completeness. The Quarterly Carbon Market report is not legal, business or financial advice. You should obtain independent professional advice on your circumstances before making any investment decisions. The information is provided as general information only. Neither the Clean Energy Regulator, nor the Commonwealth of Australia will accept liability for any direct, incidental or consequential loss or damage resulting from the Quarterly Carbon Market report, or the information provided through the Quarterly Carbon Market report, or the availability or non-availability of the Quarterly Carbon Market report.

Executive Summary – 2021 in Review and Outlook for 2022

2021 was another record year for Australia's vibrant carbon markets.

In 2021, the Renewable Energy Target (RET) and Emissions Reduction Fund (ERF) issued units and certificates equivalent to 58 million tonnes of carbon dioxide equivalent (CO_2-e), up 9.1% on 2020. The Clean Energy Regulator expects that in 2022 the estimated emissions reduction from the RET and ERF will be approximately 62.8 million tonnes CO_2-e using the average emissions intensity of the electricity grid. Emissions reductions from these schemes could be as high as 86 million tonnes CO_2-e in 2022 if the estimated emissions intensity of the mix of coal and gas-powered generation displaced is used for estimating carbon abatement from renewable energy generation.

Record demand for units and certificates to support voluntary emissions reduction action has resulted in significant spot price increases for Australian Carbon Credit Units (ACCUs) and seen large-scale generation certificate (LGC) spot prices maintained, the latter contrary to the expectations of forward markets. New issuances also increased markedly. 17 million ACCUs were issued in 2021, up 6% from 2020, whilst 38.9 million LGCs were validated, up 17% year on year.

Voluntary demand for units and certificates surges

Voluntary carbon markets continue to grow as corporate, state and territory government ambition to reduce net emissions, gains momentum. Voluntary demand for ACCUs rose by 13%, to 950,000 units cancelled in 2021. Climate Active participants contributed a significant share, at 65.8% of voluntary cancellation of ACCUs in 2021. Cancellations of international units including Certified Emission Reduction Units (CER) continue to dominate the Australian voluntary market. A total of 12 million CERs were cancelled in 2021.

Voluntary cancellations of Australian certificates and units are expected to continue to increase materially year on year in light of Australia's target to achieve net zero emissions by 2050 and as two measures introduced by the Australian Government take effect:

- the Corporate Emissions Reduction Transparency (CERT) report which supports National Greenhouse and Energy Reporters above the publication threshold to provide a clear picture of their net as well as gross emissions, including their carbon offsets and percentage of renewable electricity use, in a consistent manner, and
- modernising Climate Active to recognise businesses that buy 100% ACCUs or purchase 100% renewable electricity and a future requirement for Climate Active certifications to use at least 20% ACCUs in recognition of their integrity.

Progress on Article 6 at COP26 supports the continuation of international markets under the Paris Agreement. Article 6 supports trade in Internationally Transferred Mitigation Outcomes (ITMOs), which could include offset units generated in one country and bought by companies or governments of a different country. The rules supporting the operation of Article 6 include integrity and transparency standards for any traded abatement.

On 4 February 2022 the Minister for Industry, Energy and Emissions Reduction requested the Climate Change Authority undertake a review of the use of international carbon offsets in Australia, in the context of the Paris Agreement. On 7 March, the Climate Change Authority published a consultation paper on its review of the assessment principles for international offsets. The Authority is inviting submissions from interested parties by 4 April 2022.

The high integrity of Australia's carbon offset schemes and the factors outlined above, will likely materially increase demand for ACCUs in coming years.

The large-scale generation certificate market has also seen material growth in demand with voluntary cancellations reaching almost 5.8 million LGCs, up 43% from 2020.

More information on voluntary ACCU demand can be found in Chapter 1 and voluntary LGC demand in Chapter 2.

ACCU spot prices increase significantly

2021 was a big year for the ACCU market with the spot price increasing to $51 (up 208%) during the year, with much of the gain taking place in the second half of the year. The increase in price occurred with relatively small volume trades in the spot market.

There are many factors that have driven the spot price up so quickly. On the supply side, the Clean Energy Regulator issued 17 million ACCUs in 2021, an increase of 1 million from 2020. Demand side factors include the scale of scheduled ACCU deliveries under the Clean Energy Regulator's fixed delivery contracts (12.4 million units in 2021). Rapidly increasing corporate, state and territory government demand, hedging by accumulation and speculation added to price momentum in the second half of 2021. The net result has been rapidly increasing demand, materially exceeding available supply.

The Clean Energy Regulator expects over 18 million ACCUs to be issued in 2022 and had expected 12 million units to be delivered under the Clean Energy Regulator's fixed delivery contracts (under current contract delivery schedules). Considering the new option to exit these contracts (see below), this level of delivery will now likely be lower.

The Clean Energy Regulator introduced optional delivery contracts in March 2020, and these were quickly embraced to underwrite and de-risk projects while supplying ACCUs to meet secondary market needs. Recent auctions have seen virtually no interest in fixed delivery contracts and the Clean Energy Regulator will not offer these at the next auction held on 5 and 6 April 2022.

On 4 March 2022, the Minister for Industry, Energy and Emissions Reduction, the Hon Angus Taylor MP announced the Government would allow fixed delivery contracts to also evolve to meet the needs of this dynamic market.

Holders of fixed delivery contracts can exit their contracts with the Commonwealth on payment of an exit-fee. Fixed delivery contract holders will then be able to sell their ACCUs for higher prices in the secondary market. This will boost supply of ACCUs to the secondary market in a period of rapidly increasing demand.

Contract exits will be an orderly process. Project proponents will be able to exit from their government fixed price contracts in six-month delivery windows. The early-exit fee will be **equal to** existing damages provisions in their contracts. The Government has said all funds will be reinvested into the ERF and new emissions reduction measures.

The ACCU market is relatively young and this evolution in fixed delivery contracts will help with the current shortage of supply. However, there are other developments which will also assist with supply in coming years.

There were a record 198 ERF projects registered in 2021 (up 26% from 2020) and 7 new and varied methods developed. These new opportunities are expected to have a material impact on supply from 2023 and beyond.

The Clean Energy Regulator expects higher spot prices will encourage more project registrations, including from large demand side players contracting longer term for the ACCU supply they need.

The implementation of the Australian Carbon Exchange in 2023 will provide greater transparency of available ACCU supply and price. This should help the emergence of innovative hedging products, potentially unlocking some of the increasing ACCU holdings in the Australian National Registry of Emissions Units (ANREU) which stood at 11.5 million at the end of 2021.

The Clean Energy Regulator does not set or forecast spot prices – that is the role of the market. However, it is important to acknowledge some of the factors that may impact market pricing over the medium term.

Project proponents with Commonwealth fixed delivery contracts will make commercial decisions the volume on which they want to pay the exit fee. They will need to consider the extent to which they sell volume to private demand on longer term contracts, versus supplying to the spot market. To make it worth their while to pay the exit fee, they require prices that give them a commercial premium above double their fixed contract prices with the Commonwealth.

As discussed earlier, changes to Climate Active and the introduction of CERT will undoubtedly increase demand for ACCUs in coming years. Those entities participating, or proposing to do so, will likely be seeking to secure the future ACCU supply they need to offset their emissions. In 2021, 12 million international carbon units (Certified Emissions Reduction Units or CERs) were voluntarily cancelled, compared to nearly 1 million ACCUs. Increasing scrutiny over the provenance and quality of international units may increase demand for ACCUs.

The Clean Energy Regulator will continue to report on changes in spot prices, noting there is an expectation of an increasing shift to longer term contracting, as seen in the LGC market. It is possible this could occur quite quickly as large demand side players look to secure supply for future needs.

The evolution in, and maturity of, the ACCU market will continue to be prominent in these reports. See Chapter 1 for more details.

Renewables continue to shine

Large additions of renewable energy capacity in 2021—5.5 gigawatts (GW) across the large- and small-scale schemes—continue to transform the electricity sector toward record low total emissions and emissions intensity (the latter averaging 0.63 tonnes CO_2-e). In 2021, renewable electricity averaged 31.4% market share in the national electricity market (NEM).

Rooftop solar PV led the way for renewable energy with a record 3.2 GW installed in 2021, despite extensive lockdowns and reduced installations across 2 of Australia's biggest markets—New South Wales and Victoria. Australia's penetration of rooftop solar, at over 3 million rooftop systems and over 16 GW of capacity is world leading, with one in three suitable homes now having rooftop solar.

The Clean Energy Regulator is aware of reports of potential component supply chain constraints and understands COVID-19 may continue to impact availability of employees for installations, even in the absence of lockdowns. The small-scale market is discussed in more detail in Chapter 3, and the Clean Energy Regulator will update the expected capacity range in the Q1 2022 report.

The 2.3 GW of wind and solar projects registered for LGC generation in 2021, was down from 2020's, due to the timing of these registrations at the end of 2020. In 2022, the Clean Energy Regulator expects between 2.5 and 3 GW to be registered for LGC generation.

A better guide to the forward outlook for large-scale renewables investment comes from final investment decision (FID) information over a full year period – quarter-to-quarter comparisons are volatile. The Clean Energy Regulator collects this information through extensive liaison with project developers. Around 2.9 GW of new capacity reached FID in 2021, an increase of 9% on 2020 and 30% on 2019, showing a clear upward trend. Estimating when these projects will start to generate renewable

energy is challenging. Many factors can influence construction times, including AEMO approval to generate.

Nearly 39 million LGCs were created in 2021. While statutory demand was 33 million, almost 5.8 million LGCs were voluntarily cancelled in 2021. This is a 45% increase on 2020's cancellation. More information is available in Chapter 2.

Unit and certificate prices

LGCs continued to defy the predictions of significantly lower prices now that the renewable energy target has been exceeded. The LGC spot price finished the year at $42.40 – on par with this time 12 months ago. Of particular interest are the increases seen in forward LGC prices for 2023 and 2024 certificates which finished the year at $37.20 (up 96% from 2020) and $31.10 (up 266% from 2020). Voluntary ambition from corporates to demonstrate their increased use of renewable energy is the key driver and, as previously highlighted by the Clean Energy Regulator, may reflect the market increasingly valuing the implicit carbon content of an LGC. Further information on LGC price movements is available in Chapter 2.

For the first time ACCU spot prices exceeded LGC prices in Q4 2021.

Table ES.1 Certificate prices, Q4 2021

Certificate type	Spot price AUD (31 December 2021)[1]	Quarterly change
ACCU	$51.00	+$24.5
LGC	$42.40	+$2.00
LGC (CAL24)	$31.10	+$4.85
STC	$39.00	+$0.25

[1] Data sourced from Jarden and TFS Green

1. Australian and international carbon credit units

Key messages

- In 2021, the ACCU spot price tripled, increasing from $16.55 to $51, with much of the gain taking place in the second half of the year.
- The rise in the ACCU price is broadly consistent with trends seen in international carbon markets as interest in climate action grows. In 2021, European Union Allowances rose by 125% and New Zealand Units rose by 84%.
- Voluntary cancellations of ACCUs reached a record high for Q4 2021 and for 2021, up 8% and 13% respectively.
- Voluntary cancellations of ACCUs are expected to grow to over 1 million units in 2022, in response to accelerating corporate demand and government announcements towards net zero emissions.
- The next ERF auction will be held on 5-6 April 2022.
- 2021 saw a record 17 million ACCUs issued, surpassing the previous high of 16 million ACCUs in 2020.
    - New issuances are expected to increase to over 18 million in 2022.
- Total ERF project registrations for 2021 was 198, compared to 157 in 2020.
    - Soil carbon project registrations rose strongly with 31 projects registered in Q4 2021 and a total of 106 projects registered in 2021.
- In 2021, 12 million Certified Emissions Reduction (CER) units were cancelled in ANREU, more than double the 5.8 million cancelled in 2020.

Carbon markets around the world are rapidly growing in both scale and complexity as climate ambition grows and carbon offsets increase. The ACCU market in Australia continues to evolve, with financial intermediaries increasingly seen to be playing a bigger role in matching buyers and sellers. There has been a marked pick-up in trading volumes but overall, liquidity in the market continues to be limited as the Commonwealth remains the largest source of demand through fixed delivery contracts. There is also a growing inventory of ACCUs held in ANREU accounts.

The recent rapid increase in the ACCU spot price is expected to encourage new project registrations with it providing a strong signal for new investment, but it will take time for additional supply of units to reach the market, as carbon projects need to demonstrate environmental integrity. The recent announcement on Commonwealth fixed delivery contracts will potentially help unlock supply once the spot price is in excess of double the contract price. These details are unpacked further in this chapter.

1.1. ACCU supply and demand balance

In 2021, total ACCU holdings in ANREU increased by 47%, from 7.9 million to 11.5 million units. Supply of 3.4 million ACCUs was added to ANREU accounts during Q4 2021, while the demand from ERF contract deliveries and voluntary cancellations totalled 2.8 million units (see Figure 1.1). The balance of ACCUs held in ANREU increased for the third consecutive quarter, up 5% on the 10.9 million ACCUs to 11.5 million at the end of Q4 2021 (see Table 1.1).

Figure 1.1 ACCU supply and demand balance, 2019 to 2022

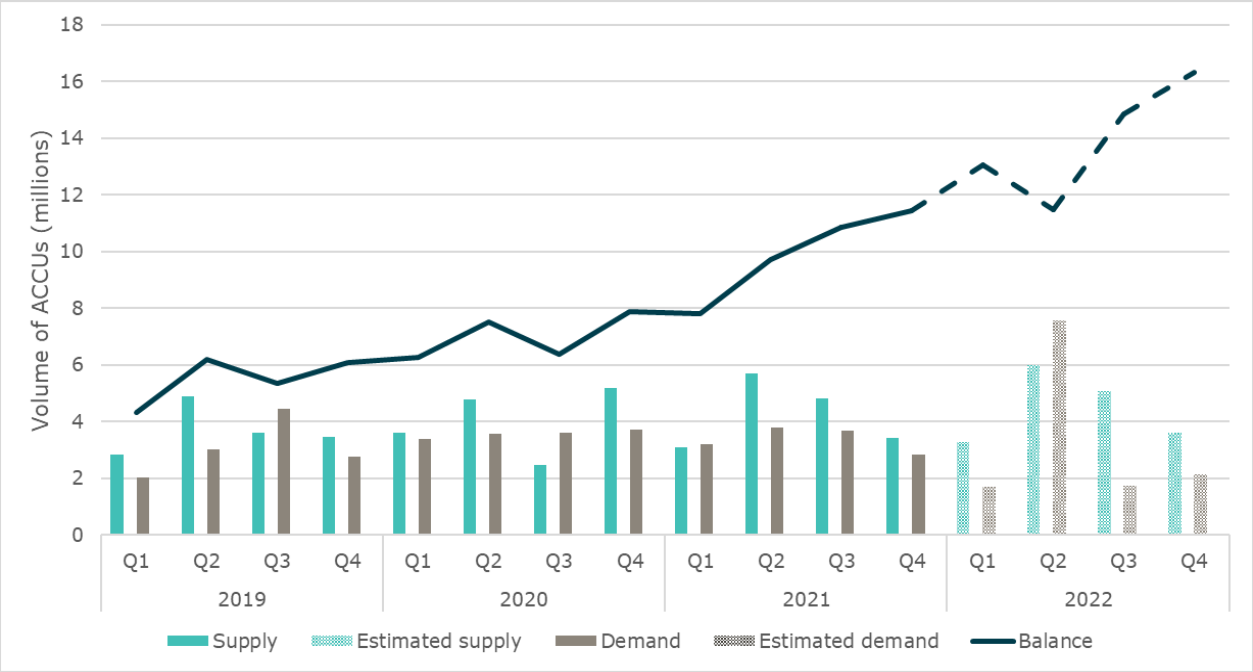


Table 1.1: Balance of supply and demand Q4 2021 close*

Balance/supply of ACCUs from Q3 2021	**10,861,746**
ACCUs issued Q4 2021	3,431,842
ERF contract deliveries	-2,508,706
Safeguard cancellations#	0
Voluntary cancellations	- 328,361
ACCU relinquishment^	0
Net balance at the end of Q4 2021	**11,456,521**

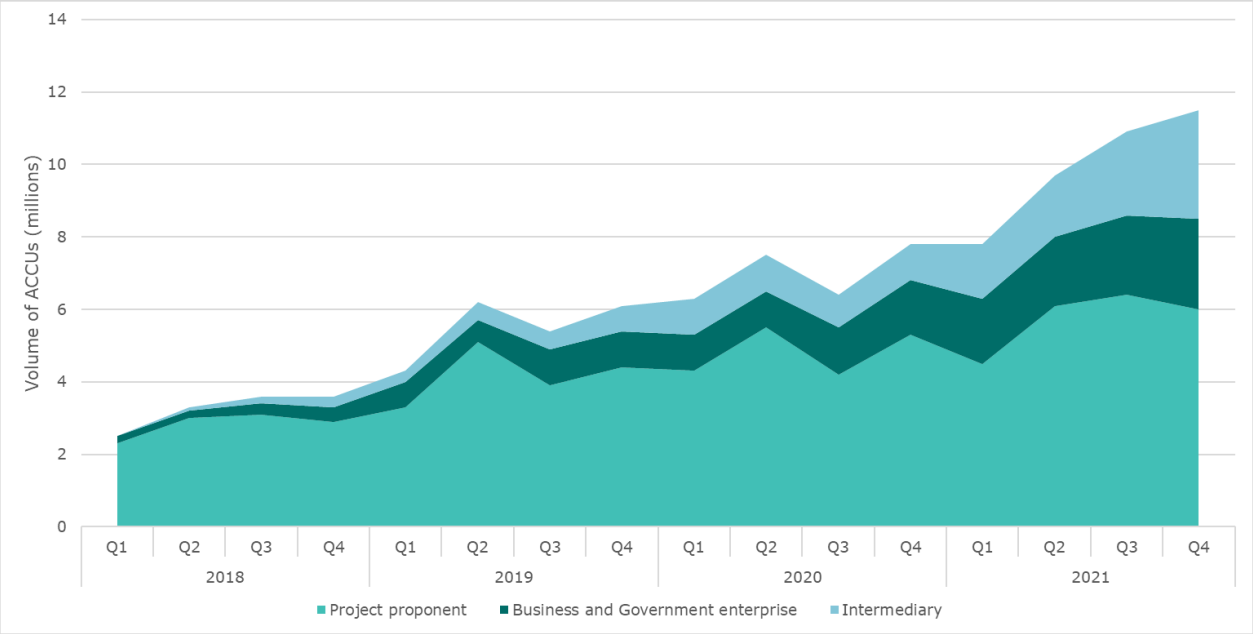
*Within a specified period, supply of ACCUs refers to ACCUs issued. Demand of ACCUs incorporates Commonwealth ERF contract deliveries, safeguard mechanism cancellations, relinquishments and state and territory government and private sector voluntary cancellation.
#Safeguard mechanism cancellations do not include deemed cancellations. A 'deemed' cancellation occurs when ACCUs issued under an ERF project at a safeguard facility, in a particular year, are delivered to the Commonwealth under an ERF contract.
^For more information see the Relinquishing ACCUs section of Australian carbon credit units.

Increase in ANREU holdings by category

In 2021, total ACCUs held in accounts of intermediaries (brokers, traders and financial institutions) tripled to 3 million (see Figure 1.2). The share of ACCUs held by intermediaries as a proportion of total ANREU holdings doubled from 13% to 26% during 2021. Holdings by intermediaries facilitate trading of units between the supply and demand sides of the market. Intermediaries play an important role in the market to facilitate trading and to perform cancellations on behalf of other entities.

The growth of ACCU holdings by intermediaries reflects greater interest from traders, aggregators and financial institutions. Some account holders are entities who are in the process of developing products to trade and use ACCUs. Intermediaries may accumulate ACCUs to back those products and platforms when launched.

Figure 1.2: ACCU holdings by market participation (millions), Q1 2018 to Q4 2021*



*The breakdown of accounts in ANREU is based on ACCU transaction characteristics of individual accounts. It is not a representation of corporate entity characteristics. As such, an entity controlling more than one account can be represented in the data in multiple categories.

In 2021, ACCUs held by project proponents increased by 13% to 6 million. This in part may reflect the fact that total fixed delivery contract volumes to the Clean Energy Regulator were anticipated to increase by 1 million in 2022, compared to 2021. This pattern is likely to change given the new option to exit fixed contract deliveries. Project proponents are individuals and entities responsible for one or more ERF projects. Some of these proponents are also entities with safeguard obligations or who have committed to net zero emissions.

In 2021, businesses and government enterprises increased their holdings by 67% to 2.5 million. This trend is expected to continue as a significant proportion of the volume in these accounts is controlled by entities who have committed to net zero emissions.

Accounts by business and government enterprises include safeguard entities, other businesses and local government entities that are accumulating for voluntary or compliance purposes. These do not include any project proponents.

In Q4 2021, ACCUs held by project proponents declined by 0.4 million ACCUs, businesses and government enterprises increased holdings by 0.3 million ACCUs and intermediaries increased holdings by 0.7 million ACCUs.

1.2. Factors impacting ACCU supply

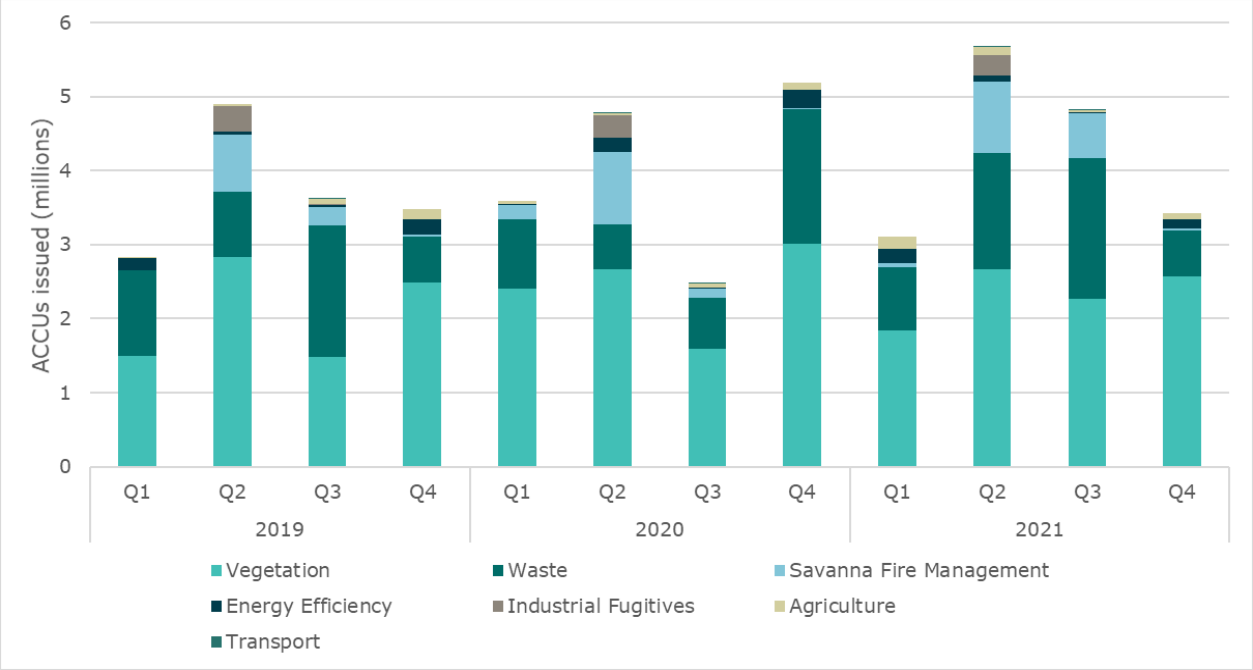
Crediting

Supply of new units in 2021 reached a record 17 million ACCUs, in line with the expected volume published in the December 2020 Quarterly Carbon Market Report. This represents an increase of 6% on the 16 million ACCUs issued in 2020 and is slightly lower than the Clean Energy Regulator's upgraded estimate of 17.3 million units published in the September 2021 Quarterly Carbon Market Report.

Supply is expected to continue to grow in 2022 to an estimated 18 – 18.5 million ACCUs.

Whilst additional supply of ACCUs through the year remains variable, more ACCUs are typically issued in Q2 of each year (see Figure 1.3). The majority of the 3.4 million ACCUs issued in Q4 2021 can be attributed to 2 method types – vegetation (75%) and waste (18%).

Figure 1.3: ACCUs issued per method type, Q1 2019 to Q4 2021



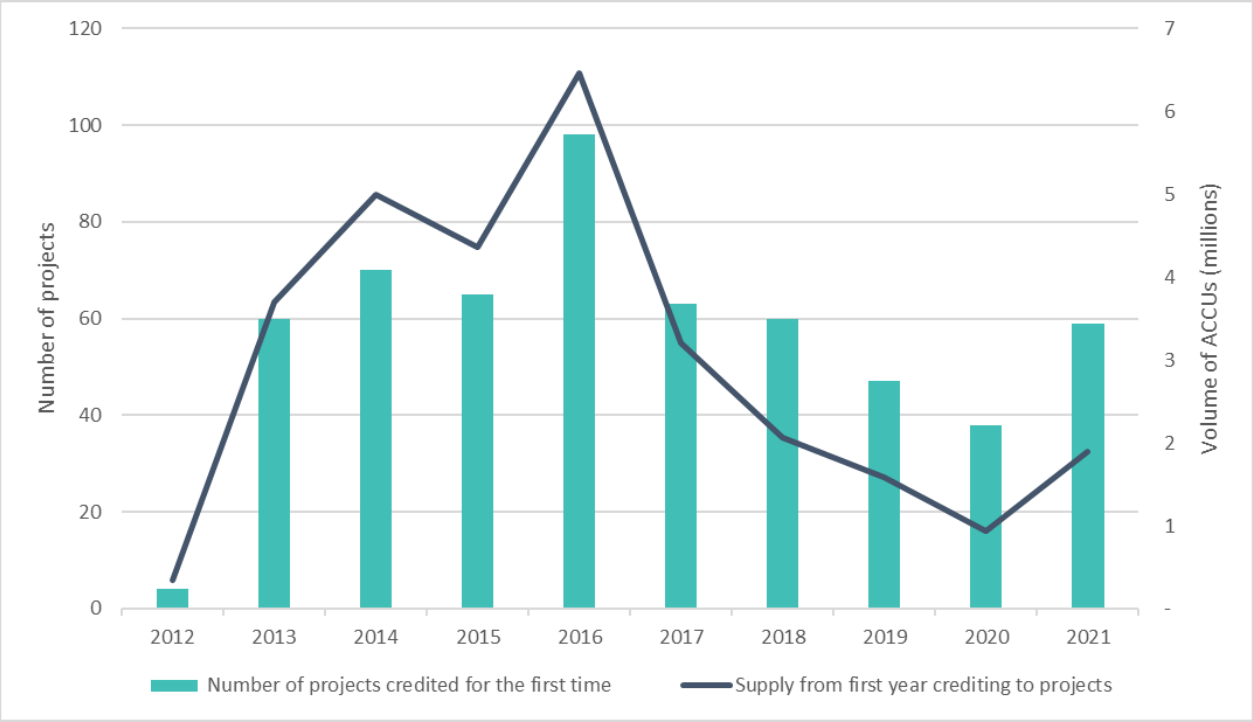
By the end of 2021, a total of 564 projects were generating ACCUs (see Table 1.2). This is 11% more than the same time last year. Of these, 18 projects were credited for the first time during Q4 2021, contributing 314,284 ACCUs to supply, most of which were Human-Induced Regeneration projects.

Table 1.2: Crediting status of projects

Crediting status	**No. of projects**
Projects generating ACCUs	564
Projects yet to receive ACCUs	524
Total registered projects	1088

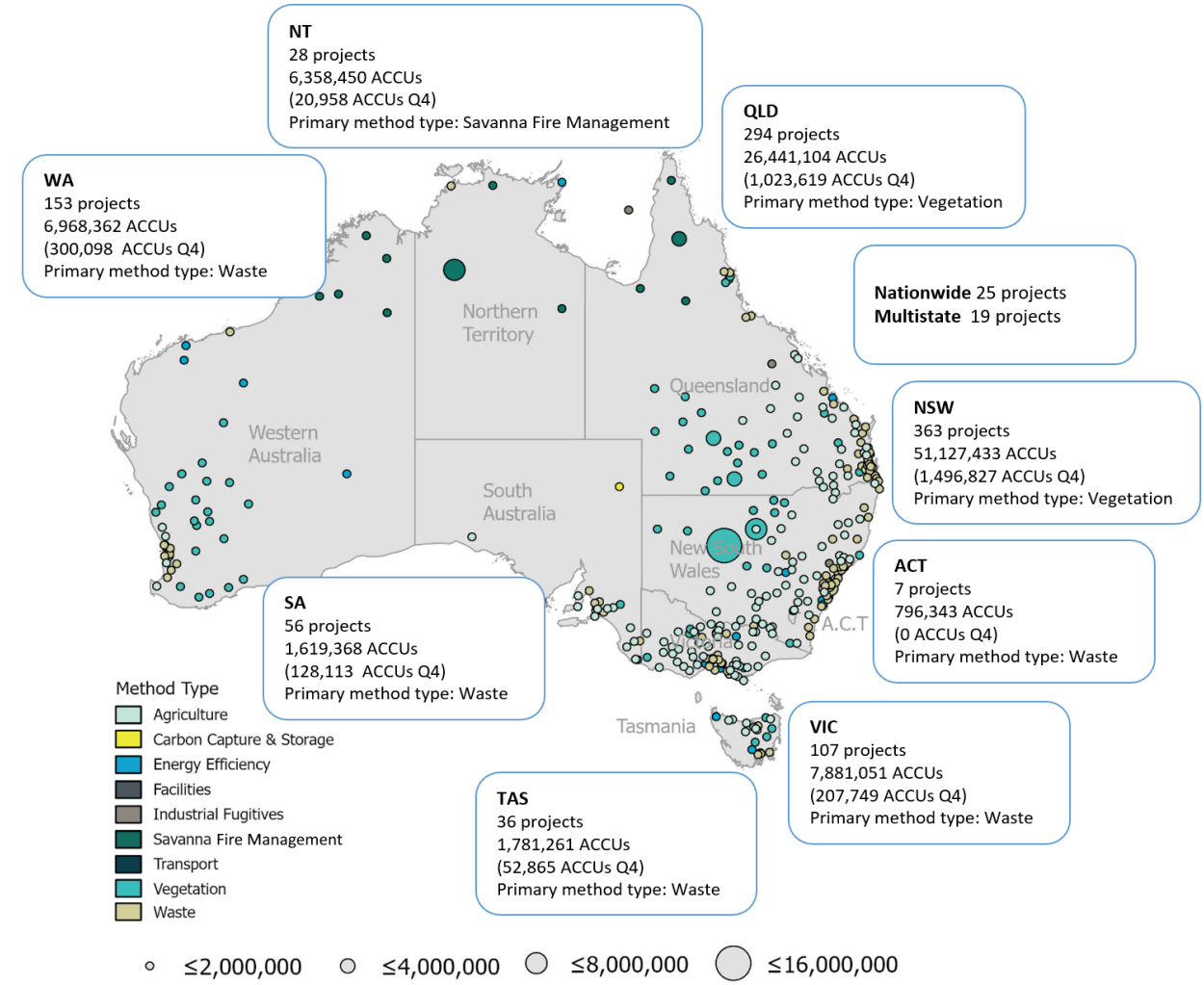
In 2021, the supply of ACCUs increased by 1 million units. There were 1.9 million units issued to 59 projects that were credited for the first time. For the first time since 2016, both the number of projects credited for the first time and the supply of ACCUs from these projects rose year on year (see Figure 1.4). Soil carbon projects are expected to add more supply in 2022 with volumes expected to rise from 2023.

Figure 1.4: Number of projects credited for the first time and associated supply, 2012 to 2021



Projects in New South Wales dominated ACCU supply in Q4 2021 with 44% of total units issued, followed by Queensland with 30%. The majority of ACCUs issued in New South Wales and Queensland were for vegetation projects (see Figure 1.5).

Figure 1.5: Total number of ACCUs issued per method type by location, Q4 2021 and scheme-to-date*



* Does not include revoked projects

Changes to fixed delivery contracts

There are currently 113 million ACCUs contracted to be delivered to the Clean Energy Regulator over the next 12 years under fixed delivery contracts. This is on top of the 75 million ACCUs already delivered. In 2022, two-thirds of all ACCUs supplied (12 million of the 18 million forecast) were expected to be delivered to the Clean Energy Regulator under current fixed delivery contract schedules.

To help de-risk investment in new ERF projects, the Clean Energy Regulator introduced optional delivery contracts at the 10th ERF auction in March 2020. Optional delivery contracts create a right but not an obligation to deliver ACCUs to the Commonwealth and allow project proponents to contract for delivery at a higher price with third parties. This facilitates additional supply in the secondary market. At the 13th Auction in October 2021, no fixed delivery contracts were awarded. The market has expressed a clear preference for optional delivery contracts and the Clean Energy Regulator will not offer fixed delivery contracts at the next auction to be held on 5 and 6 April 2022.

To help support and meet the needs of the market, the Minister for Industry, Energy and Emissions Reduction, the Hon Angus Taylor MP has announced changes to fixed delivery contracts, noting these changes are consistent with the Australian Government's longstanding policy of supporting voluntary action to reduce emissions.

Holders of fixed delivery contracts can exit their contracts with the Commonwealth on payment of an exit-fee. The early-exit fee will be equal to existing damages provisions in their contracts. This will boost

the supply of ACCUs to the secondary market as these ACCUs will be available to meet the rapidly increasing demand.

This transition from government fixed price contracts will be an orderly process. Project proponents will be able to exit from their government fixed price contracts in six-month delivery windows, with delivery milestones falling due from 4 March to 30 June 2022 being the first to be offered the option. The volume of ACCUs that would be made available to the market will depend on the number of contract holders taking up the offer. There is market intelligence to suggest these units will be secured through longer term contracting arrangements. With increasing public expectations of companies taking steps towards net zero, demand for ACCUs from corporates will only increase over time and securing longer term contracts may become the norm as it is in the Large-scale Generation Certificate (LGC) market.

Project proponents with Commonwealth fixed delivery contracts will start making commercial decisions on whether to take up the exit arrangement and pay the exit fee and which milestones for ACCU delivery would be in play. Considerations may include the extent to which they contract longer term to meet private demand or supply to the spot market. This will require a price premium above the exit fee to be commercially viable. Therefore, it is most probable additional supply will become available to the market gradually.

This evolution and other developments, including the implementation of the Australian Carbon Exchange in 2023, will help with the current shortage of supply in coming years. The Australian Carbon Exchange will provide greater transparency of available ACCU supply, trades and price. This should help the emergence of innovative hedging products.

Changes to Climate Active and the introduction of CERT will also increase demand for ACCUs in coming years. Companies participating may seek to secure future ACCU supply early. This could reduce the volume of additional units available for the market.

The Clean Energy Regulator does not set or forecast spot prices – that is the role of the market. However, it is important to acknowledge some of the factors that may impact market pricing over the medium term. The Clean Energy Regulator will continue to monitor and report on how both increasing supply and demand plays out.

Projects

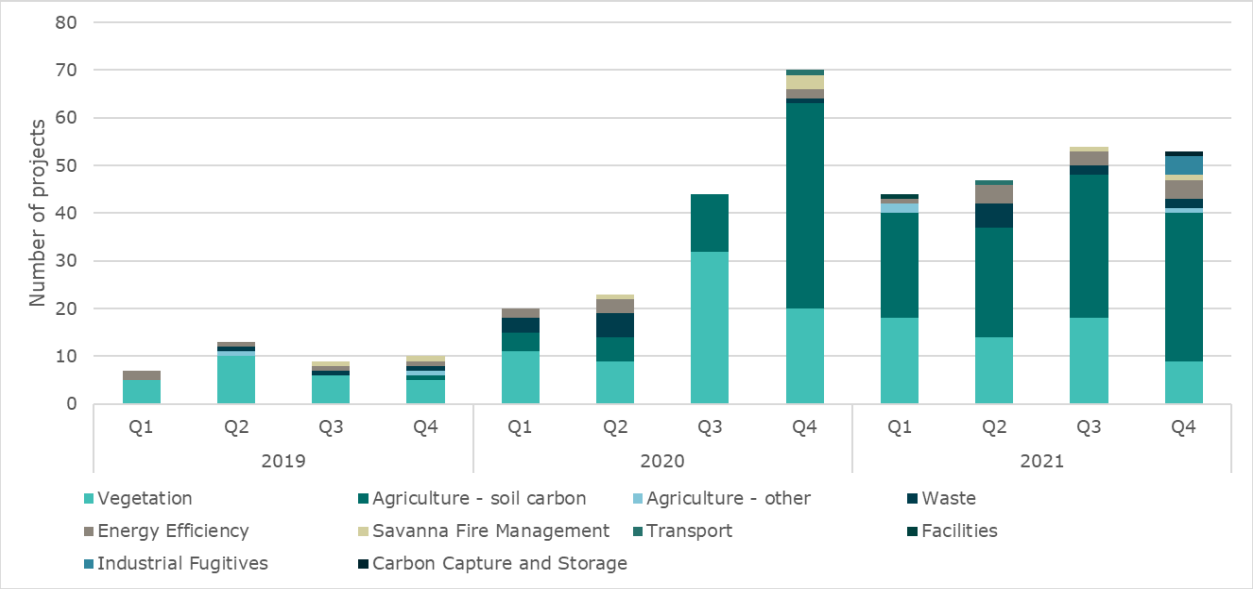
ERF Projects

At the end of 2021, 1,088 projects were registered under the ERF. Of these, nearly 20% — 198 in total — were registered in 2021. This is an increase of 26% from the 157 registered in 2020 (see Figure 1.6). New supply from these projects is expected to be seen from late 2022 onwards as projects typically take 18 – 24 months from registration to first crediting.

There were 53 new project registrations in Q4 2021, including the first Carbon Capture and Storage project, which is anticipated to contribute up to 42 million tonnes of emissions reductions over 25 years from Q1 2024.

The higher ACCU spot price and increasing demand for ACCUs should result in an increase in project registrations, including projects requiring high capital investment. New methods currently under development, such as the integrated farm method, will encourage this (see below).

Figure 1.6: New registered projects per method type, Q1 2019 to Q4 2021



Method development

The Clean Energy Regulator leads the work on developing new carbon abatement methods under the ERF. Delivering the priority methods, as identified by the Minister for Industry, Energy and Emissions Reductions within a 12-month timeframe, means that new opportunities for carbon abatement are regularly created to meet the growing demands of Australia's carbon market.

Priorities for development of new ERF methods in 2022 are:

- Carbon capture, use and storage – this will build on the existing carbon capture and storage method and incentivise new low carbon products made with captured carbon
- Transport – incentivising emissions reductions created by low emission transport fuels like electric vehicle charging and hydrogen refuelling infrastructure
- Hydrogen – incentivising the production of clean hydrogen for injection into the gas network for use in Australia in electricity generation and other uses, such as low carbon steel
- Savanna fire management – expanding the abatement opportunities available through managing fire in northern Australia by adding new carbon pools and vegetation types and updating the carbon accounting approach
- Integrated farm management – integrating existing land-based ERF activities and potentially new land-based activities into a single method to maximise abatement opportunities on land and reduce costs of participation

In addition, several methods have been approved since the release of the September 2021 Quarterly Carbon Market Report. These are:

- Soil Carbon – reducing the cost of measurement under existing soil carbon methods to increase numbers of soil carbon projects
- Blue Carbon – the first method for coastal areas
- Plantation Forestry – a new method to improve opportunities for generating abatement from plantation forestry projects
- Industrial and Commercial Emissions Reduction – a more usable energy efficiency method to replace the existing Industrial Electricity and Fuel Efficiency method
- Biomethane variation to landfill gas, animal effluent and wastewater treatment methods – to enable creation of a direct replacement of natural gas

Variations for Source Separated Organic Waste and Alternative Waste Treatment to include biomethane are being progressed after support was received during the public consultation for these biomethane method activities in 2021. The variations will be released for public consultation in 2022.

Information on the progress of method development is accessible from the Clean Energy Regulator's Method Development Tracker.

Australia's plan to reach net zero emissions by 2050

On 26 October 2021, the Australian Government released Australia's Long Term Emissions Reduction Plan (the Plan) to deliver net zero emissions by 2050. The Plan outlines how priority technologies will deliver 85% of the emissions reductions necessary to achieve net zero by 2050. It does this by, amongst other things, unlocking $80 billion of funding in low emissions technology such as clean hydrogen, soil carbon, and carbon capture and storage. The Plan outlines a goal of solar electricity generation at $15 per megawatt hour. The Plan will be reviewed every five years.

State and territory investment builds

The 2021-22 Australian Capital Territory Budget introduced a social cost of carbon of $20 per tonne of emissions from Australian Capital Territory government operations. These costs will be paid into a dedicated fund that will be used to invest in emission reduction activities.

The Government of Western Australia announced 3 major initiatives in 2021. These are:

- $3.3 million in grants to 10 projects through the Carbon Farming and Land Restoration program. This includes 4 Future Carbon projects that aim to investigate alternative project design strategies and assess their viability under ERF methodologies
- More than three million hectares of unallocated Crown land will be made available for carbon farming through diversification leases under its Carbon for Conservation initiative. The Government of Western Australia will invite high-level carbon farming concept proposals in 2022.
- A bill to amend the state's *Forest Products Act 2000,* enabling the Forest Products Commission (FPC) to trade in ACCUs created through establishing plantations. This will increase the FPC's rate of return on future investments, such as the commitment of $350 million to expand the state's softwood plantation estate.

In December 2021, the New South Wales National Parks and Wildlife Amendment Bill came into law and will allow the New South Wales Minister for Environment to create and trade in carbon sequestration rights and biodiversity credits.

1.3. Factors impacting ACCU demand

A total of 13.5 million ACCUs were cancelled in 2021, 700,000 units lower than 2020. Scheduled milestones across the portfolio of Commonwealth fixed contracts remained the key driver of demand, with 12.4 million ACCUs delivered in 2021, down from 13.3 million units in 2020. A total of 2.8 million ACCUs were delivered in Q4 2021 (see Figure 1.7).

In contrast, voluntary private and state and territory demand increased to 950,000 ACCUs in 2021 with the proportionate contribution in Q4 2021 also increasing to 8% of total cancellations, up from 6% in Q3 2021.

Under current Commonwealth fixed contract delivery schedules, 12 million ACCUs, or two thirds of the total 2022 ACCU estimated supply of 18 – 18.5 million, were expected to be delivered in 2022.

Fixed delivery contracts have been offered since auctions began in 2015, with 107 fixed delivery contracts awarded in the first auction. There is now little appetite for fixed delivery contracts as carbon

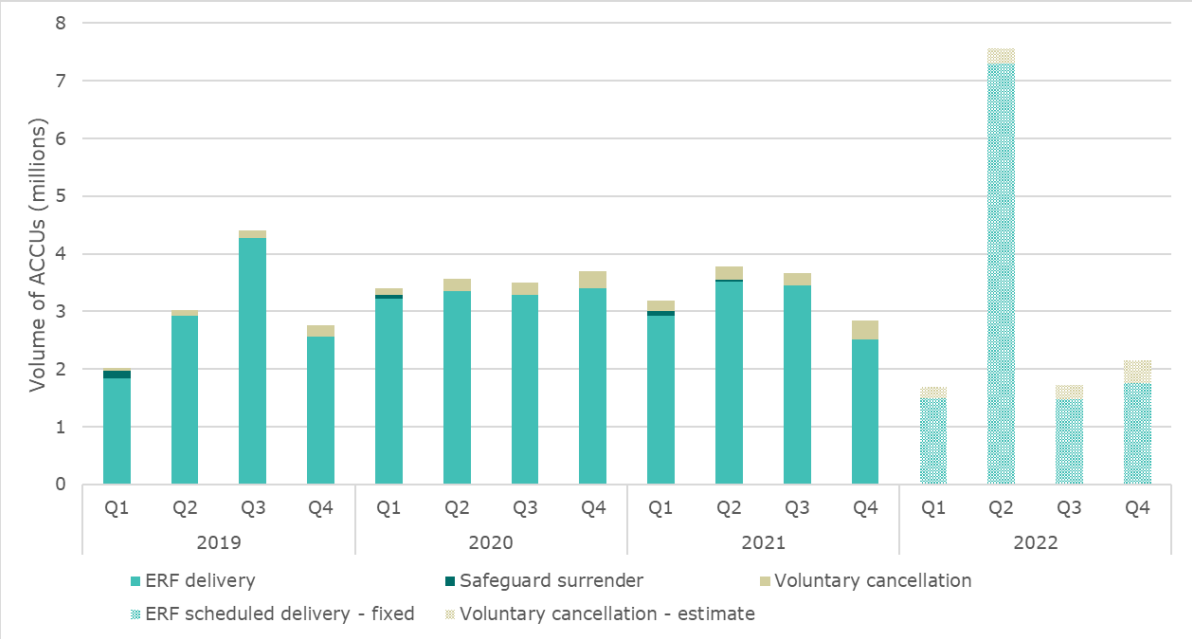
markets continue to evolve and ACCU spot prices increase with no fixed delivery contracts awarded at Auction 13.

In response to this, the Clean Energy Regulator has announced only optional delivery contracts will be offered at the 14th ERF Auction. Optional delivery contracts have an important role in de-risking new projects and increasing supply to the secondary market.

Changes to Commonwealth fixed delivery contracts, discussed above, combined with a clear market preference for optional delivery contracts mean the volume of 12 million ACCUs is unlikely to be realised. Voluntary private and state and territory demand will increasingly set cancellation trends in the future.

The Clean Energy Regulator will update scheduled delivery trends in future QCMRs.

Figure 1.7: Actual and estimated demand for ACCUs, Q1 2019 to Q4 2022



Note: * Estimated demand comprises demand from scheduled delivery against Commonwealth fixed delivery contracts as of 31 December 2021 and estimated voluntary demand. Scheduled delivery against Commonwealth contracts does not include optional delivery contracts as ACCUs contracted against an optional delivery contract may not be delivered to the Commonwealth. From 4 March 2022, scheduled delivery against Commonwealth fixed delivery contracts may not be delivered to the Commonwealth.

1.4. Voluntary demand for Australian units

Voluntary carbon markets continue to grow as government and corporate ambition to offset emissions gains momentum, and financial institutions and traders take a more proactive role in carbon markets.

Corporate Emissions Reduction Transparency

The Corporate Emissions Reduction Transparency (CERT) report pilot was launched in November 2021. Twenty-five major companies from across the economy have now opted into the pilot.

This is a significant step forward in supporting the corporate sector enhance the transparency and consistency of its net emissions reporting against voluntary emissions reduction commitments.

The participating companies from the energy, manufacturing, mining, retail, financial, construction and research sectors represent over 25% of Australia's annual greenhouse emissions reported to the Clean Energy Regulator. In addition to companies opting in at this pilot stage, a large number of companies have expressed interest in participating in future years. The first CERT report will be published in mid-2022.

International developments in carbon markets, such as those at COP26, are also expected to affect the domestic carbon market.

COP26

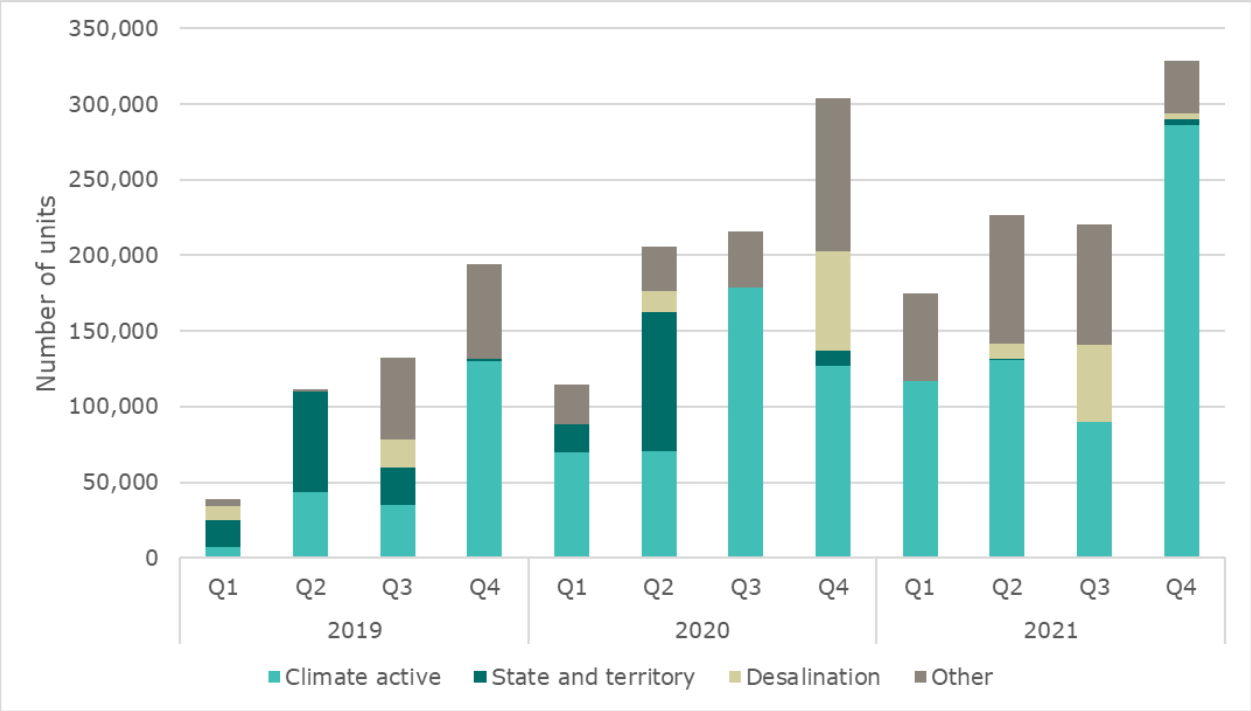
The 26th United Nations Climate Change Conference of the Parties, held in Glasgow in November 2021, achieved a number of outcomes including progress on global carbon markets (Article 6).

Article 6 provides the rules for international trading and use of emissions reductions, with operational details to be worked out during 2022 and at COP27. Voluntary market trades can exist both within and outside the framework of Article 6.

While international units continue to dominate voluntary market, a record volume of 950,168 ACCUs were voluntarily cancelled in 2021, compared to 840,957 ACCUs in 2020. This is an increase of 13%. Demand for ACCUs as a high integrity carbon offset was especially strong in Q4 2021, with a record 328,361 ACCUs voluntarily cancelled in the quarter.

In 2021, voluntary cancellation against Climate Active totalled 624,829 ACCUs, a 40% increase on the 447,026 in 2020. Climate Active accounted for a record quarterly high of 87% of cancellations with 286,459 ACCUs cancelled in Q4 2021 (see Figure 1.8).

Figure 1.8: Voluntary private and state and territory government demand for ACCUs, Q1 2019 to Q4 2021



On 10 December 2021, the Minister for Industry, Energy and Emissions Reduction announced a new requirement for all Climate Active certifications to use at least 20% ACCUs to achieve carbon neutrality.[1]

The Minister also referred in his statement to new forms of recognition for businesses that buy 100% ACCUs or purchase 100% renewable energy that was implemented in 2021. Climate Active data suggests that the number of businesses using only offsets sourced from Australian projects to achieve carbon neutrality has increased in recent years. During Q4 2021 a notable example of this was ISPT, a property

[1] Address at the Carbon Market Institute 8th Australasian Emissions Reduction Summit

investment firm, which surrendered 97,000 ACCUs under Climate Active towards their voluntary target of becoming carbon positive by 2025. This volume represented over 10% of voluntary private and state and territory demand for ACCUs during 2021.

More participants are taking an active role in the voluntary carbon market. 195 entities cancelled ACCUs in 2021, compared to 123 in 2020, an increase of 59%. A total of 76 entities cancelled ACCUs during Q4 2021, with 36 entities cancelling ACCUs for the first time.

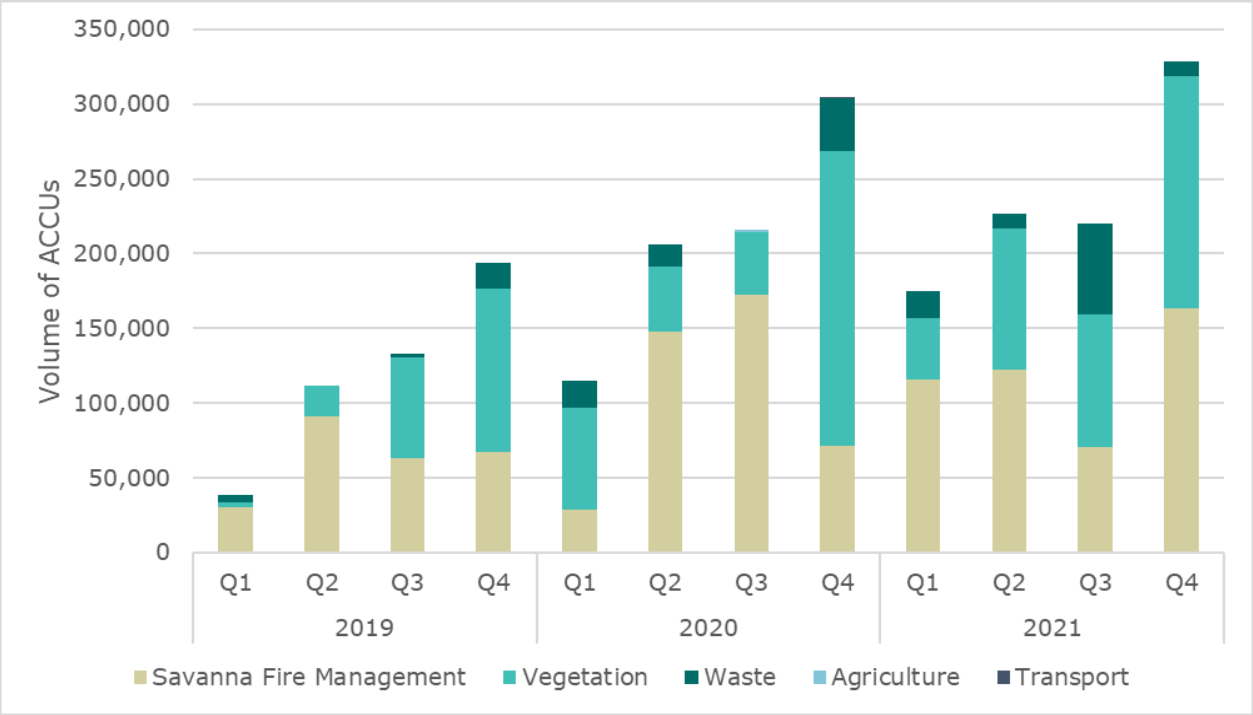
The finance sector has been particularly active, accounting for 70% of cancelled volume in Q4 2021. Financial entities are both offsetting organisational emissions, as well as starting to offer financial products and services targeted at the carbon market, such as carbon offsetting, climate targeted managed funds, or carbon offset based financial derivative instruments. As the carbon market matures, demand from the finance sector is likely to grow further.

With a growing number of private and state and territory entities choosing to offset their emissions, the increasing demand for ACCUs is expected to be approximately 1.1 million units in 2022.

Market intelligence suggests some buyers of ACCUs place a premium on ACCUs from specific method types owing to co-benefits. These co-benefits may include economic, social and biodiversity benefits beyond the associated emissions reductions. Savanna fire management and vegetation methods accounted for 90% of total cancelled volume in 2021 (851,956 ACCUs), compared to 92% in 2020 (770,814).

The share of waste credits voluntarily cancelled also steadily increased from 5% in 2019, to 10% in 2021. In Q4 2021, buyers continued to favour ACCUs from savanna fire management (50% of cancelled volume) and vegetation projects (47% of cancelled volume) with waste credits comprising the remainder (see Figure 1.9).

Figure 1.9: Voluntary private and state and territory government demand for ACCUs by method type, Q1 2019 to Q4 2021

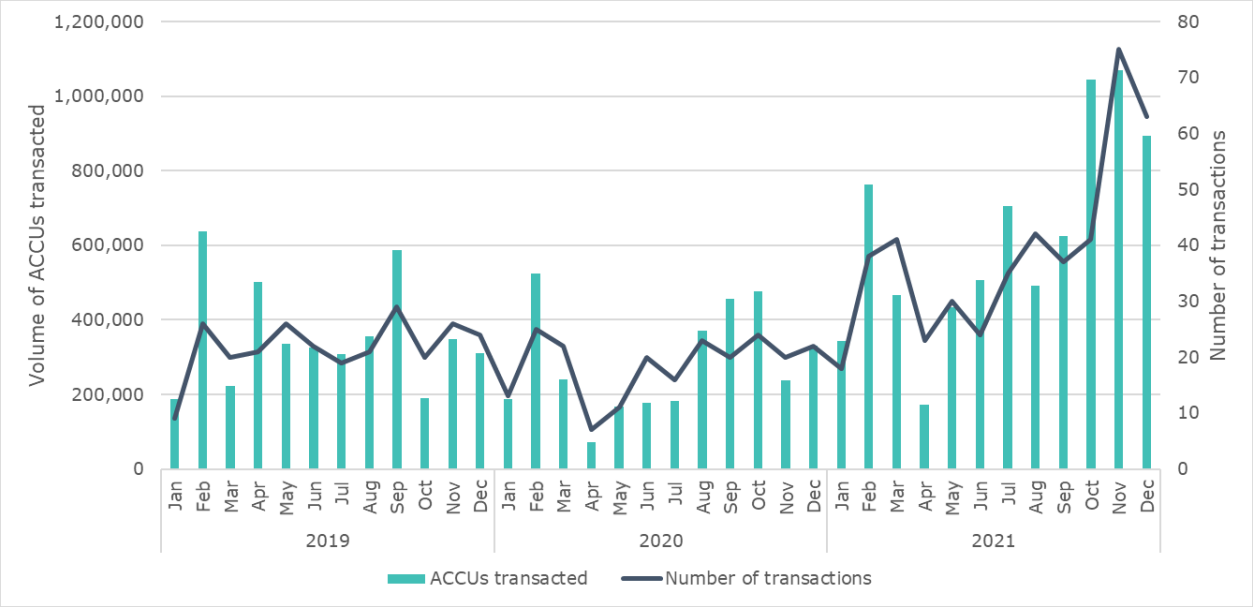


1.5. Market trading

In 2021, corporate ambition to reduce emissions from government schemes and initiatives (e.g. Climate Active), and a growing interest from financial intermediaries, led to a step up in market activity that supported a strong rise in the ACCU price.

Market activity rose sharply in Q4 2021 with 3 million ACCUs transacted through 179 transactions (see Figure 1.10), continuing a strong upward trend from mid-year. 7.5 million ACCUs were transacted in 2021, more than double the 3.4 million transacted in 2020. The increase in market activity during the latter half of 2021 reflects a mix of accumulation strategies by some account holders and increased voluntary cancellations.

Figure 1.10: ACCU market transactions (excluding ERF transactions), January 2019 to December 2021*

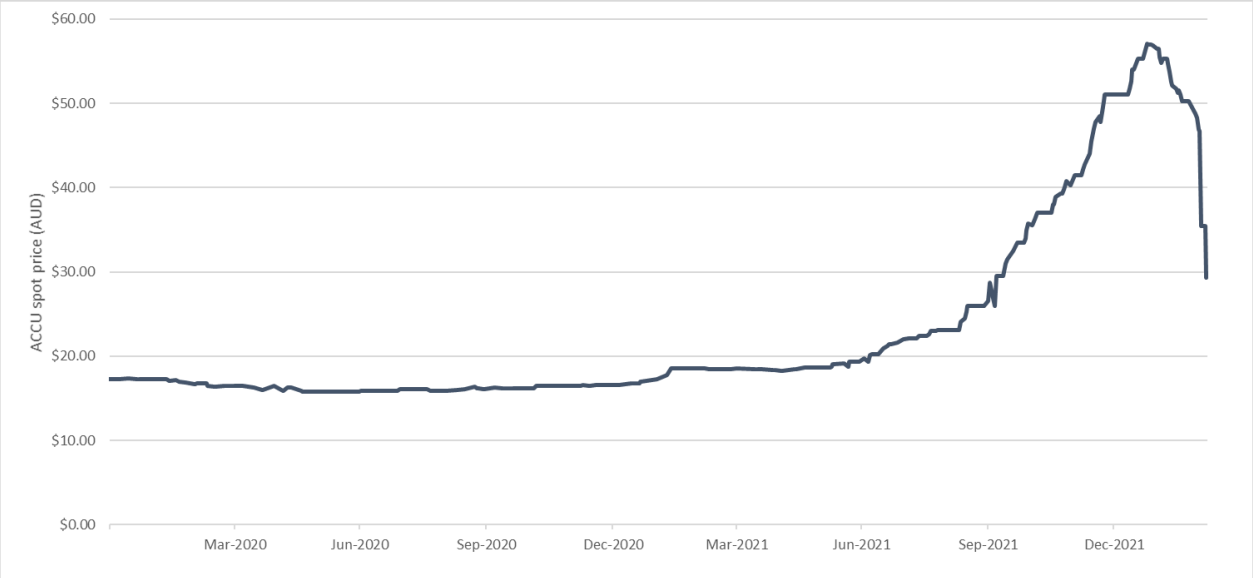


* ACCU market transactions refer to the transfer of ACCUs between separate entities or groups and does not include issuances and cancellations of ACCUs. Transactions involving the transfer of ACCUs between project proponents, between project proponents and project developers, and between accounts belonging to the same company and/or subsidiaries are excluded.

The ACCU Spot price

In 2021, the ACCU spot price surged to record levels from a relatively low number of trades/volumes and stepwise changes in the price. During 2021 the ACCU spot price tripled, rising from $16.55 to $51.00. In Q4 2021, the ACCU spot price experienced its largest quarterly move on record, with the spot price increasing from $26.50 to $51.00, a rise of 92% (see Figure 1.11). To put the recent price surge in perspective, the increase in the ACCU spot price for Q4 2021 is larger than the preceding 3 years during which the ACCU spot price increased by around 74%. The rising ACCU spot price provides a signal to the market to invest in new ERF projects to meet anticipated growth from private demand.

Figure 1.11: ACCU spot prices, January 2020 to 8 March 2022



Data sourced from Jarden and TFS Green

On 8 December 2021, the ACCU spot price surpassed the LGC price for the first time. The ACCU spot price continued to climb, reaching a record high of $57.50 on 24 January 2022, but softened to $48 at the end of February 2022. Following the changes to Commonwealth fixed delivery contracts, announced by the Minister for Industry, Energy and Emissions Reduction on 4 March, the spot price fell to $35.40 on the back of a single high-volume trade. There have been further price reductions and at close of business on 8 March 2022, spot market ACCUs were trading at $29.25.

1.6. International units

The recent rapid rise in the ACCU spot price in part reflects developments in overseas carbon markets. In 2021, carbon markets around the world experienced strong price growth for carbon instruments reflecting global developments on climate action.

In 2021, European Union Allowances (EUA) rose by 125% (in AUD) whilst during Q4 2021, EUAs increased by 20.8%, ending Q4 2021 at $116.39 (€74.61 Euro) (see Table 1.3).

High gas prices in Europe continue to impact the price of EUAs.[2] As gas prices rise, emissions-intensive coal becomes a more competitive fuel source, increasing the reliance on coal-fire power. The resulting higher emissions lead to increased demand for allowances for compliance purposes and subsequent upwards pressure on the price of EUAs.

Policy considerations may also be contributing to the recent volatility in the price of EUAs. In July 2021, the European Union (EU) introduced a package of proposed reforms to the EU Emissions Trading Scheme, to reduce emissions by 55% relative to 1990 levels by 2030. The so-called 'Fit for 55' package – which includes proposals for steeper annual reductions in the overall cap on emissions and a one-off reduction in the cap – may be contributing to volatility in price of EUAs, as the market considers potential implications of the reforms.

[2] Carbon Pulse, "Euro Markets: What a long strange trip 2021 has been for EUAs", Carbon Pulse, 22 December 2021.

Table 1.3: Domestic and international unit and certificate market spot prices*

Product	Spot price (30 September 2021)	Spot price (31 December 2021)	Quarterly change	Spot price (31 December 2021) in Australian dollar terms
ACCU	$26.50	$51.00	$24.50 (92.5%)	
LGC (t-CO_2-e)	$61.44	$64.14	$2.70 (4.4%)	
Energy Saving Certificates (ESC, New South Wales)	$33.75	$36.00	$2.25 (6.7%)	
Victorian Energy Efficiency Certificates (VEEC)	$65.00	$78.10	$13.10 (20.2%)	
European Union Allowances (EUA)	€61.74	€74.61	€12.87 (20.8%)	$116.39
New Zealand Units (NZU)	NZ$64.50	NZ$68.50	NZ$4.00 (6.2%)	$64.39
Korean Allowance Units (KAU)	₩29,750	₩34,000	₩4,250 (14.3%)	$40.80

Note: * Prices are denoted in Australian dollars unless otherwise stated.

The price of New Zealand Units (NZU) rose strongly in 2021, increasing by 84% (in AUD). In September 2021, a volume limited cost containment reserve (CCR) was triggered as the price of NZUs exceeded NZ$50 at auction. The CCR contained 7 million additional NZUs which could be purchased at auction when the price rises above the trigger of NZ$50. Increasing the supply of NZUs at auction is designed to ease demand pressure and act as a price ceiling. However, strong demand for NZUs at the September 2021 auction did little to prevent the price rise as the auction cleared all 11.75 million NZUs available at a record high of NZ$53.85.

New Zealand Units (NZU) spot prices continued to increase in Q4 2021, with prices reaching a record high of $65.76 AUD ($68.50 NZD), associated with tight supply in the market, before finishing at $64.39 AUD ($68.10 NZD). NZU spot prices reached a new record high at $77 NZD on 3 February 2022.

1.7. Key dates

Date	Event	Significance
28 February 2022	Safeguard compliance ACCU surrender deadline.	Deadline for safeguard entities to surrender ACCUs under the Safeguard Mechanism to avoid excess emissions situation.
5-6 April 2022	ERF Auction	Auction guidelines and details about the auction process are available on the Clean Energy Regulator's Participating in an auction webpage.

2. Large-scale generation certificates

Key messages

- 1.2GW of new large-scale renewable energy capacity was approved as eligible for LGCs in Q4 2021 and 2.3 GW in total across the year.[3]
    - Over 2.5 GW of capacity is expected to be registered for LGC generation in 2022.
- 2.9 GW of solar and wind power stations reached FID in 2021, with 1 GW of that in Q4 2021.
    - This continues an upwards trend in investment for the last 2 years and a similar level is expected in 2022.
- Voluntary LGC cancellations reached almost 5.8 million in 2021, up 43% from 2020.
    - Voluntary cancellations have effectively increased demand above the legislated 33,000-gigawatt hour (GWh) target by 18%
- Total 2021 new LGC supply was 39 million certificates.
- 4.9 million LGCs were taken as shortfall in the 2021 assessment year and 3.4 million LGCs were cancelled to redeem shortfall incurred in previous years.
- New LGC supply in 2022 is expected to be approximately 44 million certificates. The supply/demand balance will remain tight as voluntary demand continues to increase and shortfall of 15.9 million LGCs is able to be redeemed.
- The 2022 RPP has been set at 18.64%, requiring liable entities to cumulatively surrender 32.6 million LGCs

Record wind and utility solar generation in 2021 added to Australia's growing renewable electricity profile as more power plants came on-line and the construction of solar and wind farms continued. The Australian Government is supporting the utility scale renewables sector through many initiatives, including progressing with the New South Wales-South Australia interconnector, a regulatory framework for offshore wind farms and supporting projects that will help reduce the levelised cost of solar PV by 2030. The shift to renewables has seen several utilities bring forward the closure of coal power plants. These developments will materially reduce the emissions intensity of the electricity grid in years to come.

There has been a significant increase in voluntary LGC cancellations reflecting interest in using LGCs to demonstrate voluntary ambition. Increasing voluntary ambition to reduce emissions by corporates and State and Territory governments has supported the LGC spot price even as more certificates become available.

2.1. Supply and demand balance

In 2021, approximately 45 million LGCs were available for cancellation against statutory demand, shortfall charge refunds and voluntary demand. This consists of 6.1 million LGCs carried forward from previous years, and new LGC supply of 38.9 million in 2021.

[3] This means accredited for scheme entry to be eligible for LGCs for every net megawatt hour of generation.

After the surrender deadline of 14 February 2022, 28 million LGCs were cancelled against liability for the 2021 assessment year resulting in a compliance rate of 86.3%. This is up from the 2020 assessment year as less shortfall was taken, 4.9 million LGCs compared to 6.8 million LGCs for 2020. Of the 4.9 million LGCs taken as shortfall for 2021, 4.3 million LGCs related to paid shortfall and 0.6 million was carry forward shortfall (when a liable entity surrenders at least 90% of their liability). This suggests electricity retailers and the market generally are using the shortfall provisions as an effective liquidity mechanism.

With forward LGC prices lower than the spot price, using shortfall remains an attractive option for liable entities.

Voluntary cancellations reached almost 5.8 million LGCs in 2021, exceeding the Clean Energy Regulator's expectations of 5.5 million LGCs for the year set out in the September 2021 Quarterly Carbon Market Report. This is further evidence the market is using LGCs as a carbon unit to prove use of renewable energy and reduce net scope 2 electricity emissions.

The total supply balance for the 2021 assessment year after surrender was 7.8 million LGCs. This could be seen as the amount of liquidity the market needs (see Table 2.1). Detailed results for the 2021 assessment year will be provided through the Clean Energy Regulator's Certificate shortfall register.

Table 2.1: Estimated LGC supply and demand balance in the 2021 assessment year

	Supply	Demand
LGCs available from previous assessment years	+6.1 million	
2021 LGC supply (available for 2021 surrender)	+38.9 million	
LGCs surrendered 2021 assessment year		-28.0 million
Shortfall charge refunds		-3.4 million
Voluntary cancellations		-5.8 million
Estimated total balance for 2021 assessment year	**+7.8 million**	

The Renewable Power Percentage (RPP)

The 2022 renewable power percentage (RPP) has been set at 18.64%.

This means liable entities (generally electricity retailers) are required to surrender 32.6 million LGCs to meet their Large-scale Renewable Energy Target (LRET) obligations for 2022.

The Clean Energy Regulator will track certificate availability to meet RPP demand and report on this throughout the year.

2.2. Factors impacting supply

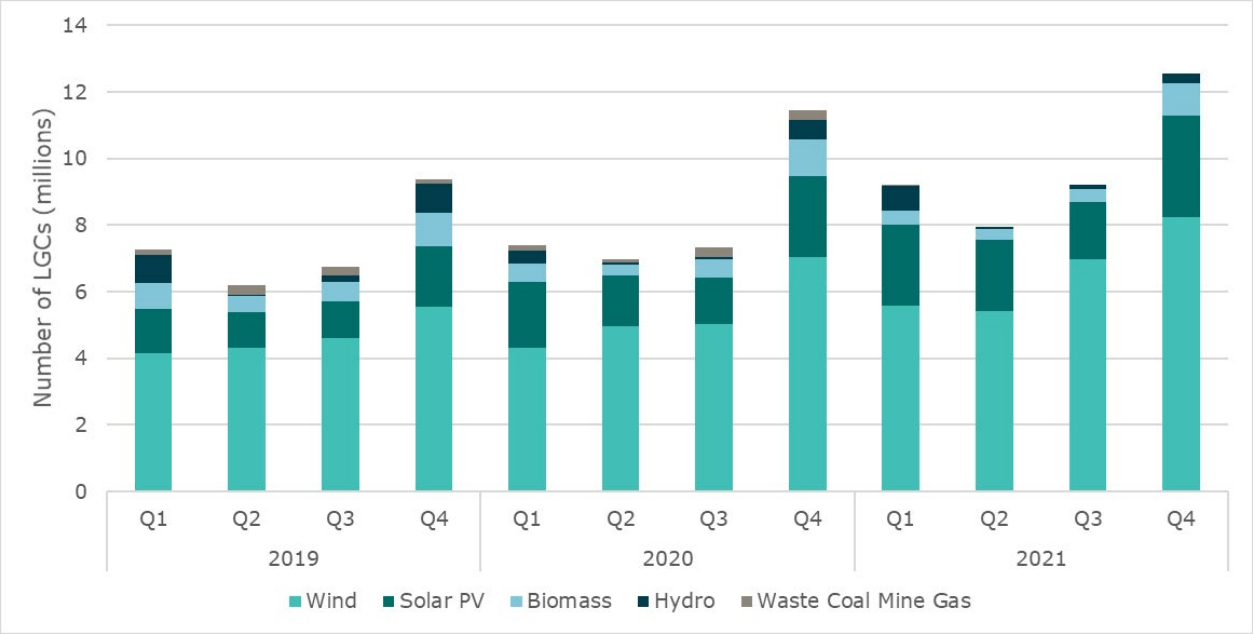
LGC supply

New LGC supply achieved a record 12.6 million certificates validated in Q4 2021, taking total supply for the 2021 calendar year to 38.9 million – a 17% increase on 2020. Wind was the dominant source in Q4 2021 accounting for almost two-thirds of LGCs. An increase in LGC supply in Q4 2021 was expected, as new power stations began generating at full or close to full capacity, combined with favourable seasonal conditions for wind and solar. In Q4 2021 LGC supply for wind and solar increased by 18% and

77% respectively, over Q3 2021 figures (see Figure 2.1). Wind and solar generation both reached record levels in 2021:[4]

- 26.2 million LGCs annual supply from wind generation. This is supported by record wind generation in the NEM of nearly 23 GWh in 2021, up 17% from the 19.7 GWh in 2020
- 9.3 million LGCs annual supply from utility scale solar. This is supported by record utility scale solar generation in the NEM of 8.8 GWh in 2021, up 32% from the 6.7 GWh in 2020.

Figure 2.1: LGCs validated by technology type, Q1 2019 to Q4 2021



In 2022, LGC supply is expected to increase to approximately 44 million LGCs, assuming no major curtailment events and typical wind and solar patterns. While legislated demand will remain static at 33 million LGCs each year until 2030, voluntary demand is expected to continue growing and there is still 15.9 million LGCs required to redeem over $1 billion of shortfall charge.

Penetration of renewables throughout Australia

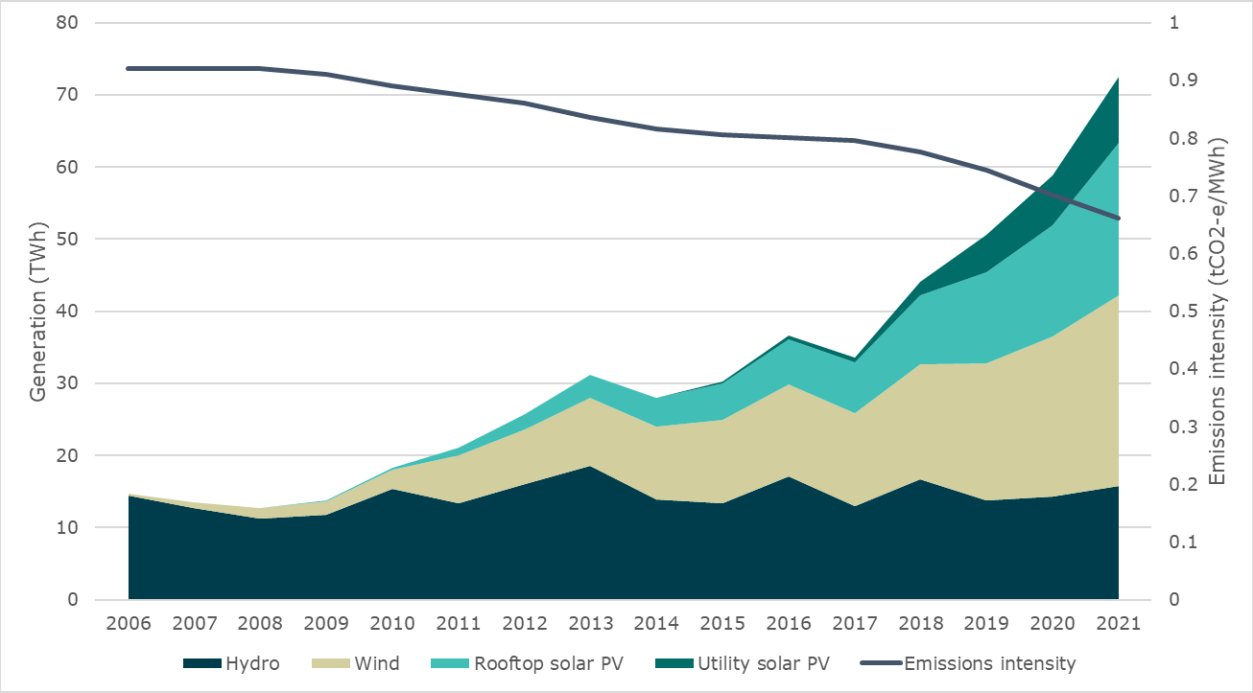
Q4 2021 set another record for renewable energy generation, accounting for 35.8% of total NEM generation, up 5.2 percentage points on the 30.6% of generation in Q4 2020. This includes rooftop solar, utility-scale wind and solar, hydro and biomass.

The rapid increase in renewable generation is helping bring the emissions intensity of the grid down. During 2018-2021, an average of 5.9 GW of renewable energy was added to the grid annually, with the emissions intensity (combined NEM and SWIS) falling from 0.79 t CO_2-e/MWh in 2017 to 0.66 t CO_2-e/MWh in 2021 (see Figure 2.2). This decline will continue as more renewable generators come online and as coal generators exit.

While wind was the leading source of renewable energy generation in Q4 2021, the share of utility solar generation saw the biggest year on year growth with a 32% increase from 2020 (see Figure 2.2). This follows record generation from utility scale solar in December 2021, surpassing 1,000 GWh generation in a month for the first time.

[4] Wind and solar generation does not include generation from the South West Interconnected System and off-grid.

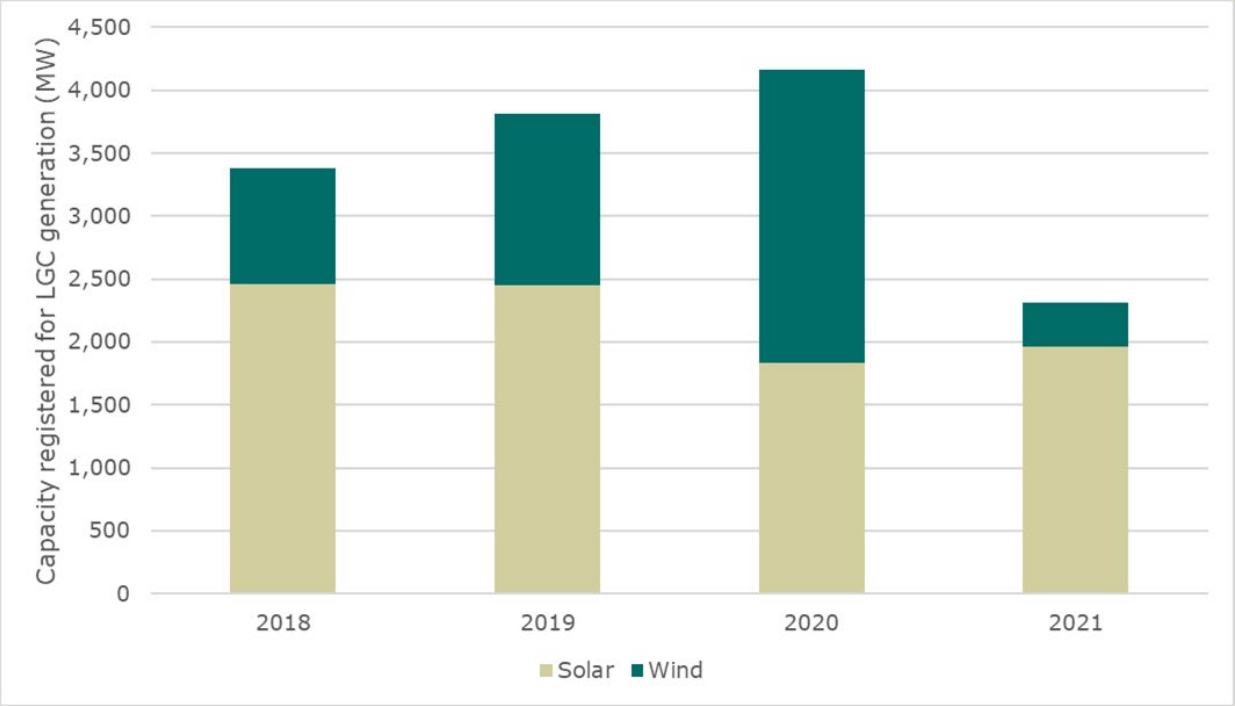
Figure 2.2: Renewable generation (TWh) by fuel type against national emissions intensity (t CO_2-e/MWh), 2006 to 2021



The growth in large-scale solar generation share is likely to continue in the near term with 2 GW of the 2.3 GW capacity registered for LGC generation in 2021 coming from solar (see Figure 2.3).

The lower capacity registered for LGC generation for wind in 2021 is partly due to the longer construction time required for wind projects compared to solar and the timing of the build. The share of wind and solar going forward is expected to be more balanced with 2 GW of solar and 2.4 GW of wind projects reaching FID and in different stages of construction by the end of 2021.

Figure 2.3: Capacity of wind and solar power stations registered for LGC generation (MW), 2018 to 2021



The Australian Government is supporting the utility scale solar sector with $40 million funding available through the Australian Renewable Energy Agency, aimed at research and development for projects that can materially reduce the levelised cost of solar PV by 2030. This is expected to help the Government's stretch goal to reduce the cost of utility scale solar electricity to $15 per megawatt hour.

South Australia experienced multiple periods where the state's demand was fully met by renewables. There were times where solar alone supplied more energy than required by the state. Notably, Project Energy Connect, an energy interconnector between South Australia and New South Wales, reached FID in June 2021. Developments such as this will facilitate further renewable penetration in the grid once constructed.

To facilitate offshore wind uptake, the Australian Government introduced the *Offshore Electricity Infrastructure Bill 2021* to Parliament in September. The bill successfully passed through the Senate in November 2021. The legislation will streamline the construction, operation, maintenance and decommissioning of offshore energy projects around Australia.

While still at the conceptual stage, the Star of the South (2.2 GW capacity) is the most progressed offshore wind project. This project received a $19.5 million funding boost from the Victorian Government in November 2021.[5]

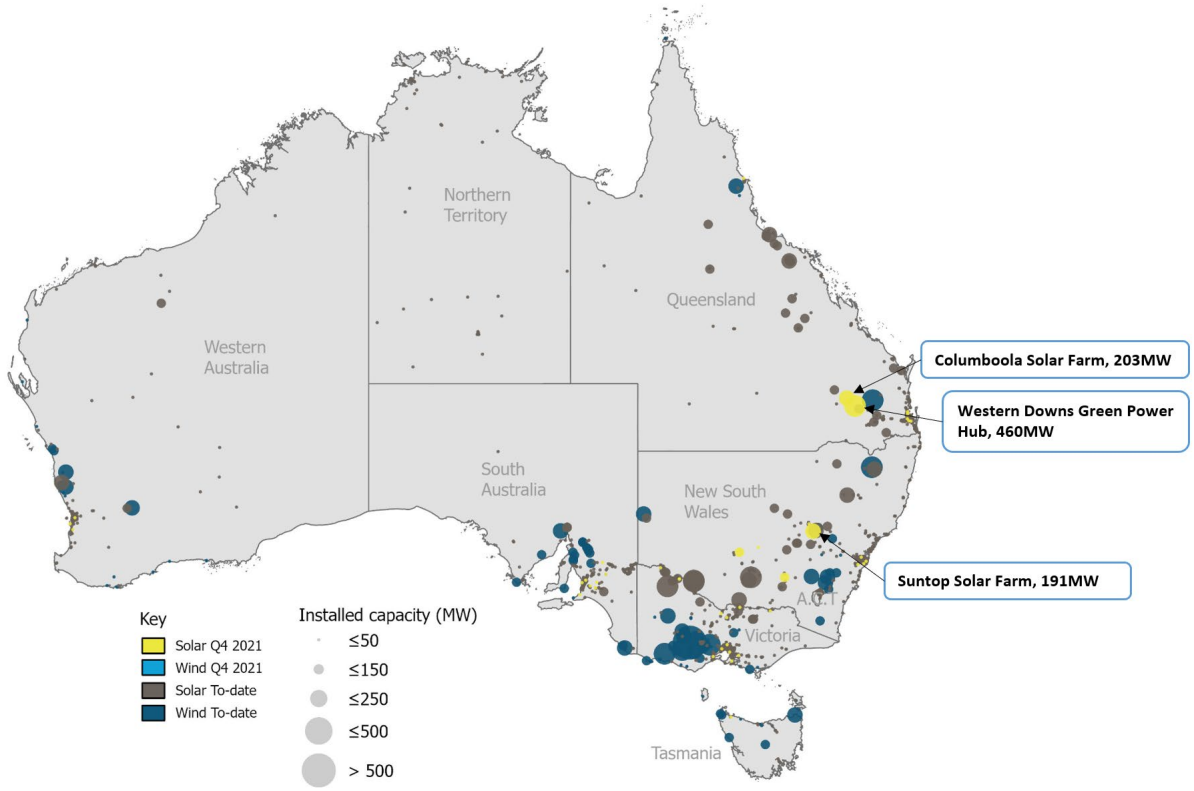
In response to a market shift towards renewable sources of electricity, some coal power plants are bringing forward their closure dates. In early February 2022, AGL Energy announced it will bring forward the closure of the Bayswater plant in New South Wales and the Loy Yang A plant in Victoria by 2 to 3 years. Origin Energy followed with their announcement of the closure of the Eraring power station in 2025, seven years earlier than scheduled. While retirement of these power stations provides opportunity for more renewables to enter the market, it also highlights the need for grid infrastructure updates, including interconnectors and battery storage and, more broadly, the adequacy of firm dispatchable generation

Accreditation - approval for eligibility for LGCs

A total of 1.2 GW of new large-scale renewable energy capacity was registered for LGC generation in Q4 2021. Western Downs Green Power Hub (460 MW) in Queensland was the largest power station approved, followed by Columboola Solar Farm at 202 MW, also in Queensland, and Suntop Solar Farm at 191 MW in New South Wales (see Figure 2.4). Western Downs is now the largest solar farm approved for LGC eligibility, surpassing the Darlington Point Solar Farm approved in early 2020.

[5] https://www.staroftheSouth.com.au/news-media-releases/funding-boost-for-australias-first-offshore-wind-project

Figure 2.4: Wind and solar power stations capacity registered for LGC generation by location, Q4 2021 and scheme to-date

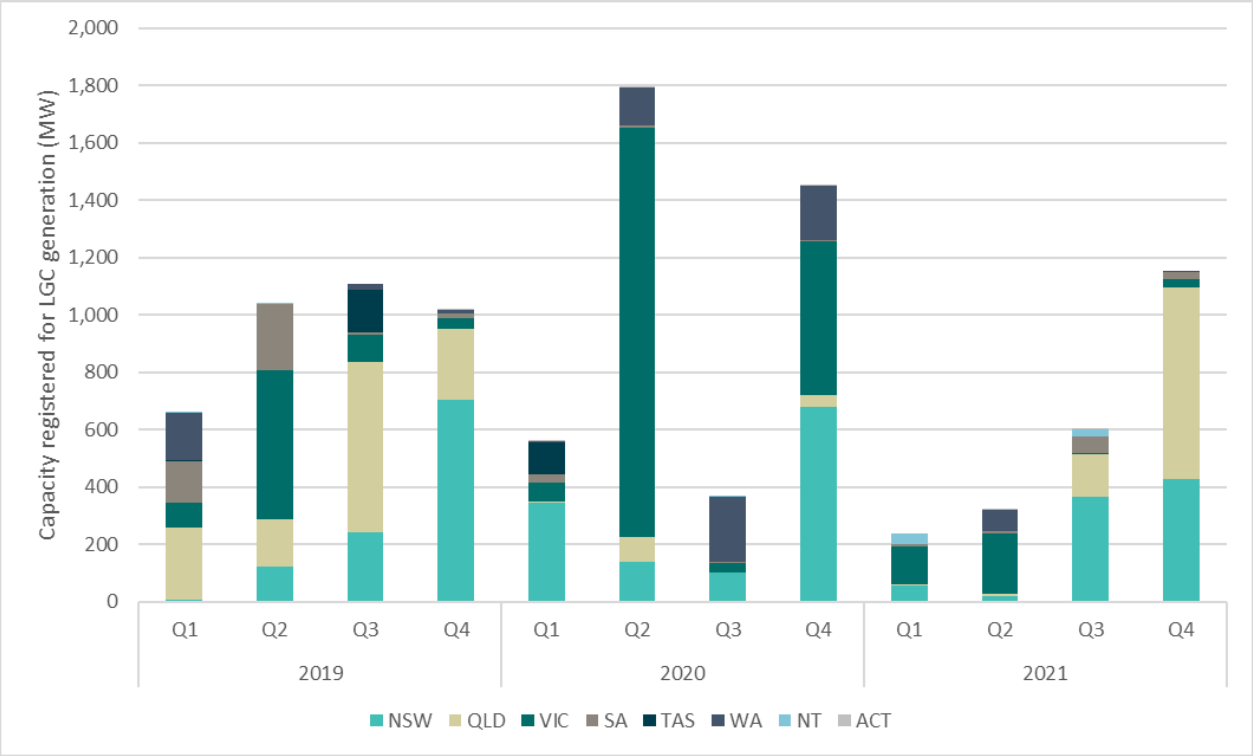


Total capacity registered for LGC generation in 2021 reached 2.3 GW surpassing the 2 GW estimated in the June 2021 Quarterly Carbon Market Report. In comparison, almost 4.2 GW was registered for LGC generation in 2020. The reduction in capacity in 2021 is partly due to the timing of accreditation for several utility scale power stations, which were expected to come online early in 2021, but commenced generation in late 2020.

The Clean Energy Regulator expects 2.5 – 3 GW capacity will be registered for LGC generation in 2022.

As shown in figure 2.5, there is considerable variability in capacity registered for LGC generation across states and territories. In 2021, New South Wales and Queensland received the bulk of accredited capacity, whereas in 2020 much of the capacity was situated in Victoria and to a lesser extent New South Wales.

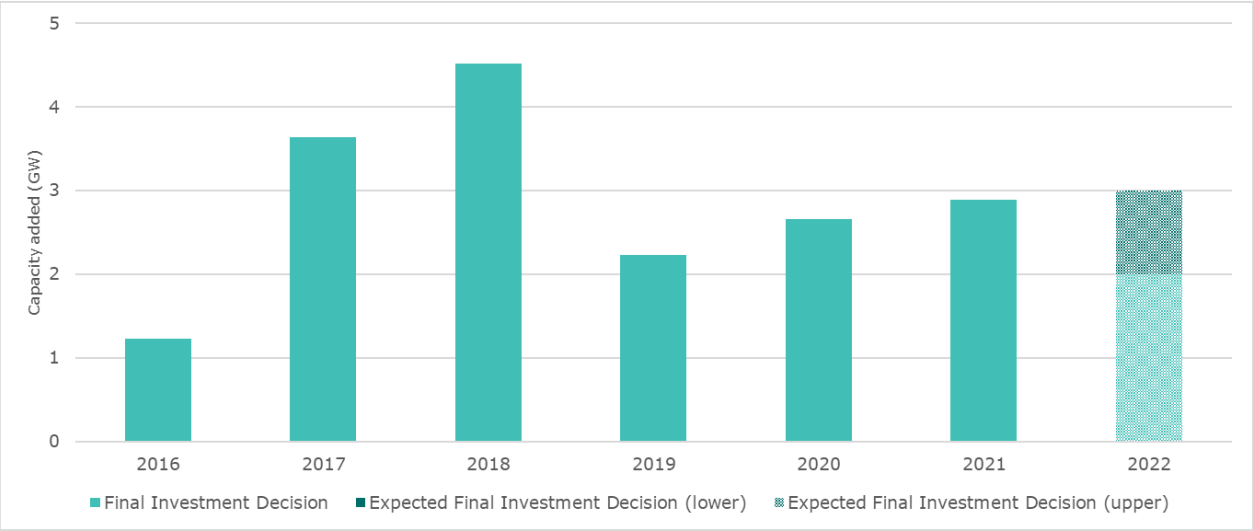
Figure 2.5: Capacity registered for LGC generation by state (MW), Q1 2019 to Q4 2021



Wind and solar power station investment trends up

Investment in large scale renewables remains strong, even after the achievement of the Large-scale Renewable Energy Target (LRET) of 33,000 GWh in January 2021, which has since been materially exceeded. In 2021, a total of 2.9 GW reached FID – at the upper end of the Clean Energy Regulator's expected range of 2 to 3 GW. This capacity was 238 MW higher than 2020 and represents an increase of 9% on 2020 figures, with an upward trend now for 2 years (see Figure 2.6).

Figure 2.6: Capacity committed per year (MW), 2016 to 2022



The Clean Energy Regulator understands that other projects may have reached FID last year but have not yet been announced. These will be included in the Q1 2022 QCMR upon confirmation of construction. The Clean Energy Regulator is tracking a number of projects and expects that total capacity reaching FID in the first half of 2022 could reach 2 GW.

On 27 February 2022, Squadron Energy announced that it had purchased the Clarke Creek (Qld) project from Goldwind and that it would immediately proceed with construction of the 350 MW first stage.

In Q4 2021, ACCIONA Energia committed to commence construction of its 923 MW MacIntyre Wind Farm in Queensland. The wind farm is expected to be fully operational in 2024. ACCIONA Energia will own and operate the project in partnership with Ark Energy, a subsidiary of Korea Zinc Co. 400 MW of energy from the MacIntyre Wind Farm will be supplied to the Queensland Government's CleanCo, under a long-term power purchase agreement (PPA) that was agreed in 2020. Energy from the MacIntyre Wind Farm will also power the Queensland operations of Sun Metals Corporation, another subsidiary of Korea Zinc.

The Karara Wind Farm, owned by CleanCo, will be located adjacent to the MacIntyre Wind Farm and will form part of the MacIntyre Wind Farm Precinct. Karara Wind Farm, once committed, will contribute an additional 103 MW of renewable energy capacity, taking the total capacity committed for the MacIntyre Precinct to 1026 MW.

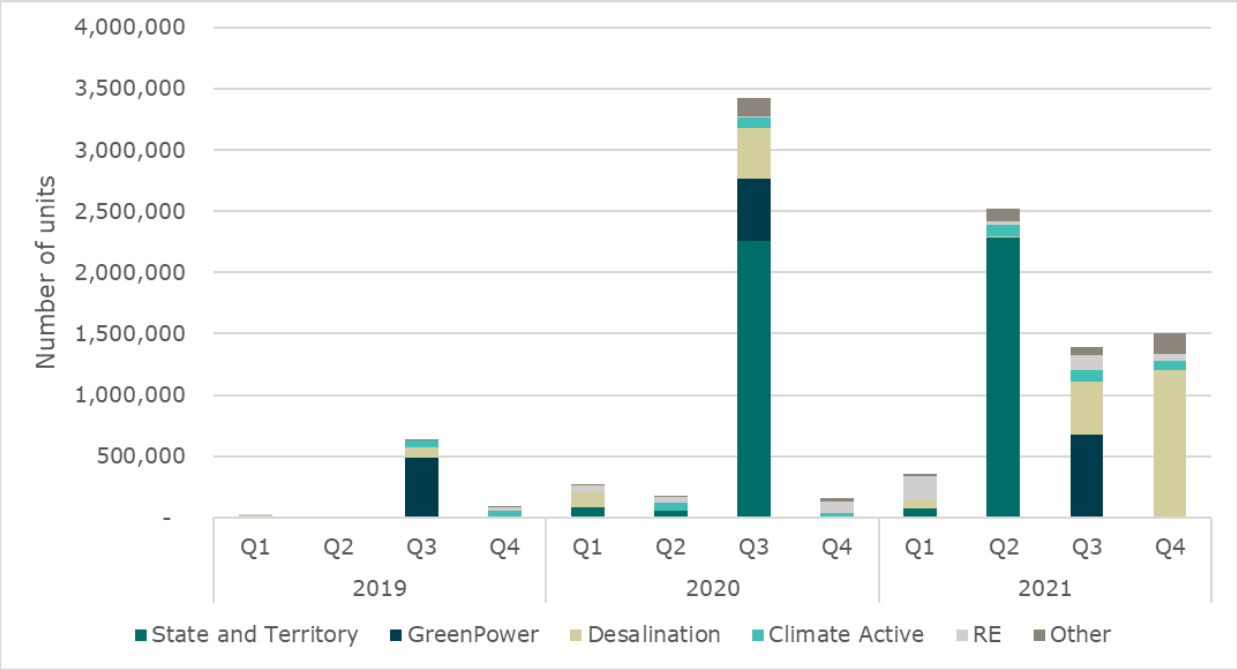
The Clean Energy Regulator expects that a similar level of capacity will reach FID in 2022 as was recorded in 2021, noting that, the commercial nature of these transactions means that timing of decision is difficult to predict. However, with the trend being up over the last 2 years, and announcements of earlier coal power station closures, it is possible that total FID announcements in 2022 may exceed 3 GW. The Clean Energy Regulator will continue to monitor and provide quarterly updates on this.

2.3. Factors impacting demand

Voluntary private and state and territory government demand

A record 5.8 million LGCs were voluntarily cancelled in 2021, an increase of 43% on 2020. This includes cancellation by the ACT Government of 2.2 million LGCs towards its renewable electricity target. Notable, is the ramp-up in cancellations over the last 2 quarters reflecting interest from desalination and the private sector (see Figure 2.7).

Figure 2.7: Voluntary private and state and territory government demand for LGCs by reason for cancellation, Q1 2019 to Q4 2021

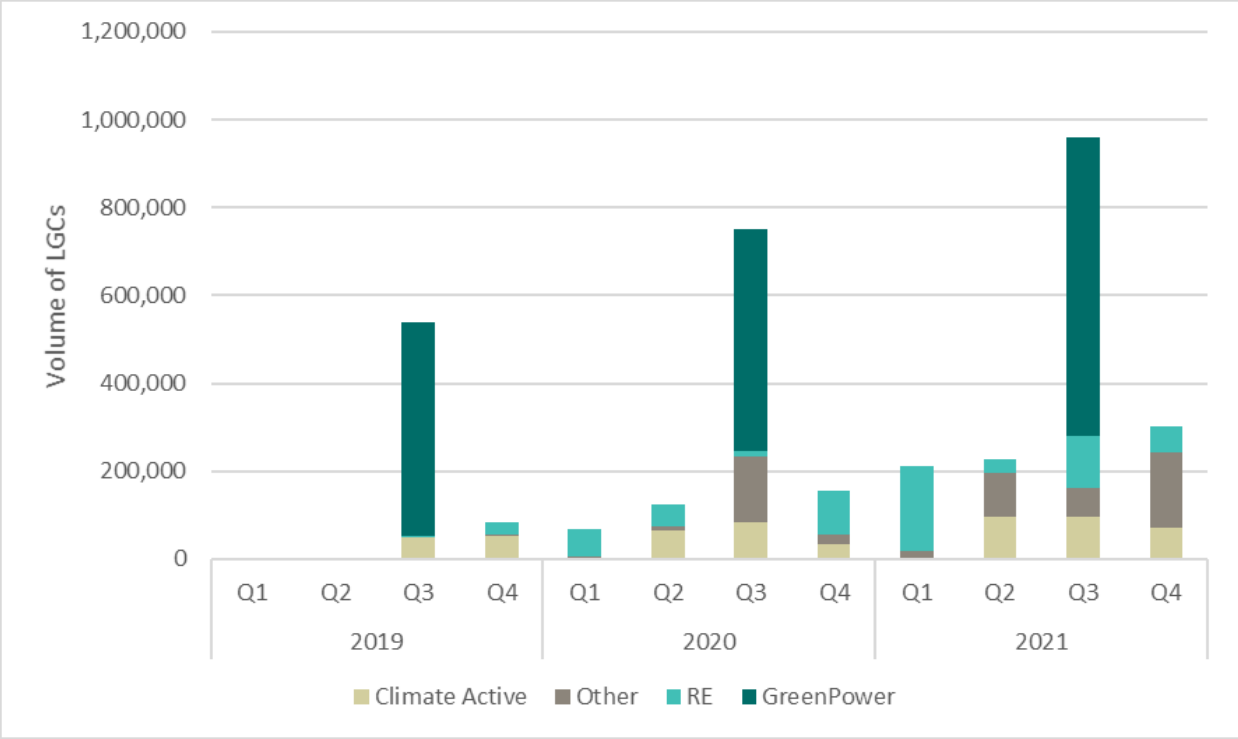


In Q4 2021, a total of 1.5 million LGCs were voluntarily cancelled. The voluntary cancellations have effectively increased LGC demand by 18% above the legislated target of 32.6 million and resulted in the LGC price staying higher than forward markets had previously expected.

Western Australia's Water Corporation voluntarily cancelled approximately 1.2 million LGCs in Q4 2021, representing more than 20% of all voluntary LGC demand in 2021. Water Corporation operates the Southern Seawater Desalination Plant, which on average produces 30% of Perth's water supply. The plant operates under the condition that all electricity used must be purchased from renewable sources and the associated renewable energy certificates are surrendered. The LGCs cancelled by Water Corporation in Q4 2021 contribute to its compliance of the plant that commenced operations in 2011. These certificates were sourced through PPAs that Water Corporation maintains with multiple renewable energy generators, namely the Mumbida Wind Farm and the Greenough River Solar Farm. As Water Corporation is likely to surrender LGCs on a more regular basis, this is likely a one-off demand increase.

LGC cancellations for GreenPower and Climate Active demonstrate growing private sector interest in net-zero emissions operations (see Figure 2.8). Voluntary cancellations of LGCs from the private sector have been trending up since 2019 and exhibit a strong seasonal influence, especially in Q3 of each year when accrued GreenPower cancellations are realised.

Figure 2.8: Voluntary private demand for LGCs by reason for cancellation, Q1 2019 to Q4 2021



Total demand from voluntary private and state and territory governments in 2022, is expected to be at a similar level to 2021. However, as the market is increasingly valuing LGCs as a carbon unit, and with the introduction of new initiatives, such as CERT, demand could go higher.

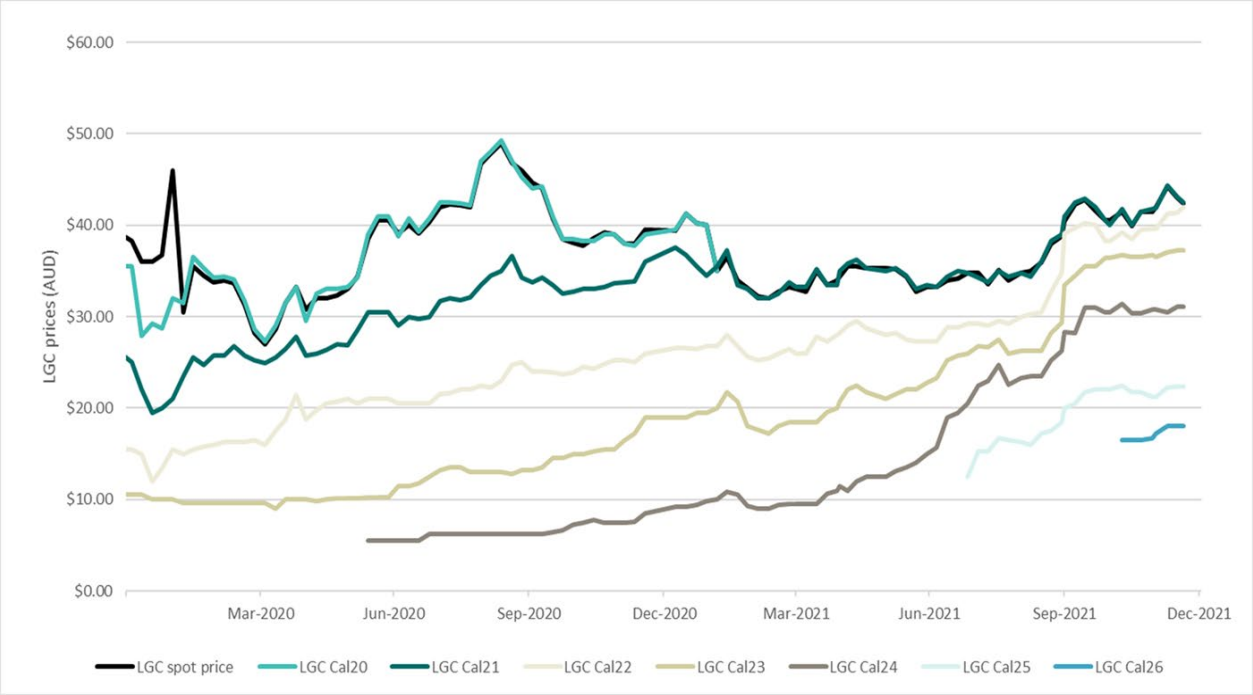
2.4. Market trading

In 2021, the LGC spot price increased by nearly $3 with much of the price momentum taking place in Q3 2021. In Q4 2021, there was little movement in the LGC spot price, with the price increasing from $42.25 to $42.40 (see Figure 2.9).

There was more significant movement in forward prices for LGCs in Q4 2021, with Cal23 LGCs increasing from $33.50 to $37.20, and Cal24 LGCs rising from $28.25 to $31.10. Forward prices have continued to rise post 1 January 2022, likely sustained by liable entities looking to shore up supply for future liability,

to redeem shortfall and expected growth in voluntary LGC demand from Climate Active and GreenPower. In Q4 2021, Cal26 forward LGC prices started trading for the first time with forward prices indicating long-term support for LGCs. Higher than expected spot prices and increasing forward prices may be contributing to the trend of increasing capacity, reaching FID as discussed above.

Figure 2.9: LGC spot and forward prices, January 2020 to December 2021



2.5. Key dates

Date	Event	Significance
14 February 2022	Lodgement of energy acquisition statement and surrender of LGCs Submit Electricity Generation Returns	This will be the final date for liable entities to: • lodge their energy acquisition statement(s) and surrender LGCs for the 2021 assessment year, and • pay any applicable shortfall charges for the assessment year.

3. Small-scale technology certificates

Key messages

- 3.2 GW of rooftop solar PV capacity was installed in 2021, a new record and 7% higher than the 3 GW installed in 2020.
- 850 MW of rooftop solar PV capacity was installed in Q4 2021, the second highest capacity installed in a quarter since the SRES began.
- A balance of 9.5 million STCs remained in the market after the 14 February 2022 surrender of approximately 7.6 million STCs.
- STC prices remained stable in 2021 ending Q4 2021 at $39.00.
- Installations and STC creations in the first 2 months of 2022 suggest installed capacity in 2022 will be lower than in 2021.
    - The Clean Energy Regulator will make an estimate of the likely range in the Q1 2022 QCMR.
- 2022 STP has been set at 27.26%, requiring liable entities to cumulatively surrender 47.7 million STCs.
- With lower STCs creations early in 2022, it appears the STC Clearing House will be materially used in the lead up to Q1 surrender on 28 April.

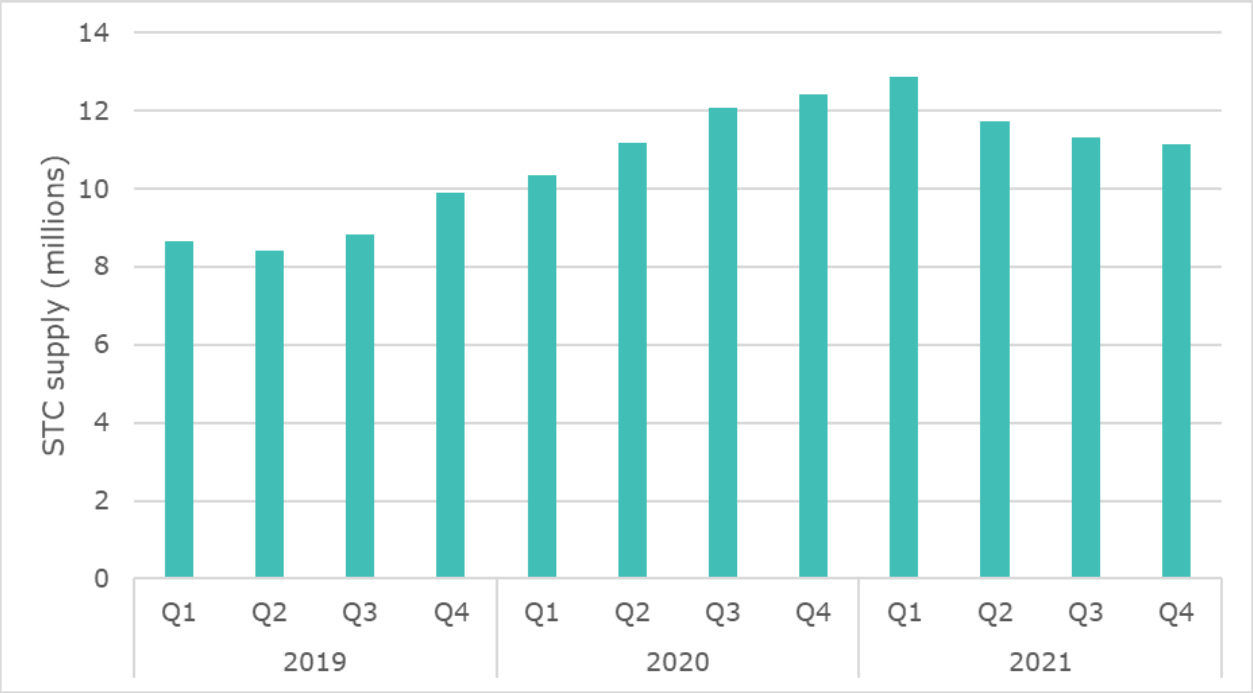
Australian households continued to install rooftop solar PV systems at a record rate in 2021, following 4 consecutive record-breaking years. Australian households continue to lead the world in rooftop solar PV installations—one third of suitable homes (excluding high density apartments) now have rooftop solar — and are continuing to opt for increasingly larger systems as costs fall and payback periods remain short. Early data suggests total installed capacity reduced year on year in early 2022. This chapter discusses the potential factors at play.

The softening in STC creations combined with the first quarter requiring 35% of the annual STC liability to be acquitted, has resulted in a tight supply demand balance with the STC spot price approaching the clearing house price of $40.

3.1. Supply and demand balance

STC supply in 2021 totalled 47 million certificates, an increase of 2.3% on total supply in 2020. Supply decreased each quarter during 2021, in contrast with an increasing supply throughout the years in 2019 and 2020 (see Figure 3.1).

Figure 3.1: STC supply by quarter, Q1 2019 to Q4 2021



Note: STC supply refers to STCs that have been created and subsequently validated through Clean Energy Regulator's assessment process

In the September 2021 Quarterly Carbon Market Report, the Clean Energy Regulator noted the decline in STC creations in Q3 2021 was associated with COVID-19 lockdowns in New South Wales, Victoria, and the Australian Capital Territory. However, by 1 March 2022, new STC creations were down 29%, compared to same period in 2021. If this trend continues for the balance of Q1 2022, then the downward quarterly trend seen in 2021, could continue into 2022.

Between 2016 and 2021, annual added capacity of rooftop solar averaged an extraordinary growth of 35% year on year, from 0.75 GW to 3.2 GW. There was an expectation this growth would eventually slow or decline. However, given the consumer nature of the product, predicting this turning point is difficult.

One possibility is that the declining trend in the supply of STCs in 2021 (see Figure 3.1) may continue until it flattens at a new level, lower than the peak in 2021. Reasons for this scenario could include expectations of higher future interest rates, a shift in household expenditure away from home renovations and lower feed in tariffs. While there has been some industry talk around component supply constraints and price increases, which could be contributing, this does not yet appear to be material.

The other scenario could see the upward trajectory of installations and certificate creations start again from Q2 2022 after consumers and installers resume work based on voluntary isolation rather than imposed lockdowns.

At this stage, the Clean Energy Regulator believes it is too early to call. This industry has surprised on the upside before and the business case for consumers remains strong with payback periods for most rooftop solar PV being less than 4 years.

The 2022 Small-scale Technology Percentage (STP) was predicated on consultants' estimates of 3.4 GW of capacity, plus the carry-over of 9.5 million STCs surplus from previous years.

In the meantime, the Clean Energy Regulator considers that the most probable scenario is that total added capacity in 2022, could be lower than the 2021 record of 3.2 GW. The Clean Energy Regulator will publish an expected range in the Q1 2022 QCMR after analysing trends for a full quarter and discussions with key parties in the industry.

Record levels of installed capacity in 2021 resulted in a balance of 9.5 million STCs in the market after the surrender of approximately 7.6 million STCs on 14 February 2022. However, STC creations since the beginning of 2022 have declined markedly. The average weekly creation rate over the first 8 weeks in 2022 (586,000 STCs) is the lowest since 2018, more than 30% below the same period in 2021 (853,000 STCs).

STC liability is acquitted quarterly with the first quarter 'front-loaded' at 35%. Hence, approximately 16.7 million certificates are required to be cancelled for the Q1 2022 assessment year on 28 April 2022. Based on the current creation rate, the Clean Energy Regulator anticipates that Q1 2022 supply and demand will be balanced shortly before 28 April. As the market needs liquidity to function, this means the STC Clearing House will see material use for the first time since 2017. The spot STC market price has been signalling this, running up from $39 at the end of 2021, to a peak of $39.65 in early March 2022.

The STC Clearing House

The Clearing House is the scheme mechanism to deal with insufficient liquidity at any point of time, because of the inherent difficulty of estimating rooftop solar capacity likely to be installed. Liable entities (primarily electricity retailers) can buy any number of Regulator created STCs at a fixed price of $40. The Clean Energy Regulator believes this could be in the order of 5 million in the run up to the Q1 liability acquittal date of 28 April. As installations and STC creations continue, sellers can sell STCs into the Clearing House also at the fixed price of $40. Over time, the Clean Energy Regulator buys and cancels the same number of STCs as the Regulator created certificates it has sold.

Whether or not the Clearing House remains in use beyond the Q1 liability period, will depend on whether installations and certificate creations remain low or pick up materially as discussed earlier in this section. Should there be a market deficit at the end of the year, it will be deducted from the 2023 estimate and reflected in the 2023 STP.

The small-scale technology percentage

The 2022 small-scale technology percentage (STP) has been set at 27.26%.

This means liable entities (generally electricity retailers) are required to surrender approximately 47.7 million STCs to meet their Small-scale Renewable Energy Scheme (SRES) obligations for 2022.

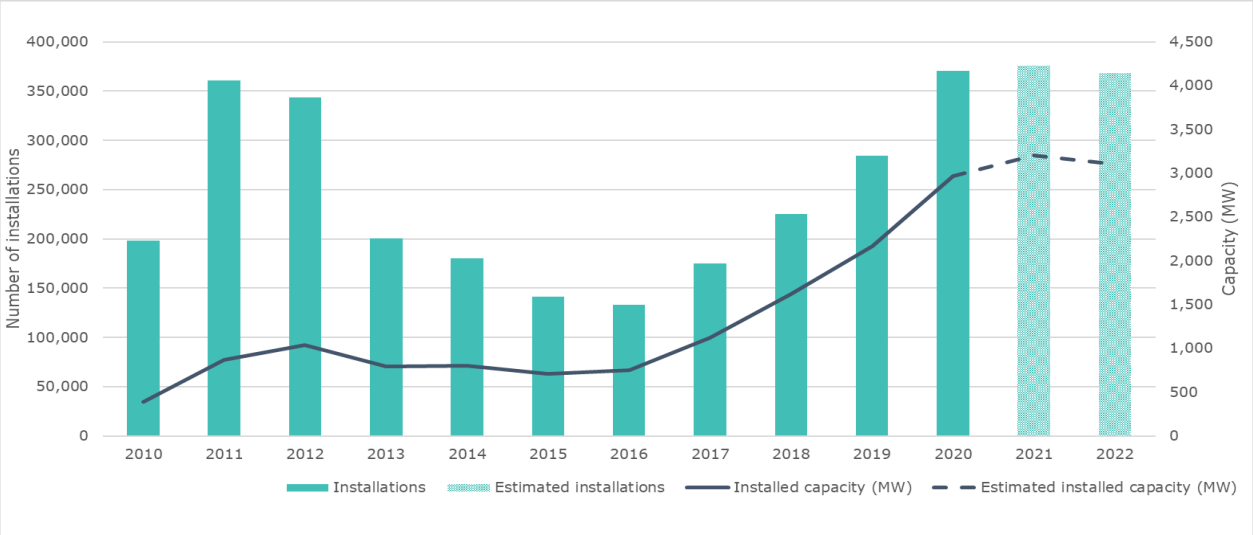
The Clean Energy Regulator will track certificate availability to meet STP demand and report on this throughout 2022.

3.2. Factors impacting supply

Solar PV and installations

Rooftop solar PV installation across Australia was 3.2 GW in 2021, slightly exceeding the Clean Energy Regulator's expectations of 3 GW (see Figure 3.2). The 3.2 GW capacity can generate an estimated 4.2 million MWh/year.

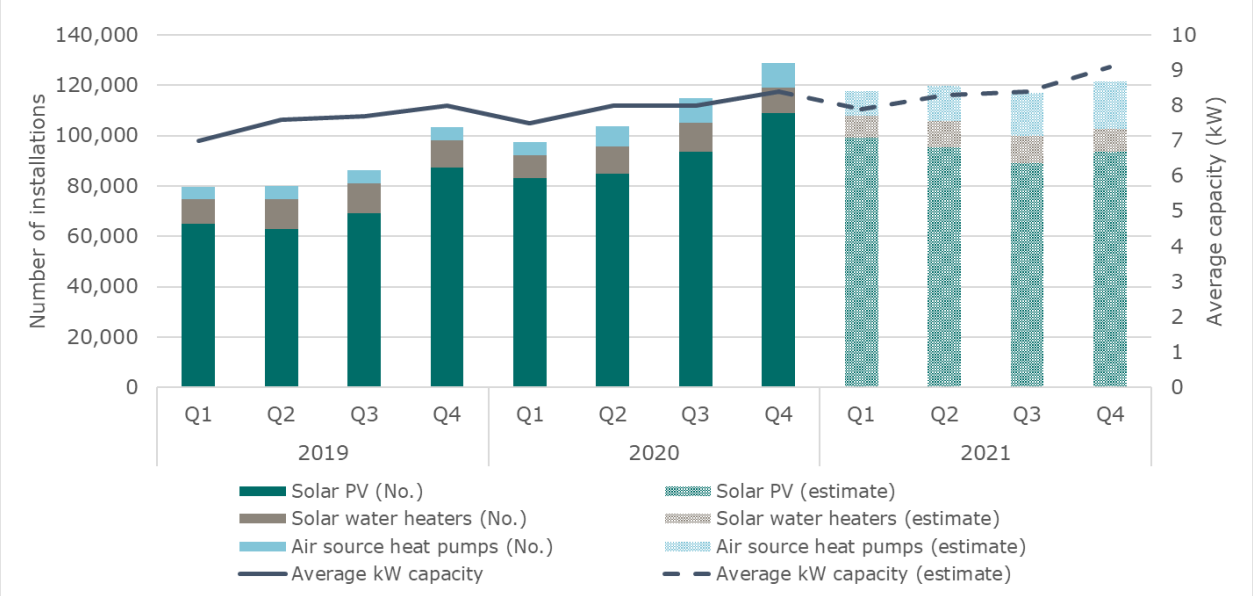
Figure 3.2: Small-scale solar PV installations and installed capacity (MW), 2010 to 2022



Q4 2021 saw an estimated 850 MW of capacity installed, the largest uptake in a single quarter in 2021. This trend is consistent over time, with installs increasing in Q4 each year as consumers and retailers look to take maximum advantage of the deeming period. The deeming period reduces on 1 January of each year. Supply of STCs in the market during Q4 2021 was moderate despite record installation – this is a scheme rule that allows certificates to be created within 12 months from when a system is installed. Certificates for the installs in Q4 2021 will be created throughout 2022.

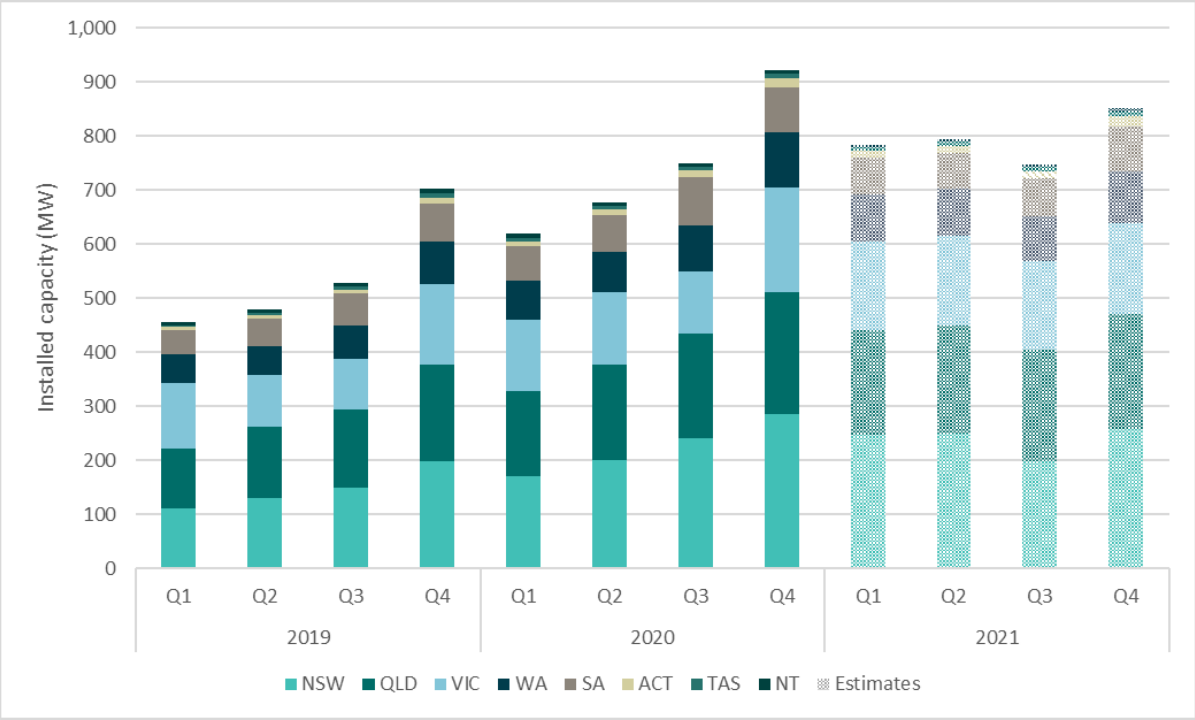
The estimated 850 MW capacity installed in Q4 2021 was 7% below the scheme record of 914 MW installed in Q4 2020. The 93,400 installations in Q4 2021 was 14% less than the 108,800 record in Q4 2020. The strong result for Q4 2021 is attributable to an increase in the average system size installed, up from 8.4 kW to 9.1 kW—the largest average system size on record (see Figure 3.3).

Figure 3.3: SRES installations and average installed system capacity (kW), Q1 2019 to Q4 2021



As shown in Figure 3.4, New South Wales led rooftop solar PV uptake for Q4 2021, followed by Queensland and Victoria. These three jurisdictions accounted for 75% of quarterly capacity installed, consistent with results observed in previous years.

Figure 3.4 Small-scale solar PV installed capacity by state (MW), Q1 2019 to Q4 2021



An estimated 13,069 concurrent battery installations occurred in 2021, a 38% increase on the 9,489 installations in 2020.[6] In comparison, concurrent battery installations grew by 11% in 2020 from 2019. While the growth rate has increased, the proportion of installation voluntarily reported with concurrent battery remains low at 3.4% for 2021. This is likely due to the capital cost of batteries being a barrier for uptake, despite incentives offered by some state and territory governments.

Rooftop solar PV generation

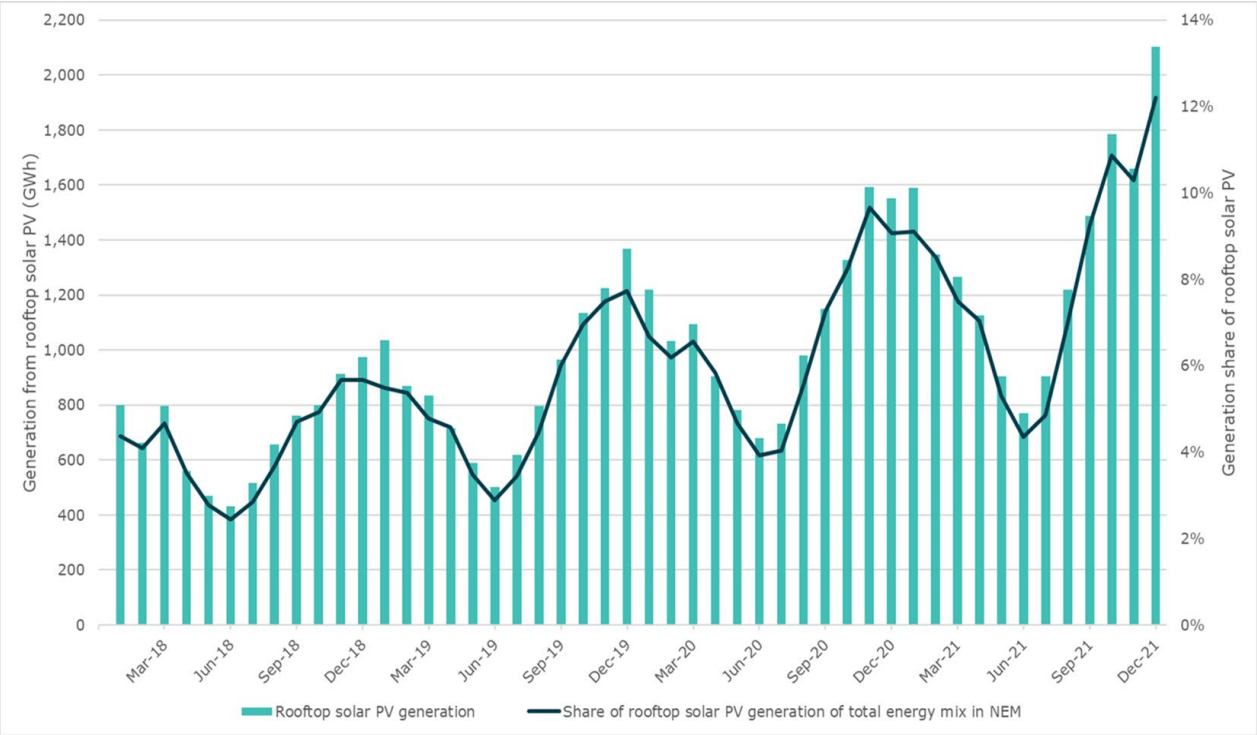
2021 has seen record generation for rooftop solar PV.[7] On 21 November, the combined output of rooftop solar and other small non-scheduled generators exceeded all the local customer load requirements in South Australia – the first gigawatt scale grid in the world to do so.[8]

Generation from rooftop solar PV systems typically peak during the November to January period, with the share of generation from rooftop solar PV following the same seasonal pattern (see Figure 3.5). In Q4 2021, rooftop solar generation accounted for 11% of NEM demand, the highest on record.

Generation from rooftop solar PV systems, as a share of total energy generation in the NEM, increased from an average 6% in 2020, to 8% in 2021.

[6] The Clean Energy Regulator's data only accounts for concurrent battery installations with solar PV system when voluntarily disclosed, it does not account for retrofit batteries into existing systems.
[7] Rooftop solar generation refers to the estimated total energy generated from rooftop solar PV. This includes generation used for self-consumption and generation exported to the grid.
[8] Rooftop solar helps send South Australia grid to zero demand in world first | RenewEconomy

Figure 3.5 Generation from rooftop solar PV and share of total generation (GWh), January 2018 to December 2021



Note: Data sourced from OpenNEM

Amendments to the Renewable Energy Electricity Regulations become law

In December 2021, the Renewable Energy (Electricity) Amendment (Small-scale Renewable Energy Scheme and Other Measures) Regulations 2021 was made into law. The amendments address the Australian Government's response to recommendations made in the Clean Energy Regulator's Integrity Review of the Rooftop Solar PV Sector published in 2021.

The new regulations will come into effect in 2022 and are expected to improve the integrity and accountability in the Small-scale Renewable Energy Scheme. Among the amendments are updated designer and installer written statements, new requirements for retailer written statements, changes to the eligibility of components, and provision for the Clean Energy Regulator to disqualify installers, retailers and components from participating in the Small-scale Renewable Energy Scheme.

For further information on the amendments see Renewable Energy (Electricity) Amendment (Small-Scale Renewable Energy Scheme Reforms and Other Measures) Regulations 2021.

Solar water heaters and air source heat pump installations

Air source heat pump installations continue to grow strongly with 18,800 installations in Q4 2021, compared to 9,800 installations in Q4 2020. Conversely, solar water heater installations in Q4 2021 decreased by 8%, compared to Q4 2020.

Solar water heater and air source heat pump installations increased by over 33%, from 74,400 installations in 2020 to 99,100 installations in 2021. Air source heat pumps comprised 61% of energy efficient systems in the SRES, up from 44% in 2020.

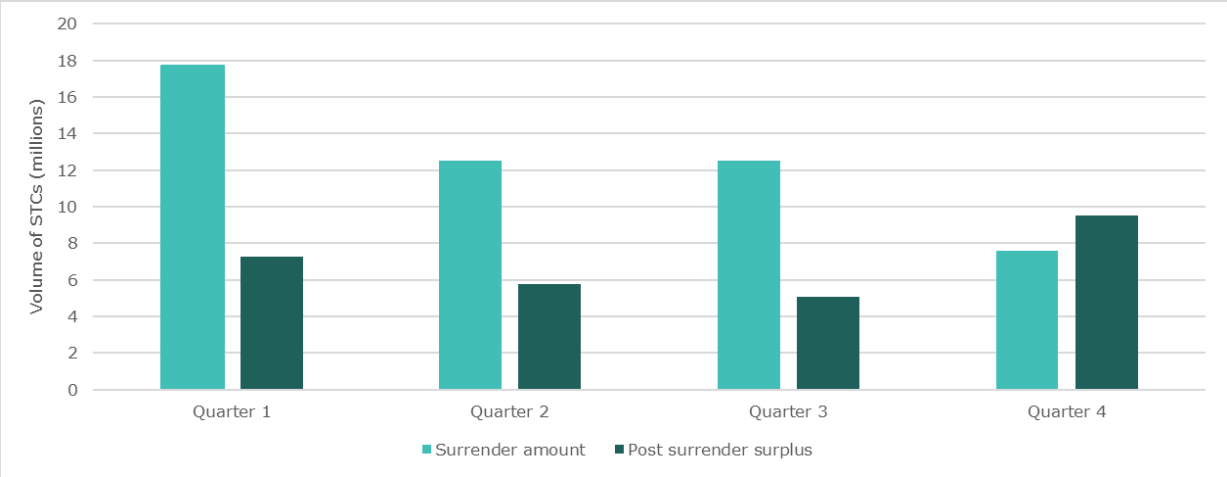
The significant increase in air source heat pump installations may be attributable to lower costs than solar water heaters, compatibility with rooftop solar PV and a shift away from traditional electric or gas water heaters.

3.3. Factors impacting demand

Quarterly surrender

A total of 134 liable entities met their obligations on 14 February 2022 with 7.6 million STCs surrendered. This was the final surrender period for the 2021 assessment year, representing 15% of total liability. The compliance rate for Q4 2021 was over 100%, leaving a balance of 9.5 million STCs (see Figure 3.6).

Figure 3.6: STC surplus after quarterly surrender, 2021



Market trading

In 2021, the STC spot price remained stable increasing by just 2.6%. Since 2019, the STC spot price has broadly trended up, rising from $36.60 in January 2019 to finish 2021 at $39, an increase of 6.5% (see Figure 3.7).

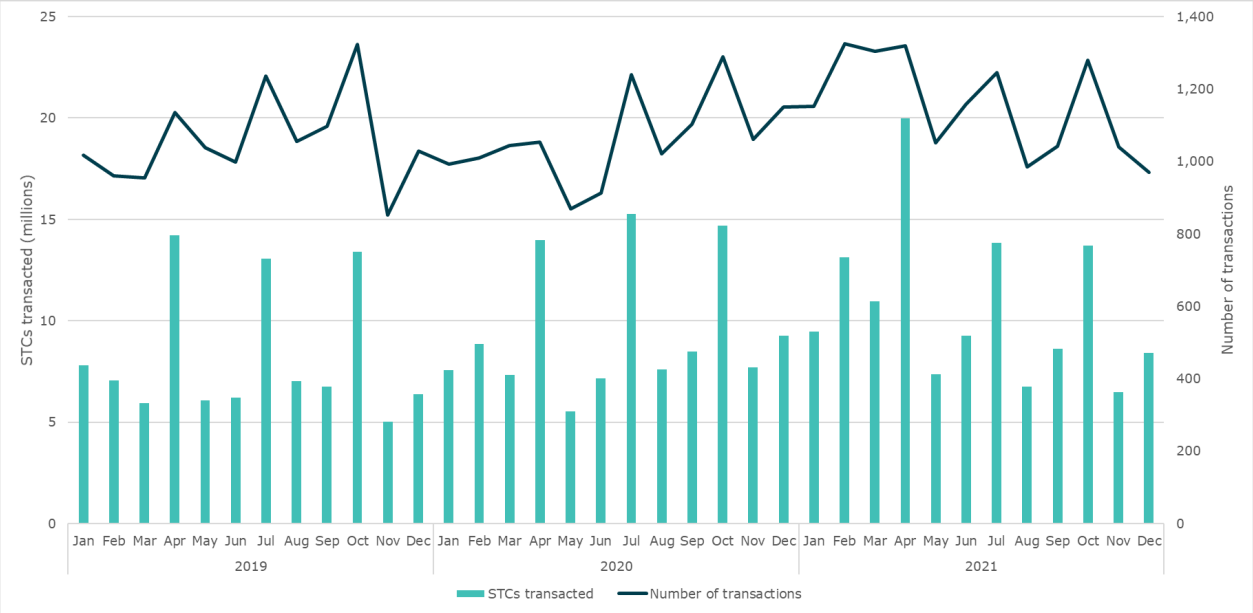
Since 1 January 2022, the STC spot price has continued to increase, closing at $39.60 in late February. The run up in price suggests the market is anticipating some shortfall in supply ahead of the April surrender.

Figure 3.7: STC spot and clearing house prices, January 2019 to December 2021

A total of 128 million STCs were transacted through 13,874 transactions in 2021, up 13% on transaction volume and 9% on the number of transactions from 2020.

During Q4 2021, 28.6 million STCs were transacted through 3,289 transactions, with an average transaction size of 8,703 STCs (see Figure 3.8).

Figure 3.8: STC market transactions, January 2019 to December 2021



3.4. Key dates

Date	Event	Significance
29 October 2021 to 14 February 2022	Q4 2021 surrender period	A liable entity must surrender 15% of liability for the year in the REC Registry for this quarter. STC surrender liability for the fourth quarter of an assessment year must be made with the liable entity's energy acquisition statement for the year.
16 February 2022 to 28 April 2022	Q1 2022 surrender period	A liable entity must surrender 35% of liability for the year in the REC Registry for this quarter.
31 December 2022	Application for liable entity required surrender amount due	The final date for liable entities to apply to set their required surrender amount for quarters 1 to 3 where no energy acquisition statement was lodged by 1 April of the assessment year.

4. Emissions reduction

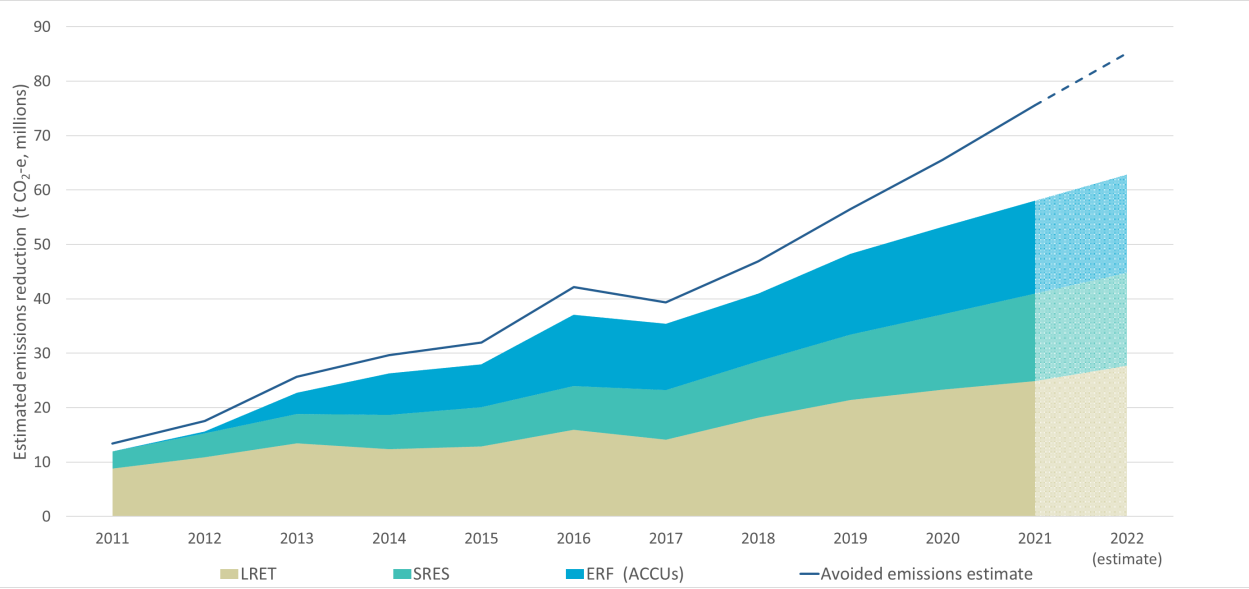
Emissions reduction from the schemes administered by the Clean Energy Regulator issued units and certificates equivalent to 58 million tonnes of CO_2-e in 2021 (see Figure 4.1). This is an increase of 9% compared to 53.2 million tonnes of emissions reduction in 2020.

16.1 million tonnes came from the SRES and 24.9 million tonnes from the LRET, up 16% and 7% respectively from 2020. The ERF delivered ACCUs representing a further 17 million tonnes of emissions reduction in 2021, a 6% increase from 2020.

The Clean Energy Regulator's estimate for scheme-based emissions reductions in 2022 is 62.8 million tonnes of CO_2-e, an increase of 8% on 2021 (see Figure 4.1).

The Clean Energy Regulator's estimation methodology for emissions reduction from renewable energy has assumed a sharp decline in emissions intensity factor of the grid for 2021. Based on a trend projection using historical data, the average NEM grid emissions intensity factor is estimated to fall from 0.6611 in 2021 to 0.6292 in 2022. The NEM is used as a proximation for the national emissions intensity.

Figure: 4.1 Estimated emissions reduction from ERF and RET (t CO_2-e, millions), 2011 to 2022*



* Based on carbon content of LRET, SRES and ERF schemes using average emissions intensity.

For 2022, approximately 27.5 million tonnes of emissions reductions is estimated to come from the LRET, the SRES is expected to deliver 17.1 million tonnes and a further 18 million tonnes of emissions reduction from the ERF. As highlighted in Chapter 1, ERF issuances is estimated to increase in 2022 with several projects expected to be credited for the first time, and an increasing generation under the LRET will help drive emissions reductions further (see Chapter 2). The SRES will also see material increases in generation, further increasing the emissions reductions for the year.

Emissions reductions using thermal displacement

Emissions reductions in 2021 could be as high as 75.6 million tonnes of CO_2-e using an approach based on the displacement of thermal generation through the LRET and SRES schemes.

The September 2021 Quarterly Carbon Market Report provides a methodological overview of the emissions reduction estimates based on (a) average emissions intensity and (b) displaced thermal

generation. It highlights that the estimate of emissions reductions using thermal displacement are higher, because electricity generated from displaced thermal fuel sources (primarily coal and gas) has a higher emissions intensity than electricity from the current generation mix in the NEM. The recent announcement by Origin Energy to bring forward the planned closure of the Eraring coal-fired power station to 2025 will reduce emission intensity of the electricity grid even further.

The 2022 estimate using the displacement method is 85.8 million tonnes of CO_2-e.

Table 4.1 shows the difference between the two estimation methods when they are applied to the 2021 estimate. By either estimation method, renewables generation is forecast to achieve record emissions reduction in 2021.

Table 4.1 Emissions reduction for 2021

2021 Emissions Reduction by scheme (million tonnes CO_2-e)	'carbon content' estimate	'avoided emissions' estimate (thermal displacement)*
LRET	24.9	35.6
SRES	16.1	22.9
ERF	17.0	17.0
Total	**58.0**	**75.6**

* Estimates includes sequestration buffers

Increased rate of renewable energy penetration is resulting in the overall emissions intensity of the grid to decline rapidly, with recent coal-fired power stations announcements of early closures set to escalate this further. This will progressively yield a larger difference between the two methodologies.

Glossary

Term	Meaning
Australian carbon credit unit (ACCU)	One Australian carbon credit unit represents one tonne of verified carbon dioxide equivalent abatement. ACCUs are created from eligible offsets projects and issued by the Clean Energy Regulator in accordance with section 147 of the *Carbon Credits (Carbon Farming Initiative) Act 2011* **(CFI Act)**. Transactions of ACCUs occur through the Australian National Registry of Emissions Units (ANREU).
Australian National Registry of Emissions Units (ANREU)	The registry in which all transactions of Australian carbon credit units takes place. A seller must have an ANREU account to participate in the Emissions Reduction Fund.
Baseline	The baseline is the reference point against which an entity's emissions or electricity generation can be measured. A power station which generates renewable energy in excess of their baseline can earn large-scale generation certificates under the Renewable Energy (Electricity) Regulations 2001. An entity with obligations under the safeguard mechanism must keep its net emissions at or below its baseline.
Cal prices	This is the forward trade price for large-scale generation certificates traded for the calendar year it is referring to. For example, Cal24 is the calendar year 2024.
Carbon abatement	Carbon abatement refers to a reduction in atmospheric carbon dioxide through emissions avoidance or carbon sequestration.
Certificate spot price	Certificate spot price refers to the secondary market price for small-scale technology certificates, large-scale generation certificates and ACCUs.
Committed projects	Committed projects refers to large-scale renewable energy projects that have received all development approvals and reached a final investment decision.
Emissions avoidance	Emissions avoidance refers to projects that generate abatement by reducing or avoiding greenhouse gas emissions which would otherwise have occurred. For example, savanna fire management may reduce carbon dioxide emissions by reducing the frequency and extent of late dry season fires. Capturing and flaring landfill gases converts methane to carbon dioxide, which has lower global warming potential than methane.
Emissions Reduction Fund (ERF)	The Emissions Reduction Fund is a scheme where the Government purchases the lowest cost abatement (in the form of Australian carbon credit units) from a wide range of sources, providing an incentive to businesses, households and landowners to proactively reduce their emissions.
Greenhouse gas emissions	Greenhouse gas emissions are gases which trap heat in the atmosphere, such as carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). Greenhouse gas emissions are measured as tonnes of carbon dioxide equivalence (CO_2-e). This means that the amount of a greenhouse gas that a business emits is measured as an equivalent amount of carbon dioxide, which has a global warming potential of one.

GreenPower	GreenPower is the only voluntary government accredited program for renewable energy in Australia. A joint initiative of the governments of the Australian Capital Territory, New South Wales, South Australia, Victoria and Tasmania, GreenPower guarantees that any GreenPower-accredited energy sold by Australian energy retailers is renewably sourced.
National Greenhouse and Energy Reporting Scheme (NGER)	The National Greenhouse and Energy Reporting scheme is a single, national framework for corporations to report on greenhouse gas emissions, energy use and energy production.
Optional delivery contract	An optional delivery contract is an agreement that gives proponents the right, but not the obligation, to sell up to a nominated quantity of ACCUs to the Commonwealth at a fixed price. Under optional delivery contracts, the Clean Energy Regulator is essentially underpinning the project with project proponents retaining the flexibility to sell ACCUs on the secondary market.
Project proponent	A project proponent is an individual, a collective of individuals or an organisation with the legal responsibility for running a project under the ERF. This means they will hold the legal right to the project and will be issued any ACCUs created from project activities.
Safeguard Surrender	Safeguard surrender is the statutory obligation to surrender carbon units above an entity's baseline.
Secondary market	The secondary market consists of financial institutions, traders, agents and installers, parties that are involved in the buying and selling of renewable energy certificates or ACCUs between private entities. For example, the price of an ACCU on the secondary market is the price at which private entities agree to trade ACCUs. While the Clean Energy Regulator does not intervene in the secondary market, the Clean Energy Regulator's Renewable Energy Certificate Registry facilitates transactions between parties.
Scope 2 emissions	Scope 2 emissions are greenhouse gas emissions released into the atmosphere as a result of a facility's energy consumption. For example, if a facility is powered by coal combusted at a power station, the facility's scope 2 emissions would include the gases emitted from that coal combustion. The facility's scope 2 emissions are therefore the power station's scope 1 emissions. Scope 2 emissions, sometimes referred to as indirect emissions, must be reported under National Greenhouse and Energy Reporting legislation.
Sequestration	Sequestration refers to the capture and storage of carbon dioxide. It typically refers to the absorption of carbon by ecosystems, including oceans, soils and vegetation.
Small-scale technology certificate	A renewable energy certificate created by the owner of a small-scale system, or their installer, for the electricity generated or displaced by that system. While the number of certificates that can be created per system is based on several factors, including its geographical location, installation date, and other factors, one certificate is typically equal to one megawatt hour of eligible renewable electricity.

List of acronyms and abbreviations

Abbreviation	Term
ACCU	Australian carbon credit unit
AEMO	Australian Energy Market Operator
ANREU	Australian National Registry of Emissions Units
CERT	Corporate Emissions Reduction Transparency
ERF	Emissions Reduction Fund
ESC	Energy saving certificate
EUA	European Union allowance unit
FID	Final Investment Decision
GW	Gigawatt
LGC	Large-scale generation certificate
LRET	Large-scale Renewable Energy Target
MW	Megawatt
NEM	National Electricity Market
NGER	National Greenhouse and Energy Reporting Act 2007
REC Registry	Renewable Energy Certificate Registry
RPP	Renewable Power Percentage
RET	Renewable Energy Target
SRES	Small-scale Renewable Energy Scheme
STC	Small-scale technology certificate
STP	Small-scale technology percentage
VEEC	Victorian energy efficiency certificate