Australian Government
Clean Energy Regulator

CLEAN ENERGY REGULATOR

# Quarterly Carbon Market Report

March Quarter 2021

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# 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 the Clean Energy Regulator administers for the March Quarter 2021 (January 2021 to March 2021) and provides information on supply and demand trends and opportunities to inform market decisions.

# 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 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 your own independent professional advice in light of your particular circumstances on the state of these markets before making any investment decisions. 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, the information provided through Quarterly Carbon Market report, or the availability or non-availability of the Quarterly Carbon Market report.

**Version history**

| Version | Date | Changes |
|---|---|---|
| 1.00 | 21 June 2021 | |

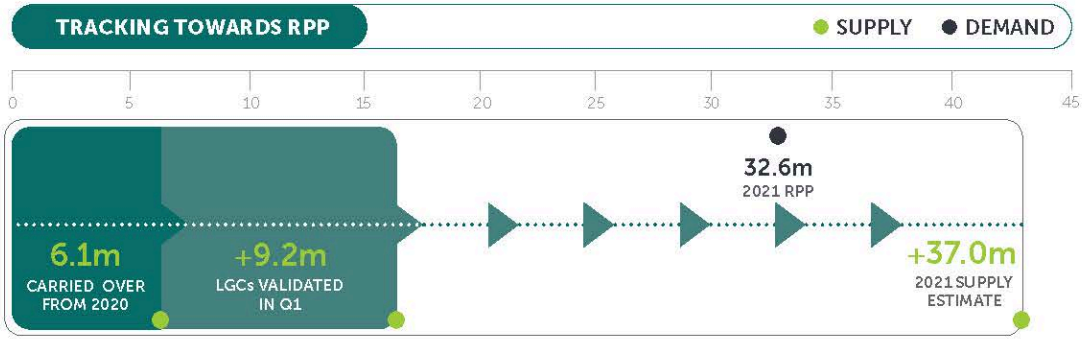
Australian Government
Clean Energy Regulator

# 2021 Q1 MARKET OUTCOMES AND TRACKING AGAINST ESTIMATES

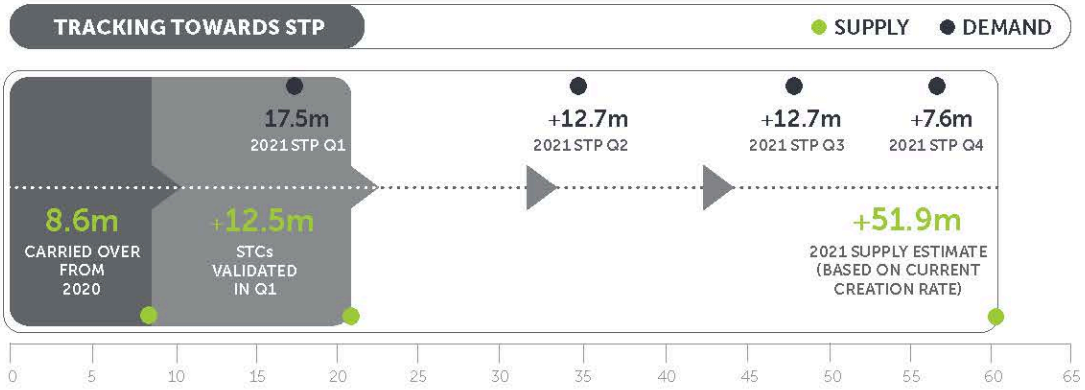
## MARKET OUTCOMES

| | 2021 Q1 RESULT | CHANGE FROM 2020 Q1 | 2021 ESTIMATE | TRACKING TOWARDS 2021 ESTIMATE |
|---|---|---|---|---|
| ACCUs issued | 3.1m | 14% ↓ | 17m | ✓ |
| Renewable capacity installed - LRET | 165 MW | 76% ↓ | 2-2.5 GW | ✓ |
| Renewable capacity installed - SRES | 792 MW | 28% ↑ | 3-4 GW | ✓ |

## TRACKING TOWARDS RPP




## TRACKING TOWARDS STP




## VOLUNTARY AMBITION

| | 2021 Q1 RESULT | CHANGE FROM 2020 Q1 | 2021 ESTIMATE | TRACKING TOWARDS 2021 ESTIMATE |
|---|---|---|---|---|
| Voluntary surrender - ACCU | 174,000 | 52% ↑ | 1,000,000 | ✓ |
| Voluntary surrender - LGC | 358,000 | 33% ↑ | 5,000,000 | ✓ |
| Voluntary surrender - CERs | 1.8 million | 125% ↑ | | |

## LIST OF ACRONYMS

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

# Executive summary

Results from Quarter 1 2021 confirmed that carbon markets are on track for a growth year in 2021, consistent with the expectations published in the December Quarter 2020 Quarterly Carbon Market report.

The Large-scale Renewable Energy Target of 33,000 gigawatt hours (GWh) was met at the end of January 2021 with eligible generation from 1 February 2020 to 31 January 2021 reaching an estimated 33,100 GWh.

The schemes administered by the Clean Energy Regulator are expected to reduce carbon dioxide equivalent ($CO_2$-e) emissions by 57 million tonnes in 2021, up 7% from the 53 million tonnes delivered in 2020. This is considered a conservative estimate as, for additional renewable energy, it is estimated using the average emissions intensity of the grid which is falling rapidly. An alternative estimate would use the weighted average emissions intensity of the thermal generation displaced by additional renewable energy. Preliminary analysis shows this could result in a higher emissions reduction estimate of circa 75 million tonnes.[1] See Chapter 5 for more information.

At the end of the quarter, there were 118 power station accreditation applications on hand with a combined capacity of 875 MW. While no major large-scale renewable energy project reached financial close in Quarter 1 2021, probable projects (projects backed by a power purchase agreement but yet to reach financial close) continued to grow to 3.7 gigawatts (GW) – the highest level ever tracked by the Clean Energy Regulator. PPAs are clear evidence of commercial drivers and have been a good lead indicator of financial close announcements.

Hence, the Clean Energy Regulator maintains an expectation of between 2 and 3 GW of large-scale renewables capacity reaching financial close in 2021. This is a similar level to 2020. The downside risk to this range is the difficulty, time and costs in getting connection approvals which may delay projects reaching financial close.

These matters are further discussed in Chapter 2. The Clean Energy Regulator will continue to monitor and report on investments in future reports.

In Quarter 1 2021, the supply of small-scale technology certificates (STCs) and large-scale generation certificates (LGCs) hit record levels, up 14% and 24% respectively on Quarter 1 2020.

Quarter 1 2021 saw 44 projects registered under the Emissions Reduction Fund (ERF), the largest Quarter 1 result in the scheme. This follows the record quarterly supply of Australian carbon credit units (ACCUs) of 5.2 million in Quarter 4 2020. ACCU supply in Quarter 1 was 3.1 million, down 14% on Quarter 1 2020, however claims for a further 2.5 million ACCUs were under assessment at the end of the quarter. Total supply for the 2021 calendar year remains on track to reach 17 million, up from 16 million in 2020.

Private demand for ACCUs and LGCs also showed strong growth with the highest Quarter 1 surrenders on record, up 39% compared with Quarter 1 2020. Climate Active demand accounted for 67% of ACCU cancellations from across the economy with the air transport sector particularly active this Quarter. Demand from corporates with commitments to use renewable energy increased LGC surrenders.

## Emissions Reduction Fund (ERF) Auction 12 contracted solid volume

Auction 12, held on 12 and 13 April 2021, contracted 6.8 million tonnes of forward carbon abatement from 10 contracts at an average price of $15.99 per tonne, for a total commitment of $108 million.

Optional delivery contracts dominated at Auction 12, accounting for 98% of the

[1] Using the weighted average emissions intensity of displaced coal and gas generation in the National Electricity Market (NEM) could result in significantly higher emissions reductions. A preliminary estimate by the Clean Energy Regulator, assuming 1 megawatt-hour (MWh) of additional renewable generation displaces 1 MWh of non-renewable generation, predicts a reduction of over 70 million tonnes of $CO_2$-e in 2021. This estimate is calculated from Quarter 1 2021 generation and emissions data sourced from OpenNEM.

contracted volume.[2] The average price paid for the optional delivery contract was $15.97, an increase of 14% from the price at Auction 11. More detail can be found in Chapter 1.

## Strong trading in the ACCU market

The ACCU market saw the highest trading activity on record with 1.6 million ACCUs transacted through 97 transactions.[3] This is a significant increase in both the volume of units and number of transactions from Quarter 1 2020 (950,000 ACCUs transacted through 60 transactions).

This is positive evidence of an increasingly vibrant carbon market owing to ACCU demand from sources other than demand to meet contract deliveries from the Clean Energy Regulator's auctions.

## LGC market supply and demand to remain tight

LGC supply grew in Quarter 1 2021 with 9.2 million, up 24% on Quarter 1 2020. Supply remains on track to exceed the minimum 37 million LGCs expected at the start of 2021.

However, the market for LGCs is expected to remain tight through to 2023 as 16 million LGCs are needed to redeem $1 billion in shortfall revenue under the 3-year rule and voluntary demand continues to ramp up.[4]

More details are available in Chapter 2.

## Australia leads world in renewables investment

Following the Clean Energy Regulator's announcement of a record 7 GW of renewables capacity added in 2020, the International Renewable Energy Agency (IRENA) confirmed Australia's position as a world leader in the deployment of renewables.[5] IRENA's Renewable Capacity Statistics 2021 report indicates that, in total across 2018, 2019 and 2020, Australia has added the highest wind and solar capacity per capita of any developed nation at 578 watts per person. For wind and solar investment in 2020 alone, Australia added 260 watts per person, the second highest per capita capacity and fourth overall[6] for total capacity added. [7]

## Rooftop solar continues to grow

Quarter 1 2021 saw continued growth in rooftop solar with an estimated 792 MW installed, up 28% on Quarter 1 2020.

Given the strong Quarter 1 result, the Clean Energy Regulator now expects between 3.5 and 4 GW of rooftop solar capacity to be added in 2021 under the Small-scale Renewable Energy Scheme (SRES).[8]

Combined with an additional 300 to 325 MW of mid-scale rooftop capacity in the Large-scale Renewable Energy Target (LRET), the total capacity of rooftop solar could exceed 4 GW in 2021.

During the quarter, there was increased attention on the ability of the network to accommodate continued high levels of rooftop

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[2] 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 these, the Clean Energy Regulator is essentially underpinning the project proceeding with the project proponent able to find alternative buyers or sell to the Regulator.

[3] The Clean Energy Regulator tracks transactions between unrelated parties (not part of the same corporate entity) in the Australian National Registry of Emissions Units (ANREU). This may result in a higher number of transactions if an ACCU is transferred through multiple parties before being surrendered. However, consistently measuring this gives a good indication of the level of trading activity in the market. Full data and methodology can be found in Chapter 1. This data excludes transactions to surrender units against contracts under the ERF.

[4] There is a commercial incentive for Renewable Energy Target (RET) liable entities to redeem shortfall charges within the allowable period as (a) the shortfall charge of $65 per certificate is not tax effective and (b) spot LGC prices are approximately $33 and redeeming shortfall charge is tax effective. For more information see the Clean Energy Regulator's website.

[5] For more information see the December Quarter 2020 Quarterly Carbon Market report.

[6] Behind China, the United States and Vietnam.

[7] The watts per capita analysis is calculated using global population statistics sourced from CIA World Factbook.

[8] In the December Quarter 2020 Quarterly Carbon Market report, the estimated range for rooftop solar photovoltaic (PV) capacity was 3 to 4 GW.

solar photovoltaic (PV) uptake as this is leading to record low levels of minimum demand.[9]

In response to these concerns, a number of new initiatives were implemented or proposed by the AEMC and state governments.

These are discussed in more detail in Chapter 3 on STCs.

Supply of STCs in Quarter 1 2021 was 12.5 million certificates, up 14% on Quarter 1 2020. A surplus of at least 9.3 million certificates is now expected at the end of the 2021 compliance year.

## Solid growth in voluntary use of ACCUs and LGCs

Total voluntary private and state and territory demand for LGCs and ACCUs grew from 384,000 units and certificates in Quarter 1 2020 to 532,000 units and certificates in Quarter 1 2021.

- 358,000 LGCs were voluntarily surrendered in Quarter 1 2021, up 33% on Quarter 1 2020.
- 174,000 ACCUs were voluntarily cancelled in Quarter 1 2021, up 52% on Quarter 1 2020.

Announcements of corporate commitments to reduce emissions continued in Quarter 1 2021 with supermarket giant Coles Group committing to net-zero emissions by 2050. Along with Woolworths Group and ALDI Australia, all large supermarket chains in Australia now have an emissions reduction target. More information on their respective targets and mitigation strategies can be found in Chapter 4.

To support growth in the carbon market and streamline voluntary private sector action to reduce emissions, the Clean Energy Regulator is seeking a partner or partners to facilitate the emergence of an exchange traded market for carbon offset units. An expression of interest was published on AusTender in April 2021.

The Clean Energy Regulator is co-designing with industry the pilot of the Corporate Emissions Reduction Transparency report (CERT) for National Greenhouse and Energy Reporters. The CERT guidelines to opt into the pilot are anticipated to be available towards the end of 2021.

## Unit and certificate prices

The combination of increased trading and high levels of private demand saw ACCU spot prices increase to, and maintain, a new high of $18.50 from mid-February to the end of the quarter, up from $16.55 at the end of Quarter 4 2020.

STC spot prices were higher at the close of Quarter 1 at $38.85, an increase of $0.85 compared to the Quarter 4 2020 closing price of $38.00. Prices increased to $39.40 following the announcement of the 2021 STP on 3 March 2021, before falling as the market saw increased STC supply and a likely strong surplus of STCs for the full year at a similar level to 2020.

The LGC spot price decreased from $40.00 at end of Quarter 4 2020 to $33.25 at end of Quarter 1 2021. A decline in price is typical following the end of the compliance year on 14 February (see Table ES.1).

The Clean Energy Regulator will continue to monitor price trends during the year given the supply and demand factors discussed earlier in this Executive Summary.

Table ES.1 Price trend, Q1 2021

| Certificate type | Spot price AUD (31 March 2021)[10] | Quarterly trend |
|---|---|---|
| ACCU | $18.50 | +$1.95 |
| LGC | $33.25 | -$6.75 |
| STC | $38.85 | +$0.85 |

[9] Both low voltage distribution networks and the high voltage transmission networks.
[10] Data sourced from Jarden and TFS Green.

# 1. Australian carbon credit units

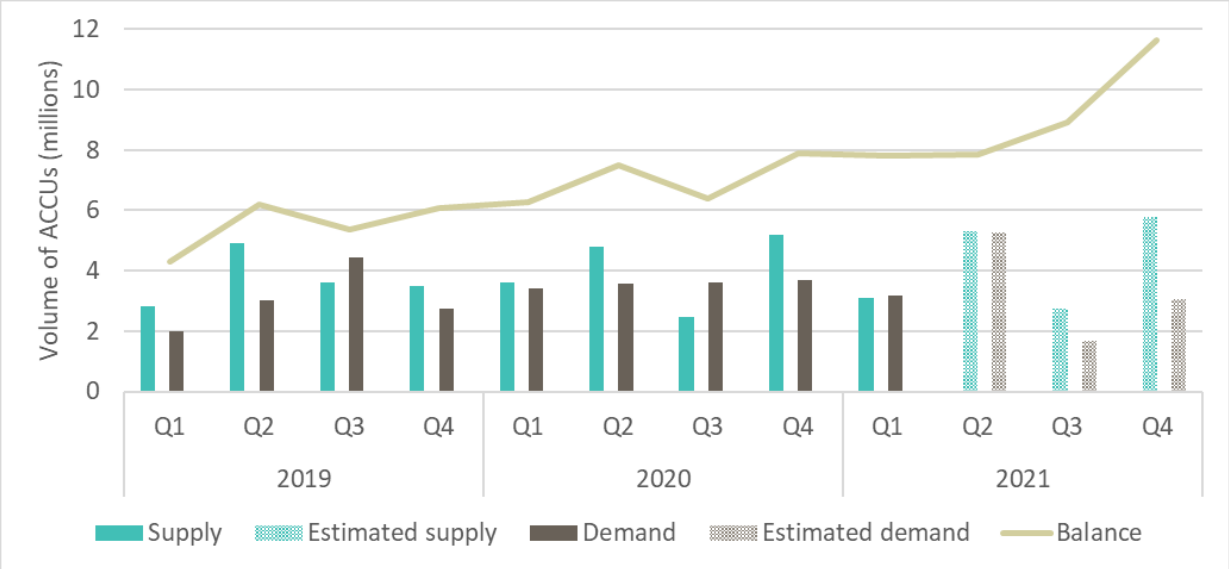
- ERF Auction 12 secured 6.8 million tonnes of forward carbon abatement from 10 contracts and 10 projects at an average price of $15.99 per tonne, for a total commitment of $108 million.
  - Orica secured a contract for 3.4 million ACCUs to improve the emissions intensity of its operations – the first contract awarded for a project under the facilities method.
  - Optional delivery contracts were preferred to fixed delivery contracts, with 6.6 million tonnes of abatement committed from 9 contracts.
- 44 new projects were registered in the quarter, potentially delivering up to 13 million tonnes of abatement over their project lifetime.
- Safeguard demand for the 2019–20 compliance year (88,325 ACCUs) was higher than for 2018-19 (58,731 ACCUs).
- Spot prices increased from $16.55 at the end of Quarter 4 2020 to $18.50 at the end of Quarter 1 2021.

## 1.1. Supply and demand balance

Quarter 1 2021 saw ACCU supply increase by 3.1 million units while demand from ERF contract deliveries, safeguard surrender and voluntary surrender was similar at 3.2 million ACCUs (see Figure 1.1).

As a result, the balance of ACCUs held in the Australian National Registry of Emissions Units (ANREU) decreased slightly to 7.8 million at the end of the quarter (see Table 1.1).[11]

Figure 1.1 ACCU supply and demand balance (millions), Q1 2019 to Q4 2021



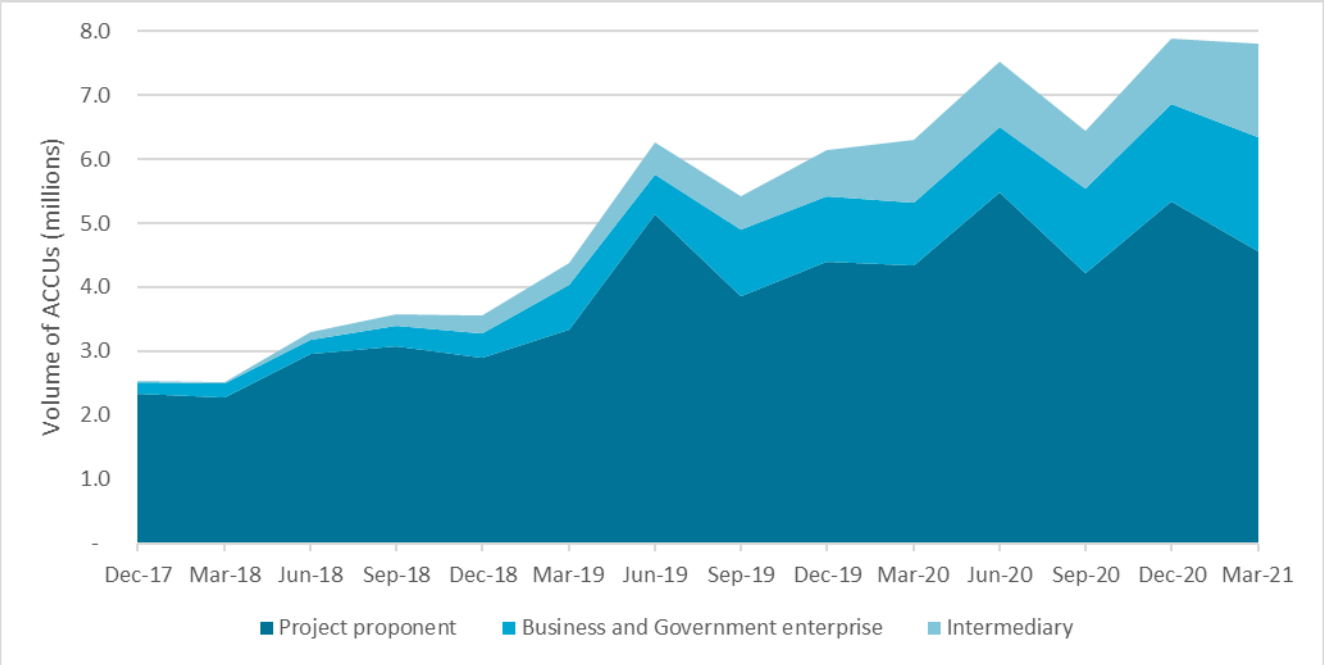

[11] The 7.8 million ACCUs available in ANREU accounts may not be available for sale as a portion of these ACCUs may be held or banked for future needs (e.g. for delivery under contract, future safeguard mechanism liability or voluntary cancellation).

Table 1.1 Balance of supply and demand at Quarter 1 2021 close[12]

| | |
|---|---|
| **Balance/supply of ACCUs from Quarter 4 2020** | **7,882,590** |
| **ACCUs issued Quarter 1 2021** | 3,107,328 |
| **Emissions Reduction Fund contract deliveries** | -2,925,362 |
| **Safeguard surrender[13]** | -88,325 |
| **Voluntary surrender** | -174,489 |
| **ACCU relinquishment[14]** | 0 |
| **Net balance at the end of Quarter 1 2021** | **7,801,742** |

ACCUs held in ANREU accounts by the category 'project proponent' decreased by 0.8 million as project proponents delivered against ERF contracts or transferred units to other entities (see Figure 1.2).[15] Holdings by 'business and government enterprises' increased by 0.5 million reaching a new peak of 1.8 million ACCUs, likely accumulated to meet future safeguard and voluntary demand. Holdings by the 'intermediary' group increased by 0.3 million and reached a peak of 1.5 million ACCUs – a sign of increasing liquidity in the market.

Figure 1.2 Breakdown of ACCU holdings by market participation (millions), Q1 2018 to Q1 2021[16]




[12] Within a specified period, supply of ACCUs refers to ACCUs issued. Demand of ACCUs incorporates three sources including Commonwealth ERF contract deliveries, safeguard mechanism surrenders and state and territory and private sector voluntary cancellation.
[13] Safeguard mechanism surrender does not include deemed surrender. A 'deemed surrender' 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.
[14] For more information see ACCU relinquishments.
[15] 'Project proponents' refer to accounts where the account holder is connected to one or multiple ERF projects. 'Business and government enterprise' refer to accounts where the account holders do not have direct link to ERF projects, and include safeguard entities, voluntary participants, local government entities that are accumulating for voluntary or compliance purposes. 'Intermediary' refer to accounts where account holder's primary operation is to facilitate trading of units between the supply and demand sides of the market.
[16] Data is accurate as at last day of the quarter.

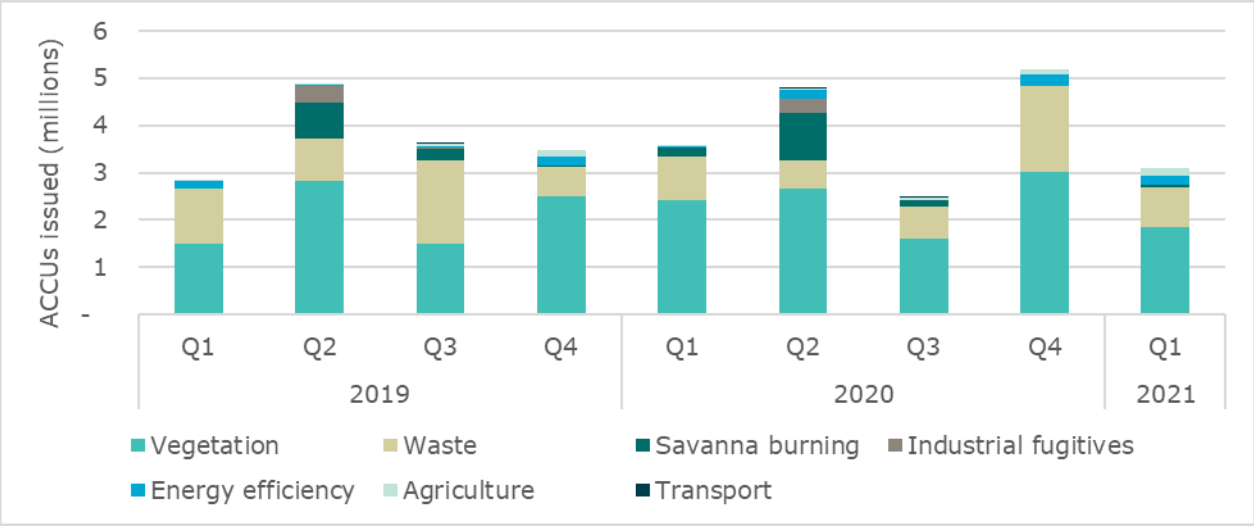
## 1.2. Factors impacting supply

### Crediting

Following a record quarterly supply of 5.2 million ACCUs in Quarter 4 2020, supply in Quarter 1 2021 moderated to 3.1 million ACCUs. This was 14% lower than ACCU supply in Quarter 1 2020, however a further 2.5 million ACCUs were under assessment at the end of the quarter. Supply for 2021 remains on track to reach 17 million units.

Vegetation and waste projects continued to dominate ACCU supply with 59% and 27% of total units issued in the quarter respectively (see Figure 1.3).

Figure 1.3: ACCUs issued per method type (millions), Q1 2019 to Q1 2021




Quarter 1 2021 saw 15 projects credited for the first time contributing 570,000 ACCUs to supply, most of which came from Western Australian Human-Induced Regeneration projects.

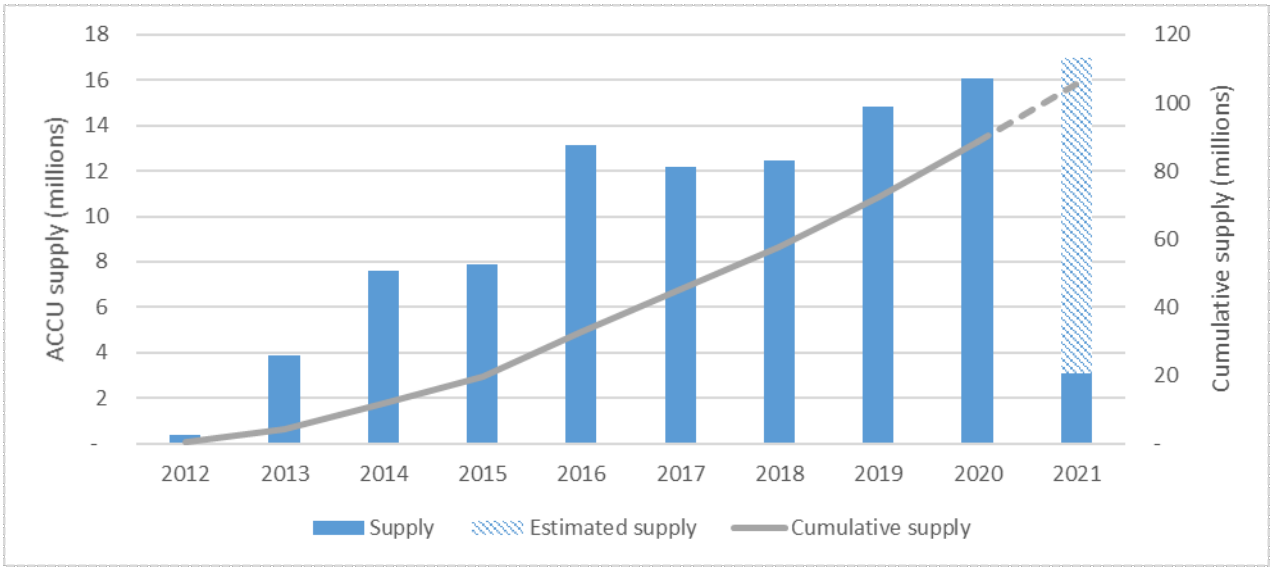
During the quarter, total issuances under the scheme passed 90 million ACCUs. Since 2018, ACCU supply has increased year on year at an average rate of 10% (see Figure 1.4). This rate is expected to continue as the current pipeline of projects (see Table 1.2) enter their crediting phase and additional supply sources are realised from new and existing methods. Supply from these projects is expected to support the growing voluntary demand for ACCUs and assist with market liquidity. More information on voluntary participation is available in Chapter 4.

Table 1.2 Crediting status of projects as at end of Q1 2021

| Crediting status | No. of projects |
|---|---|
| Projects generating ACCUs | 520 |
| Projects yet to receive ACCUs[17] | 442 |
| Conditionally registered | 323 |
| Unconditionally registered | 119 |

[17] Projects generally take one to two years from when they are registered before they are issued their first ACCUs. Once projects are registered, they have a crediting period between 7 to 25 years depending on the method.

Figure 1.4 Annual ACCU issuances, 2012 to 2021

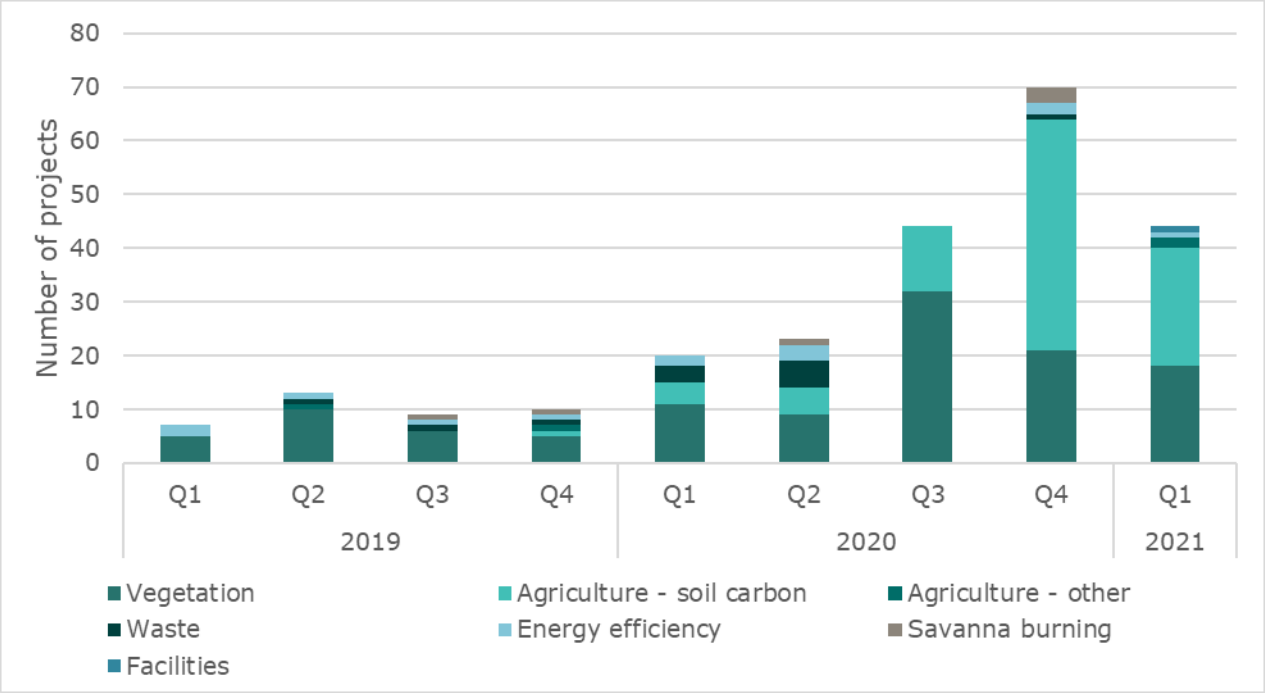



## Projects

Quarter 1 2021 saw 44 projects registered, the largest Quarter 1 registration in the scheme and more than double the number of projects registered in Quarter 1 2020 (20 projects; see Figure 1.5). Collectively these new projects are estimated to deliver up to 13 million tonnes of abatement over their lifetime.

Quarter 1 2021 saw the first project registered under the facilities method since 2018, and subsequently secure a contract at Auction 12 for 3.4 million ACCUs. The project registered by Orica Australia aims to reduce emissions intensity of operations at the Kooragang Island facility by installing new energy efficient equipment. Including this project, a total of 3 projects have been registered under the facilities method to date.

Figure 1.5 New registered projects per method type, Q1 2019 to Q1 2021

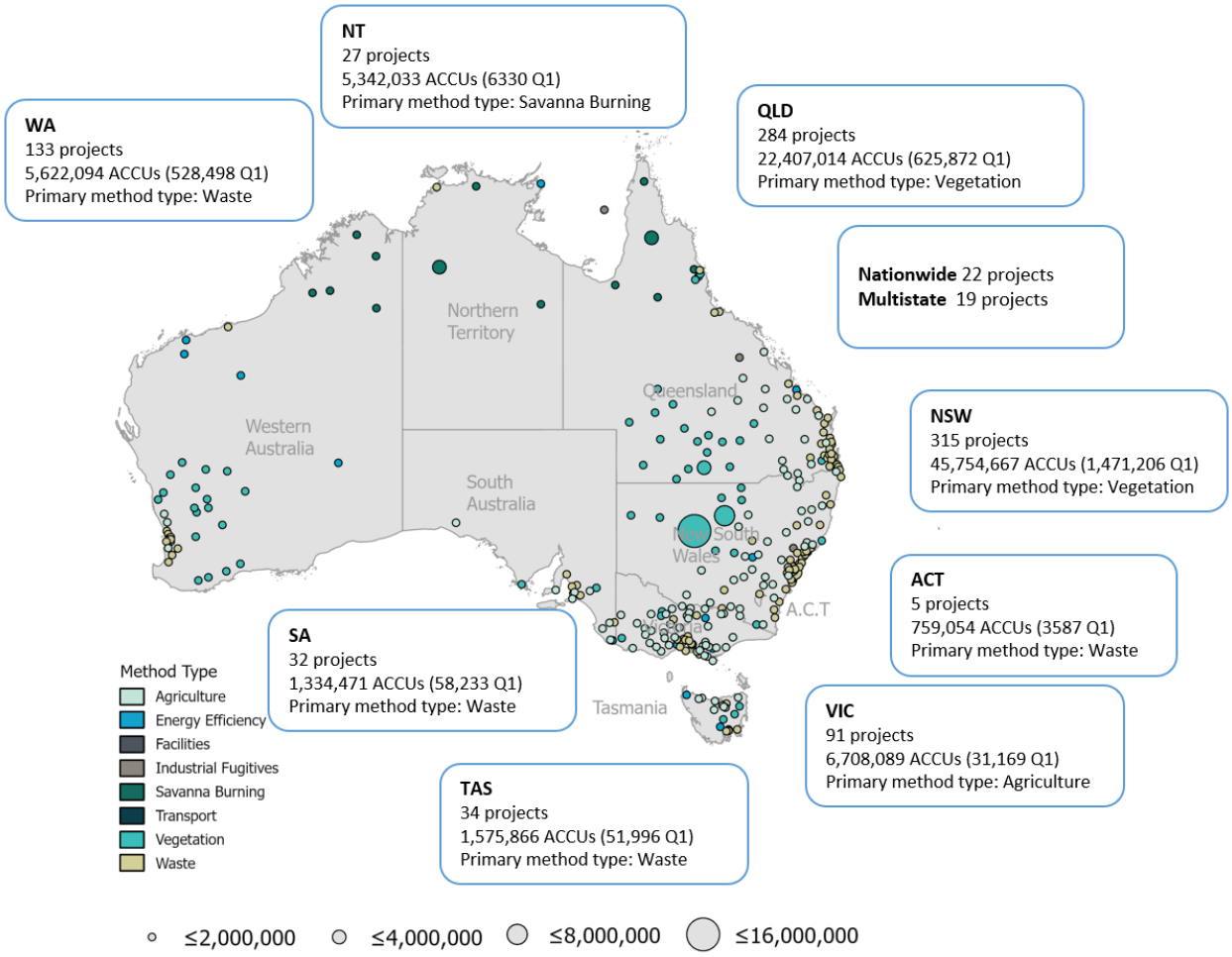


The Department of Agriculture, Water and the Environment launched its Carbon + Biodiversity Pilot during Quarter 1 2021. The Australian Government has committed $23.5 million for this program. Under this program, farmers will receive payments for on-farm biodiversity outcomes in addition to any ACCU revenue generated by the ERF projects. This is likely to encourage new project registrations under the environmental plantings method.

Growth in the soil carbon sector continued in the quarter, accounting for half the projects registered under the ERF (22 projects). Given the Government's recent announcement of additional funding for farmers to improve soil health, the Clean Energy Regulator will continue to monitor these initiatives.

NSW accounted for nearly half the ACCU supply this quarter, with majority of this coming from vegetation projects (see Figure 1.6).

Figure 1.6 Total number of ACCUs issued per method type by location, Q1 2021 and scheme to-date




## Investment builds

Interest in the ACCU market continues to build with private equity firm Adamantem Capital acquiring a majority share in project developer Climate Friendly. This follows Shell's acquisition of Select Carbon, and global investment firm KKR's investment in GreenCollar in 2020.

The government has committed $50 million for the development of carbon capture, use and storage (CCUS) technology.

The Clean Energy Regulator is developing a carbon capture and storage (CCS) method under the ERF for activities that capture and store carbon in secure geological formations. CCS technology has the potential to underpin new low emissions industries (including hydrogen) and reduce emissions from other economically important, hard-to-abate industries such as cement production and steel manufacture.

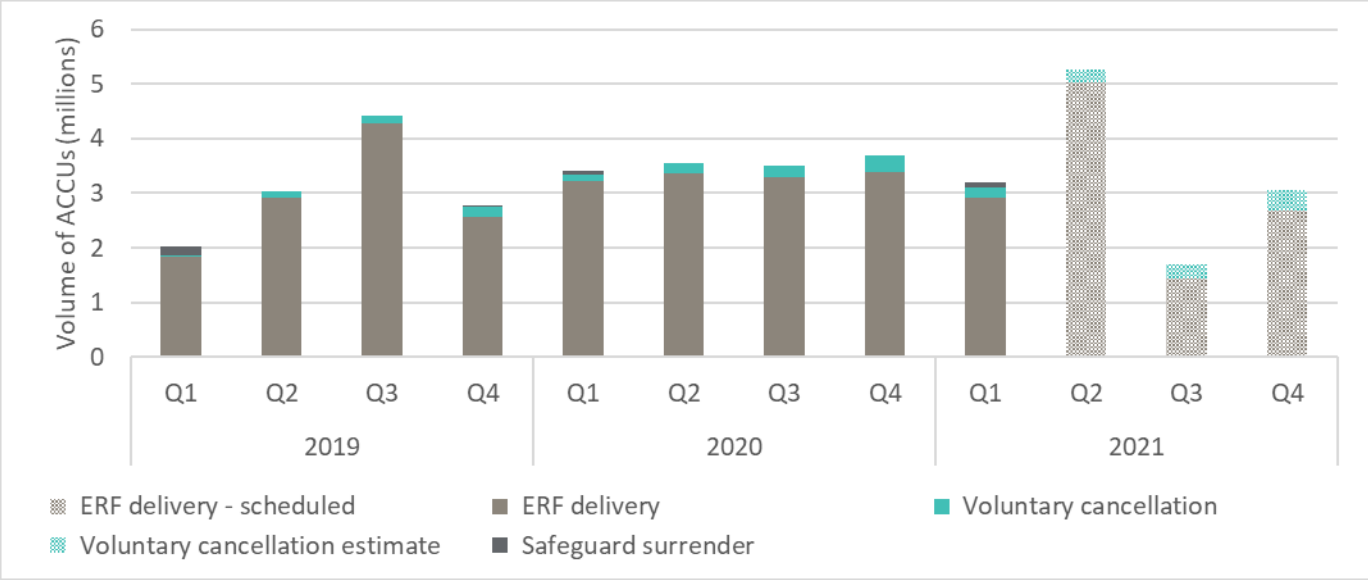
## 1.3. Factors impacting demand

Total demand for ACCUs in Quarter 1 2021 was 3.2 million, 6% lower than the same quarter in 2020 (see Figure 1.7). This was primarily due to lower demand from ERF contracts as proponents chose to deliver over 400,000 ACCUs early (Quarter 4 2020). At the end of the Quarter 1 2021, deliveries against Commonwealth contracts were ahead of schedule at 105.6%.

In contrast, demand from voluntary cancellations and safeguard surrender increased by 52% and 55%, respectively, compared to Quarter 1 2020.

Quarter 1 typically sees safeguard demand realised as safeguard entities that have chosen to use ACCUs to meet their safeguard obligations must surrender them by the end of February. Further information on this is included in the 'Safeguard mechanism surrender' section below.

Figure 1.7 Actual and estimated demand for ACCUs (millions), Q1 2019 to Q4 2021[18]




New sources of demand are emerging. The NSW government issued an expression of interest for the supply of carbon credits to offset emissions of New South Wales light vehicles under their Net Zero Plan – stage one: 2020-2030. This initiative aims to use ACCUs sourced primarily from New South Wales-based projects with a view to extending the initiative to projects elsewhere, should demand allow it. This tender closed on 14 April 2021.

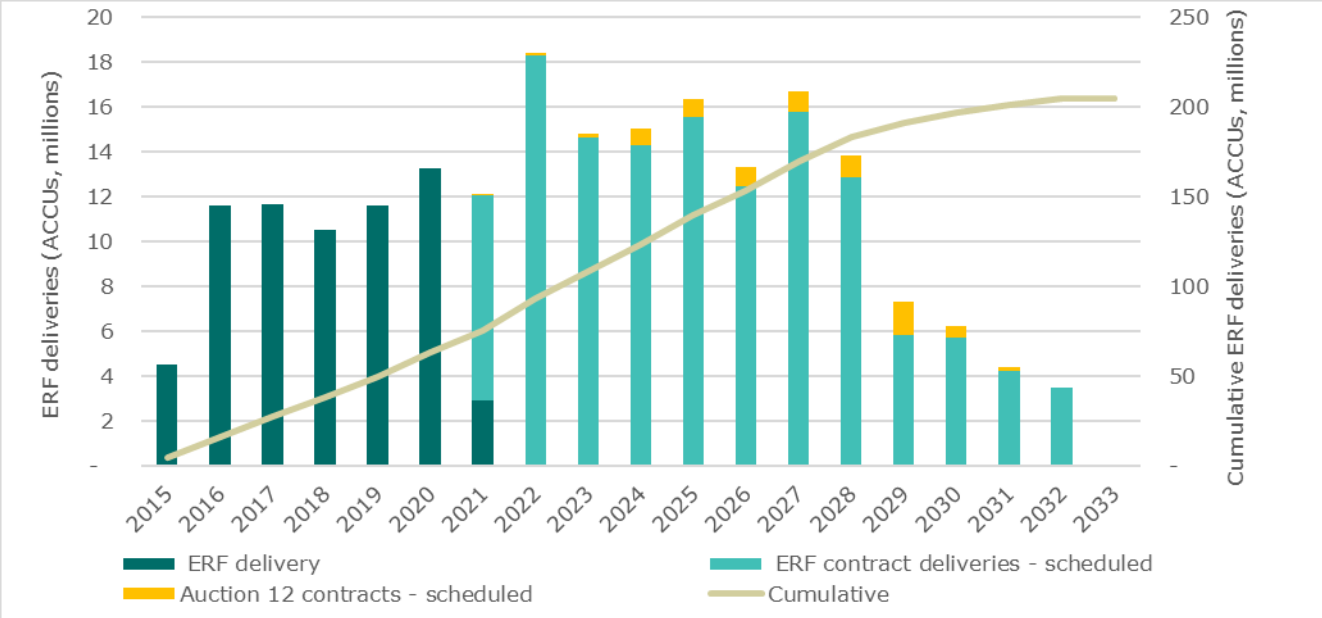
[18] Estimated demand is comprised of demand from scheduled delivery against Commonwealth contracts as at 31 December 2020 and estimated voluntary demand. Scheduled delivery against Commonwealth contracts include optional delivery contracts. ACCUs contracted against an optional delivery contract may not be delivered to the Commonwealth.

## Commonwealth demand

Demand from scheduled deliveries for 2021 was 12.1 million units. Early delivery against contract schedules could increase total 2021 demand beyond this volume.[19] Demand is expected to rise to a peak of 18.4 million in 2022 (see Figure 1.8).

ERF auction 12 added 6.8 million tonnes to total potential demand, 95% of which is scheduled to be delivered in 2024 and beyond.

Figure 1.8 Commonwealth delivery for current portfolio of projects (volume of ACCUs, millions), 2015 to 2033[20]




## Voluntary cancellations

Voluntary private and state and territory ACCU cancellations in Quarter 1 2021 totaled 174,000, a 52% increase from Quarter 1 2020. Surrender against the Climate Active initiative accounted for 67% of the cancelled volume.

The Clean Energy Regulator estimates that more than a million ACCUs will be cancelled voluntarily in 2021. More information on the voluntary carbon market is in Chapter 5.

## ERF Auction 12

The Clean Energy Regulator held ERF Auction 12 on 12-13 April 2021, contracting to purchase 6.8 million tonnes of carbon abatement. A total of 10 contracts were awarded for 10 projects at an average price of $15.99 per tonne, an increase of $0.25 from ERF Auction 11 (see Figure 1.9). While the volume of carbon abatement purchased is similar to Auction 11 (7 million tonnes), the number of contracts awarded fell – from 33 at Auction 11 to 10 contracts for Auction 12.

There was a clear market preference for the optional delivery contract with all but one of the contracts being optional delivery, representing 98% (6.6 million tonnes of carbon abatement) of the contracted volume.

The price paid for the single fixed delivery contract was $17 per unit, an increase of 9% from Auction 11, albeit for a comparatively smaller volume of 149,000 ACCUs.

The price of the fixed delivery contract was higher than the average price paid for optional delivery contracts ($15.97). This is expected as the optional contract provides sellers the

[19] Commonwealth contract holders can make early deliveries against their contracts including, with the consent of the agency, against milestones due in future financial years

[20] This graph shows Auction 12 scheduled delivery data added to the delivery schedule as at 31 March 2021.

security of being able to deliver abatement to the Commonwealth at the contracted price while also allowing flexibility to choose to sell some or all ACCUs elsewhere. Sellers are willing to accept a lower price for the greater flexibility offered.

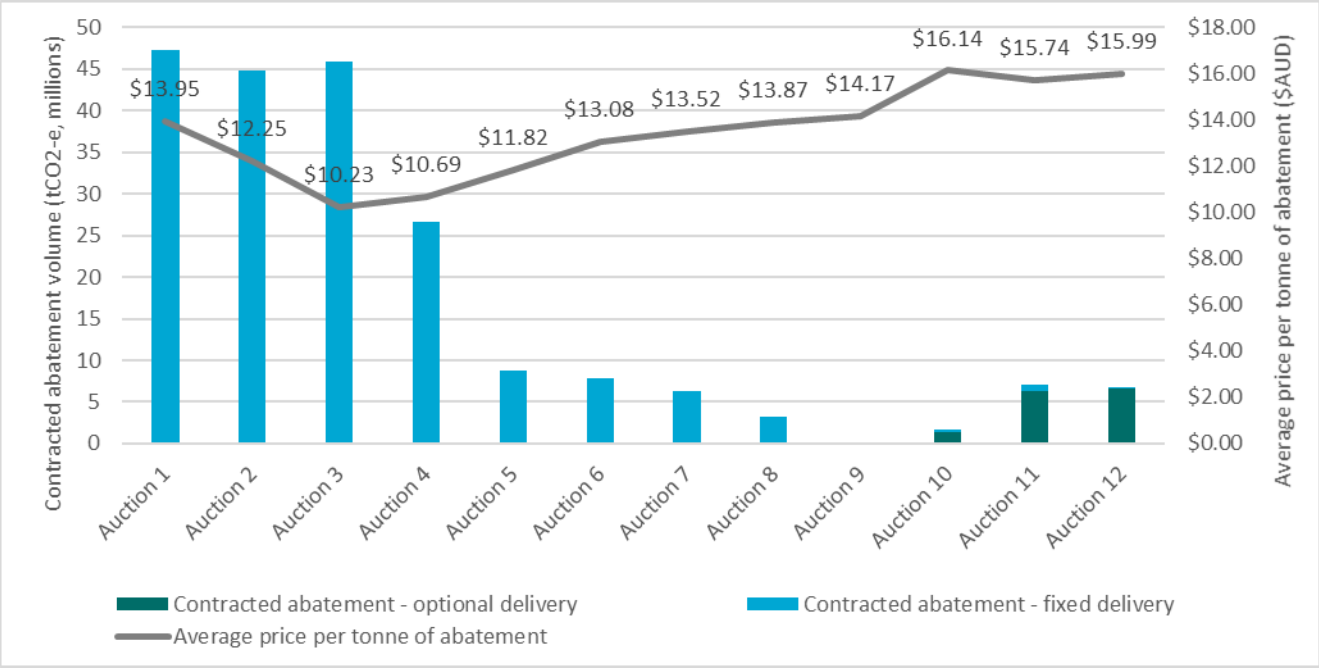
With 3.4 million tonnes of abatement, Orica Australia's Kooragang Island facility project secured the largest contract, as discussed in the 'Projects' section above.

New South Wales-based projects represented 4.2 million tonnes of contracted abatement.

Continuing on from Auction 11, Western Australia secured the highest number of contracted projects within a single state with 5 of the 10 contracts, accounting for 2.2 million tonnes of abatement. All 5 contracted projects are under the vegetation methods.

The WA Government's allowance of carbon farming to be undertaken on pastoral lands has seen an increasing number of projects commencing abatement activities, and subsequent increasing participation in the ERF and auction process.

Figure 1.9 ERF Auction results



## Safeguard mechanism surrender

A total of 88,325 ACCUs were surrendered for the 2019-20 compliance year, a 55% increase from the 2018-19 surrender volume.[21]

Safeguard surrender volume is expected to grow over the next three years, with the Clean Energy Regulator estimating between 1.1 and 1.2 million ACCUs will be surrendered by facilities with multi-year monitoring periods over this period.[22] While this is a significant increase on the volume of ACCUs surrendered under safeguard to date (679,000 ACCUs, excluding deemed surrenders), it may not translate to additional demand, as units may already be held by entities for this potential future demand, as discussed in the 'Supply and demand balance' section above.

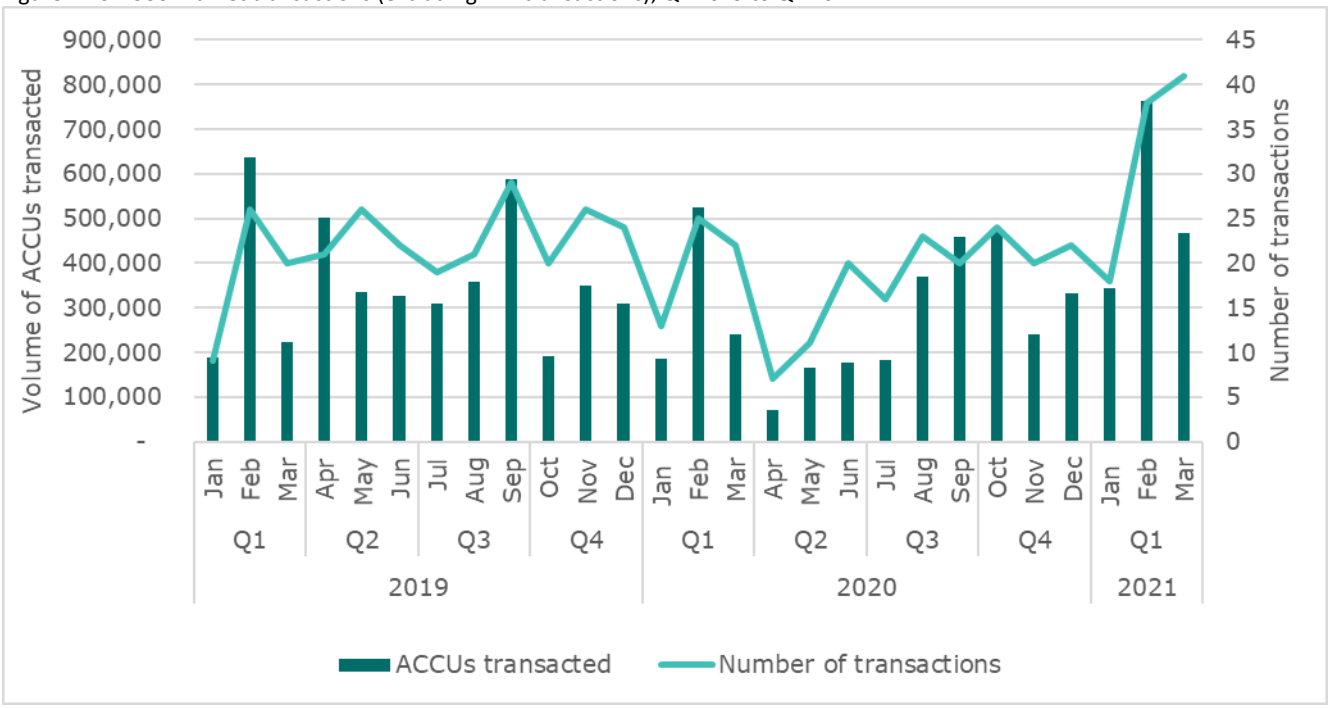
A list of all safeguard entities, their annual emissions and whether they surrendered ACCUs is provided in the safeguard baselines table on the Clean Energy Regulator website.

## Market trading

In Quarter 1 2021 market activity reached record levels with nearly 1.6 million ACCUs transacted through 97 transactions (see Figure 1.10). This is an increase of 62% in transaction number and 66% in volume from Quarter 1 2020.

The increased level of activity is due to a combination of demand stemming from safeguard surrender, and private and state and territory government sectors wishing to acquire and voluntarily cancel ACCUs.

Figure 1.10 ACCU market transactions (excluding ERF transactions), Q1 2019 to Q1 2021[23]




[21] Does not include deemed surrender.

[22] This estimate is indicative only as it relies on projections of emissions and baselines for the facilities over a three-year period.

[23] ACCU market transactions refer to the transfer of ACCUs between separate entities or groups and does not include issuances and surrenders 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.

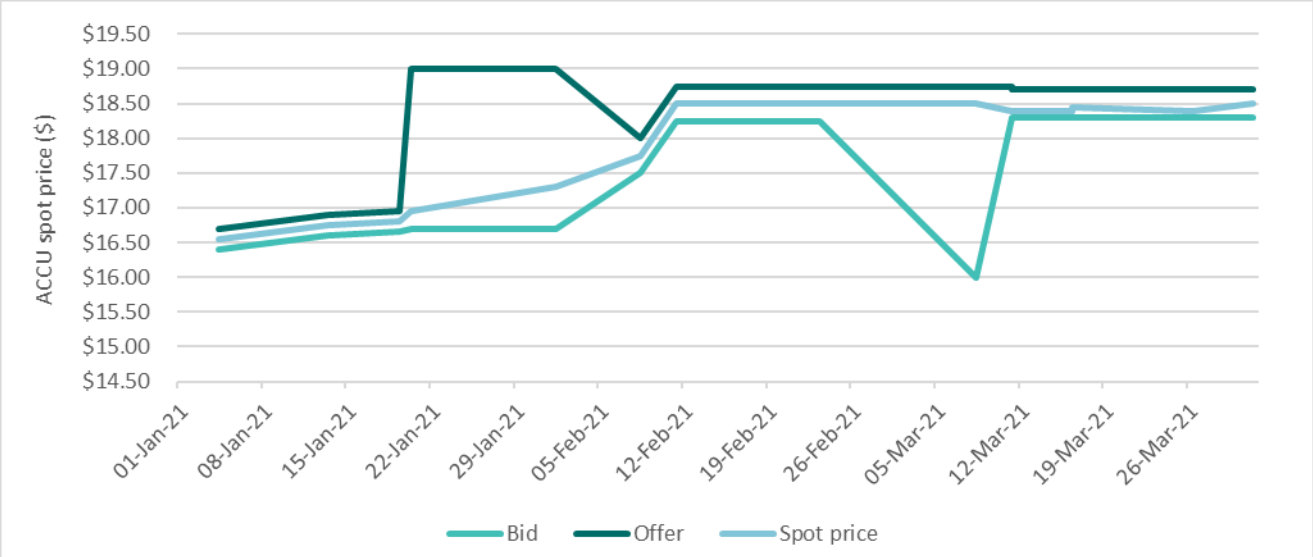
## Spot price

The ACCU spot price increased from $16.55 at the end of Quarter 4 2020 to a record high of $18.50 at the end of Quarter 1 2021 (see Figure 1.11).

In mid-January, sellers were offering units at $19 against purchase bids at $17. Prices settled at $18.50 in mid-February before moderating slightly to $18.35 at the end of April.[24] April also saw a forward ACCU trade recorded for February 2022 delivery of 15,000 ACCUs at $18.70. More forward trades are expected to emerge as the market continues to mature.

Reported parcel size of trades during the quarter averaged 20,000 ACCUs – twice the size of average parcel sizes traded during 2020.

Figure 1.11 ACCU spot prices ($AUD), Q1 2021[25]




### Expression of interest open for the development of an Australian carbon exchange

The Clean Energy Regulator has called for expressions of interest to accelerate the emergence of an exchange traded market for emissions offsets, in effect an Australian carbon exchange. The exchange will make trading of ACCUs simpler and reduce transaction costs, supporting rapidly increasing voluntary demand from the corporate sector.

The expression of interest closed on 20 June 2021.

[24] Data sourced from Jarden and TFS Green.
[25] Data sourced from Jarden and TFS Green.

## 1.4. Key dates

| Date | Event | Significance |
|---|---|---|
| **24-25 June 2021** | 8th Annual Australasian Emissions Reduction Summit 2021 | This annual event, hosted by the Carbon Market Institute, will showcase world-leading knowledge sharing, commercial interactions and capacity building, helping delegates to manage climate risk and opportunities. |
| **1 November 2021**[26] | National Greenhouse and Energy Reporting (NGER) and safeguard application deadline | Deadline for NGER reporters and safeguard entities to submit:<br>• 2020-21 NGER data, and<br>• Calculated and production adjusted baseline applications (for baselines commencing 1 July 2020). |

[26] The usual NGER and safeguard application deadline is 31 October following the end of the financial year. In 2021 the deadline has been extended to 1 November, as 31 October falls on a weekend.

# 2. Large-scale generation certificates

- The Large-scale Renewable Energy Target of 33,000 gigawatt hours (GWh) was met, on a rolling 12-month basis, at the end of January 2021.
- 165 MW of new large-scale renewable energy capacity was accredited in Quarter 1 2021, compared to 698 MW in Quarter 1 2020.
    - This was expected as several large power stations accredited in late Quarter 4 2020 were originally estimated to reach accreditation in Quarter 1 2021.
    - Between 2 and 2.5 GW is still expected to be accredited in 2021.
- 19 MW of new projects reached financial close during the quarter and the pipeline of probable projects with a PPA grew to 3.7 GW, a positive indicator for further financial close announcements in 2021.
    - The financial close announcements for the full year is expected to be in the 2 to 3 GW range.
- The Renewable Power Percentage (RPP) was set on 3 March 2021 at 18.54% for the 2021 assessment year. Liable entities will collectively be required to surrender 32.6 million LGCs on or before 14 February 2022.
- Additional voluntary demand of at least 5 million LGCs to meet corporate and state and territory government commitments, and 3.4 million LGCs for shortfall refunds, is expected over the 2021 assessment year.
- LGC spot prices decreased 17% from $40 at the end of Quarter 4 2020, to $33.25 at the end of Quarter 1 2021.
- The Clean Energy Regulator expects supply of 37 to 40 million LGCs in 2021.

## 2.1. Supply and demand balance

The Large-scale Renewable Energy Target of 33,000 gigawatt hours (GWh) was met at the end of January 2021. Eligible generation from 1 February 2020 to 31 January 2021 reached an estimated 33,100 GWh.[27] More information on the pathway to achieving the target will be available in the *2020 annual statement – Large-scale renewable energy target met* which is scheduled to be tabled in Parliament in June 2021.

An estimated 43 million to 46 million LGCs are expected to be available for surrender for the 2021 assessment year. This includes 6.1 million LGCs carried forward from previous years with 37 to 40 million LGCs expected to be validated in 2021.

The 2021 RPP was set at 18.54%, requiring liable entities to surrender approximately 32.6 million LGCs to meet LRET obligations for 2021. In addition to the legislated demand, voluntary demand in 2021 of at least 5 million LGCs to meet corporate and state and territory government commitments and a further 3.4 million LGCs for shortfall refunds is expected.

[27] Generation estimate calculated from power station data collected by the Clean Energy Regulator, supplemented with generation data from utility-scale power stations from NEMReview and estimates for mid-scale power stations.

This increased demand from voluntary ambition is expected to keep supply and demand balance tight for the year.

Table 2.1 shows the LGC balance if no shortfall is taken for the 2021 assessment year based on the lower bound supply estimate of 37 million LGCs.

However, given the arbitrage opportunity owing to lower forward LGC prices, material shortfall charge is expected to be taken for the 2021 compliance year.

Table 2.1 Estimated LGC supply and demand balance in 2021 assessment year (millions)

| | Supply | Demand |
|---|---|---|
| **LGCs available from previous assessment years[a]** | +6.1 million | |
| **2021 LGC supply[b] (available for 2021 surrender)** | +37 million | |
| **Legislated demand for 2021[c]** | | -32.6 million |
| **Shortfall charge refunds[d]** | | -3.4 million |
| **ACT Government scheme[d]** | | -2.3 million |
| **Other Voluntary surrenders[d]** | | -2.7 million |
| **Estimated total balance for 2021 assessment year** | | **+2.1 million** |

Notes:
[a] Number reflects the LGCs that were created prior to 2021 but were still registered as available in the REC Registry as at 15 February 2021.
[b] Numbers based on the lower bound range estimate of 37 million LGC supply in 2021
[c] Number assumes no shortfall is taken for the 2021 assessment year
[d] These values are estimates for 2021 and could vary significantly based on commercial decisions

## 2.2. Factors impacting supply

### LGC supply

LGCs validated in Quarter 1 2021 totalled 9.2 million, a 24% increase on the 7.4 million LGCs validated in Quarter 1 2020 (see Figure 2.1). At the end of Quarter 1 2021, there were 14 million LGCs in the REC Registry.

This increase in 2021 reflects newly accredited power stations ramping to reach full generating capacity, and a reduction in the number of curtailment events across the National Electricity Market (NEM). That is, existing power stations have spent more hours generating electricity and at a higher capacity. In particular, curtailment was reduced due to removal of the generation constraint for a number of West Murray solar farms in 2020, a notable issue for the grid mentioned in previous Quarterly Carbon Market reports.[28]

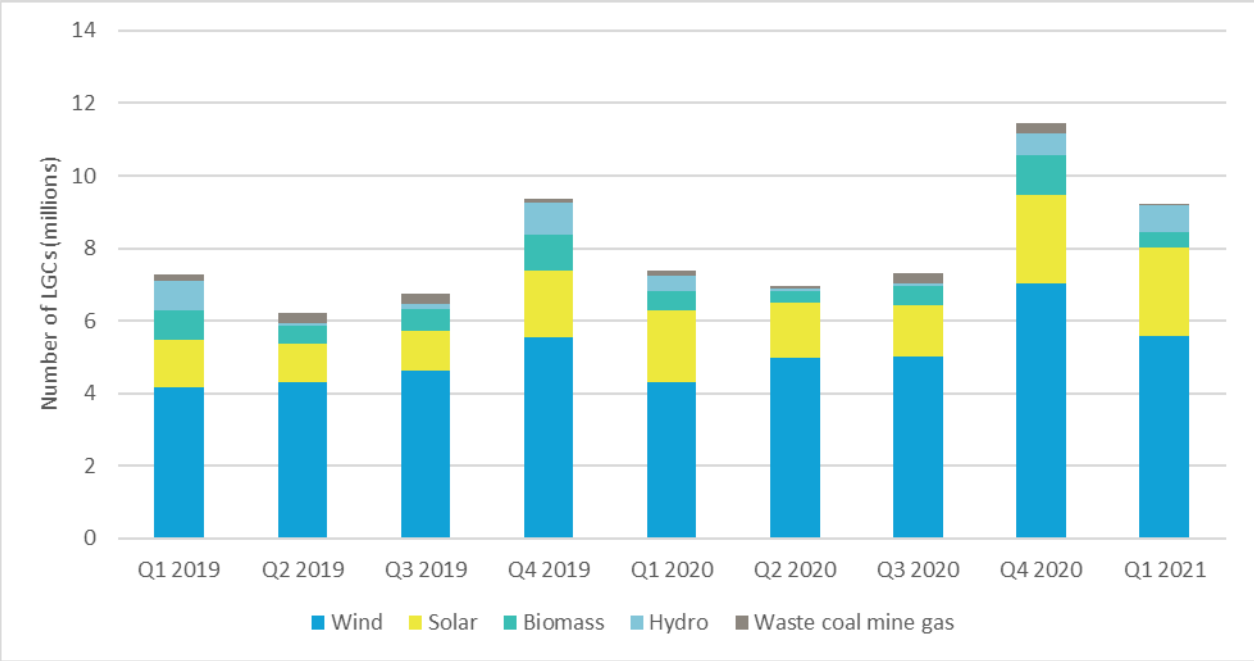
Quarter 1 2021 saw renewable electricity generation account for 29.6% of total NEM generation, an increase of 5.6 percentage points over the 24% achieved in Quarter 1 2020.

The Australian Energy Market Operator (AEMO) released final Marginal Loss Factors (MLFs) for FY 21-22 on 1 April 2021. MLFs in New South Wales, South Australia and Tasmania decreased slightly from their FY 20-21 level while on average MLFs across Queensland have increased. In Victoria, MLFs for solar power stations increased moderately overall whilst wind power station MLFs decreased slightly overall.

Overall, the effect of these MLF changes in FY 22 is expected to reduce generation by less than half a percent.

[28] For more information see AEMO's Q1 2021 Quarterly Energy Dynamics.

Figure 2.1 LGCs validated by technology type (millions), Q1 2019 to Q1 2021




## Accreditation

In Quarter 1 2021, 39 power stations were accredited, with a cumulative capacity of 165 MW (see Table 2.2 and Figure 2.2).

This result is consistent with accreditation levels foreshadowed in the December Quarter 2020 Quarterly Carbon Market report, as several large power stations the Clean Energy Regulator had expected to begin scheduled generation in 2021 commenced generating in late 2020.

Winton Solar Farm (100 MW) located in Victoria was the largest power station accredited in Quarter 1 2021.

In addition, 11 power stations owned by supermarkets were accredited throughout the quarter, with a combined capacity of 3 MW. For more information on supermarket support for renewable electricity, see Chapter 4 on voluntary demand.

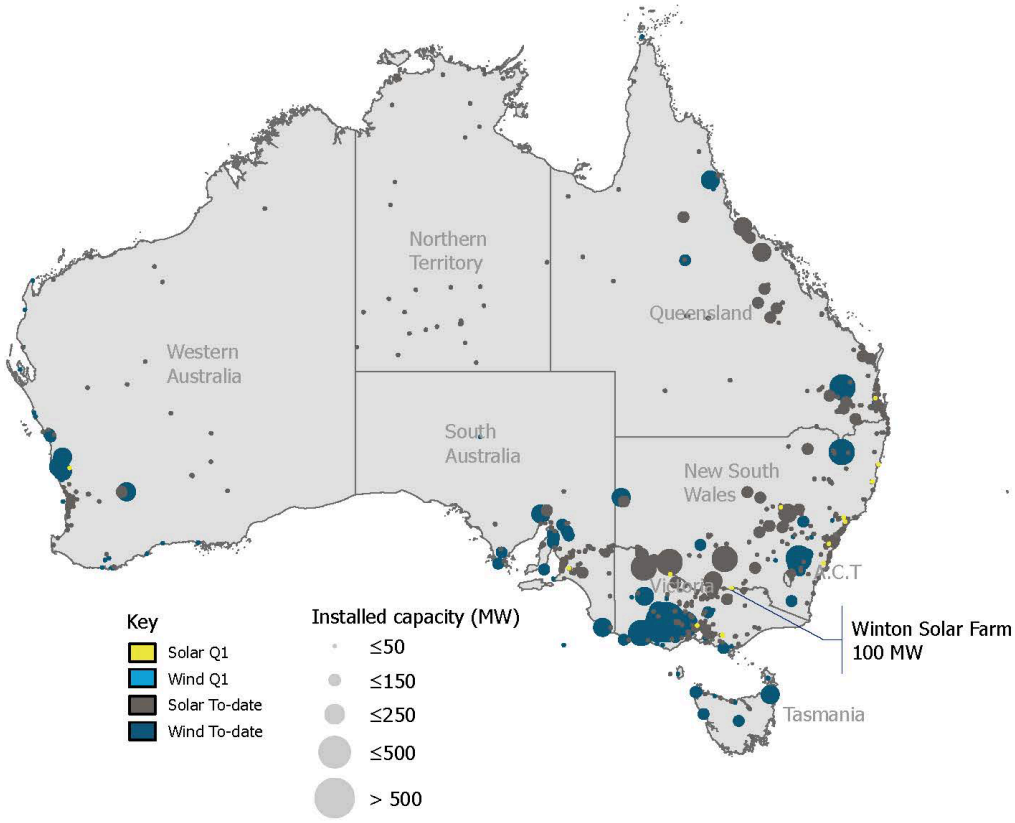
The Clean Energy Regulator expects to accredit 2 to 2.5 GW of large-scale capacity in 2021. At the close of Quarter 1, there were 118 power station accreditation applications on hand with a combined capacity of 875 MW.

Table 2.2 Power station accreditation capacity (MW) and count by state (MW), Quarter 1 2021

| | Capacity (MW) | Count |
|---|---|---|
| ACT | 0 | 0 |
| NSW | 45 | 14 |
| NT | 0 | 0 |
| QLD | 3 | 7 |
| SA | 0 | 2 |
| TAS | 0 | 0 |
| VIC | 113 | 12 |
| WA | 3 | 4 |
| **Total** | **165** | **39** |

Note: Totals may not sum due to rounding

Figure 2.2 Wind and solar power stations accredited capacity by location (MW), Q1 2021 and scheme to-date

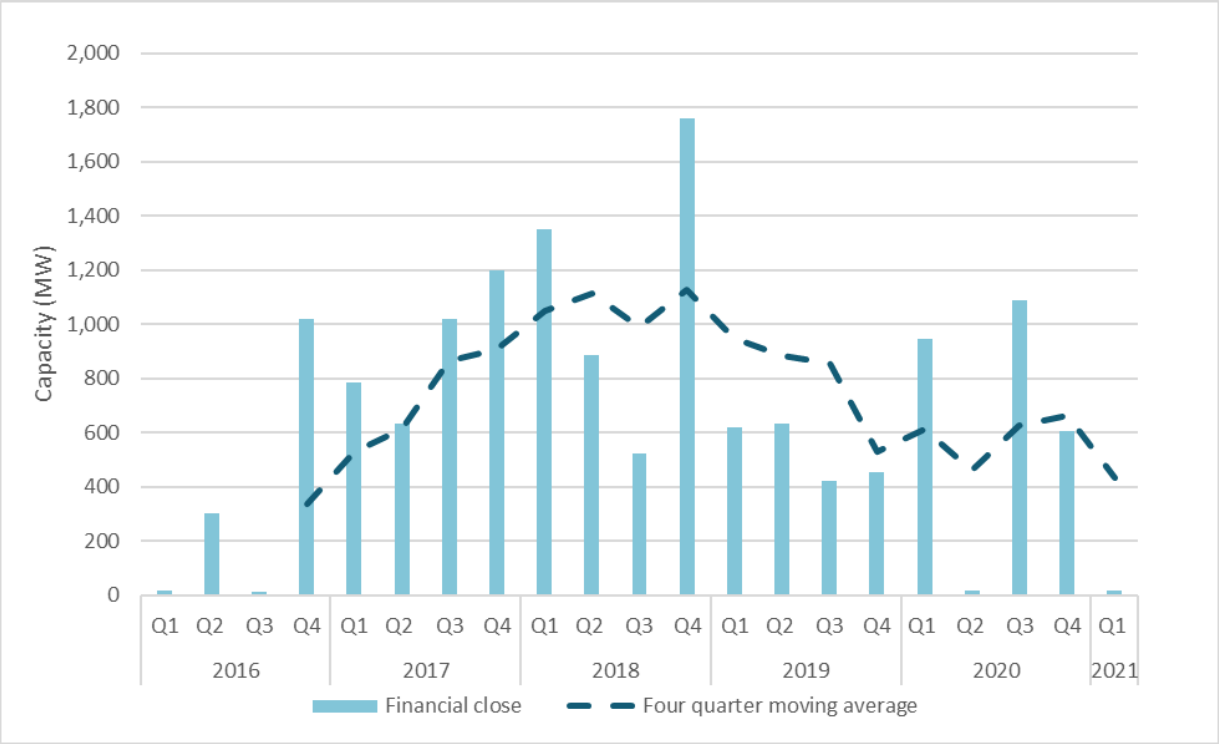



## Committed and probable projects

In Quarter 1 2021, 19 MW of capacity reached financial close. Announcements on projects reaching financial close are uneven from quarter to quarter (see Figure 2.3) as they involve separate commercial negotiations, with financing highly sensitive to many factors that differ greatly from project to project. This includes the cost, speed and timing of connection approvals.

There is still strong willingness from all parties to PPAs to get projects to financial close, however these processes must consider connection arrangements.

Figure 2.3 Capacity committed per quarter and 4 quarter moving average (MW), Q1 2016 to Q1 2021




The inconsistency of financial close capacity reaching financial close from quarter to quarter is expected to become more pronounced moving forward as a result of the increasing trend towards very large and gigawatt-scale projects, discussed previously in the September Quarter 2020 Quarterly Carbon Market report.

Figure 2.4 shows the trend in financial close announcements on a calendar year basis. There was a pullback in investment in 2019 after the boom to reach the 2020 large-scale renewable energy target. However, the 2.1 GW reaching financial close in that year was still more than 5 times the pre boom average of 400 MW per annum prior to 2016. 2020 saw an increase to 2.7 GW reaching financial close.

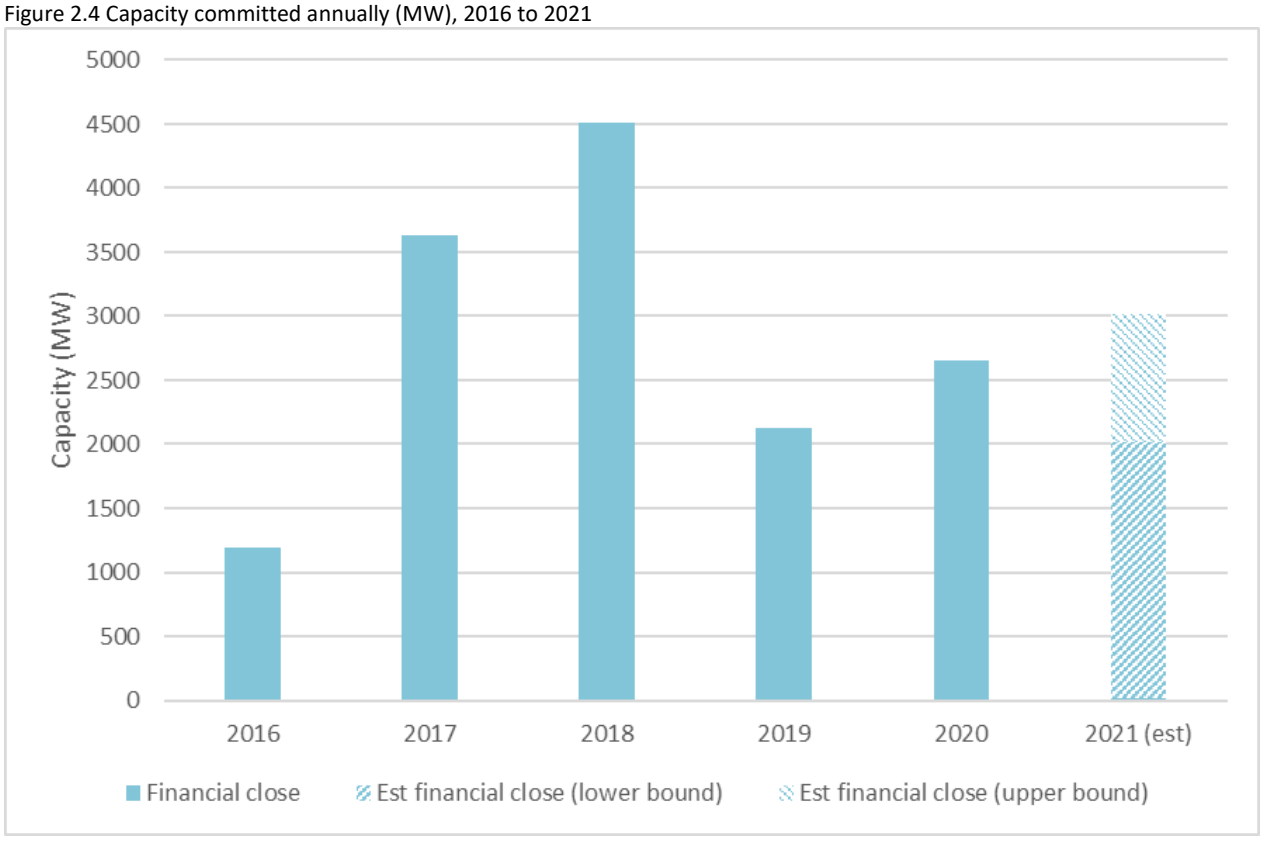
The Clean Energy Regulator's pipeline of projects with a power purchase agreement (PPA) reached a record 3.7 GW at the end of Quarter 1 2021 following the addition of 2 new projects with a combined capacity of 490 MW. PPAs have proven to be a very reliable indicator of future financial close announcements.

The record level of capacity in the PPA (probable) category gives the Clean Energy Regulator confidence to maintain its estimate that between 2 and 3 GW of capacity can still reach financial close in 2021. The Clean Energy Regulator considers it too early to be calling an 'investment stall' as some are doing.

While there are strong commercial drivers to get projects with PPAs to financial close, the key downside risk will be the increasing cost, uncertainty and delays in grid connection approvals. At some stage investment may stall if delivery of transmission and interconnector upgrades is not sped up.

The Clean Energy Regulator will continue to update on this in future reports.

Figure 2.4 Capacity committed annually (MW), 2016 to 2021



**Yallourn early closure a potential driver for additional renewables**

In early March 2021, EnergyAustralia announced plans for the Yallourn coal-fired power station to retire in mid-2028, 4 years earlier than initially planned. Generation from the Yallourn power station has been declining on average 5.2% per year since 2016, which coincides with the influx of new renewable capacity added to the grid. In 2020, Yallourn generated around 9.2 terawatt hours (TWh) of electricity.[29] This decline in generation is in line with decreases seen at other brown coal power stations.

In announcing the early closure, EnergyAustralia has given the market time to respond to the anticipated supply deficit without placing pressure on electricity prices. To assist the transition, EnergyAustralia will build a 350 MW, four-hour utility-scale battery by 2026.

To replace the current level of generation from Yallourn, the Clean Energy Regulator estimates an additional 3.7 to 6.5 GW of renewable capacity would be required, depending on the mix of energy sources.[30]

The Clean Energy Regulator is tracking a further 1.2 GW of renewable capacity with PPA or financial close in Victoria. Rooftop solar capacity additions in Victoria is likely to be 660 to 760 MW in 2021 and, if that rate continues, could make a material contribution to additional capacity and generation – even at a lower capacity factor of 15%.

If that 1.2 GW of large-scale projects is built, and if Victoria continues to add around 700 MW of rooftop solar per annum to mid-2028, total capacity of circa 6.1 GW may be almost enough to replace the energy generated in 2020 by Yallourn. However, this renewable energy would need to be firmed. Additionally, this assumes electricity demand remains flat.

Excluding the possibility of the loss of a large load source, it is generally expected that material fuel switching to electricity will start to occur well before mid-2028.

Hence, it is reasonable to assume added generation capacity is needed over and above the existing large-scale wind and solar projects and rooftop solar additions before mid-2028.

Given current grid constraints and assuming no other early closure of coal-fired power station, there is a range of renewable energy options to meet the additional generation requirement. There is great potential for onshore wind in Tasmania at almost offshore wind capacity factors in some locations. However, little of this can be realised until at least the first 750 MW Marinus Link is built, currently planned for completion in 2028-29 after the Yallourn closure.[31] Another extended outage of Basslink is a risk that must be considered.

There is also a 2 GW offshore wind project, Star of the South, planned to be built off the Gippsland coast.[32] If the project is feasible and meets approval requirements it could be operating at full capacity by 2030.

Other brown coal generators are operating at lower than historical capacity factors owing to the ongoing influx of renewable energy, and they may be able to partially offset the lost generation from Yallourn. However, it has been reported that brown coal plants continue to have material outages and the remaining plants will be 7 years older by mid-2028.[33]

Renewable Energy Zones in Victoria are at an early stage of development. This may be the only option that could be delivered, enabling more large-scale onshore wind and solar in Victoria, prior to the mid-2028 exit deadline for Yallourn – unless Star of the South or Marinus Link timelines can be brought forward.

All of this points to a need for flexibility and some level of 'insurance' in ensuring reliability and security. There is currently a great deal of debate regarding the preference for large batteries or gas-powered generation, including whether large batteries can provide the firming the system needs in such a fast transition to variable renewable energy.

[29] Data sourced from NEMReview.
[30] This assumes a capacity factor of 0.35 for wind power stations and a capacity factor of 0.2 for solar power stations.
[31] This project has not reached financial close.
[32] This project has not reached financial close.
[33] For more information see AEP Elical's assessment of ageing coal-fired generation reliability report.

It is possible the firming needs will be more than the 350 MW battery announced by EnergyAustralia and other batteries currently proposed in Victoria.

Batteries have exceeded expectations in relation to the speed at which they can respond to a sudden drop in frequency in the grid and the timeframe to commission new builds. However, like pumped hydro they are a net load. That is, they require excess generation to charge and discharge between 10% and 20% less energy than is required to charge.

Snowy Hydro states that Snowy 2.0, a new pumped hydro system, is expected to generate its first power in 2025 with progressive commissioning of the 6 generation units. If this project is delivered on time with all associated transmission, and with sufficient additional generation to pump, then this could provide significant flexible capacity to firm variable renewables for Victoria.

The Clean Energy Regulator's analysis shows that timing is critical in considering these options. Gas power generation can provide some insurance in a fast transition to variable renewables as it can be built in a relatively short time frame, start up quickly and provide ongoing generation if needed. Gas plants are typically the last to be dispatched by AEMO unless ordered on for system security reasons. Consequently, they only operate when the system actually needs additional generation.

Diversification of types of flexible capacity may be useful in a fast transition with many uncertainties.

More detail on the characteristics of different types of flexible capacity can be found in the Clean Energy Regulator's submission to the House of Representatives Inquiry into the current circumstances, and the future need and potential for dispatchable energy generation and storage capability in Australia.

## 2.3. Factors affecting demand

### Voluntary private and state and territory government demand

Quarter 1 2021 saw 358,000 LGCs voluntarily surrendered, a 33% increase on Quarter 1 2020 surrenders. Supported by this heightened interest, voluntary surrenders in 2021 look on track to reach a record 5 million LGCs.

For a detailed breakdown of voluntary surrenders and the outlook for 2021, see Chapter 4.

## 2.4. Market trading

Over the quarter, the LGC spot price decreased by 17%, from $40.00 at the end of Quarter 4 2020 to $33.25 at the close of Quarter 1 2021. After holding value early in the quarter as liable entities sought LGCs for the February surrender, spot prices then declined over February and March to parity with the Cal21 prices.

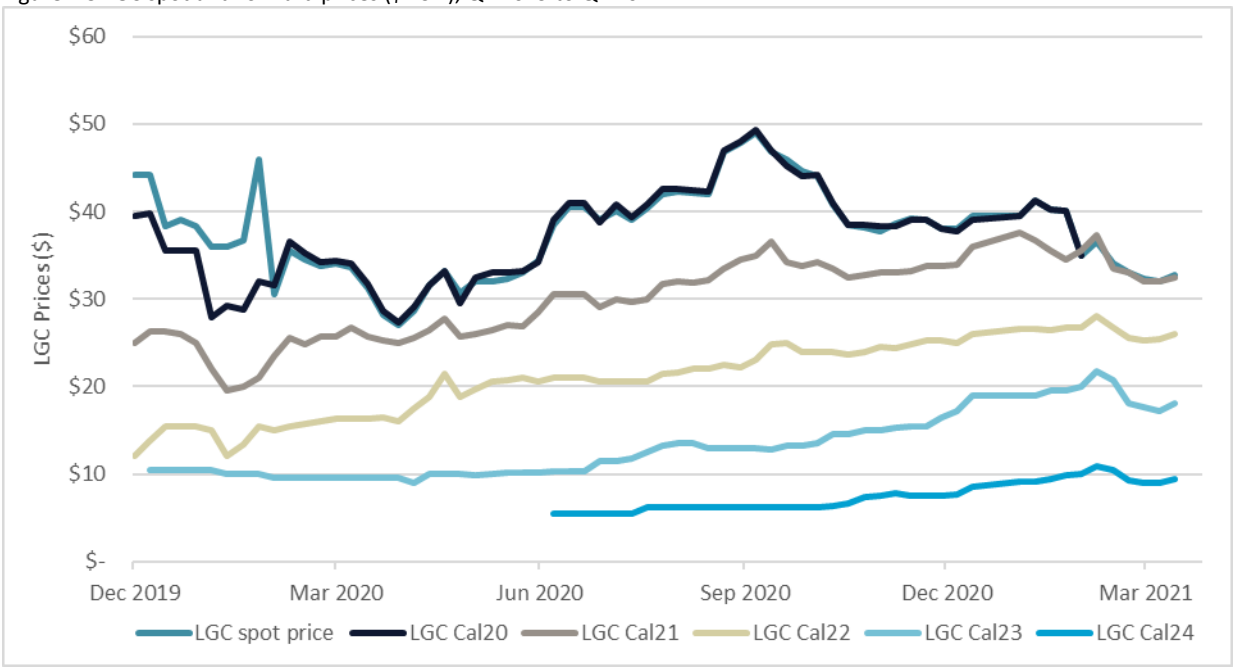
The forward prices for LGCs created in future years have steadily increased since late 2019 (see Figure 2.5). For example, the future market for LGCs created in 2023 (Cal23s) increased from $9.60 at the end of Quarter 1 2020 to $18.00 at the end of Quarter 1 2021.[34]

Possible reasons are that the market may not have, in the past, fully recognised the cumulative level of shortfall charge to be redeemed over a number or years; or anticipated such a rapid increase in voluntary demand for LGCs to prove use of renewable energy.

The forward LGC market still shows future prices are lower than the current spot price, as future supply may eventually outpace future demand. So, while the overall price trend is down, it will be interesting to see the price point where the market finds a floor and how that might relate to the ACCU price.

[34] Data sourced from TFS Green.

Figure 2.5 LGC spot and forward prices ($AUD), Q4 2019 to Q1 2021



## The changing supply and demand outlook for LGCs

This section explores the historical supply and demand dynamics for LGCs observed from 2015 through to 2020 and provides preliminary insights on how these dynamics are expected to evolve from 2020 onwards.

**LGC supply and demand dynamics 2015-2020**

In mid-2015, the large-scale generation target was set at 33,000 GWh of additional renewable generation in 2020 with that annual demand continuing each year until 2030.

In the 2015 calendar year, eligible generation was only 15,200 GWh, and the challenge to meet the 2020 target was significant – a 117% increase in annual generation over five years. The Clean Energy Regulator estimated an additional 6.4 GW of installed capacity would be required to meet the demand for LGCs through to 2020.[35] However, only 1.2 GW reached financial close in 2016 with most of that coming in Quarter 4 of the year. There was always going to be a LGC supply issue given the required 3 GW of capacity reaching financial close was not achieved.

Hence, the steep trajectory to the 2020 target resulted in the LGC price rising quickly through 2016, with spot prices peaking around $89.50 in October 2016 as the market foresaw future scarcity. Forward prices exceeded spot prices over this period, indicating an anticipated supply deficit market outlook.[36] This provided a very strong investment signal for new build to meet the target. By the end of 2016, the market had begun to respond to the settled policy and a healthy pipeline of potential projects with a combined capacity of 1.5GW had emerged. Newly committed power station announcements with a high proportion of solar projects, typically with faster construction times than windfarms, improved the future outlook for supply of LGCs, but was not sufficient to cover the future supply shortfall resulting from well less than 3 GW reaching financial close in 2016.

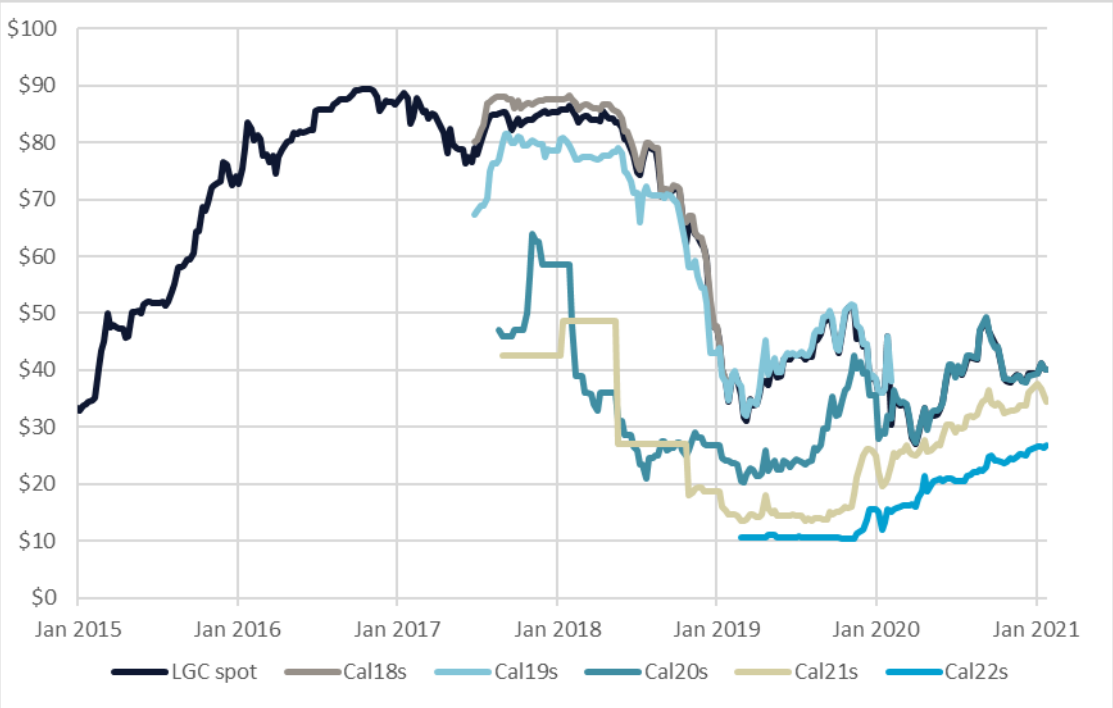
In early 2017, the Hazelwood coal fired power station closed with only 5 months' notice, resulting in wholesale electricity prices increasing from an average of $52 per MWh in 2016 to $96 per MWh in 2017.[37] This resulted in the total build signal (LGCs and wholesale electricity price) reaching almost $190 per MWh. This supported a very large 3.6 GW of projects reaching financial close in that year.

2018 saw the strong pipeline of committed projects transitioning to completion, and more financial close announcements flowing (5 GW in 2018). Consequently, LGC supply began to increase and future supply adequacy concerns were allayed. LGC spot and forward prices then declined steeply.[38] The growing confidence in the industry also saw a market shift as forward LGC prices fell below the spot price, and have remained lower, indicating market expectations that future supply would exceed future demand (see Figure 2.6).

[35] The Clean Energy Regulator said that 3 GW needed to reach financial close in 2016, 2 GW in 2017 and 1 GW in 2018 to both meet the target in 2020 and provide sufficient LGC liquidity in the market to meet all intervening years' targets.
[36] RenewEconomy, Renewable energy market hurtles towards a penalty price, April 2016.
[37] For more information see the Australian Energy Regulator's Hazelwood advice wholesale performance monitoring report.
[38] LGC spot prices dropped from $85 to around $47 over the course of 2018.

On 17 July 2018 the Clean Energy Regulator announced that it had no concerns if market participants took shortfall charge as it had become clear that sufficient capacity would be built to meet the 2020 target, but LGC supply to meet some annual targets will be insufficient. On 17 December 2019, the Treasurer advised that the tax law would be amended to ensure the redemption of shortfall through surrender of LGCs within the allowable 3-year period would be tax neutral. These two steps made it clear that a commercial decision to take shortfall and redeem in the future at a lower cost and when more LGCs would be available would not raise difficulties.

Figure 2.6 Historical LGC and forward prices ($AUD), Quarter 1 2015 to Quarter 1 2021




**Future supply and demand dynamics to 2025**

Beyond 2020, the supply and demand dynamics for LGCs is expected to materially shift. Supply of LGCs is expected to continue to increase well beyond the 33,000 GWh target. Additional demand to the legislated demand is being driven by entities seeking shortfall charge refunds and rapid growth in voluntary demand. These drivers are likely to be price sensitive and may compete with other available carbon units that can be used to meet corporate emissions reduction goals.

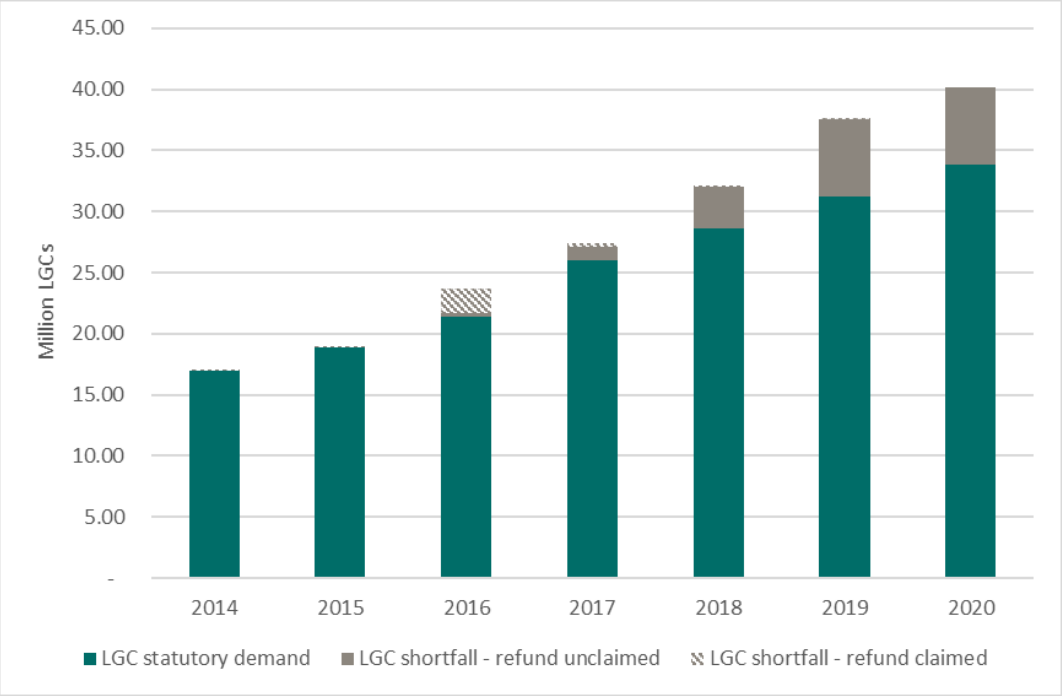
*Drivers of supply*

The supply of LGCs is expected to remain strong moving forward, with 37 to 40 million LGCs expected in 2021. This supply will grow further in future years, as most of the 6.9 GW of projects tracked on the committed and probable pipeline should continue to progress towards completion. Beyond these, there are numerous gigawatt-scale projects, and other renewable energy initiatives such as renewable energy zones, that should drive renewable investment for years to come. As mentioned earlier in this chapter, the risk to ongoing large-scale renewables projects being built largely relates to the pace of transmission and interconnector upgrades.

*Redeeming shortfall charge*

Liable entities have used the shortfall redemption mechanism since 2018 to shift their demand for LGCs into future years. However, this has led to a material deficit of LGCs accumulating over time (see Figure 2.7) as 16 million LGCs are eligible for shortfall charge refunds over the coming years with $1 billion in consolidated revenue.

Figure 2.7 LGC shortfall charge claimed and unclaimed, 2014 to 2020




This accumulated shortfall demand brings the effective balance of LGCs after the 2020 surrender date to a 6.8 million LGC deficit (see Table 2.3). This shortfall demand is expected to be realised as liable entities have a strong economic incentive to surrender LGCs and recoup shortfall charges. This incentive was further clarified by the taxation amendment which will ensure no tax is payable on the shortfall charge refund amount of $65, this mirrors the arrangement where no deduction can be taken for shortfall payments. This amendment is an announced yet unenacted measure.

Table 2.3 Effective LGC supply demand balance 2020, after including shortfall

| | Supply | Demand |
|---|---|---|
| **LGCs available from previous assessment years** | +7.4 million | |
| **2020 LGC supply available for surrender** | +33.2 million | |
| **LGCs surrendered on 15 February 2021** | | -26.9 million |
| **Shortfall charge refunds** | | -1.05 million |
| **Voluntary surrenders** | | -4 million |
| **Total balance in Rec Registry at 16 February 2021[a]** | | **+9.2 million** |
| **LGCs that can be redeemed under the 3-year rule** | | **- 16 million** |
| **Effective balance after including shortfall** | | **-6.8 million** |

[a] This value includes LGCs created in early 2021

Surrendering LGCs to redeem paid shortfall is currently an attractive proposition. Based on the 31 March 2021 LGC spot prices of $33, a liable entity surrendering an LGC in 2021 against a prior year shortfall would receive a refund of the $65 shortfall charge that is non assessable income for tax purposes which, after removing the cost of the LGCs, would see net $32 return to the liable entity.

Given current market conditions, refunding shortfall will remain attractive for the foreseeable future. The Clean Energy Regulator expects that entities seeking shortfall charge refunds will remain a material demand for LGCs over the next few years. This will be a feature of the market moving forward as long as forward prices continue to track below spot prices.

*Potential growth in voluntary demand*

Voluntary demand and its potential for growth is the most significant watch point of the LGC market beyond 2020. The voluntary demand growth rate of 33% year on year in Quarter 1 2021 and the very large 2020 voluntary demand surrender result of 4 million LGCs are a positive sign for growth in this sector. Other initiatives such as the Guarantee of Origin for hydrogen and the Corporate Emissions Reduction Transparency report may accelerate the growing voluntary ambition and further increase demand for LGCs.

For more information see Chapter 4 on voluntary demand.

**LGC-ACCU price convergence**

The forward price of LGCs continues to track below the spot price of LGCs, indicating market expectations that LGC prices will continue to trend down. The decline of LGC prices is expected to eventually lead to LGC prices reaching parity with ACCU prices in terms of value per tonne of carbon abatement.

## 2.5. Key dates

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

# 3. Small-scale technology certificates

- Total installed small-scale solar PV capacity for the quarter was 792 MW, an increase of 28% compared to Quarter 1 2020:
    - Number of installations increased by 22% to 101,000
    - Average small-scale solar PV system size continued to increase year on year, growing to 7.8 kW in Quarter 1 2021 from 7.5 kW in Quarter 1 2020.
- Installed capacity from small-scale solar is tracking to between 3.5 and 4 GW for 2021.
- The 2021 small-scale technology percentage (STP) was set at 28.80%, approximately 50.6 million STCs.
- A balance of 7.2 million STCs remained in the market after the Quarter 1 surrender of approximately 17.5 million STCs (35% of the STP) on 28 April 2021.
- The STC spot price increased by $0.85 to $38.85 from the end of Quarter 4 2020.

## 3.1. Supply and demand balance

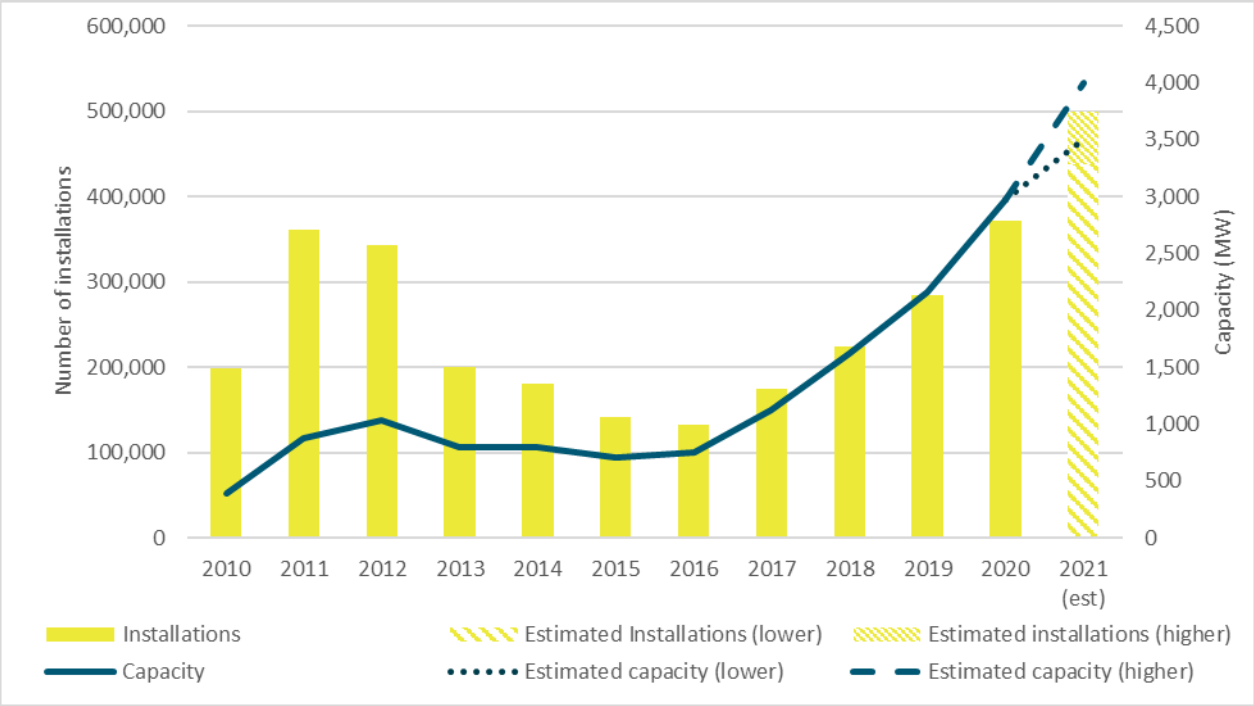
Growth in rooftop solar installations over Quarter 1 2021, and an increase in average system size, led to high creation rates of STCs. A balance of 7.2 million STCs remained in the market after the 28 April 2021 Quarter 1 surrender of approximately 17.5 million STCs.

The 2021 STP of 28.80% was announced on 3 March 2021, requiring liable entities to collectively surrender 50.6 million STCs to meet their 2021 obligations. The average weekly STC creations over Quarter 1 2021 were 988,800, at this rate supply will be more than adequate to meet demand.

The total estimated installed small-scale solar PV capacity for the quarter was 792MW, an increase of 28% over Quarter 1 2020. At current rates of installation, capacity for 2021 is estimated to be in the range of 3.5 to 4 GW (see Figure 3.1), higher than the 3 GW lower bound expected in the December Quarter 2020 Quarterly Carbon Market report.

Predicting when consumers' appetite to install rooftop solar PV will change is difficult. The mix of available incentives, and low technology costs, suggest the high install rates are likely to continue over the near term given ongoing year on year growth.

Figure 3.1 Small-scale solar PV installations and capacity (MW), 2010 to 2021




## 3.2. Factors impacting supply

### Solar PV and installations

Over 790 MW of rooftop solar PV capacity was installed in Quarter 1 2021, an increase of 28% over the 620 MW installed in Quarter 1 2020 (see Figure 3.1).

The observed growth in capacity year on year was driven by increasing numbers of rooftop solar PV installations and the increasing average system size. Installations grew by 22% from 83,000 in Quarter 1 2020 to 101,000 in Quarter 1 2021, while average system size grew from 7.5 kW in Quarter 1 2020 to 7.8 kW in Quarter 1 2021 (see Figure 3.2).

New South Wales and Queensland continued to lead rooftop solar PV uptake across Australia, followed by Victoria and Western Australia (see Table 3.1).

Victorian installed capacity fell by 18% from Quarter 4 2020 to Quarter 1 2021 (see Figure 3.3). This result was expected following the large number of installations that were completed in Quarter 4, as businesses worked through the backlog of applications accrued under the Solar Homes Program during the Stage 4 Victorian lockdown.[39] The seasonal variability towards installations of smaller system size in Quarter 1 compared to Quarter 4 also contributed to this decline (see Figure 3.2).[40]

The decline in installations is driven by the STC deeming period declining each year from 1 January. The declining deeming period incentivises consumers to bring forward purchasing decisions and businesses to complete installs before December 31 of each year to maximise the number of certificates per system.

Additionally, less installations are usually completed in January due to many solar businesses closing for the Christmas and school holiday shutdown and homeowners being away and therefore unable to grant access to the property.

Given these typical constraints, the strong result for Quarter 1 sets a very positive outlook for the remainder of 2021.

An estimated 2,100 batteries were concurrently installed alongside rooftop solar PV in Quarter 1 2021, a 5% increase on the 2,000 batteries installed in Quarter 1 2020.

[39] For more information see the December 2020 Quarterly Carbon Market report.
[40] The reasons for this seasonal variability have not been fully investigated and remain unclear.

While it is important to note the data is incomplete as disclosure of battery installations to the Clean Energy Regulator is voluntary, the rising trend is a watchpoint for consumer sentiment on becoming more self-sufficient with respect to their electricity use.

Table 3.1 Estimated rooftop solar PV (<100 kW) capacity by state, Quarter 1 2021

| | Estimated capacity (MW) |
|---|---|
| ACT | 12 |
| NSW | 258 |
| NT | 3 |
| QLD | 200 |
| SA | 69 |
| TAS | 7 |
| VIC | 151 |
| WA | 97 |
| Total | **792** |

Figure 3.2 SRES installations and average kW capacity, Q1 2019 to Q1 2021

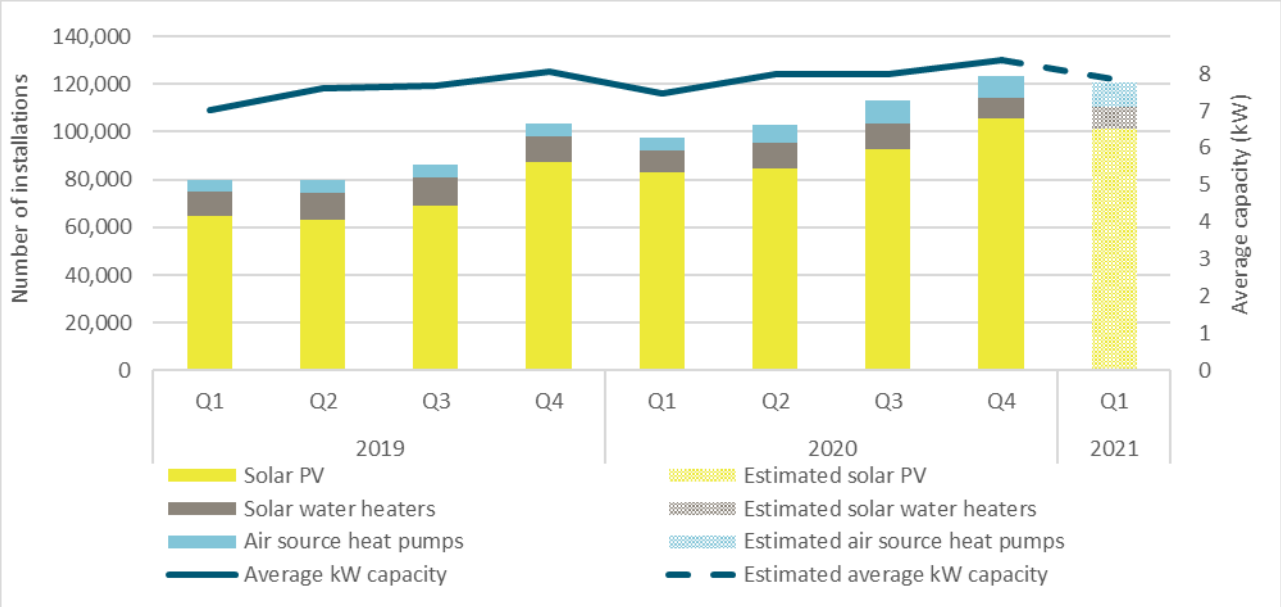
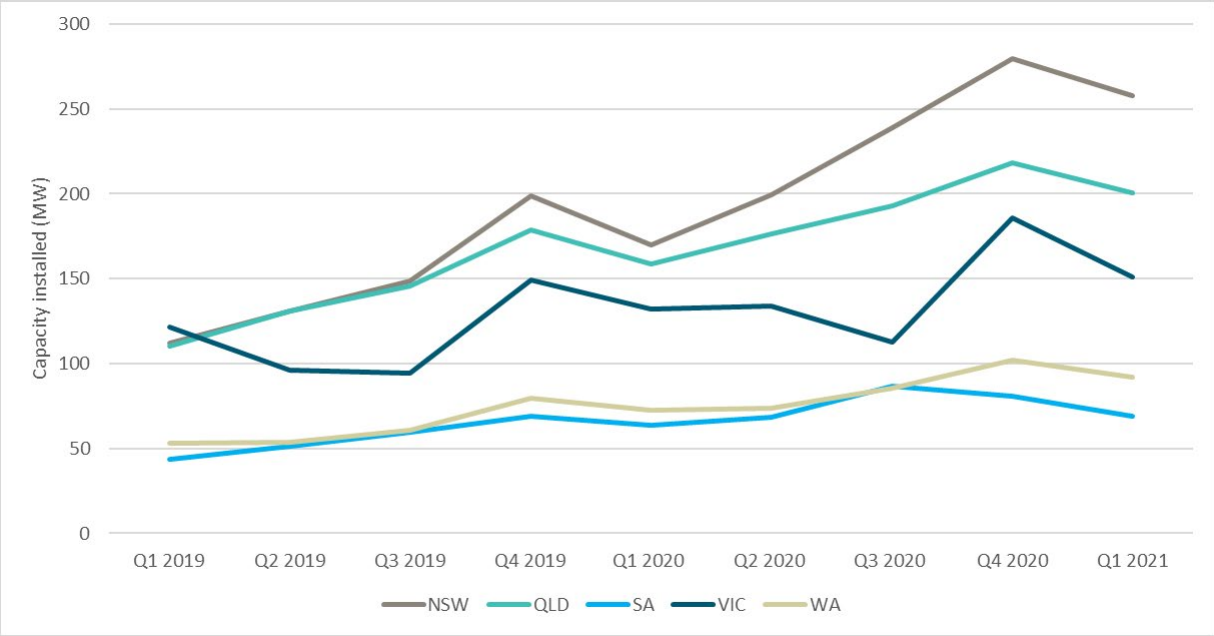


Figure 3.3 Solar PV capacity installed by state (MW), Q1 2019 to Q1 2021




**An evolving electricity network**

Homeowners are investing in electricity generation infrastructure that is delivering emissions reductions for Australia.[41]

In Quarter 1 2021, $701 million was invested in rooftop solar PV under the SRES. Of this, $483 million was invested in residential systems (≤15 kW) with an average cost per watt of $0.84. A further $217 million was invested in commercial systems (>15 kW), with an average cost per watt of $1.00.[42]

Household (<15kW) rooftop solar has been growing on average 39% year on year since 2017. Commercial (15 kW to 100kW) and industrial (100 kW to 5 MW) rooftop solar capacity increased by only 5% from 2019 to 2020 possibly owing to the increased financial uncertainty caused by COVID-19. However, it is likely to continue growing as corporates seek to voluntarily reduce their emissions.

Combined, total cumulative rooftop solar (1 kW to 5 MW systems) equalled 13.8 GW of renewable capacity by the end of 2020, changing how the national electricity grid and market need to operate.

Various rule changes aimed at supporting stability and more efficient integration of distributed energy resources in the grid (including rooftop solar PV) are being introduced and explored by the AEMC. These include new minimum technical standards for rooftop solar to help manage voltage disturbance and pricing reforms related to export of electricity to the grid.

State governments are exploring approaches to quickly introduce new or changed timing of loads that can follow the increased supply of renewable generation from rooftop solar. This includes battery trials, electric vehicles, demand management and load shifting of hot water heaters to periods of peak renewables supply.[43] The latter is already being tested in South Australia.[44]

In a system rapidly changing with high penetration of renewables, multiple approaches are needed to ensure grid stability.

With an upper bound estimate of 4 GW of added capacity for 2021, and no sign of decreasing rooftop solar growth, Australia could

[41] For more information, see the Department of Industry, Science, Energy and Resources' Australian emissions projections for 2020.
[42] These figures are based on Clean Energy Regulator analysis and Solar Choice's commercial and residential solar PV indexes. For more information on the methodology see the December Quarter 2020 Quarterly Carbon Market report.
[43] For more information, see the Queensland Government's Network-connected battery storage trial announcement, Ausgrid's community battery announcement, Victorian Government's Neighbourhood Battery Initiative consultation.
[44] With the support of the Australian Renewable Energy Agency, Rheem will test the feasibility and value of aggregating approximately 2400 hot water systems to provide services in the wholesale energy and Frequency Control Ancillary Services markets.

add another 20 GW of rooftop solar by 2025. Hence, more needs to be done pre 2025 in addition to proposed market reforms post 2025.

New approaches that recognise and monetise benefits, wherever they appear in the system – at the distribution or transmission network level – are needed to underpin new investments.

Deployment of community batteries in the distribution network to soak up excess generation from rooftop solar, and discharge electricity at evening peak demand, currently face economic hurdles. However, community batteries provide multiple benefits such as:

- Less ramping of thermal generation, and less wear and tear, potentially prolonging the life of thermal generation assets,
- Improved utilisation of renewable energy and the ability to smooth generation load profiles,
- Easier grid management for AEMO and the distribution networks,
- Reducing the need for additional expenditure on high and low voltage network upgrades.

Future Quarterly Carbon Market reports will explore these issues in more detail.

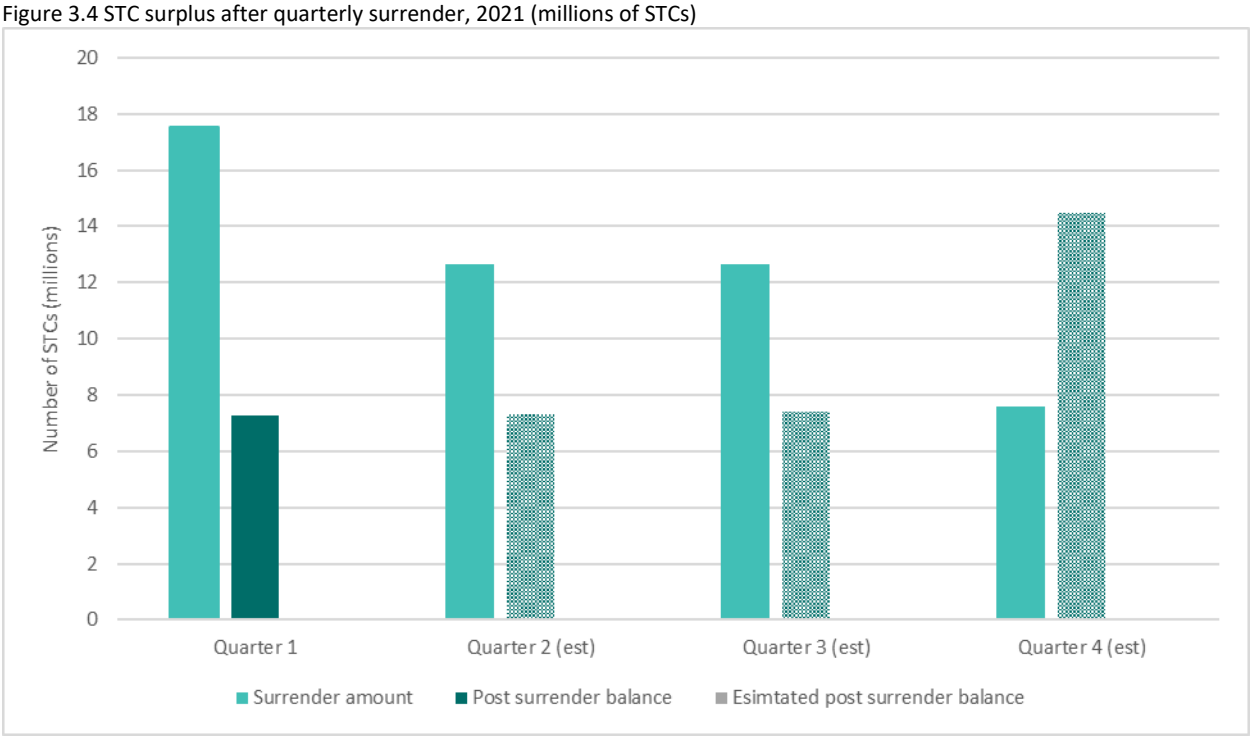
## 3.3. Factors impacting demand

### Quarterly surrender

17.5 million STCs were surrendered by 123 liable entities to meet their STC quarter 1 obligations on 28 April 2021. This was the first surrender period of the 2021 assessment year, representing 35% of total liability. The surrender compliance rate was 99.9%, leaving a balance of 7.2 million STCs (see Figure 3.4).

12.7 million STCs are required to be surrendered by liable entities to meet their quarter 2 surrender obligations on 28 July 2021. Based on current creation trends, a surplus of 7.3 million STCs is expected to be in the market after the Quarter 2 2021 surrender.

Figure 3.4 STC surplus after quarterly surrender, 2021 (millions of STCs)



## 3.4. Market trading

Over Quarter 1 2021, 33.6 million STCs were traded on the open market through 3,800 transactions, with an average transaction size of 8,870 STCs (see Figure 3.5). Less than half a percent of the STCs traded in Quarter 1 2021 were through the clearing house, consistent with previous quarters.

## 3.5. Spot price

STC spot prices fluctuated between $38.00 and $39.30 during Quarter 1 2021, ending the quarter at $38.85. The STC spot prices experienced a brief peak of $39.30 in early March, following the release of the STP. However, it quickly moderated down to $38.85 as the market recognised there would be more than sufficient liquidity to meet liability surrenders (see Figure 3.6).

Figure 3.5 STC market transactions, Q1 2019 to Q1 2021

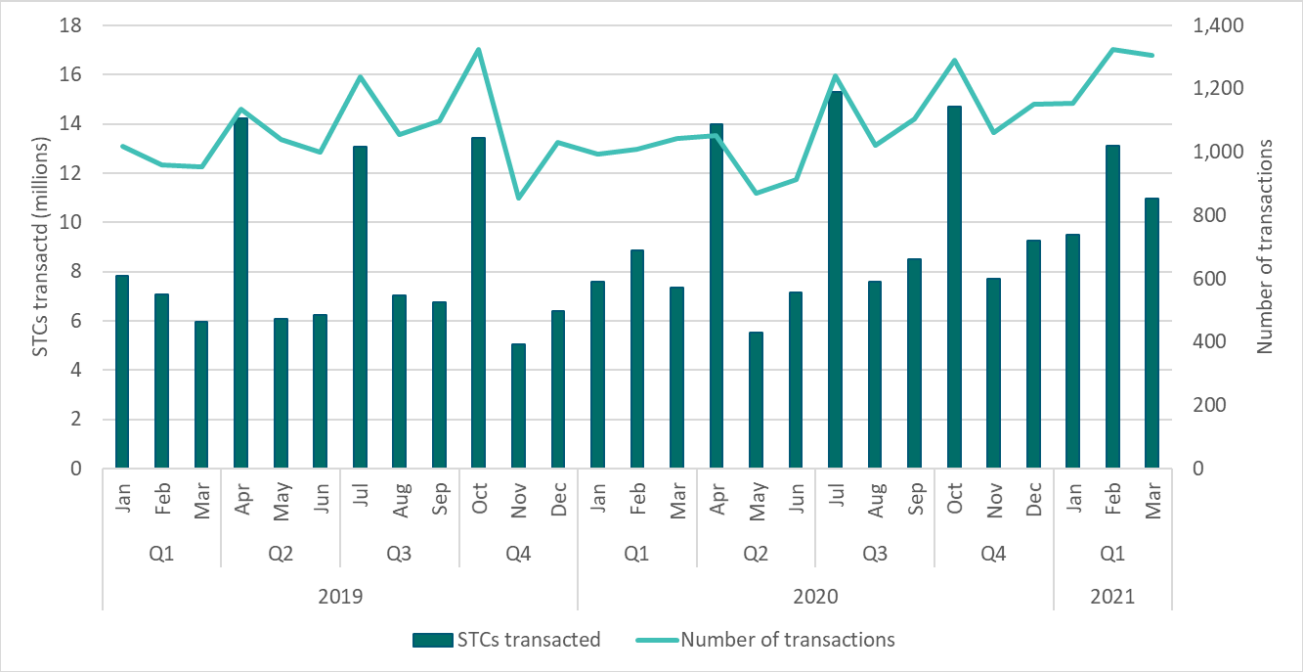
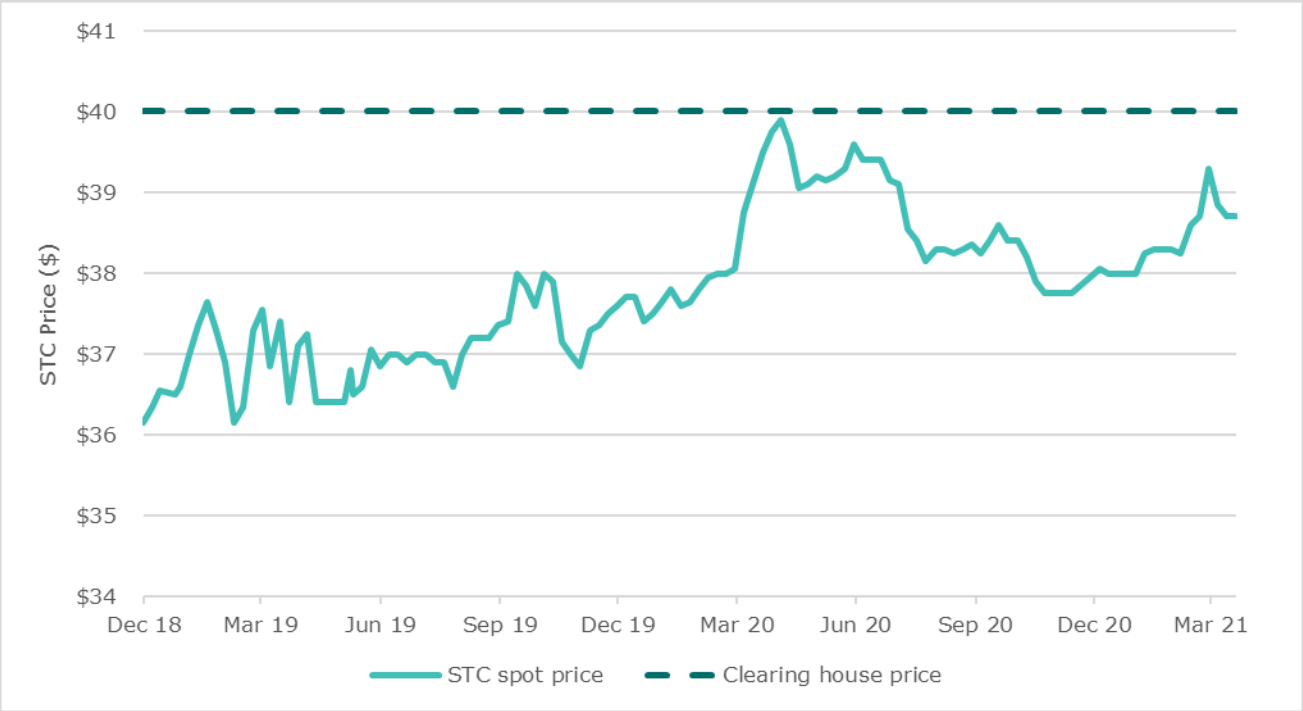



Figure 3.6 STC spot and clearing house prices ($AUD), Q4 2018 to Q1 2021



## The 2021 Small-scale Technology Percentage (STP)

The SRES aims to balance STC supply and demand by requiring all STCs that are created be surrendered over time. To do this each year the STP is set to require liable entities to surrender STCs equal to the amount estimated to be created for that year, plus or minus an adjustment for previous over and under surrenders.

Each year the Clean Energy Regulator recommends a STP to the Minister.[45] To date, the Minister has always accepted the Clean Energy Regulator's recommendation.

The 2021 STP is 28.80%. It was legislated on 3 March 2021 through an amendment to the Renewable Energy Regulations, following a decision by the Minister for Energy and Emissions Reduction.

As per the *Renewable Energy (Electricity) Act 2000*, the Minister must consider, but is not limited to, the following matters when setting the STP:

- an estimate of the amount of electricity to be acquired by liable entities
- an estimate of exemptions for Emissions Intensive Trade Exposed facilities
- an adjustment for STC creations above or below STC surrenders in the preceding year
- an estimate of STC creations.

While the first three matters are estimated from Clean Energy Regulator's data, the STC creation estimate for the year is the average of consultants' projections based on SRES data to 31 December of the previous year. This estimate is driven primarily by trends in number and capacity of rooftop PV installations.[46]

The factors the Minister must consider do not include liquidity for the STC market to operate, which can potentially lead to insufficient supply with the first quarter surrender being 35% of the total liability for the year. If the consultants engaged by the Clean Energy Regulator accurately or over estimate the capacity and certificates for a year, the market would experience a material shortage of certificates, increasing the STC spot price to $40 and the Clearing House would have a material share of the market and impact significantly on the secondary market.

The Clean Energy Regulator considers the average of the consultants' projections to be a reasonable approach for estimating the STC creations for the year. Predicting the future is inherently difficult, particularly for consumer products where state and territory government incentives also have an effect.

There can be significant differences in consultants' estimates. The average approach allows for a moderation of potentially both the more conservative and optimistic outlooks on the STC creations for the year. This usually ensures the STP is set moderately and adequate liquidity exists within the STC market.

Experience has proven that an STP that ends up being conservative does not have any material downside impact on the STC price as the market has confidence that any surplus will be added into the next year's STP. This has proven to be the case again this year.

For 2021, the average of consultants' projections for rooftop PV was 2.8 GW.[47] However, based on Quarter 1 2021 data and expected seasonal trends throughout the remaining quarters, the installed capacity for 2021 is expected to be 3.5 GW to 4 GW. The difference is largely due to ongoing growth in the average system size and number of installs continuing to outpace the Clean Energy Regulator's consultants' expectations.

This means material surplus of approximately 14.5 million STCs is expected to emerge by the end of the 2021 calendar year. Despite this surplus and higher market liquidity, the STC price remains strong at $38.85 at the end of Quarter 1 2021.

[45] For more information, see the Clean Energy Regulator's 2021 STP calculation webpage.
[46] In addition to PV systems, the SRES includes technologies such as solar water heaters and air sourced heat pumps, which are responsible for only a small proportion of STC creations.
[47] For more information, see the Clean Energy Regulator's Small-scale technology percentage modelling reports webpage.

## 3.6. Key dates

| Date | Event | Significance |
|---|---|---|
| **28 July 2021** | Quarter 2 surrender period | A liable entity must surrender 25 per cent of liability for the year in the REC Registry for this quarter. |
| **30 September 2021** | Variation application period | The final date for liable entities to apply to vary their required surrender amount(s) for quarters 1 to 3 under section 38AF of the *Renewable Energy (Electricity) Act 2000* (provided an energy acquisition statement was lodged on or before 1 April for the assessment year). |
| **28 October 2021** | Quarter 3 surrender period | A liable entity must surrender 25 per cent of liability for the year in the REC Registry for this quarter. |
| **31 December 2021** | Application for liable entity required surrender amount due | The final date for liable entities to apply to set their required surrender amount for quarters one to three where no energy acquisition statement was lodged by 1 April of the assessment year. |

# 4. Voluntary private and state and territory government markets

## 4.1. Domestic carbon market

Demand for ACCUs and LGCs for voluntary private, and state and territory government demand reached 532,000 in Quarter 1 2021. This is the highest Quarter 1 surrender on record, up 39% from Quarter 1 2020.

**LGC demand**

358,000 LGCs were surrendered in Quarter 1 2021, 33% more than the volume surrendered in Quarter 1 2020 (see Figure 4.1). Corporate and business intention to demonstrate use of renewable energy has driven this increase in LGC surrender.

Nearly 194,000 certificates were surrendered by business and corporates for their self-administered renewable energy targets, accounting for 54% of the total surrendered volume this quarter.[48]

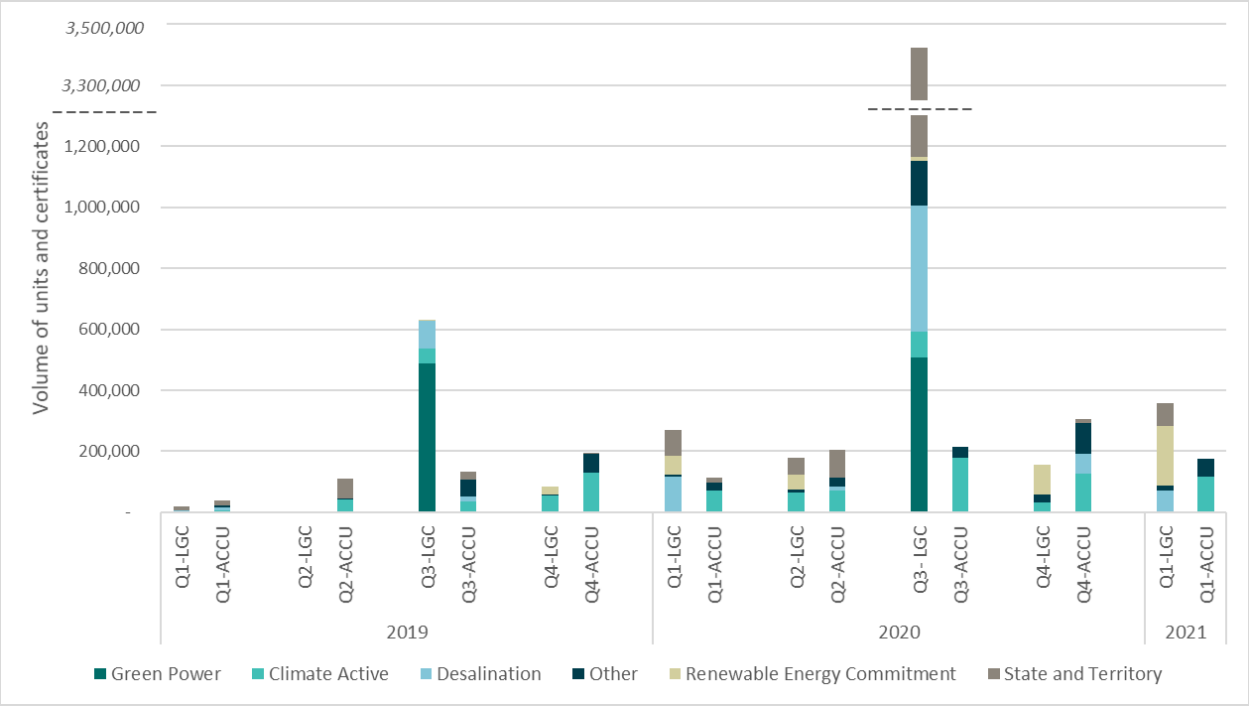
Further growth is expected as more businesses set their own renewable targets or subscribe to international programs.

For example, Coca-Cola Amatil has joined the RE100 program, which accepts and encourages the use of LGCs to demonstrate renewable energy commitments.[49]

The ACT government expects to surrender LGCs later in the year towards its 100% renewable status. Nearly 2.3 million LGCs were surrendered in July 2020 against its 2019-20 renewable energy commitment as discussed in the September Quarterly Carbon Market report 2020.[50]

Combined with corporate interests to use renewable energy, this is expected to take LGC voluntary surrenders to at least 5 million certificates in 2021.

Figure 4.1 Voluntary private and state and territory government demand for ACCUs and LGCs, Q1 2019 to Q1 2021




Note: Dashed lines indicate a break in the y-axis. Q3 2020 State and Territory LGC demand totals 2.3 million.

[48] This excludes surrenders by business and corporates against government programs including Greenpower and Climate Active, which are accounted for separately in the data.
[49] Australian Financial Review, Coca-Cola to crack renewable target by 2030 across Asia-Pacific, 13 April 2021.
[50] The ACT has legislated the methodology for determining the number of certificates required to be surrendered Climate Change and Greenhouse Gas Reduction (Renewable Electricity Target Measurement Method) Determination 2020.

**ACCU demand**

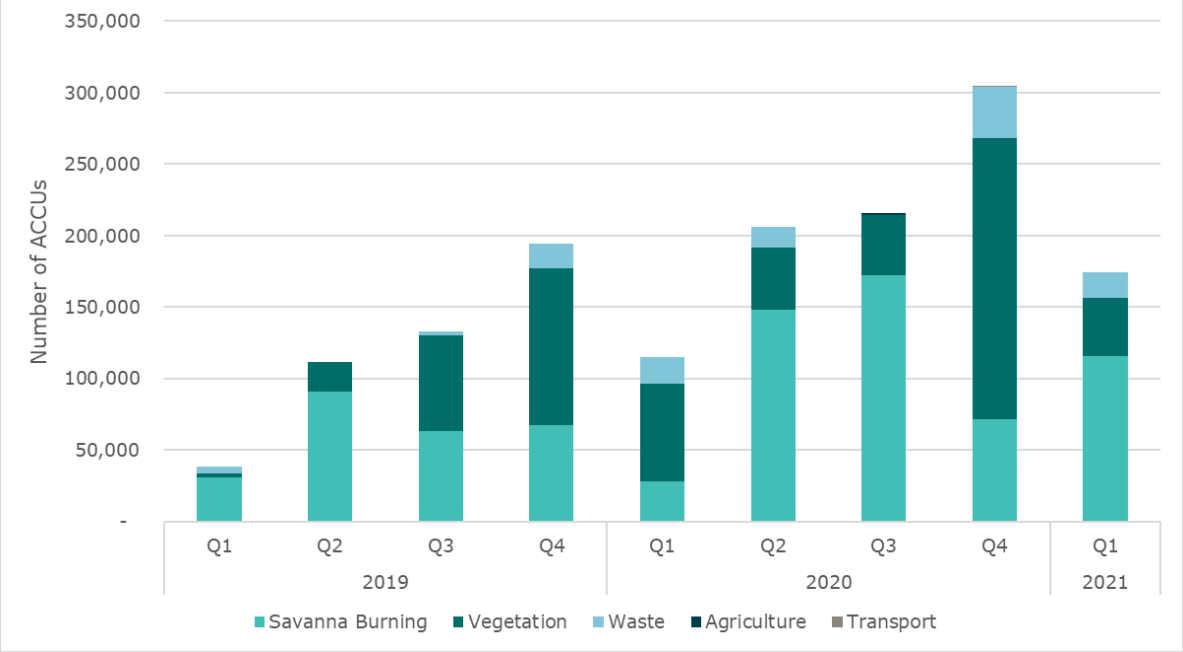
Voluntary private and state and territory government demand for ACCUs totalled 174,000 in Quarter 1 2021, a 52% increase on the 115,000 ACCUs cancelled in Quarter 1 2020. Surrenders from Climate Active participants increased by 67% in this quarter compared to Quarter 1 2020, with 117,000 ACCUs.

In Quarter 1 2021, 34 entities cancelled ACCUs, with 19 entities cancelling ACCUs for the first time.[51] In comparison, 24 entities cancelled ACCUs in Quarter 1 2020. The air transport sector dominated, accounting for 64% of the voluntarily cancelled volume.

With a strong Quarter 1, which typically sees the lowest quarterly cancelations each year, the voluntary private and state and territory government ACCU demand is on track to exceed an estimated 1 million in 2021.

Voluntary market participants continue to show a preference for ACCUs from savanna burning projects, which accounted for 66% of voluntary surrenders in Quarter 1 2021 (see Figure 4.2). Market participants indicate that these certificated are favoured due to the associated Indigenous co-benefits from these projects.

Figure 4.2 Voluntary private and state and territory government ACCU demand by method type, Q1 2019 to Q1 2021




## 4.2. Growth in voluntary market

Quarter 1 2021 saw supermarket giant Coles Group commit to a target of net-zero emissions by 2050. With this announcement, the three largest supermarket chains in Australia – Coles Group, Woolworths Group and ALDI Stores – have now committed to and set strategies for achieving net-zero status by 2050.

Combined, these three supermarket chains are responsible for 4.2 million tonnes $CO_2$-e of emissions – 1.0% of Australia's reported emissions in 2019-20 (see Table 4.1).[52]

[51] The total number of buyers have been identified from ANREU transactions data. This excludes transactions where the reason for cancellation is unknown, totalling 4 transaction (19,000 ACCUs).

[52] Data sourced from Corporate emissions and energy data 2019-20, ALDI, the Woolworths Group, and the Coles Group.

Table 4.1 Australia's three largest supermarkets reported emissions and emissions reduction targets

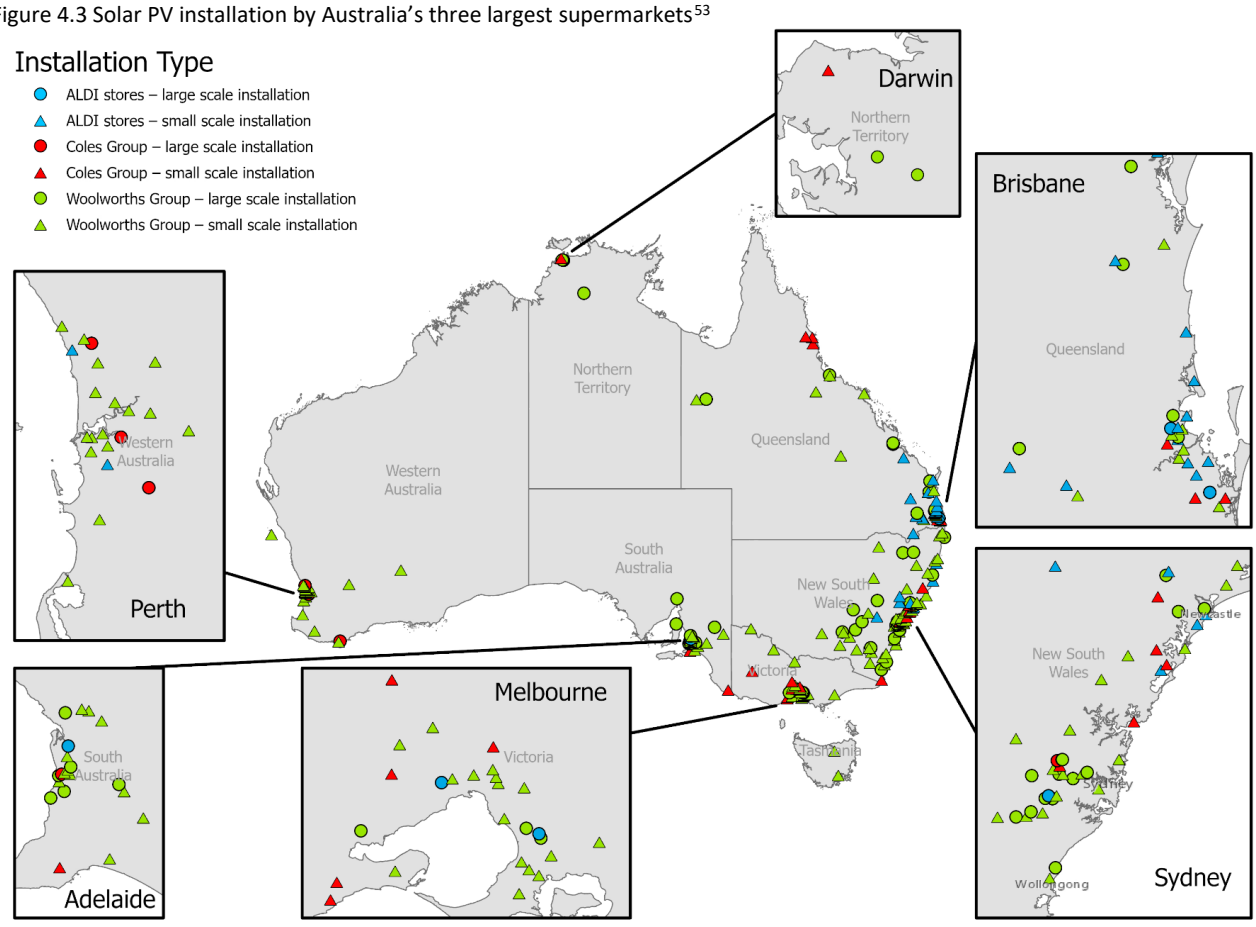
| | Combined scope 1 and scope 2 emissions in 2019-20 (million t $CO_2$-e) | Share of Australia's reported emissions in 2019-20 | 100% renewable energy target | Net-zero emissions target |
|---|---|---|---|---|
| **Woolworths Group** | 2.35 | 0.57% | by 2025 | by 2050 |
| **Coles Group** | 1.60 | 0.39% | by 2025 | by 2050 |
| **ALDI Stores** | 0.27 | 0.07% | by 2021 | by 2050 |

Carbon markets administered by the Clean Energy Regulator are playing a vital role in supporting these supermarkets to reach their emissions reduction goals. Scope 2 emissions from energy consumption makes up 82.4% of the total emissions of these supermarkets.

As such, reducing reliance on grid electricity is a key strategy that all three corporates have adopted.

To-date, the three supermarket chains have installed a combined 62 MW of solar PV capacity across 436 stores and distribution centres to reduce energy consumption from the grid (see Figure 4.3).

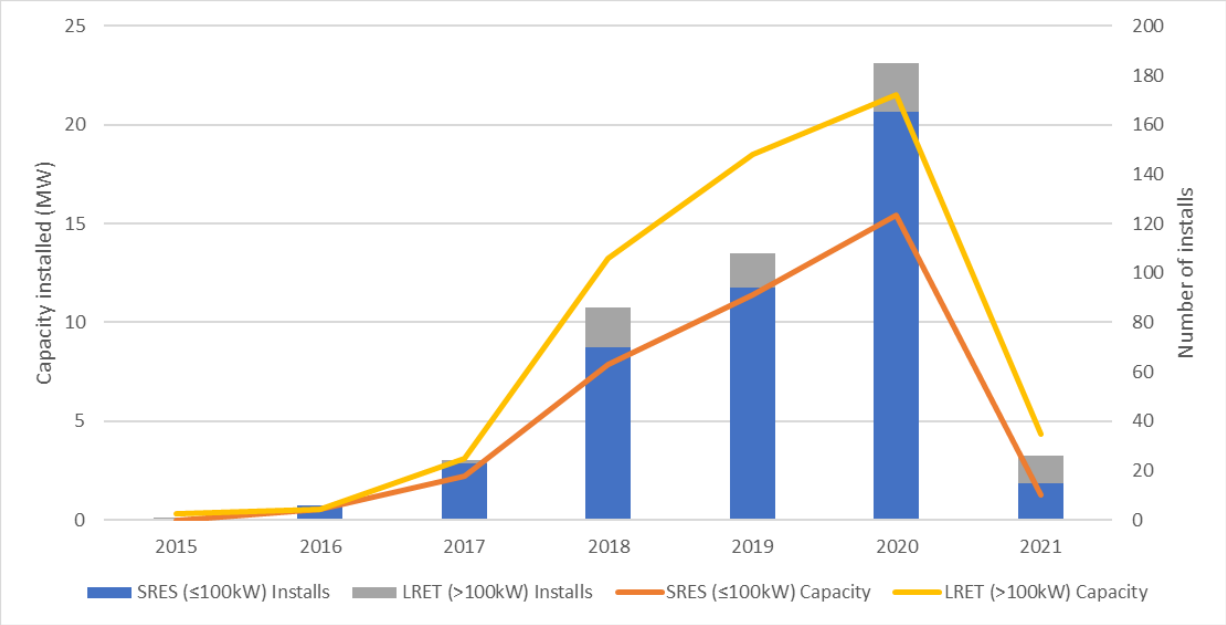
Figure 4.3 Solar PV installation by Australia's three largest supermarkets[53]




[53] Based on Clean Energy Regulator's data as at 31 March 2021 and may not show location for all solar PV installations.

Solar PV systems have been installed both under the SRES (≤100 kW) and the LRET (>100 kW), with system sizes ranging from 12 kW to 1.7 MW. At the end of Quarter 1 2021, the 3 supermarket chains have installed a total of 39 MW under the SRES, and 23 MW under the LRET. Capacity of solar PV installed by these supermarkets has increased year on year and will likely continue in 2021 as supermarkets progress towards their renewable energy targets (see Figure 4.4).[54]

Figure 4.4 Solar PV installation by Australia's three largest supermarket chains (as at 31 March 2021)




In addition to on-site solar PV installations, Coles Group and ALDI Stores have secured power purchase agreements (PPAs) to source renewable energy from large-scale solar and wind farms across the nation.

ALDI Stores has PPAs with Collector wind farm in NSW and Dundonell wind farm in Victoria, covering 100% of ALDI's electricity demand from their NSW and VIC stores and distribution centres.

Coles Group has PPAs with Wagga Wagga, Junee and Corowa solar farms in NSW, and Lal Lal wind farm in Victoria. Coles Group has signed a PPA with QLD state-owned CleanCo Queensland to cover more than 90% of electricity demand from its QLD stores, and has secured PPAs with electricity utility companies ENGIE and Neoen.

The supermarkets will voluntarily surrender LGCs generated from these projects to demonstrate progress towards respective renewable energy targets.

Woolworths Group has also invested in developing projects under the ERF nation-wide, including a waste project and an energy efficiency project. These projects aim to divert food waste from landfills and avoid emissions through electricity and fuel efficiency activities respectively.

Both projects secured Commonwealth contracts in 2016 committing to deliver 565,000 tonnes of abatement over a 7-year period. To-date, these projects have been issued with over 373,000 ACCUs and have delivered 226,000 ACCUs against their contracts.

Efforts to reduce emissions have seen these corporates pledge participation in multiple programs. Both Woolworths Group and ALDI are signatories to the Science Based Target, which provides a clearly-defined pathway for companies to set emissions reduction targets consistent with an aim to limit global warming to well-below 2°C above pre-industrial levels and pursue efforts to limit warming to 1.5°C.

[54] ALDI has committed to power all their stores and distribution centres using renewable energy from 2021.

Woolworth Group also became a RE100 member in November 2020, committing to source all their electricity through renewable sources.

Starting from 2021, NGER reporters, including these supermarkets, will also have access to the Corporate Emissions Reduction Transparency report (CERT), an initiative by the Clean Energy Regulator (see below).

The CERT will aid in demonstrating how corporates, including these supermarkets, are tracking against their emissions reduction and renewable energy targets.

**An update on the Corporate Emissions Reduction Transparency report**

The Corporate Emissions Reduction Transparency (CERT) report is a voluntary initiative that provides a framework to demonstrate the net annual emissions and energy position of participating NGER reporters. It supports their climate action claims by providing a trusted and independent source of information and encourages voluntary participation in Australia's carbon markets.

During Quarter 1 2021 the Clean Energy Regulator sought feedback on the CERT proposal 2021 and received 57 submissions.

The vast majority of submissions supported development of a net emissions report that enables corporations to track progress against their voluntary targets.

Stakeholders also expressed support for CERT to align with other domestic and international sustainability reporting frameworks and flexibility to provide context for their targets and emissions reduction journey.

The Clean Energy Regulator is embarking on a co-design process with key stakeholders to settle details and ensure CERT is fit for purpose. It is expected that the CERT guidelines will be available in the latter half of the year.

## 4.3. Prices

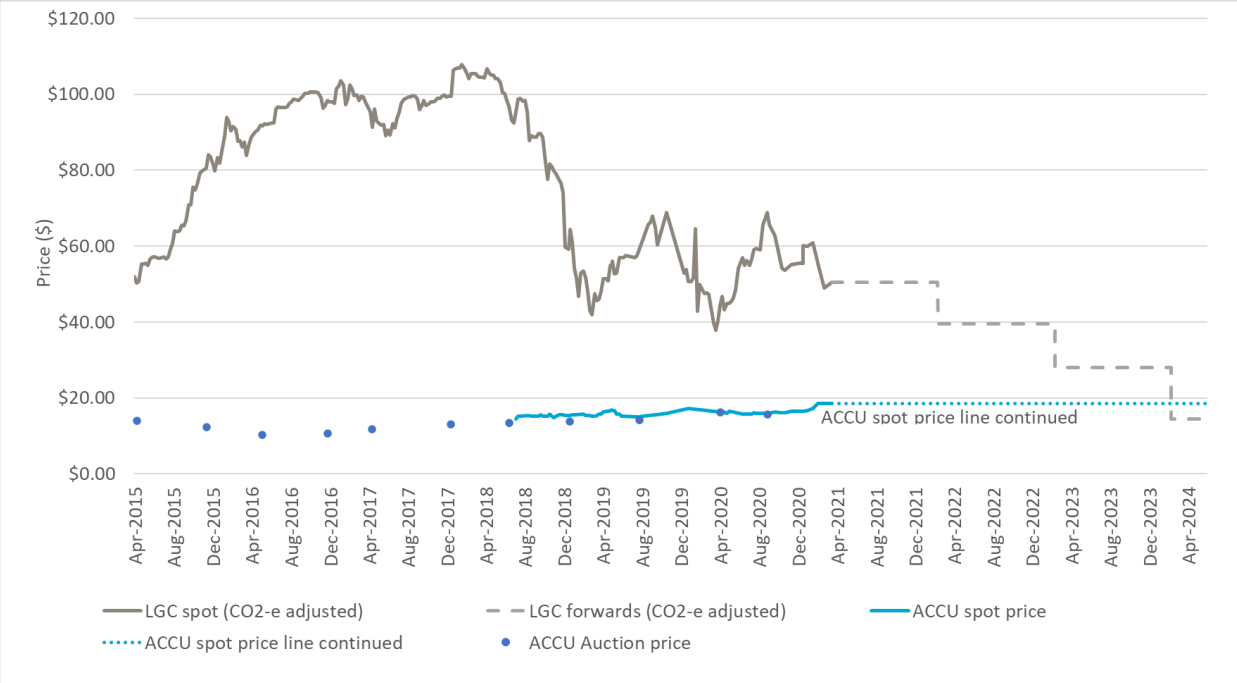
The Clean Energy Regulator is continuing to monitor forward prices to determine the point of potential convergence between ACCUs and the equivalent carbon content of LGCs. At current prices, it is anticipated this may occur in early 2024 (see Figure 4.5).

The current estimated timeline for convergence has shifted out from early 2023 as was estimated at the end of Quarter 1 2020.[55]

A declining emissions intensity factor in the national grid, which is used here to derive the implicit carbon content value of an LGC, means future LGC prices need to decrease further to converge on the current spot price of an ACCU. However, as discussed in Chapter 2, increasing voluntary demand for LGCs, and material shortfall charge that can be commercially redeemed by cancelling LGCs in the future, has led to LGC spot prices being higher than past forward prices had assumed. For example, Cal23 LGC price has increased from $10 at the end of Quarter 1 2020 to $18.50 at the end of Quarter 1 2021.

[55] For more information see the March Quarter 2020 Quarterly Carbon Market Report.

Figure 4.5 ACCU and LGC price convergence ($AUD), 2015 to 2024^




^The convergence may occur earlier or later depending on the actual future LGC and ACCU prices. The estimate is based on continuation of current ACCU spot prices, as forward prices for ACCUs are not available. If, for example, ACCU prices rise and LGC prices fall further over this period the convergence will occur earlier.

## 4.4. Other units

New Zealand held its inaugural carbon auction on 17 March selling 4.75 million NZUs at NZ$36 per unit. The NZU spot price fell from NZ$38.75 prior to the auction to NZ$36.90 at the end of March (see Table 4.2). New Zealand will run quarterly auctions with a 'confidential reserve price' mechanism, designed to ensure the auction price does not fall significantly below the market price.

EUA prices increased from AUD$51.73 to AUD$65.70 over Quarter 1 2021. Steeper decline in annual allowance from 2021 onwards is expected to keep EUA prices high.

Certified emissions reduction (CER) unit cancellations in ANREU totalled 1.8 million this quarter, compared to 0.8 million cancelled in Quarter 1 2020. Of the 1.8 million cancelled CERs, nearly 650,000 were cancelled to convert into Verified Carbon Units (VCUs) under the 'Verified Carbon Standard' (VCS) program. This is likely due to VCUs fetching a higher price compared to CERs.[56] Voluntary participants continue to show preference for CERs possibly due to their significantly lower price compared to domestic offset units.

[56] The VCS allows for greenhouse gas emission reductions and removals issued by an approved greenhouse gas program, such as CER under the Clean Development Mechanism, to be cancelled and issued as VCUs in the VCS registry.

Table 4.2 Domestic and international carbon market spot prices ($AUD)

| Product | Spot price AUD (31 March 2021)[57] | Quarterly trend[58] |
|---|---|---|
| ACCU | $18.50 | $1.95 (+12.0%) |
| LGC ($CO_2$-e) | $50.57 | -$3.75 (-7.0%) |
| ESC | $30.20 | $1.90 (+7.0%) |
| VEEC | $52.10 | $9.85 (+23.0%) |
| CER | $0.56 | -$0.01 (-2.0%) |
| EUA | $65.70 | $13.97 (+27.0%) |
| NZU | $34.32 | -$0.60 (-2.0%) |
| KAU | $19.91 | -$2.75 (-14.0%) |

CERs - Certified emissions reduction (CER) units are issued through the Clean Development Mechanism.
EUA - European Union Allowances (EUA)
NZU - New Zealand Carbon Units (NZU)
KAU - Korean Allowance Units (KAU)
ESC - Energy Saving Certificates (NSW)
VEEC - Victorian Energy Efficiency Certificates

[57] Prices are converted to Australian dollars and were correct at time of conversion at 31 March 2021. Data sourced from Jarden, TFS Green, ICE, Korea Exchange.
[58] This is the quarterly trend from the end of Quarter 4 2020 to the end of Quarter 1 2021.

# 5. Emissions reduction

## 5.1. National emissions reduction

The schemes administered by the Clean Energy Regulator are on track to deliver 57 million tonnes of emissions reduction ($CO_2$-e) in 2021, up 7% on 2020 (see Figure 5.1). This is in line with expectations for the year set out in the December Quarter 2020 Quarterly Carbon Market report.[59]

The LRET is estimated to deliver emissions reductions of 24.3 million tonnes $CO_2$-e, an increase of 6% from 2020. This includes 2.9 million tonnes $CO_2$-e corresponding to 4,400 GWh of renewable generation expected from voluntary demand for LGCs.

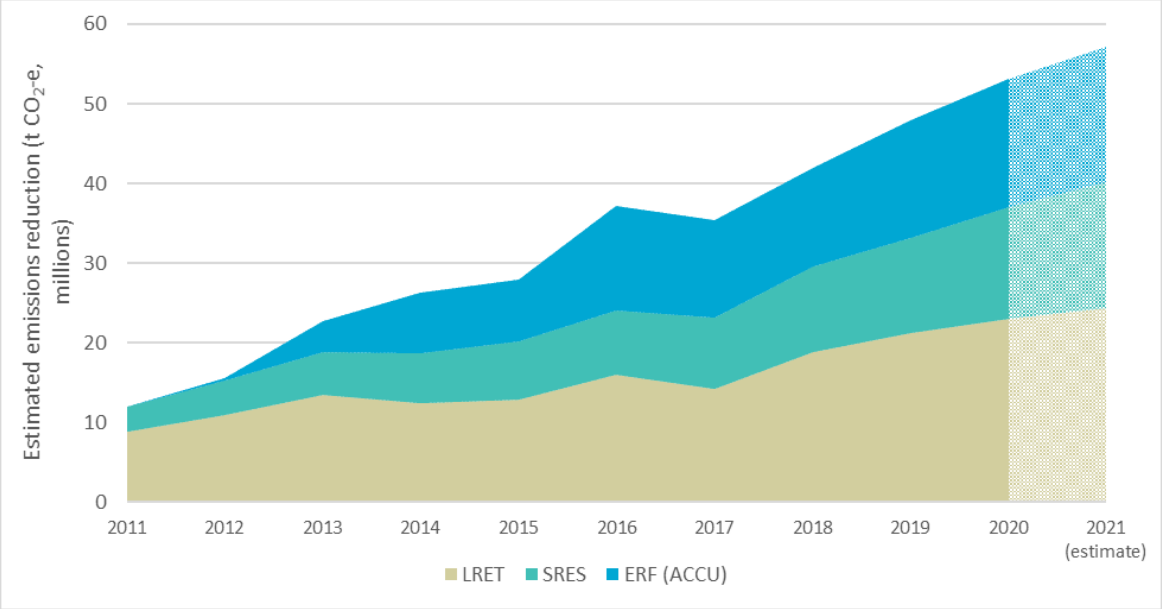
A further 15.8 million tonnes $CO_2$-e of emissions reduction is expected to come from the SRES in 2021, an increase of 12% from 2020.

The ERF is expected to deliver ACCUs representing 17 million tonnes of $CO_2$-e in 2021, a 6% increase from 2020.

The Clean Energy Regulator's emissions reduction estimation method is considered conservative. It uses the average emissions intensity of generation from all fuel sources to derive the estimated emissions reduction. The average emissions intensity from all fuel sources is falling due to increasing penetration of renewables. As a result of this method, the decreasing emissions intensity lowers the estimated emissions reduction.

An alternative method that uses the weighted average emissions intensity of thermal generation displaced by additional renewable energy is an alternative representation of the emissions reduction delivered. Based on a preliminary analysis, this alternative method could result in a higher emissions reduction estimate of circa 75 million tonnes $CO_2$-e.[60]

Figure 5.1 Estimated emissions reduction from ERF and RET, 2011 to 2021 (t $CO_2$-e, millions)[61]




[59] The estimated total emissions reduction for 2021 is slightly higher than previously predicted 56.9 million tonnes $CO_2$-e due to updated generation and an increase in expected capacity of renewable generation.

[60] This preliminary analysis by the Clean Energy Regulator and its crude estimate are restricted by the limitations of the sample data used in the derivation and the assumptions regarding the displacement between renewable and non-renewable generation. It assumes that 1 MWh of additional renewable generation displaces 1 MWh of non-renewable generation based on a weighted average of generation and emissions from black coal, brown coal and gas in Quarter 1 2021 as sourced from OpenNEM. This new estimate and its methodology will be revisited in the next Quarterly Carbon Market Report to provide a more accurate estimate taking into consideration a more representative generation mix for 2021 and a more robust displacement ratio between renewables and non-renewables.

[61] Annual values used in this graph can be slightly different from those reported in previous QCMRs for some years due to updated generation, scheme information and minor revisions to the methodology.

## 5.2. National Greenhouse and Energy Reporting data release

On 25 February 2021, the Clean Energy Regulator published annual NGER data for 2019-20 (see Figure 5.2).[62] For 2019-20, corporations reported a total of 327 million tonnes $CO_2$-e of scope 1 greenhouse gas emissions, 86 million tonnes $CO_2$-e of scope 2 emissions and 3,834 petajoules of net energy consumed.[63]

Total scope 1 emissions in 2019-20 decreased by 10.1 million tonnes (3%) from 2018-19. This is largely owing to a reduction of 7.5 million tonnes (4.6%) in electricity sector emissions compared to 2018-19. The decrease in emissions was driven by the reduction in electricity generation from black coal and the increased use of renewables.

The electricity sector was the largest emitter in 2019-20, accounting for 47.9% of all scope 1 emissions. Mining and manufacturing accounted for 29.4% and 15% of total scope 1 emissions, respectively. Transport added a further 4.7%.

AGL Energy Limited, EnergyAustralia Holdings Limited and Stanwell Corporation Limited were the top three scope 1 emitters in 2019-20.

Queensland has the largest share of scope 1 emissions with 28.6% of all scope 1 emissions in 2019-20. Electricity generation, mining and oil and gas extraction are the most significant contributors.[64]

Queensland's emissions have increased by 2 million tonnes $CO_2$-e since 2016-17, the commencement year of the safeguard mechanism.[65] This was driven by a 7 million tonne increase in mining emissions that was partly offset by reductions in emissions from the electricity (2 million t $CO_2$-e) and manufacturing sectors (3.5 million t $CO_2$-e).

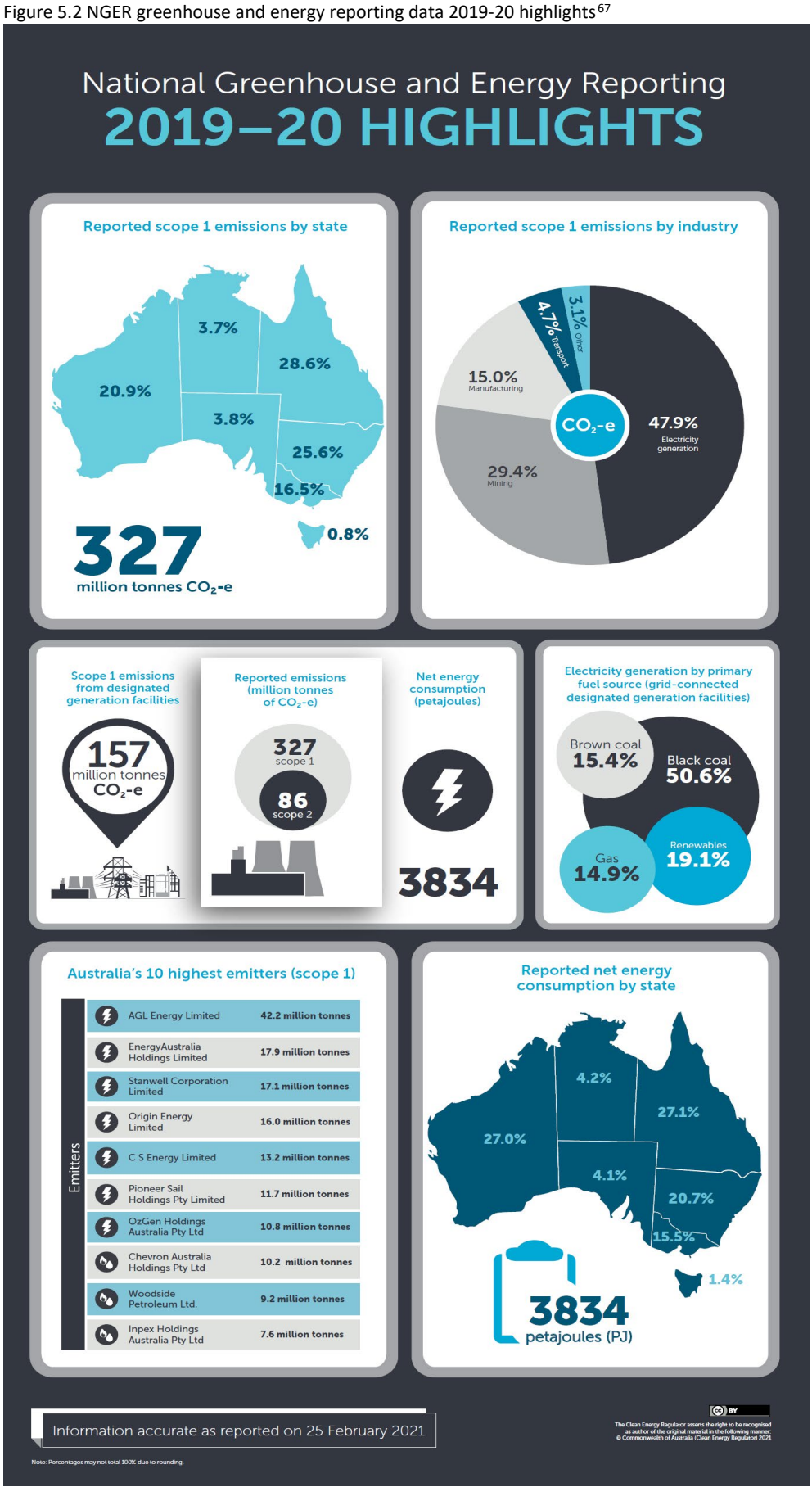
New South Wales (including Australian Capital Territory) reported the second most scope 1 emissions accounting for 25.6% of the national total, followed by Western Australia (20.9 %), Victoria (16.5%), South Australia (3.8%) and Northern Territory (3.7%). Tasmania's contribution was less than 1%.

In 2019-20, electricity generation remained the highest emitting industry in New South Wales (including Australian Capital Territory), South Australia and Victoria. Mining was the second highest contributor to New South Wales emissions. Oil and gas extraction was the second largest contributor in South Australia and Victoria, and the leading source of scope 1 emissions in Western Australia and Northern Territory.

Victoria's emissions, as a share of national scope 1 emissions, have reduced in recent years from 20.4% in 2016-17 to 16.5% in 2019-20 largely owing to the reduction in the electricity sector emissions driven by the closure of Hazelwood and the influx of renewable generation reducing emissions from remaining thermal generation units. Victoria's remaining coal power plants are currently the State's largest single source of greenhouse gas emissions.[66]

[62] Under the NGER, Australian corporations are required to report their emissions and energy information to the Clean Energy Regulator. For more information see the Clean Energy Regulator's website.
[63] Scope 1 emissions are those produced as a result of an activity at a facility level such as emissions from manufacturing processes or electricity production by burning coal. They are referred to as 'direct emissions'. Scope 2 emissions are produced from the indirect consumption of an energy commodity.
[64] These three industries account for a combined 23.77 percentage points of Queensland's scope 1 emissions.
[65] Safeguard mechanism encourages large facilities whose net emissions exceed the safeguard threshold, to keep their emissions at or below emissions baseline set by the Clean Energy Regulator. For more information see the Clean Energy Regulator's website.
[66] For more information see Environment Victoria's Greenhouse data media release.

Figure 5.2 NGER greenhouse and energy reporting data 2019-20 highlights[67]




[67] For more information, see the Clean Energy Regulator website.

# Glossary

| Term | Acronym |
|---|---|
| Australian carbon credit unit | ACCU |
| Australian Energy Market Operator | AEMO |
| Australian Energy Regulator | AER |
| Australian National Registry of Emissions Units | ANREU |
| Australian Renewable Energy Agency | ARENA |
| Certified emission reduction unit | CER |
| Climate Solutions Fund | CSF |
| Emissions Reduction Fund | ERF |
| Energy saving certificate | ESC |
| European Union allowance unit | EUA |
| Integrated Systems Plan | ISP |
| Gigawatt | GW |
| Large-scale generation certificate | LGC |
| Large-scale Renewable Energy Target | LRET |
| Land Restoration Fund | LRF |
| Marginal loss factor | MLF |
| Megawatt | MW |
| National Electricity Market | NEM |
| National Greenhouse and Energy Reporting Act 2007 | NGER |
| New Zealand unit | NZU |
| Power purchase agreement | PPA |
| Renewable Energy Certificate Registry | REC Registry |
| Renewable Energy Target | RET |
| Renewable power percentage | RPP |
| Small-scale Renewable Energy Scheme | SRES |
| Small-scale technology certificate | STC |
| Small-scale technology percentage | STP |
| Verified carbon unit | VCU |
| Victorian energy efficiency certificate | VEEC |
| Verified emission reduction unit | VER |

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