



Australian Government  
Clean Energy Regulator

CLEAN  
ENERGY  
REGULATOR

# Quarterly Carbon Market Report



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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 3 national carbon markets that the Clean Energy Regulator administers for the September quarter 2021 (July 2021 to September 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 Australian Government has announced or is consulting on proposed policy changes.

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

## Version history

Version	Date	Changes
1.00	26 November 2021	

# 2021 September quarter market outcomes and tracking against estimates



## Market outcomes

	Year to date 2021 results	Year on year change	2021 estimate	Tracking towards 2021 estimate
ACCUs issued	13.6m	▲ 25%	17m	✓
Renewable capacity installed - LRET	1.2GW	▼ 57%	2-2.5GW	✓
Renewable capacity installed - SRES	2.3GW	▲ 10%	3-4GW	✓



## Voluntary ambition

	Year to date 2021 results	Year on year change	2021 estimate	Tracking towards 2021 estimate
Voluntary surrender (domestic unit) - ACCUs	622,000	▲ 16%	1.0m	✓
Voluntary surrender (domestic unit) - LGCs	4.3m	▲ 10%	5.0m	✓
Voluntary surrender (international unit) - CERs	8.7m	▲ 104%		

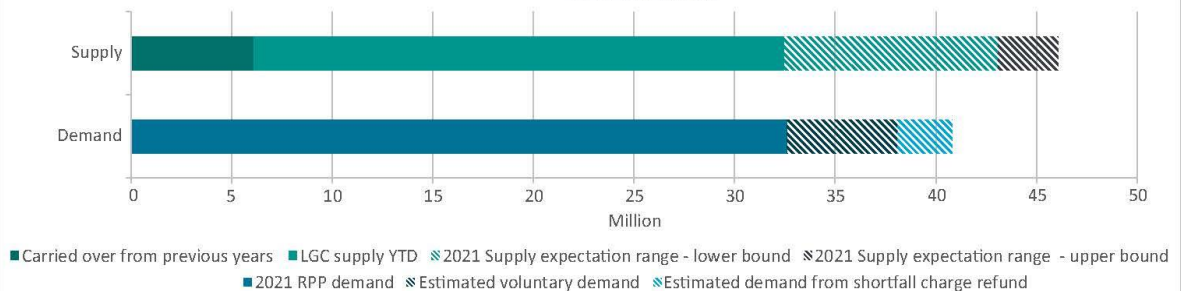


## Tracking market dynamics

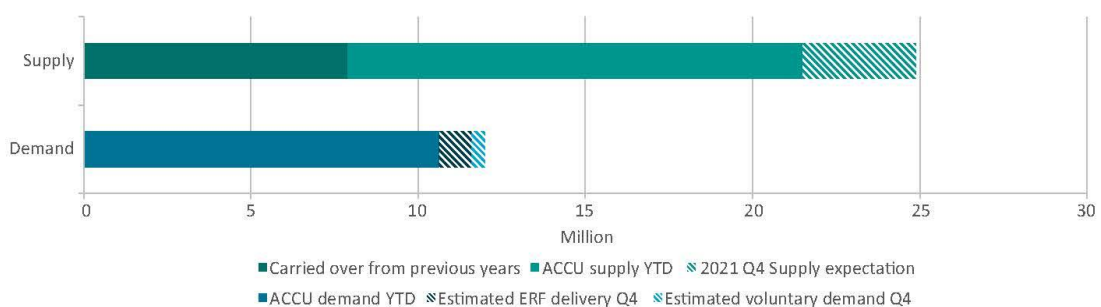
2021 STC market



2021 LGC market



2021 ACCU market



### LIST OF ACRONYMS

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

## Executive summary

Emissions in the electricity sector are declining quickly due to rapid renewables deployment displacing thermal generation. A record 32% of electricity generated in the NEM in Q3 2021 was from renewable energy. The 2021 calendar year is likely to average around 30%, double the 15% share in 2017.

Results from the September 2021 quarter (Q3) confirm total emissions reduction from the ERF and RET schemes remain on track for an estimated 57 million tonnes carbon dioxide equivalent (CO<sub>2</sub>-e) for the calendar year - approximately 17 million tonnes from ERF and 40 million tonnes from the RET - using the conservative method that calculates the implicit avoided carbon content of renewable generation<sup>1</sup>.

A less conservative estimate of avoided emissions from RET incentivised generation, based on estimates of the intensity of thermal generation displaced<sup>2</sup> would put total emissions reduction from the ERF and RET for this year at around 75 million tonnes CO<sub>2</sub>-e.

The 13th ERF auction held on 13 and 14 October 2021 resulted in 6.8 million ACCUs contracted under optional delivery contracts at an average price of \$16.94 per ACCU. There were no fixed delivery contracts.

This confirms the market sees value in optional delivery contracts to underwrite projects while providing the flexibility to sell the ACCUs to those who need them for voluntary emissions reduction ambition or statutory obligations.

Ahead of COP26 in Glasgow, the Government announced a commitment toward net zero emissions by 2050.

### ACCU supply continues to grow

New supply of ACCUs was 4.8 million units in Q3 – nearly double the supply in Q3 2020. This took total supply for the first 9 months of 2021 to 13.6 million, a 25% increase over the same period in 2020. Supply is now likely to exceed 2021 expectations of 17 million units.

The outlook for ACCU supply is positive. This quarter saw 54 new projects registered in the ERF bringing the total for the year to 145 projects, 67% higher than for the same period last year.

Two significant milestones were also achieved in Q3 – the registration of the 1000th ERF project and the issuance of the 100 millionth ACCU.

On 29 September, the new carbon capture and storage (CCS) method was made available following approval by the Minister for Industry, Energy and Emissions Reduction. The Minister also announced the 2022 priorities for ERF method development which included transport (including EV charging), hydrogen (including injection of clean hydrogen into the gas network), an integrated farm method, carbon capture use and storage, and savanna fire management.

Further information is available in Chapter 1.

### Investment in large-scale renewables is trending up

As predicted in the Q2 report, Q3 was a very strong result for final investment decisions (FID) with 1.1 GW of capacity announced. This brings the 2021 total to 1.9 GW. The Clean Energy Regulator is

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<sup>1</sup> The implicit avoided carbon content approach multiplies estimated small and large scale RET incentivised generation (megawatt hours) multiplied by the rapidly reducing average emissions intensity of all grid generation (tonnes CO<sub>2</sub>-e per megawatt hour). The avoided carbon content of renewable energy will ultimately decline as thermal generation becomes a smaller part of electricity generation.

<sup>2</sup> The thermal generation displaced approach multiplies estimated RET incentivised generation by the emissions intensity of average thermal generation (which is higher than the average emissions intensity of all grid generation).



expecting a similar level of capacity to achieve FID in Q4, likely bringing the full year total to the high end of its original 2 to 3 GW estimate and potentially exceeding the 2.7 GW from 2020.

See chapter 2 for more information.

### **Rooftop solar remains resilient despite Covid-19 lockdowns**

Added rooftop solar capacity from the SRES for 2021 is expected to set a new record at approximately 3.2 GW as installations are expected to rebound in Q4 following easing Covid-19 restrictions.

Despite extended Covid-19 lockdowns in New South Wales, Victoria and the ACT, small-scale solar system installation held ground in Q3 with total installed capacity on par with Q3 2020.

As stated in the Q2 report, total added capacity could have exceeded 3.6 GW this year in the absence of Covid-19 lockdowns.

The Integrity Review of the Rooftop Solar PV Sector was released on 16 September 2021, along with the Government response. The report recommends major changes to the SRES to lift integrity and accountability in the rooftop solar PV sector, protect consumers and ensure emission reductions occur.

Consultation on draft amendments to regulations is expected to occur in Q4 this year.

### **LGC supply is strong but market balance remains tight**

LGC supply increased by 9.2 million in Q3 and is expected to be in the upper end of the 37 to 40 million estimated for 2021. This means eligible generation will be close to 40,000 gigawatt hours (GWh), well above the 33,000 GWh statutory demand target.

Nevertheless, total supply and demand for LGCs is likely to remain tight to 2023, and possibly beyond, as voluntary cancellation continues to increase and 17 million LGCs are needed to claim \$1 billion in shortfall charges from prior years.

LGC supply and demand is discussed further in Chapter 2.

### **Voluntary demand continues to grow**

Total Australian carbon unit and certificate cancellations for 2021 are 2.7 million, up 24% year on year at the end of Q3. The ACT government cancellation of 2.2 million LGCs is an addition to this.

Climate Active participants contributed a significant 20% of the voluntary demand for both LGCs and ACCUs, while cancellation of LGCs for GreenPower also increased by 34% compared to 2020.<sup>3</sup>

An in-depth look at the voluntary demand market is available at chapter 4.

### **New carbon market initiatives gain momentum**

The Australian Carbon Exchange moves to the procurement stage later this year with 13 parties shortlisted. These entities have been invited to tender for exchange trading and related market services and/or registry related services. Further information can be found on our dedicated [Australian Carbon Exchange web page](#).

Final consultation on the pilot design of the Corporate Emissions Reduction Transparency (CERT) report was completed in October. We expect the CERT report to be launched later this year. CERT provides a framework for Australian companies (above the NGER publication threshold) to publicly report on their net emissions position and emissions reduction commitments, and progress, in a clear and consistent

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<sup>3</sup> This is excluding LGCs cancelled by the ACT government.

way. It will also support climate-related disclosures by Australian companies and give investors, shareholders and the public a clearer picture of action taken by companies to reduce net emissions.

### Unit and certificate prices

ACCU spot prices increased steadily reaching \$26, up \$7 at the end of Q3. Trades post the end of Q3 saw the reported spot price increase to \$37 in early November.

The difference between the average optional delivery contract price and the reported spot price is now around \$20.

Reported spot trades during this period of material increase in price have been on relatively small volumes and reflect short term supply/demand dynamics. The Clean Energy Regulator is monitoring those trades closely in the Australian National Registry of Emissions Units (ANREU) as the over-the-counter market is relatively thin. Total ACCU holdings in ANREU accounts increased from 9.6 million at the end of Q2 to 10.9 million at the end of Q3.

Further data and analysis on this can be found in Chapter 1.

During Q3, LGC spot prices increased by \$7.15, reaching \$40.40—the highest price since January 2021. This matches historical patterns as electricity retailers secure supply in the lead up to the annual statutory surrender on 14 February next year.

Small-scale Technology Certificates (STC) spot prices remained stable for the quarter.

Table ES.1 Price trend, September quarter 2021

Certificate type	Spot price AUD (30 September 2021) <sup>4</sup>	Quarterly trend
ACCU	\$26.50	+\$7.20
LGC	\$40.40	+\$7.15
STC	\$38.75	-\$0.15

<sup>4</sup> Data sourced from [Jarden](#) and TFS Green.

# 1. Australian carbon credit units (ACCUs)

## Key messages

- ACCU spot prices increased by more than \$7 in Q3 to \$26.50 before climbing to \$37.00 in early November.
- 6.8 million tonnes of abatement was contracted at an average price of \$16.94 under optional delivery contracts at ERF Auction 13.
- ACCU supply in 2021 is up 25% compared to the same period last year with 4.8 million ACCUs issued in Q3.
  - Total supply is likely to exceed expectations for 2021 and reach 17.3 million ACCUs.
  - The coal mine waste gas variation and the carbon capture and storage method made in Q3 will substantially strengthen supply in the short term.
- Total ACCU holdings in ANREU accounts increased to a record 10.9 million units, up 12% from Q2.
- Project registrations were 67% higher than for the same period last year with 54 registrations in Q3, bringing total new projects for 2021 to 145.
  - The ERF surpassed 1000 registered projects on August 26 and the 100 millionth ACCU was issued on September 6.

## 1.1. Supply and demand balance

Supply of 4.8 million ACCUs was added to Australian National Registry of Emissions Units (ANREU) accounts during Q3 2021, while the total demand from ERF contract deliveries and voluntary cancellations totalled 3.7 million units (see Figure 1.1). The balance of ACCUs held in the ANREU increased for the second consecutive quarter to a record 10.9 million units, up 12% on the 9.7 million ACCUs held at the end of Q2 2021 (see Table 1.1).



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

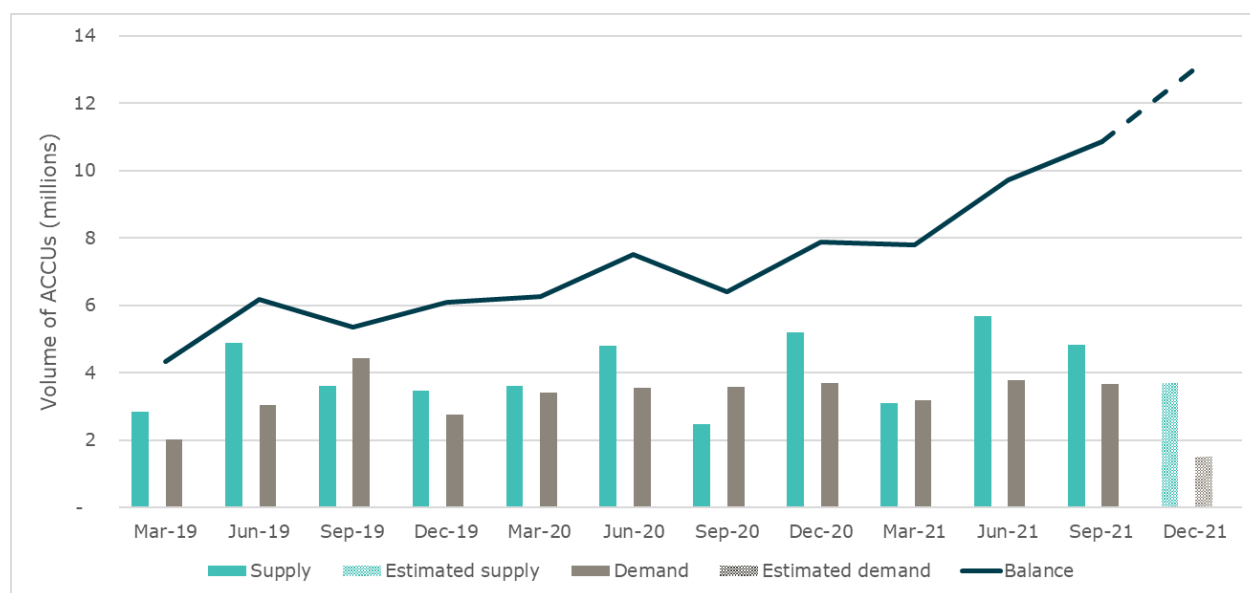


Table 1.1: Balance of supply and demand September quarter 2021 close<sup>5</sup>

<b>Balance/supply of ACCUs from June quarter 2021</b>	<b>9,711,982</b>
<b>ACCUs issued September quarter 2021</b>	<b>4,814,773</b>
<b>ERF contract deliveries</b>	<b>- 3,444,651</b>
<b>Safeguard cancellations<sup>6</sup></b>	<b>0</b>
<b>Voluntary cancellations</b>	<b>-220,358</b>
<b>ACCU relinquishment<sup>7</sup></b>	<b>0</b>
<b>Net balance at the end of September quarter 2021</b>	<b>10,861,746</b>

During 2021, total ACCU holdings have increased 70% with accounts in all categories increasing substantially. ACCUs held by project proponents<sup>8</sup> increased 52% to 6.4 million, while holdings by ‘Business and Government enterprises’<sup>9</sup> increased by 69% to 2.2 million. ‘Intermediary’<sup>10</sup> accounts increased 156% from 0.9 million to 2.3 million at the end of Q3 (see Figure 1.2).

At the end of Q3, there were 15 accounts in the ‘intermediary’ category. In the past year, a total of 2.8 million units have flowed into these accounts from project proponents, business and government enterprises, while 1.4 million ACCUs have been transferred out of these accounts. Of the ACCUs transferred out, 0.4 million were voluntarily cancelled by 9 account holders.

<sup>5</sup> Within a specified period, supply of ACCUs refers to ACCUs issued. Demand of ACCUs incorporates 3 sources including Commonwealth ERF contract deliveries, safeguard mechanism cancellations and state and territory government and private sector voluntary cancellation.

<sup>6</sup> Safeguard mechanism cancellations does not include deemed cancellations. A ‘deemed cancellations 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.

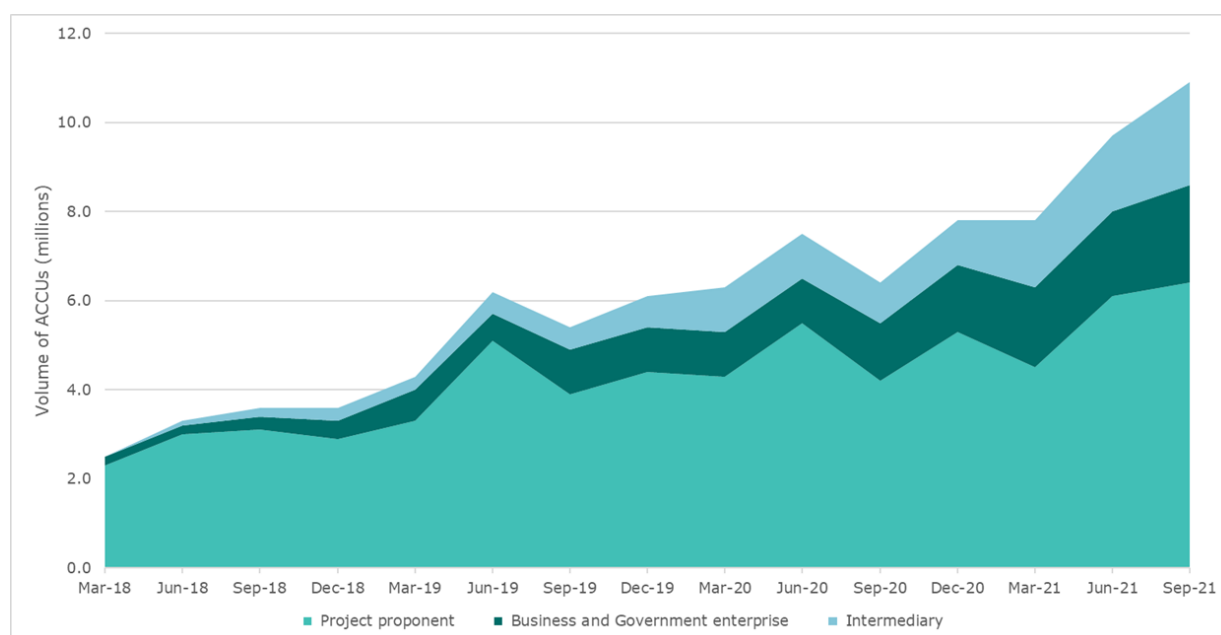
<sup>7</sup> For more information see the Relinquishing ACCUs section of [Australian carbon credit units](#).

<sup>8</sup> Project proponent - Account holder is connected to one or multiple ERF projects.

<sup>9</sup> Business and Government enterprise - Account holders that do not have direct link to ERF projects. These include safeguard entities, voluntary participants, local government entities that are accumulating for voluntary or compliance purposes.

<sup>10</sup> Intermediary - Account holder’s facilitate trading of units between the supply and demand sides of the market.

Figure 1.2: Breakdown of ACCU holdings by market participation (millions), March quarter 2018 to September quarter 2021



## 1.2. Factors impacting supply

### Crediting

More than 100 million ACCUs have now been issued under the ERF. The 100 millionth ACCU was issued to the Wilinggin Fire Project, a savanna burning project located on the Wilinggin Indigenous Protected Area in the Kimberley in Northern Western Australia. In Q3, 4.8 million ACCUs were supplied to the market, almost double the 2.5 million units supplied in Q3 2020.

A total of 561 projects are generating ACCUs (see Table 1.2). This is 11% more than the same time last year. Of these, 16 projects were credited for the first time during Q3 2021, contributing 450,639 ACCUs to supply. These 16 projects took, on average, 2.5 years to progress from registration to crediting and included 15 vegetation methods.

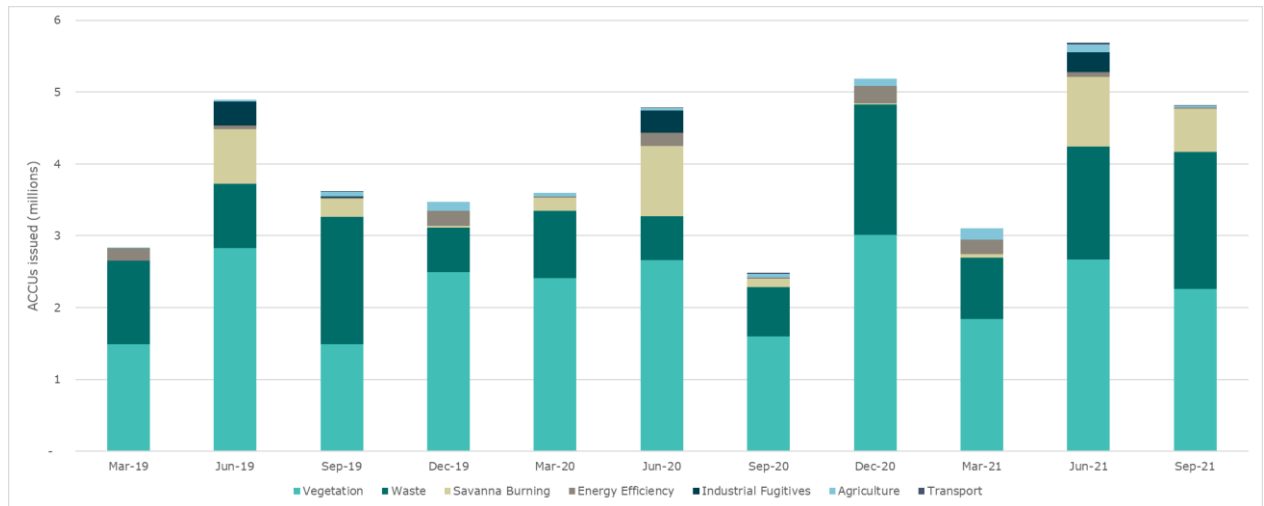
Table 1.2: Crediting status of projects

Crediting status	No. of projects
Projects generating ACCUs	546
Projects yet to receive ACCUs <sup>11</sup>	489
Conditionally registered	361
Unconditionally registered	128

The 4.8 million ACCUs issued in Q3 can be attributed to 3 method types: vegetation (47%), waste (40%) and savanna burning projects (12%) (see Figure 1.3).

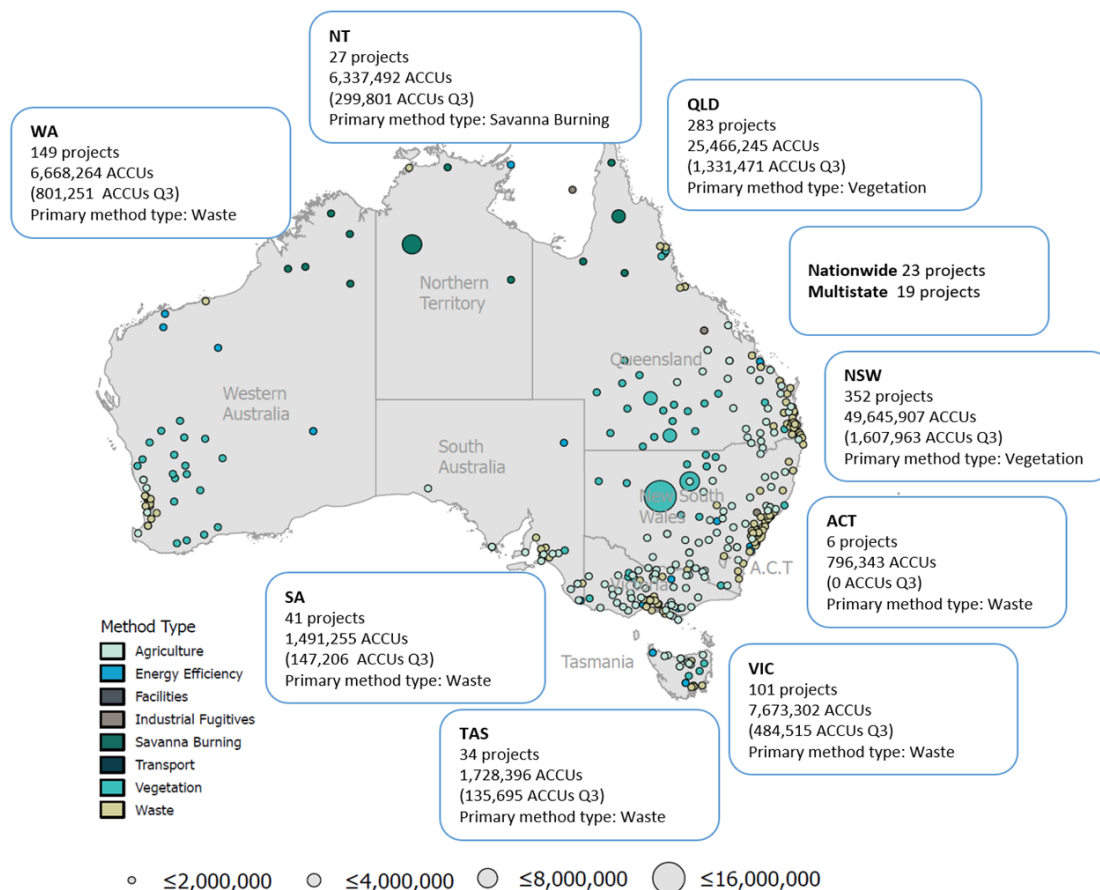
<sup>11</sup> Once projects are registered, they have a crediting period between 7 and 25 years depending on the method.

Figure 1.3. ACCUs issued per method type (millions), March quarter 2019 to September quarter 2021



Projects in NSW dominated ACCU supply in Q3 with 33% of the total units issued, followed by QLD with 28%. The majority of ACCUs issued in these states were for vegetation projects (see Figure 1.4).

Figure 1.4: Total number of ACCUs issued<sup>12</sup> per method type by location, September quarter 2021 and scheme-to-date



The outlook for ACCU supply remains positive. A total of 13.6 million ACCUs have been issued in 2021 and supply is expected to exceed the 17 million estimated for the year by the Clean Energy Regulator.

<sup>12</sup> Does not include revoked projects.

A total of 41 projects have been issued ACCUs for the first time in 2021, supplying 1.3 million ACCUs or just under 10% of the year’s supply to date.

Development of new and varied methods is also expected to unlock material volumes of supply to the ACCU market in the short term. The carbon capture and storage method and the coal mine waste gas variation are now available under the ERF after being approved in late September 2021. In November, Beach Energy Ltd and Santos Ltd registered the Moomba carbon capture and storage project which is expected to start generating a supply of 1.7 million ACCUs per annum from 2024.

Applications from 58 landfill gas projects to transition to the 2021 method variation are being assessed with a further 57 applications expected by 31 December 2021. The method variation extends crediting for these projects for a further 5 years and is anticipated to supply up to an additional 21.6 million ACCUs to the market over that period.

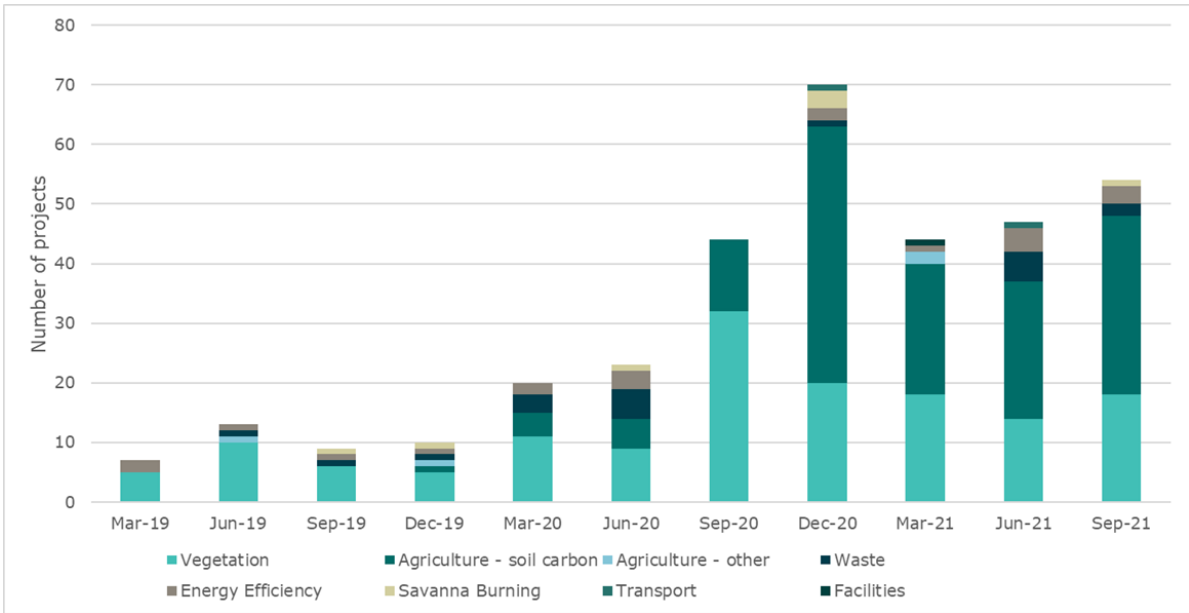
**Projects**

The ERF has passed 1000 registered projects, finishing Q3 at 1,035 projects. The registration of AgriProve’s Street Carbon Project saw the scheme reach this key milestone. This soil carbon project will run on a sheep and cropping farm at Gollan, New South Wales.

There were 54 project registrations in Q3, 10 more than the same period in 2020 (see Figure 1.5). A total of 145 projects have now been registered in 2021 compared with 87 in the same period in 2020. This increase in registrations can mainly be attributed to soil carbon projects.

Australian Integrated Carbon (AIC) registered 7 projects in the quarter, bringing its portfolio to 17 projects. This increase in registration activity by AIC in the lead up to Auction 13 resulted in optional delivery contracts being secured against 9 projects (including 2 projects registered on 1 October 2021). It also coincided with [Mitsubishi’s move to acquire a 40% stake in the company](#).

Figure 1.5: New registered projects per method type, March quarter 2019 to September quarter 2021



### State investment builds

The Tasmanian Government has allocated an additional \$900,000 to the [Landcare Action Grants Program](#) and expanded the eligibility criteria to include carbon farming activities. This funding allocation is on top of \$1.8 million previously allocated to the program. In addition, the state also unveiled the [Carbon Farming Advice Pilot Rebate Program](#). This program is available to Tasmanian primary producers seeking advice from approved advisors on the costs and benefits of accessing carbon credits, auditing requirements, and on-ground actions that are eligible for carbon credits. The total funding allocated to the program is \$250,000.

The second round of applications for the Queensland Government’s [Land Restoration Fund \(LRF\)](#), with up to \$5 million funding available per project, closed on 8 October 2021 with shortlisted applicants to be notified in early December.

Expressions of interest to Western Australia’s \$15 million [Carbon Farming and Land Restoration Program](#) closed on 20 August 2021 and preparation has begun for launching Round 2 in early 2022.

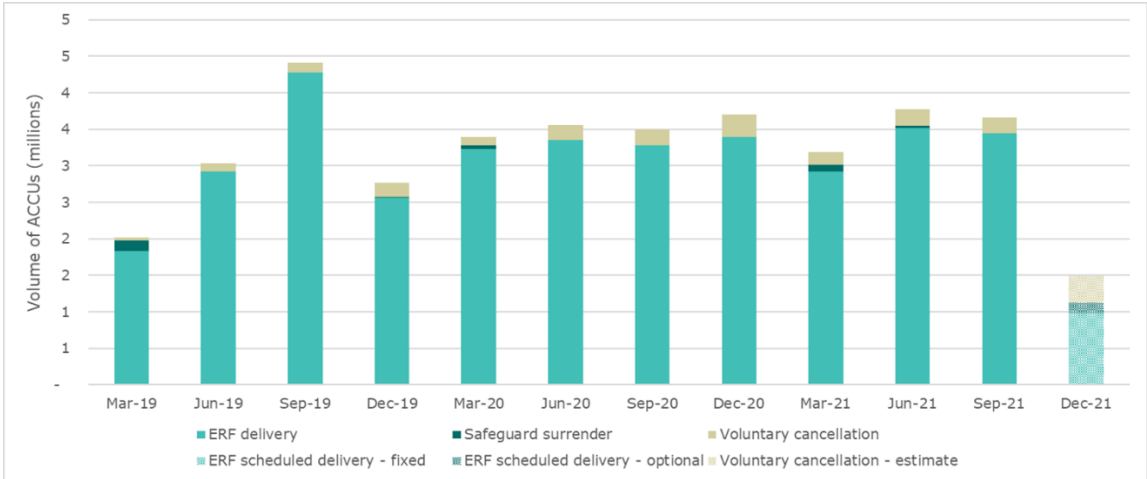
The consultation period on the Northern Territory’s [Greenhouse Gas Emissions Offsets Policy](#) has now closed. The draft policy includes a proposal to prioritise the cancellation of Territory-generated ACCUs against Territory offset requirements.

### 1.3. Factors impacting demand

Total demand in Q3 was 3.7 million ACCUs, 5% higher than Q3 2020 (see Figure 1.6). Commonwealth contracts remained the largest source of demand at 94%. The proportion of voluntary and state and territory demand remained stable with that observed in Q3 2020 at 6%.

The total demand from fixed delivery contracts is not anticipated to increase in line with supply. This will ensure an increasing supply of ACCUs to the secondary market. This is supported by the clear preference of bidders for optional delivery contracts at Auction 13 (see below for more detail).

Figure 1.6: Actual and estimated demand<sup>13</sup> for ACCUs (millions), 2019 to 2021



### Commonwealth demand

The total demand for ACCUs under Commonwealth contracts immediately after Auction 13 increased to 209 million tonnes. Of this, fixed delivery demand accounted for 188.2 million tonnes, while the balance of 20.8 million tonnes were optional delivery contracts. Although very small volumes of optional

<sup>13</sup> Estimated demand is comprised of demand from scheduled delivery against Commonwealth contracts as at 30 September 2021 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.

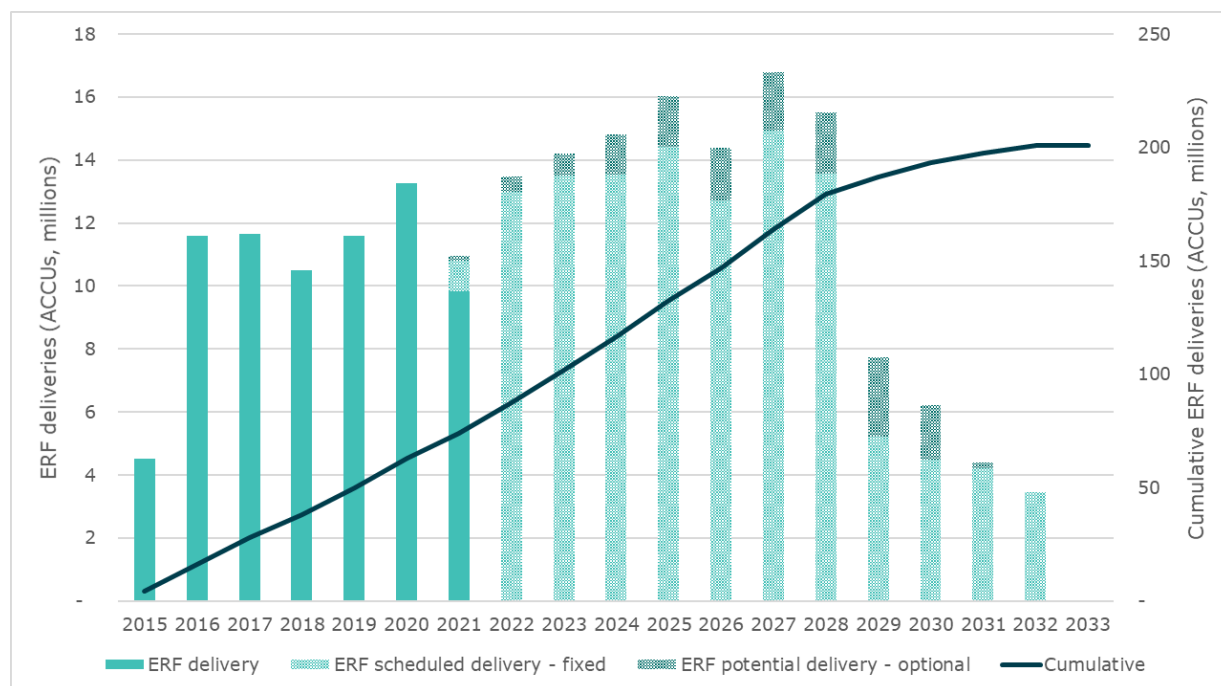
deliveries have been made (8,818 tonnes), in general, the Clean Energy Regulator does not expect options to be realised.

Auction 13 awarded 24 optional delivery contracts for 6.8 million ACCUs at an average price of \$16.94 per tonne. There were no fixed contracts awarded. In total, 85% of the bids on offer were purchased, demonstrating that scheme participants were bidding competitively with the average price paid well below the spot price. The Clean Energy Regulator’s obligation under the law is to buy at the lowest price and will buy up the long-run supply curve, not the short run supply curve.

Optional delivery contracts de-risk and support investment in projects, while allowing project proponents to contract for delivery at a higher price with others. This can facilitate additional supply in the secondary spot market. The clear preference for optional delivery contracts highlights how Australia’s carbon market is evolving. To date, 70,000 ACCUs from projects with optional delivery contracts with the government have been sold on the secondary market.

Commonwealth demand from contracts is anticipated to consume two-thirds of the total 2021 ACCU supply of 17.3 million. Demand from fixed delivery contracts is set to increase next year. After this, contract deliveries on average remain flat over the 2022 to 2028 period at an average 13.7 million ACCUs/year before dropping significantly and tailing off.

Figure 1.7: Commonwealth delivery for current portfolio of projects (volume of ACCUs, millions), 2015 to 2033

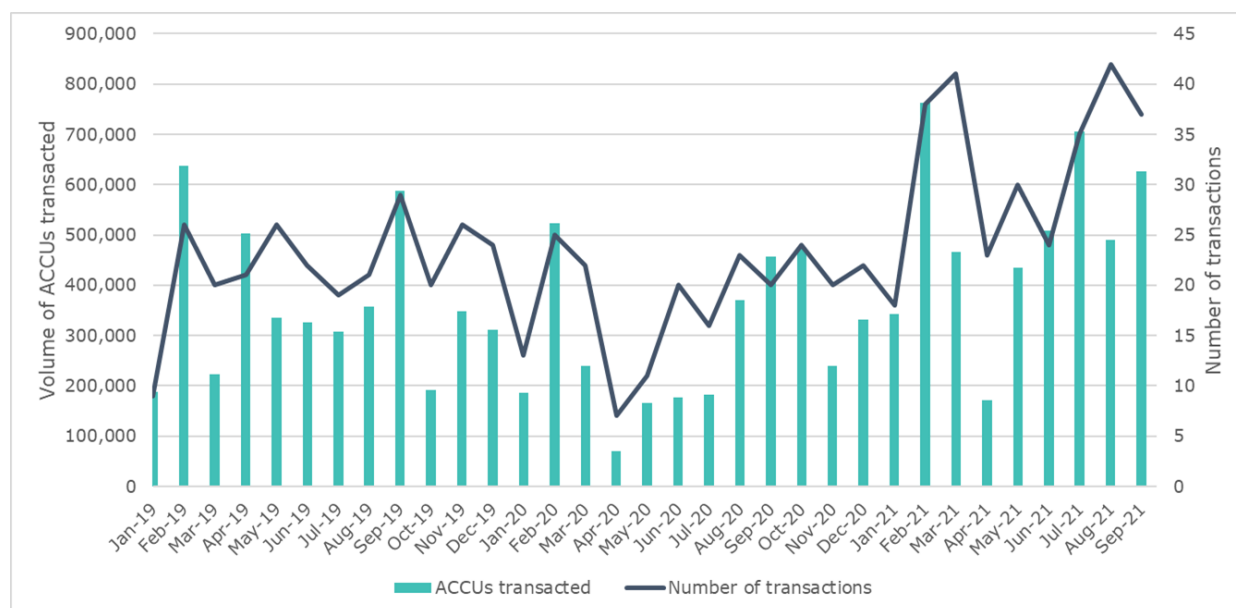


## 1.4. Market trading

Market activity increased throughout Q3 2021, compared to the previous quarter, with 1.8 million ACCUs traded through 114 transactions (see Figure 1.10). The increase in market activity since the start of the year reflects a mix of accumulation strategies by some account holders; internal transfers within ANREU to package disparate parcels of ACCUs to meet demand by a third party and increased voluntary cancellations.



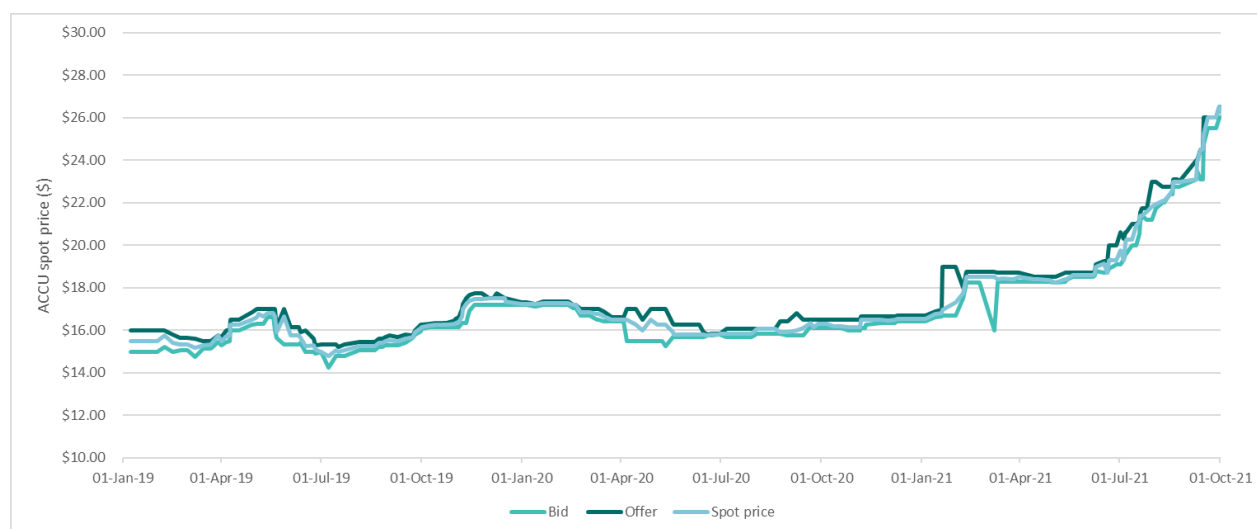
Figure 1.8: ACCU market transactions (excluding ERF transactions), January 2019 to September 2021<sup>14</sup>



### Spot price

Over the quarter, the ACCU spot price increased more than \$7 from \$19.30 to \$26.50 (see Figures 1.11 and 1.12).<sup>15</sup> Prices have continued to rise post quarter reaching \$37.00 in early November. On several occasions there has been a step change in price trading off relatively small volumes. The Clean Energy Regulator has and will continue to monitor trades for any potential unusual patterns. The rising spot price provides a signal to the market to invest in new ERF projects to meet anticipated growth from private demand.

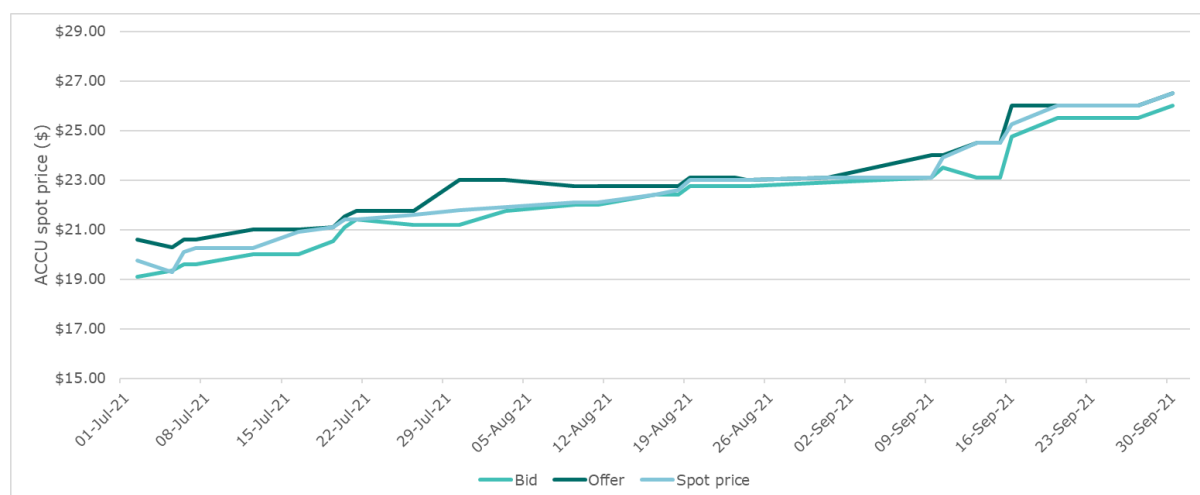
Figure 1.9: Historical ACCU spot prices (\$AUD), January 2019 to September 2021<sup>15</sup>



<sup>14</sup> ACCU market transactions refer to the transfer of ACCUs between separate entities or groups and does not include issuances and cancellations of ACCUs. Transactions involving the transfer of ACCUs between project proponents, between project proponents and project developers, and between accounts belonging to the same company and/or subsidiaries are excluded.

<sup>15</sup> Data sourced from [Jarden](#) and TFS Green.

Figure 1.10: ACCU spot prices (\$AUD), September quarter 2021<sup>16</sup>



## 1.5. Key dates

Date	Event	Significance
<b>1 November 2021<sup>17</sup></b>	National Greenhouse and Energy Reporting (NGER) and Safeguard application deadline	Deadline for NGER reporters and Safeguard entities to submit: <ul style="list-style-type: none"> <li>2021-22 NGER data</li> <li>calculated and production adjusted baseline applications (for baselines commencing 1 July 2020).</li> </ul>
<b>9-10 December 2021</b>	8 <sup>th</sup> Annual Australasian Emissions Reduction Summit 2021	This annual event, hosted by the Carbon Market Institute (CMI), will showcase world-leading knowledge sharing, commercial interactions and capacity building, helping delegates to manage climate risk and opportunities.

<sup>16</sup> Data sourced from [Jarden](#) and TFS Green.

<sup>17</sup> 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 (LGCs)

### Key messages

- A record 32% average of electricity generated in the National Electricity Market (NEM) in Q3 2021 was renewable, with the 2021 calendar year average likely to slightly exceed 30%.
  - The share of renewable generation in the NEM has doubled since 2017.
- 603 megawatts (MW) of new large-scale renewable energy capacity was approved<sup>18</sup> in Q3, bringing the total for 2021 to 1.2 GW, a decrease from the 2.7 GW approved over the same period last year.
  - Approximately 2 gigawatts (GW) of capacity expected to be accredited in 2021, with over 1.4 GW under application at the end of the quarter.
- Investment in large-scale renewable energy power stations appears to be trending up, signalling additional future utility scale build and generation.<sup>19</sup>
  - 1.1 GW achieved a Final Investment Decision (FID) in Q3 compared to 44 MW in Q1 and 725MW in Q2, bringing 2021 total capacity to 1.9 GW.
  - Market intelligence suggests FID for 2021 will be at the upper end of, and may exceed, the 2 to 3 GW range predicted by the Clean Energy Regulator.
- LGC spot prices, following a normal seasonal pattern, increased sharply in September finishing the quarter at \$40.40.
- LGC supply in 2021 is expected to be at the upper end of 37 to 40 million range predicted by the Clean Energy Regulator.

### 2.1. Supply and demand balance

LGCs available for the 2021 assessment year is expected to be at the upper end of the estimated 43 to 46 million range. This consists of 6.1 million LGCs carried forward from previous years, and the expected creation of 37 to 40 million LGCs in 2021.

Approximately 32.6 million LGCs will be required to be cancelled to meet obligations against the 2021 Renewable Power Percentage.<sup>20</sup> Demand from liable entities eligible for shortfall charge refunds is estimated to be an additional 2.7 million LGCs. Cancellations against voluntary targets in 2021 is expected to exceed 5.5 million LGCs, including 2.2 million LGCs that have been cancelled by the ACT government towards their 100% renewable energy target.

The LGC balance after the 2021 assessment year is likely to be at the upper end of the 2.3 to 5.3 million range (see Table 2.1). This relatively tight balance suggests that shortfall will be taken in the 2021

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<sup>18</sup> This means accredited for scheme entry to be eligible for LGCs for every net megawatt hour of generation.

<sup>19</sup> Investment is defined as the capacity reaching a Final Investment Decision (FID).

<sup>20</sup> The Renewable Power Percentage (RPP) is set each year in regulation under the *Renewable Energy (Electricity) Act 2001*. For 2021 the RPP is 18.54%.

assessment year to allow sufficient LGC liquidity. There is still \$1 billion in consolidated revenue representing over 17 million LGCs that can be redeemed under the 3-year rule.<sup>21</sup>

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

	Supply	Demand
LGCs available from previous assessment years <sup>a</sup>	+6.1 million	
2021 LGC supply (available for 2021 surrender)	+37 to 40 million	
Legislated demand for 2021 <sup>b</sup>		-32.6 million
Shortfall charge refunds <sup>c</sup>		-2.7 million
ACT Government scheme		-2.2 million
Other Voluntary cancellations <sup>c</sup>		-3.3 million
<b>Estimated total balance for 2021 assessment year</b>	<b>+2.3 to 5.3 million</b>	

Notes:

<sup>a</sup> Number reflects LGCs created before 2021 but still registered as available in the REC Registry as at 15 February 2021.

<sup>b</sup> Number assumes no shortfall is taken for the 2021 assessment year.

<sup>c</sup> These values are estimates for 2021 and could vary significantly based on commercial decisions.

## 2.2. Factors impacting supply

### LGC supply

LGC supply was 9.2 million in Q3, taking total supply for the first three quarters of 2021 to 26.4 million – a 22% increase from the same period in 2020.

Further supply growth is expected with LGC creations typically peaking in Q4 (see Figure 2.1). This is likely due to generators with a baseline creating when they exceed baselines (typically in Q4) and generators creating LGCs before the end of the year enabling these LGCs to be used against the respective year's liability<sup>22</sup>.

Q4 2021 may also see above usual level of hydro generation with the Bureau of Meteorology forecasting the November 2021 to January 2022 period is likely to be wetter than normal.<sup>23</sup> This may result in increased level of LGC creations from hydro generation in Q4. As such total LGC creations for 2021 is estimated to be at the upper end of the 37 to 40 million range.

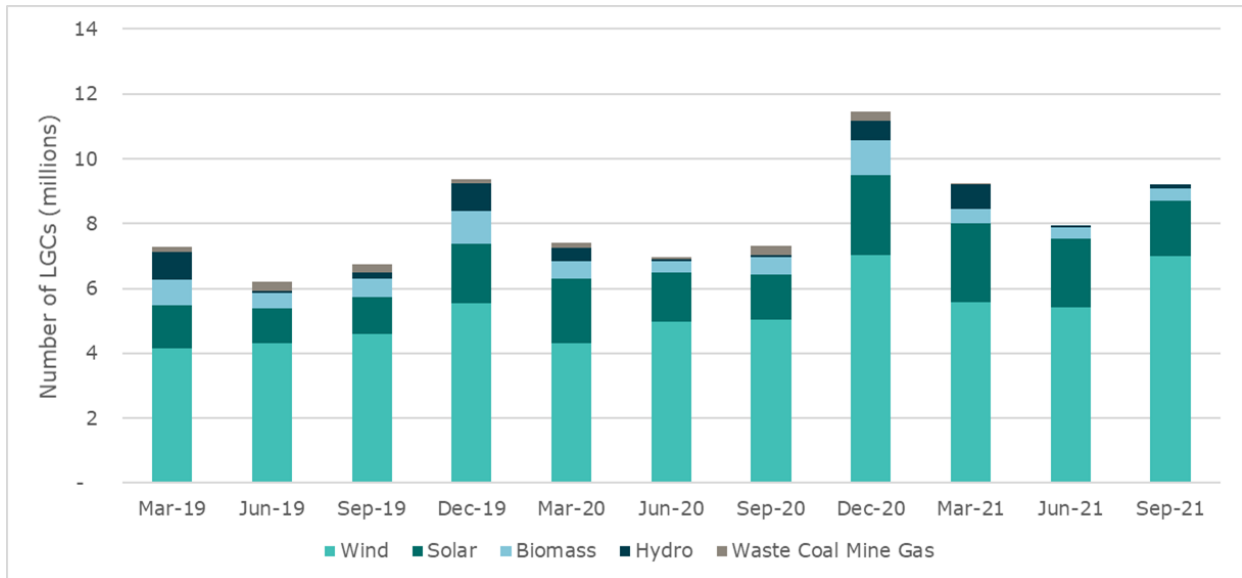
A balance of 26.2 million LGCs was held in the REC Registry at the end of the Q3.

<sup>21</sup> Entities with a LGC shortfall of more than 10 per cent of their liability for a year incur a shortfall charge. Under certain circumstances, these entities can subsequently surrender additional certificates and obtain a refund of the shortfall charges previously paid, less an administrative fee.

<sup>22</sup> Liable entities can only surrender certificates that were created in the assessment year or earlier. This is referred to as the vintage rule. To surrender additional certificates related to an amendment of an energy acquisition statement, liable entities will need to ensure the certificates were created in the REC Registry in the year the electricity was acquired (or earlier years).

<sup>23</sup> [Australian climate outlooks \(bom.gov.au\)](https://www.bom.gov.au), statement issued 28 October 2021

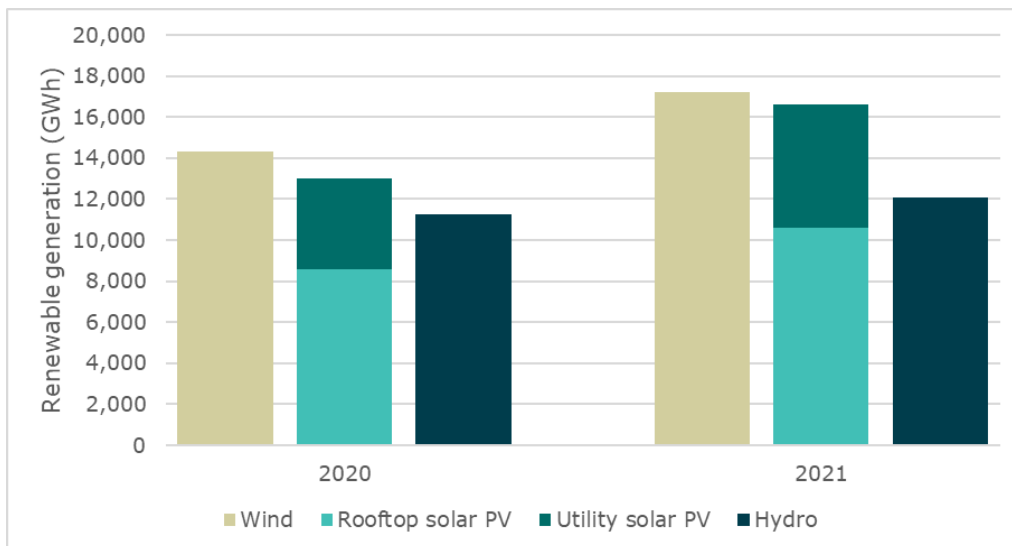
Figure 2.1 LGCs validated by technology type (millions), March quarter 2019 to September quarter 2021



### Penetration of renewables throughout Australia

While wind continues to be the leading source of renewable energy generation this quarter, the share of utility solar generation saw the biggest year on year growth with a 34% increase from Q3 2020 (see Figure 2.2). Despite this increase in generation, the renewables mix has remained relatively stable with each of the main generation sources contributing the same proportion of generation between 2020 and 2021. Generally, a reasonably even mix of wind and solar allows for less overall variability in generation, as wind often picks up at night and at other periods of poor solar generation.

Figure 2.2 Renewable generation in the NEM over the first three quarters (GWh), 2020 and 2021

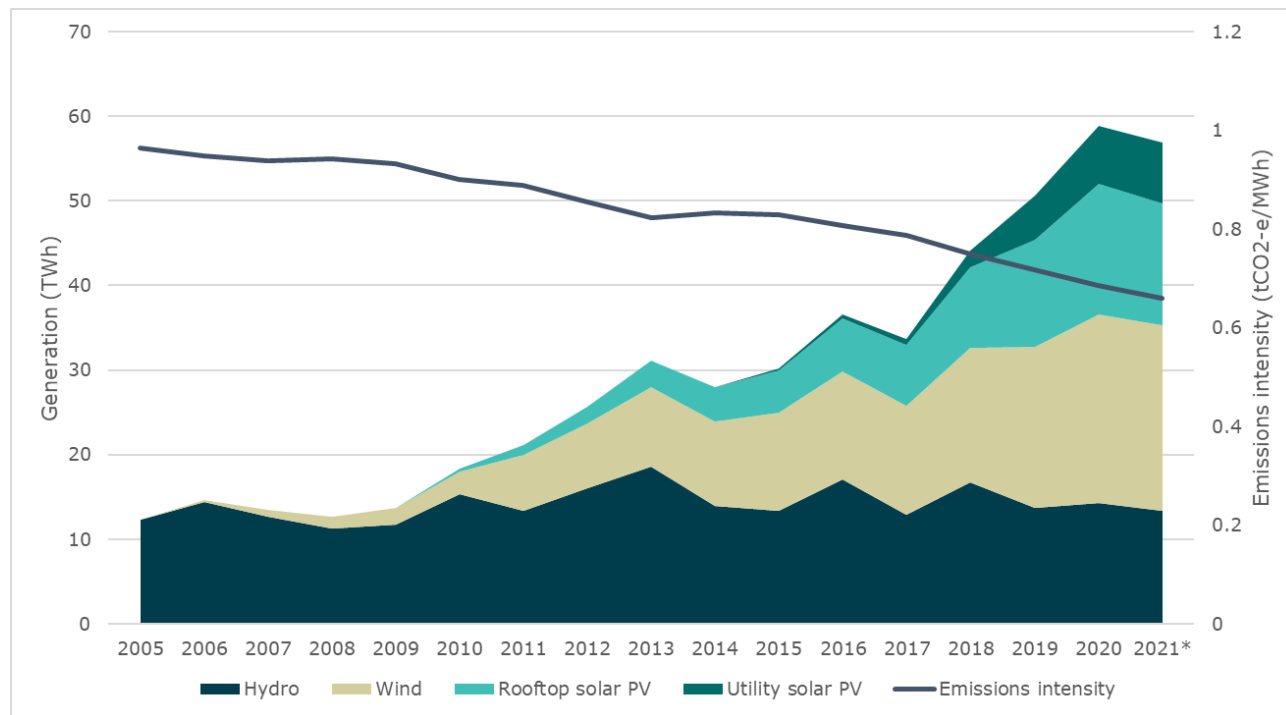


Renewable generation achieved 2 significant records in Q3. On 24 September, AEMO recorded the highest level of instantaneous renewable generation ever at 61.4%.<sup>24</sup> In addition, electricity from renewable sources accounted for 31.7% of the total NEM generation in Q3. This is the highest quarterly renewable generation on record, beating the previous record of 30.5% from Q4 2020 and more than double the 15% renewable generation from 2017.

<sup>24</sup> [AEMO | Quarterly Energy Dynamics \(QED\)](#)

With more renewable capacity introduced into the grid, Australia’s emissions intensity of generation is declining. Figure 2.3 shows the impact of the rapid uptake of renewables on the emission intensity of Australia’s electricity generation. During 2018-2020, an average of 6 GW of renewable energy was added to the grid annually, with the emissions intensity (combined NEM and SWIS) falling from 0.79 t CO<sub>2</sub>-e/MWh in 2017 to 0.66 t CO<sub>2</sub>-e/MWh in 2021 (as at end of Q3). This decline will continue as more renewable generators come online and as fossil fuel generators exit.

Figure 2.3 Annual renewable generation (TWh) by fuel type against national emissions intensity (t CO<sub>2</sub>-e/MWh), 2005 to 2021



\* as at 18 October 2021

### Unlocking future supply

As stated in the Q1 QCMR, Australia led the developed world in renewable energy capacity installed per capita from 2018 to 2020, with Australia’s solar capacity more than double its wind capacity. Australia’s wind uptake ranked 4<sup>th</sup> globally from 2018 to 2020, with 180W per capita, behind Norway, Sweden and Ireland.

As shown in figure 2.1 above, wind generation accounted for 37% of Australia’s renewable generation in 2021. Nonetheless, there is significant potential to further scale up wind generation with offshore wind currently an untapped resource.<sup>25</sup> Globally, the United Kingdom is leading offshore wind uptake with 10.4 GW capacity installed by the end of 2020. China had the largest uptake in recent years, accounting for half of the 6.1 GW of offshore wind added globally in 2020.<sup>26</sup> With Australian wind resources comparable to the United Kingdom and China, there is a lot of potential for a high value offshore wind sector in Australia, particularly along the southern and western coastline. This could help energy security and emissions reductions goals.

To facilitate offshore wind uptake, the Australian Government introduced the *Offshore Electricity Infrastructure Bill 2021* to the Parliament in September. The legislation will streamline the construction, operation, maintenance and decommissioning of offshore energy projects around Australia.<sup>27</sup> This will reduce regulatory burden and help several projects that are already under development to advance,

<sup>25</sup> [Wind Energy | Geoscience Australia \(ga.gov.au\)](https://www.ga.gov.au/wind-energy)

<sup>26</sup> [Global Wind Report 2021 - Global Wind Energy Council \(gwec.net\)](https://www.gwec.net/global-wind-report-2021)

<sup>27</sup> [Regulating offshore renewable energy | Department of Industry, Science, Energy and Resources](https://www.industry.gov.au/Regulating-offshore-renewable-energy)



including ‘Star of the South’ off the coast of Gippsland, Victoria<sup>28</sup> and Marinus Link. At its full capacity of 2.2 GW, the ‘Star of the South’ alone could contribute as much as 20% of Victoria’s electricity needs.<sup>29</sup>

**Accreditation - approval for eligibility for LGCs**

A total of 603 MW of new large-scale renewable energy capacity has been approved in Q3. Bango wind farm stage 1 (159 MW) located between Yass and Boorowa in New South Wales was the largest power station approved. Stage 2 of Bango wind farm is expected to add another 44 MW capacity, with generation anticipated to begin in early 2022.<sup>30</sup>

Over the first nine months of 2021, 184 power stations have been approved with a capacity of 1.16 GW (see Table 2.2). In comparison, 2.7 GW were approved over the same period in 2020. This reduction in accredited capacity in 2021 is partly due to the timing of accreditation for several utility scale power stations, which were expected to come online early in 2021, but commenced generation in late 2020.

At the end of Q3, 85 accreditation applications remained on hand with a combined capacity of 1.4 GW. The Clean Energy Regulator still expects approximately 2 GW of large-scale capacity will be approved in 2021. While this is lower than the 4 GW approved in 2020, approved capacity is expected to increase in 2022 and future years as the pipeline of projects with FID remains strong (see next section).

Table 2.2 Power station accreditation capacity (MW) and count by state, 2021 to date

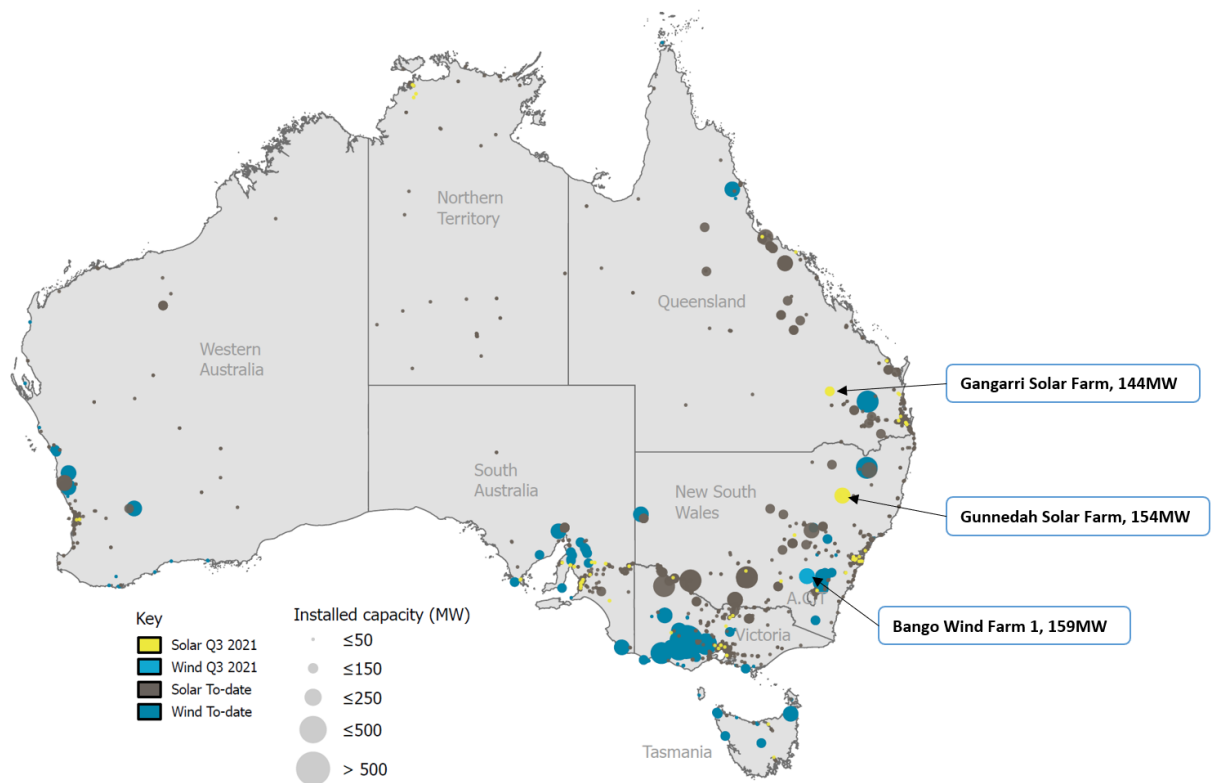
	Capacity (MW)	Count
NSW	437.3	62
VIC	351.3	46
QLD	162.7	23
WA	76.1	9
SA	67.5	31
NT	60.8	8
ACT	1.5	2
TAS	1.0	3
<b>Total</b>	<b>1158.2</b>	<b>184</b>

Figure 2.4 Wind and solar power stations accredited capacity by location, September quarter 2021 and scheme to-date

<sup>28</sup> [Introducing legislation to unlock investment in offshore energy projects | Ministers for the Department of Industry, Science, Energy and Resources](#)

<sup>29</sup> [Benefits — Star of the South](#)

<sup>30</sup> <https://cwprenewables.com/our-projects/bango-wind-farm>



## Committed and probable projects

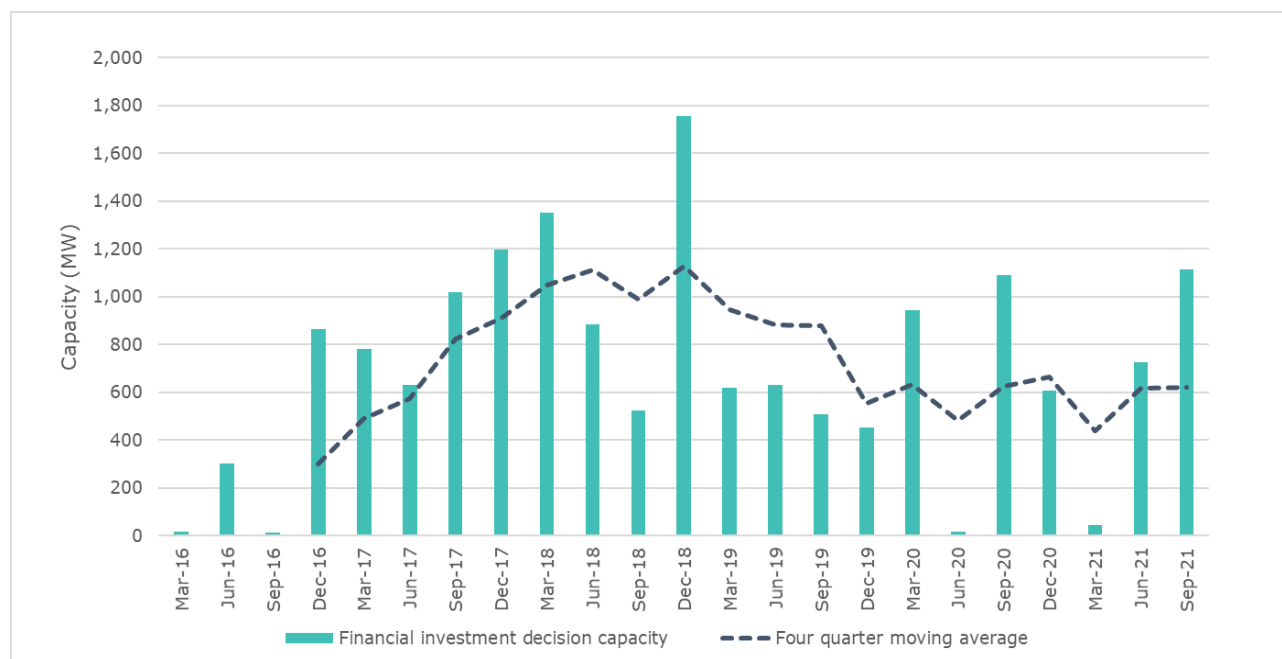
### Final investment decision expectations for 2021

Q3 saw a total of 1113 MW final investment decision (FID) announcements, an increase from the 725 MW in Q2 and 44 MW in Q1. In 2021, a total of 1.9 GW has reached FID, resulting in a rolling 4-quarter average of 622 MW (see Figure 2.5). This reinforces that no meaningful trend can be drawn from quarterly investment data.

Based on market intelligence, total capacity reaching FID in Q4 is expected to be at a similar level to Q3; and prospects for Q1 next year look positive. Total FID for 2021 is expected to exceed the 2.7 GW achieved in 2020 and 2.1 GW in 2019 and be at the upper end of the 2 to 3 GW range predicted at the start of the year. It does look like an increasing trend may be forming.

However, given the commercial nature of these transactions they are inherently difficult to predict. The Clean Energy Regulator will continue to monitor and report on FID results.

Figure 2.5 Capacity committed per quarter and four quarter moving average (MW), March quarter 2016 to September quarter 2021



### Projects with a PPA

While no project was added to the probable (PPA) pipeline in Q3 2021, 607 MW advanced from probable to committed status where the project also has development approvals and has reached FID. The total probable pipeline now stands at 2.9 GW. With a joint probable and committed pipeline of 7.3 GW, prospects for the renewable energy industry over the next few years look positive.

### AEMO reports 1GW of NEM registrations in the quarter

The Australian Energy Market Operator (AEMO) *State of the System* reports 6 generators with a total capacity of 953 MW were registered on the main grid in Q3.<sup>31 32</sup> This includes 2 big battery storage systems – Neoen and Tesla’s Big Battery in Victoria and the Wandoan battery in Queensland. Installation of these two big battery systems and South Australia’s synchronous condensers will provide a greater level of support for asynchronous generators, such as wind and solar farms, allowing them to generate at a higher capacity. Notably, South Australia’s wind generation has been increased to a maximum of 1900 MW.<sup>33</sup> This will facilitate further LGC supply in future years.

## 2.3. Factors impacting demand

### Voluntary private and state and territory government demand

The quarter saw 1.4 million LGCs voluntarily cancelled. Excluding cancellations from the ACT government, this is the highest quarterly cancellation of LGCs since Q3 2014.

The 4.3 million LGCs voluntarily cancelled in 2021 have effectively increased LGC demand by 12% above the legislated target of 32.6 million. The Clean Energy Regulator is now expecting voluntary cancellations for 2021 to pass 5.5 million LGCs. For a detailed breakdown of voluntary cancellations, see Chapter 4 *Voluntary market demand*.

<sup>31</sup> [AEMO | State of the System update](#).

<sup>32</sup> Capacity registered with AEMO is different to the capacity accredited by the Clean Energy Regulator as these are separate processes. AEMO registration includes batteries, which are not eligible systems under the LRET.

<sup>33</sup> [AEMO | Market Notices](#)

## Removing the tax on shortfall refunds

On 13 September 2021, parliament amended the large-scale generation shortfall charge (LGSC) refunds provisions of the *Renewable Energy (Electricity) Act 2000*. The amendment ensures that no tax is payable when companies receive a refund of their shortfall charge. The new law categorises LGC shortfall charge refunds as non-assessable non-exempt income for all refunds received after 1 January 2019. This measure applies to refunds relating to all LGC shortfall charges including those charges already paid.

This ensures shortfall and redemption can operate as an effective liquidity mechanism. As discussed in section 2.1, supply and demand is expected to remain tight for some time despite LGC supply this year set to materially exceed statutory demand.

For further information on the process of obtaining LGSC refunds, see [Refunds of large-scale generation shortfall charges under the Renewable Energy Target](#), and the tax treatment on the [ATO's website](#).

A total of 1.9 million LGCs were cancelled to recoup shortfall charge refunds worth more than \$122 million in 2021. This includes 1 million LGCs that were offered to the Clean Energy Regulator before the 14 February legislative surrender. These will not impact the 2021 demand.

A further 1.8 million LGCs are still outstanding for 2018, which are likely to be cancelled by February 2022 before exceeding their allowable refund period. The removal of tax on LGSC refunds will provide additional certainty for liable entities cancelling LGCs and claiming a refund.

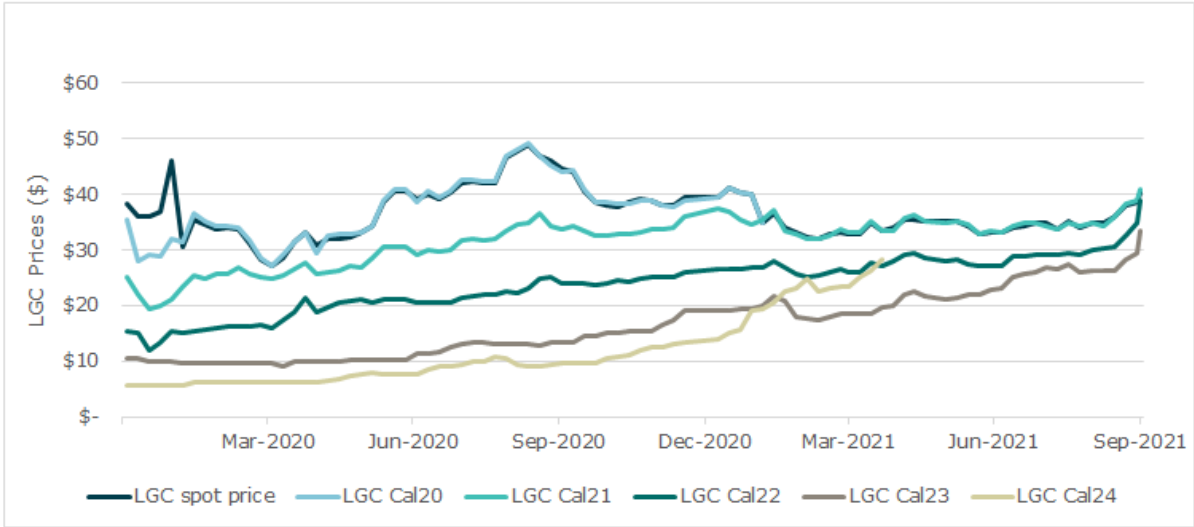
A minimum of 2.7 million LGCs are expected to be cancelled in the 2021 compliance year to redeem shortfall charges.

## 2.4. Market trading

LGC spot prices increased steadily over July and August, from \$33.25 to \$34.75, before rising sharply to \$40.40 by the end of September. Forward prices saw similar growth, with Cal24s experiencing the steepest increase from \$15.00 at the start of Q3 to \$28.25 at the end of Q3. Forward prices are likely being sustained by liable entities looking to shore up supply for future liabilities, including demand to redeem shortfall and expected growth in voluntary LGC demand from the Climate Active program and GreenPower.

Forward prices have continued their convergence with the spot prices. During the quarter, Cal21s converged on to the spot price while Cal22s closed the gap with the spot price by \$3.50. While the spot price typically increases at this time of year as liable entities prepare for the annual RET liability acquittal, it is noted that some forwards are converging at the same price as the spot. It will be interesting to monitor this, particularly, after liability is acquitted on 14 February 2022.

Figure 2.6 LGC spot and forward prices (\$AUD), January 2020 to September 2021



**2.5. Key dates**

Date	Event	Significance
<b>14 February 2022</b>	Lodgement of energy acquisition statement and surrender of LGCs  Submit Electricity Generation Returns	This will be the final date for liable entities to: <ul style="list-style-type: none"> <li>• lodge their energy acquisition statement(s) and surrender LGCs for the 2021 assessment year, and</li> <li>• pay any applicable shortfall charges for the assessment year.</li> </ul>

### 3. Small-scale technology certificates (STCs)

**Key messages**

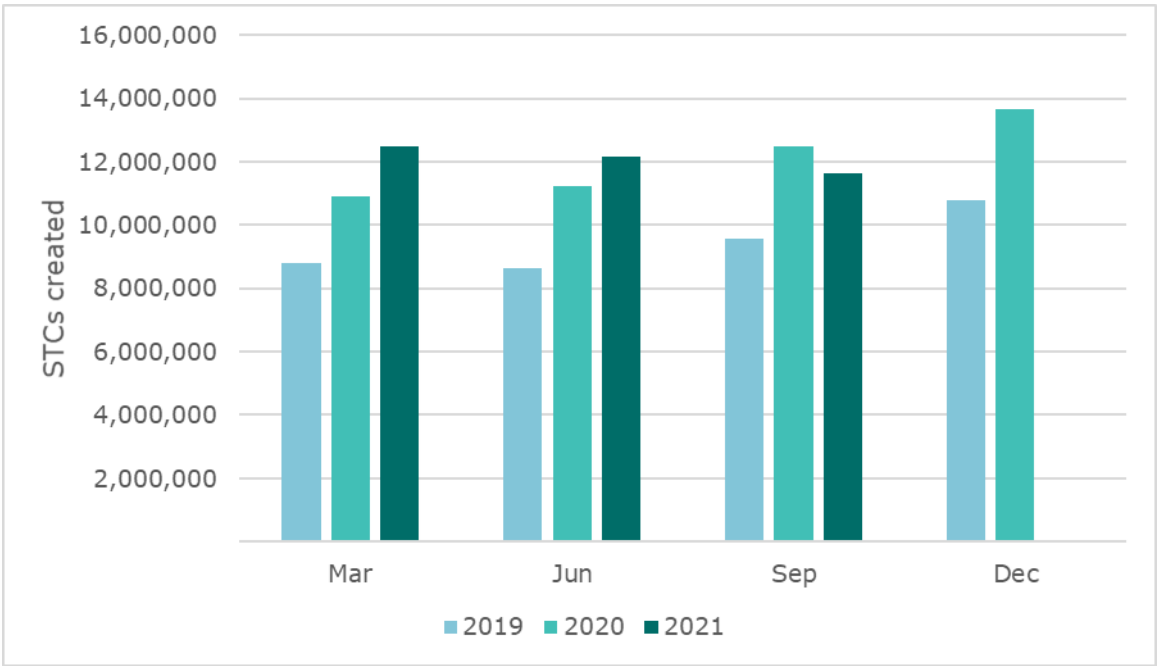
- Rooftop solar capacity exceeded expectations in Q3 with 755 MW installed despite the COVID-19 lockdowns in NSW, Victoria and the ACT.
- The Clean Energy Regulator expects total added Small-scale Renewable Energy scheme (SRES) capacity for 2021 to set a new record of circa 3.2 GW.
  - Capacity could have exceeded 3.6 GW had the lockdowns not occurred.
- Following the end of Q3 surrender of 12.5 million STCs on 28 October 2021, a balance of 5 million STCs remained in the market
- The STC spot price was steady over Q3, finishing at \$38.75

#### 3.1. Supply and demand balance

STC supply for 2021 year to date totalled 36.3million, 5% above the same period in 2020. In addition, 8.6 million STCs were carried forward from earlier assessment years into the 2021 assessment year.

STC creations have been impacted by the lockdowns across NSW, Victoria and the ACT. Creation trends in previous years suggest more STCs are created during the second half of the year (see Figure 3.1). In 2021 STC creations in Q3 decreased by 5% from Q2. Weekly creations in the Q3 2021 averaged at 886,000 STCs, down 9% compared to the weekly average of 963,000 over the first half of 2021.

Figure 3.1: STC creation by quarter, 2019 to 2021





With lockdowns lifting, creations are expected to rebound during Q4 as installations increase. If the creation rate over the first three quarters of 2021 (922,000 STCs/week) continues, a surplus of 11.3 million STCs would emerge following Q4 surrender in February 2022.

The Clean Energy Regulator expects supply will exceed the 50.6 million certificates required to be cancelled under the Small-scale Technology Percentage. Given the surplus, the clearing house is unlikely to see material use.

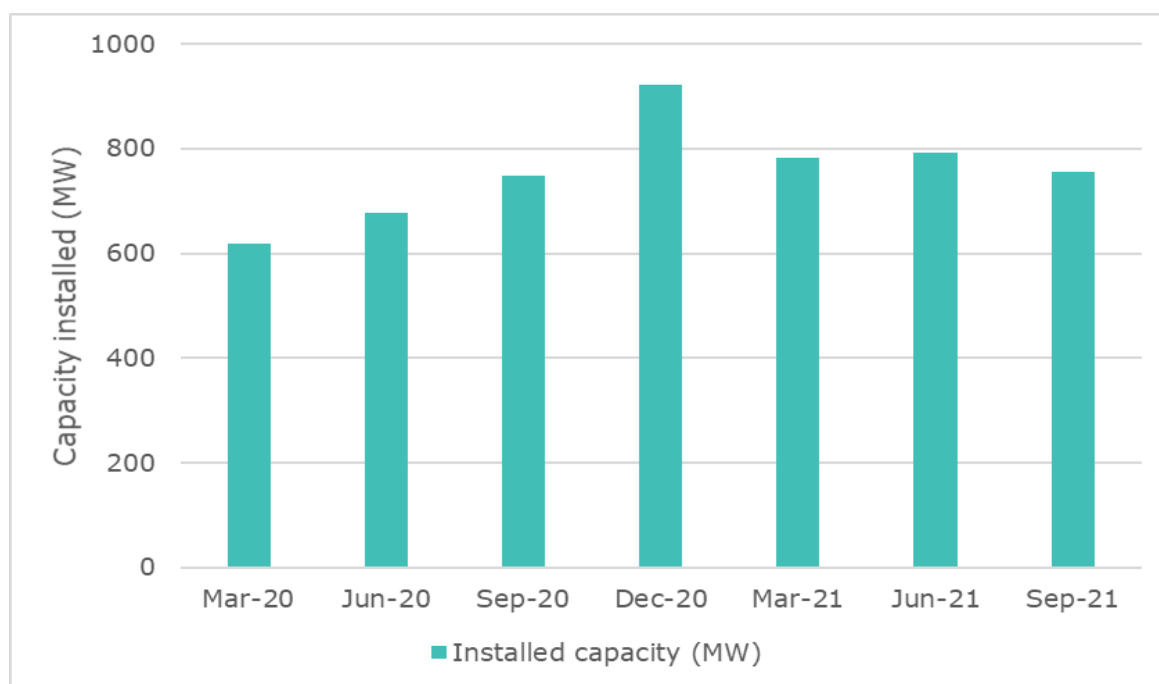
## 3.2. Factors impacting supply

### Solar PV and installations

Installed rooftop solar PV capacity for Q3 reached 755 MW, the lowest quarterly capacity for 2021. This is, nevertheless, a strong result given the COVID-19 lockdowns in some jurisdictions.

Typically, capacity installed each quarter progressively increases throughout the year. This trend was not observed in Q3 with installed capacity reducing by 5% from Q2 (see Figure 3.2). Compared to Q2 2021, installed capacity in New South Wales and Victoria decreased by 19% and 3% respectively, while Queensland and South Australia increased by 5% and 8% respectively.

Figure 3.2 Small-scale solar PV installed capacity (MW), March quarter 2020 to September quarter 2021



In New South Wales, from mid-July, solar installation work was restricted for two weeks in Greater Sydney including the Blue Mountains, Central Coast, Wollongong and Shellharbour. From the end of July, solar installation was permitted in occupied premises, including residential homes in Greater Sydney areas, with certain conditions including zero contact between workers and residents and limits to worker numbers. From July to September there were multiple stay at home orders in many local government areas where installations were completely restricted.<sup>34</sup>

<sup>34</sup> [Latest Updates: Melbourne and Victoria Solar Industry Restrictions \(energymatters.com.au\)](https://energymatters.com.au/latest-updates/melbourne-and-victoria-solar-industry-restrictions/)

In Victoria, restrictions eased from the end of July permitting rooftop installations on occupied premises under specific conditions. However, installation work was completely put on-hold from the third week of September for two weeks.<sup>35</sup>

As shown in Table 3.1, Queensland led rooftop solar PV uptake for Q3, followed by New South Wales and Victoria. With these three jurisdictions accounting for 76% of quarterly capacity and restrictions removed, the outlook for the remainder of 2021 and into 2022 is looking strong.

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

	Estimated capacity (MW)
QLD	212
NSW	202
VIC	159
WA	87
SA	71
ACT	12
TAS	9
NT	4
<b>Total</b>	<b>755</b>
Note: Totals may not sum due to rounding	

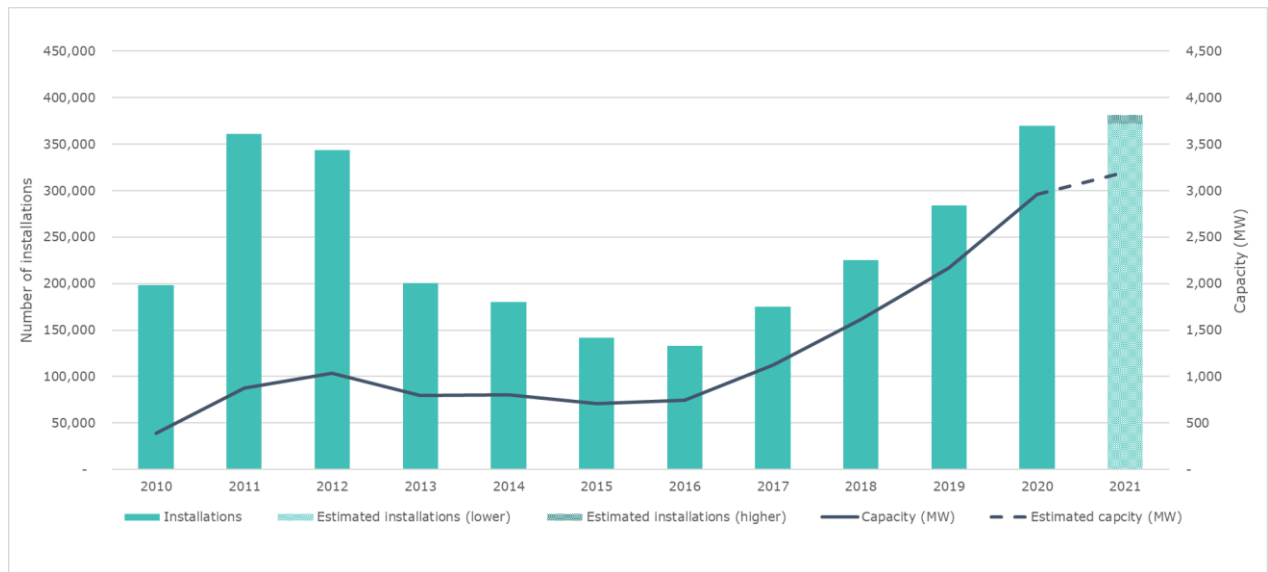
### Installed capacity expectation for 2021

Strong growth in installations over the first half of 2021 combined with a modest Q3 has resulted in a total of 2.3 GW capacity installed in 2021 – a 14% increase from the 2 GW installed over the same period in 2020 (see Figure 3.2). If the typical seasonal pattern for Q4 holds, total additional installed capacity for 2021 is likely to set a new record of circa 3.2 GW, exceeding Clean Energy Regulator minimum expectation of 3GW earlier in the year (see Figure 3.3).

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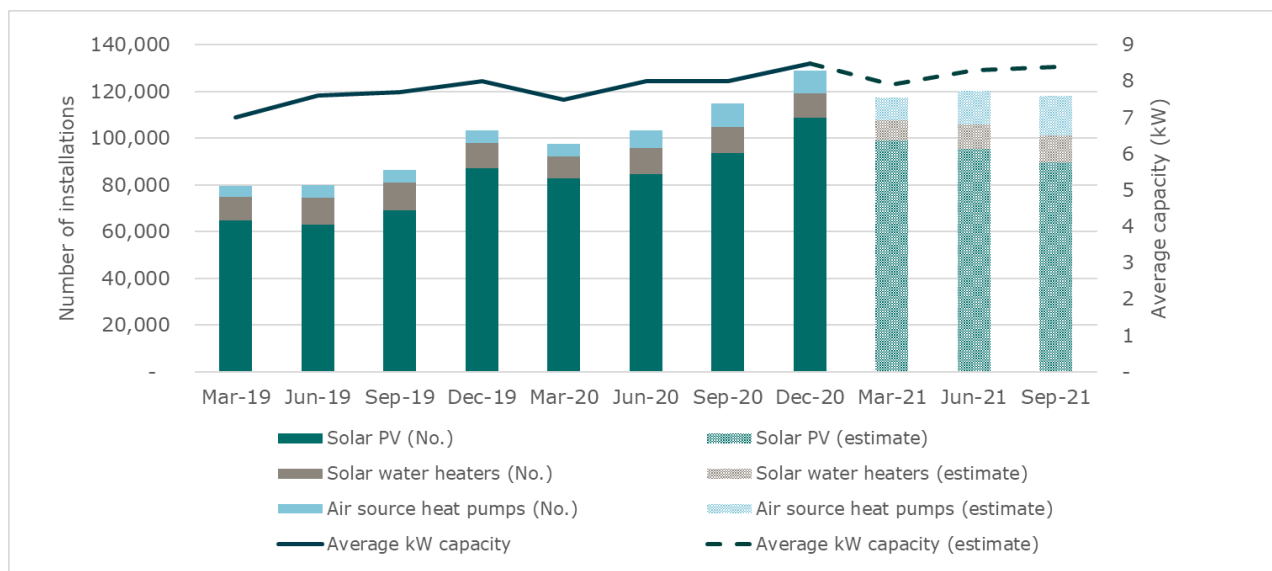
<sup>35</sup> [Victorian Solar Industry Enters Two Week Snap Lockdown: Government Urges Installers to Get Vaccinated \(energymatters.com.au\)](https://energymatters.com.au/victorian-solar-industry-enters-two-week-snap-lockdown-government-urges-installers-to-get-vaccinated/)

Figure 3.3 Small-scale solar PV installations and installed capacity (MW), 2010 to 2021



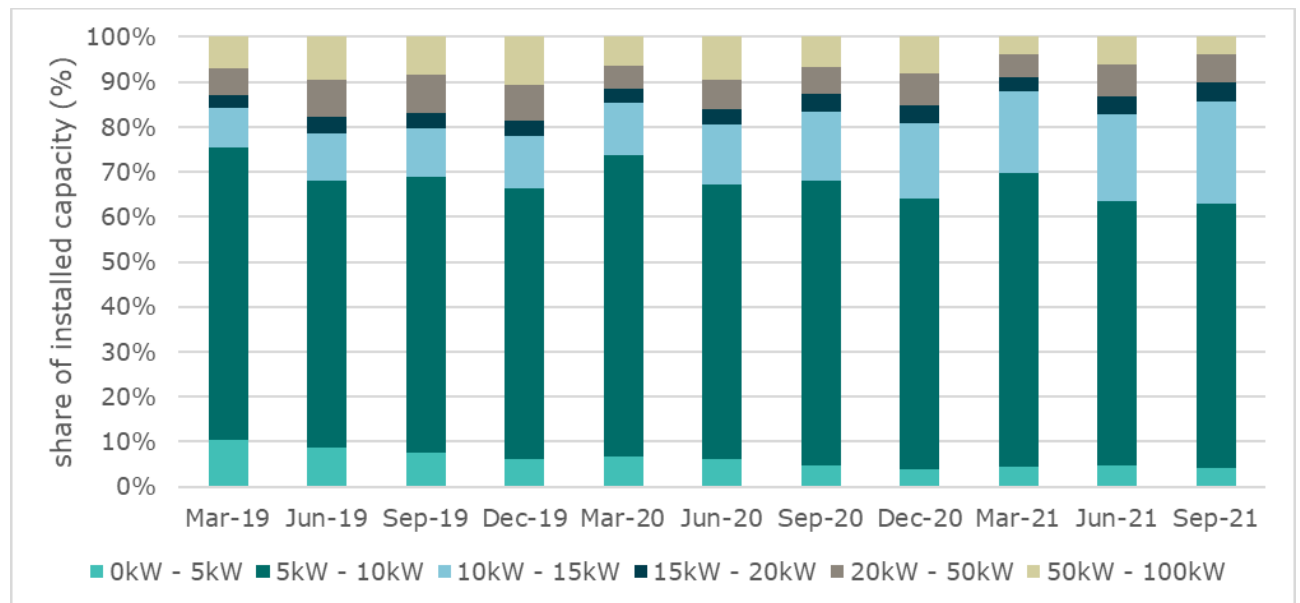
While the 755MW capacity installed in Q3 2021 is comparable to the 749MW in Q3 2020, the number of installations decreased by 4% over the same period – 89,751 in Q3 2021 compared to 93,664 in Q3 2020. The strong result for Q3 2021 is attributable to an increase in average system size, up from 7.99kW to 8.42kW over the same period (see Figure 3.4).

Figure 3.4 SRES installations and average system capacity (kW), March quarter 2019 to September quarter 2021



The increase in average system size is attributed to a growth in the number of systems installed in the 10kW to 15kW band. While systems within the 5kW to 10kW band continue to make up the bulk of installs under the SRES, the share of installed capacity from this band has decreased from 75% in Q3 2020 to 70% in Q3 2021. On the other hand, the share of systems in the 10kW to 15kW band has increased from 10% to 16% over the same period (see Figure 3.5).

Figure 3.5 SRES share of installed capacity by system size band, March quarter 2019 to September quarter 2021



### Rooftop solar PV generation

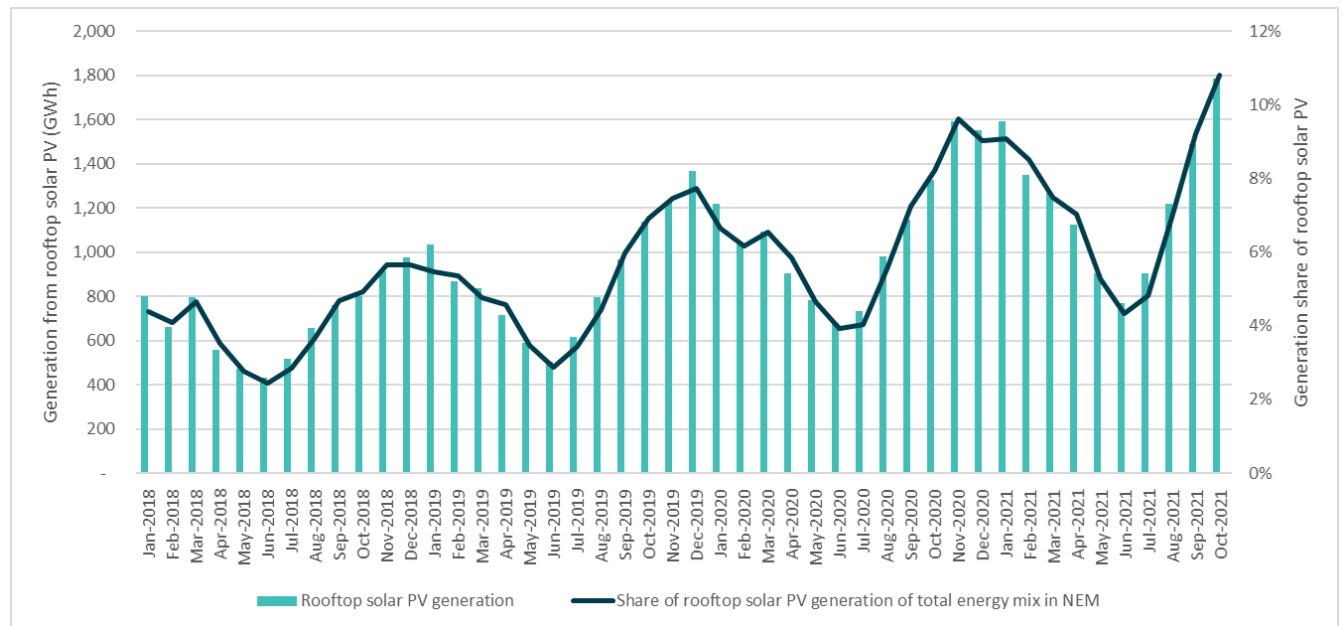
2021 has seen record generation for rooftop solar PV. The generation capacity from all rooftop systems set a new record at 9.1 GW at midday on October 6 contributing more than one-third of the total generation mix in the National Energy Market over a 30-minute dispatch interval.<sup>36</sup>

Generation from rooftop solar PV systems peaks during the November to January period, with the share of generation from rooftop solar PV following the same seasonal pattern (see Figure 3.6). With over 13 GW of rooftop solar PV systems installed in the NEM states by the end of Q3, the actual contribution of distributed energy sources could potentially meet over one-third of NEM demand in late spring and early summer months during periods of high renewable generation. AEMO suggests rooftop solar, alone, could account for up to 100% of state demand in South Australia in certain time periods this spring, and up to 77% of national grid demand by 2026.<sup>37</sup>

<sup>36</sup> [Rooftop solar PV smashes generation record on main grid | RenewEconomy](#)

<sup>37</sup> [2021 Electricity Statement of Opportunity, AEMO, AEMO | Reliability outlook positive as energy transition accelerates](#)

Figure 3.6: Generation from rooftop solar PV (GWh) 2018 to 2021<sup>38</sup>



As the average size of rooftop solar PV system increases (from 7.2kW in 2018 to 8.4kW in Q3 2021), increasing level of generation from these systems may see more shifting of load to daylight hours and greater utilisation of storage.

## Looking ahead

The Clean Energy Regulator, with the support of the Department of Industry, Science, Energy and Resources (DISER), led a review into the rooftop solar PV sector to address consumer issues, defective installations and safety and quality concerns within the sector.<sup>39</sup>

The [Integrity Review of the Rooftop Solar PV Sector](#) (the Review) made 13 recommendations to improve integrity, accountability and better protect consumers in the rooftop solar PV sector. The Australian Government accepted 12 of the 13 recommendations (one recommendation noted) and has committed \$19.2 million to implement the Review’s recommendations.<sup>40</sup> Consultation on an exposure draft of [proposed amendments](#) to the Renewable Energy (Electricity) Regulations 2001 closed on 12 November 2021. The proposed amendments addressed the Australian Government’s response to the Review.

## Solar panel supply concerns

Concerns have been raised regarding solar panel supply and possible price increases in the near future, partly owing to a disruption of polysilicon supply, shortage in solar panel supply from Chinese factories due to power crisis<sup>41</sup>, strong demand of solar installations and global price increase in shipping costs.<sup>42</sup> Claims about panel supply issues and price increases were raised after COVID-19 first emerged in early 2020. Liaison with industry does not point to this being a universal concern. Consumers should shop around by obtaining several quotes before settling on a solar panel system.

The Clean Energy Regulator is aware of concerns about forced labour in the polysilicon supply chain and will, along with the Department of Foreign Affairs and Trade, continue to monitor the situation.

<sup>38</sup> Data sourced from [OpenNEM](#)

<sup>39</sup> [Integrity Review of the Rooftop Solar PV Sector \(cleanenergyregulator.gov.au\)](#)

<sup>40</sup> [Australian Government response: integrity review of the rooftop solar PV sector | Department of Industry, Science, Energy and Resources](#)

<sup>41</sup> <https://www.nytimes.com/2021/10/13/business/china-electricity-shortage.html>

<sup>42</sup> [Solar panel demand hits record highs as prices set to skyrocket by 15%. This could cause a solar crisis as soon as this summer, PV magazine](#)

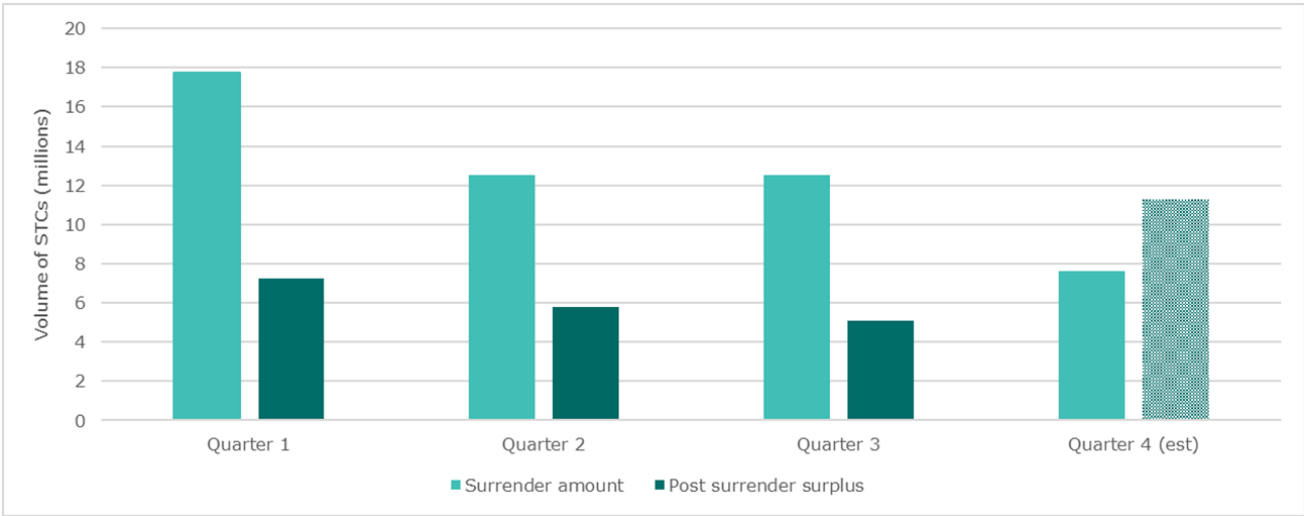
### 3.3. Factors impacting demand

#### Quarterly surrender

To meet the Q3 liability on 28 October 2021, 123 liable entities cancelled 12.5 million STCs. This was the third surrender period of the 2021 assessment year, representing 25% of total liability. A balance of 5 million STCs remained in the market after the Q3 2021 surrender (see Figure 3.7).

To meet the Q4 surrender obligations on 14 February 2022, liable entities are required to cancel 7.6 million STCs. Based on current creation trends, there will be sufficient liquidity in the market with a surplus of 11.3 million STCs expected after the Q4 2021 surrender.

Figure 3.7 STC surplus after quarterly surrender (millions of STCs), 2021



### 3.4. Market trading

Over Q3, 29.2 million STCs were traded through 3274 transactions, with an average transaction size of 8,919 STCs (see Figure 3.8). Less than one percent of the STCs traded in the quarter were traded through the clearing house, consistent with previous quarters.

The STC spot price remained relatively steady over Q3, moving between \$38.50 and \$39.30 before closing the quarter at \$38.75 (see Figure 3.9).

Figure 3.8 STC market transactions, January 2019 to September 2021

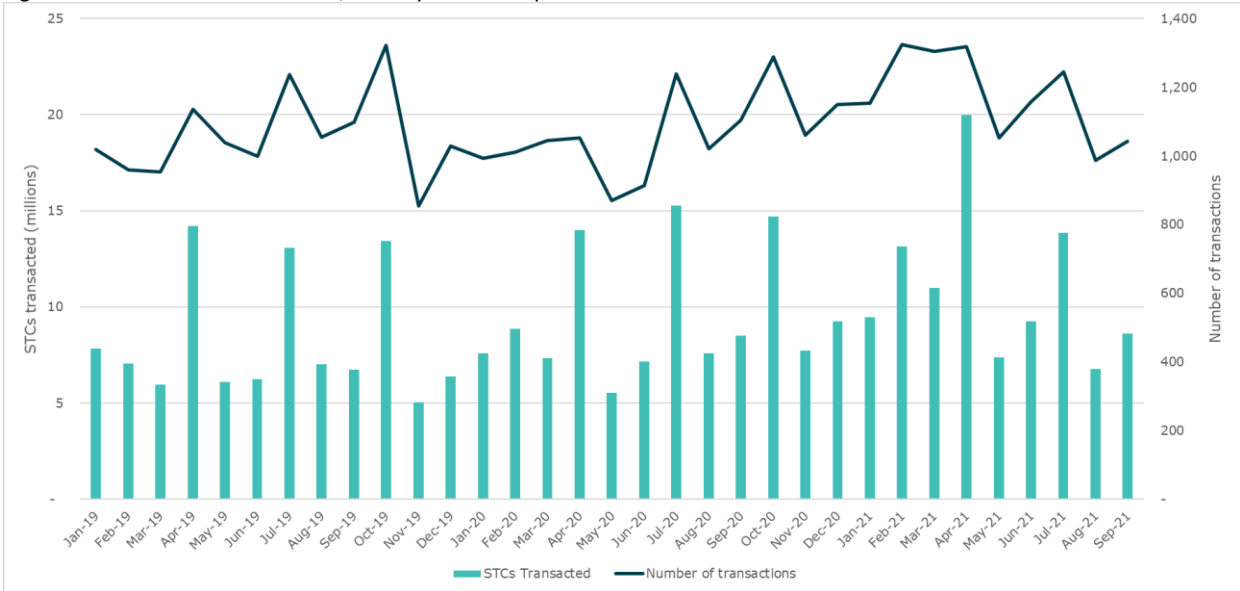
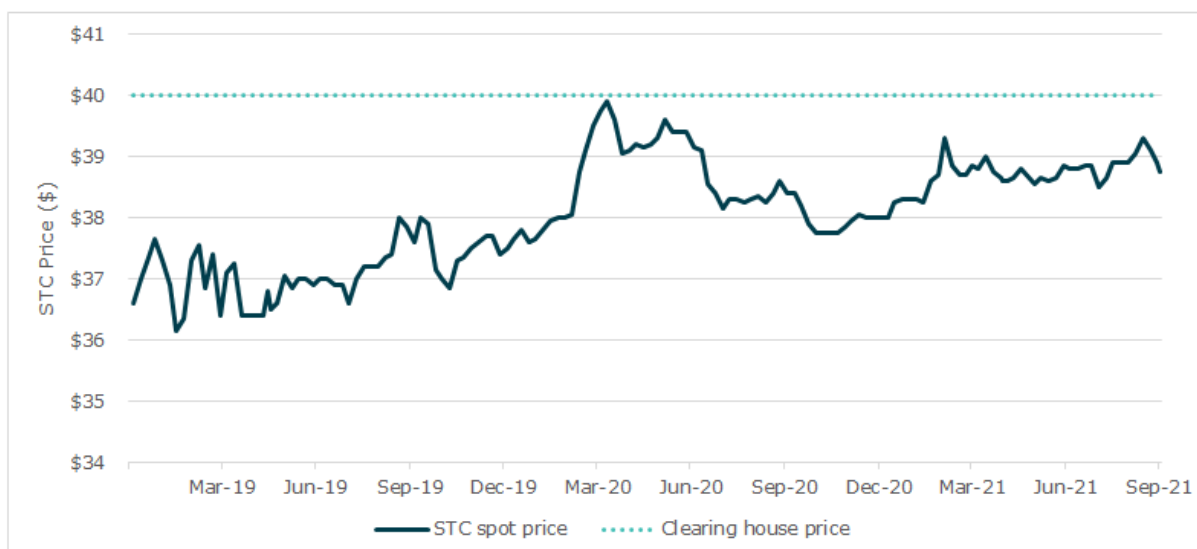


Figure 3.9 STC spot and clearing house prices (\$AUD), January 2019 to September 2021



### 3.5. Key dates

Date	Event	Significance
<b>29 October 2021 to 14 February 2022</b>	Quarter 4 surrender period	A liable entity must surrender 15% of liability for the year in the REC Registry for this quarter.  STC surrender liability for the fourth quarter of an assessment year must be made with the liable entity's energy acquisition statement for the year.
<b>31 December 2021</b>	Application for liable entity required surrender amount due	The final date for liable entities to apply to set their required surrender amount for quarters 1 to 3 where no energy acquisition statement was lodged by 1 April of the assessment year.
<b>30 March 2022</b>	STP announced on or before this date	The SRES aims to balance supply and demand by requiring all STCs that are created to be surrendered over time. To do this, the STP is set each year to require liable entities to surrender to the Clean Energy Regulator the same number of STCs as the number that are estimated to be created in that year, plus or minus an adjustment for previous under- or over-surrender.

## 4. Voluntary market demand

### Key messages

- Demand for domestic units and certificates in the voluntary market has seen rapid growth in 2021, reaching a total of 2.7 million at the end of Q3 – up 22% from the 2.2 million cancelled over the same period in 2020<sup>43</sup>
  - LGC cancellations totalled 2.1 million at the end of Q3, up 24% from the 1.7 million cancelled over the same period last year. The ACT government’s cancellation of 2.2 million is additional to this.
  - ACCU cancellations totalled 622,000 units, up 15% from 537,000 units over the same period last year.
- International units continue to dominate the voluntary market with volume of Certified Emissions Reduction (CER) units cancelled in ANREU in 2021 totalling 8.7 million at the end of Q3, more than double the volume cancelled over the same period in 2020.

### 4.1. Voluntary demand for Australian units and certificates

Voluntary carbon markets are growing rapidly, off a relatively low base, as ambition to offset emissions gains momentum with corporations, state and territory governments and individuals.

Total Australian unit and certificate cancellations were 2.7 million, up 24% at the end of Q3 compared to 2020. The ACT government cancellation of 2.2 million LGCs towards its 100% renewable energy target is additional to that total.

Australian businesses and households are increasingly wanting to procure renewable energy.

In Q3, 1.4 million LGCs were voluntarily cancelled (Figure 4.1). This included GreenPower acquittal of 681,000 LGCs, representing an increase of 34% from 2020, and the highest volume cancelled against GreenPower since 2017. A new offering under this program, [GreenPower Corporate Direct](#), will allow large energy users to have their cancelled LGCs audited by GreenPower and the renewable generator details published on their website at a reduced cost. The intent is to support the credibility of renewable energy claims by participants.

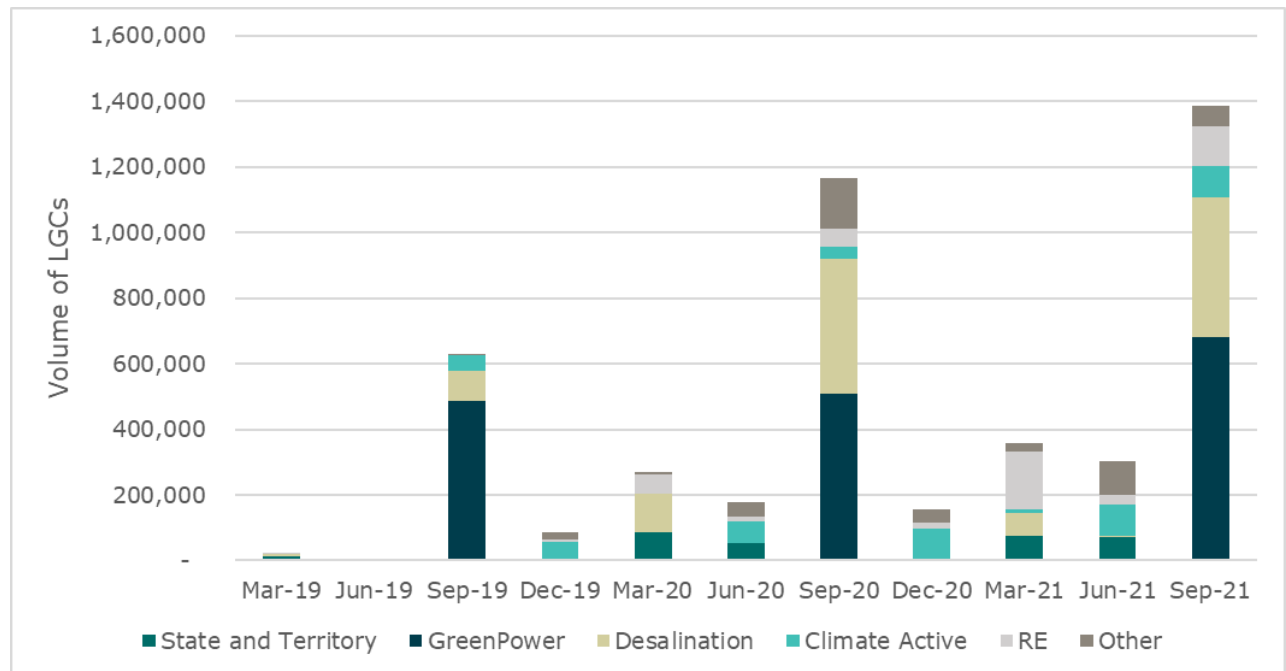
By October 2021, voluntary cancellations surpassed the Clean Energy Regulator expectations of 5 million LGCs for 2021 and could exceed 5.5 million LGCs by the end of the year.

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<sup>43</sup> The ACT government’s cancellations of 2.2 million LGCs is additional to this.



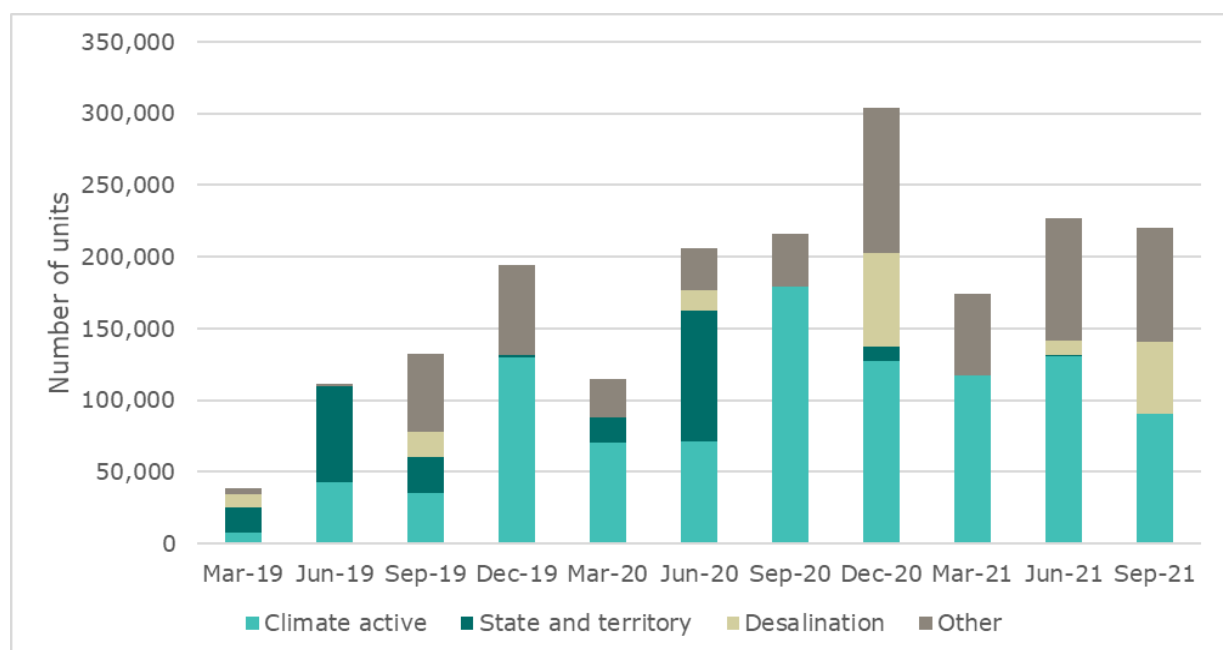
Figure 4.1 Voluntary private and state and territory government demand for LGCs by reason for cancellation, March quarter 2019 to September quarter 2021 (excluding ACT government cancellations)



Demand for ACCUs as a high integrity carbon offset is also growing with 220,000 ACCUs voluntarily cancelled in Q3 2021, taking total demand for the year to 622,000, up 16% compared to the same period in 2020. If Q4 follows the seasonal pattern in being the largest quarter for cancellations, total demand for 2021 could exceed expectations of 1 million ACCUs.<sup>44</sup>

Climate Active accounted for 41% of Q3 cancellations with 90,000 ACCUs (see Figure 4.2) and a total of 338,000 ACCUs cancelled for 2021, a 6% increase compared to the end of Q3 in 2020.

Figure 4.2 Voluntary private and state and territory government demand for ACCUs by reason for cancellation, March quarter 2019 to September quarter 2021

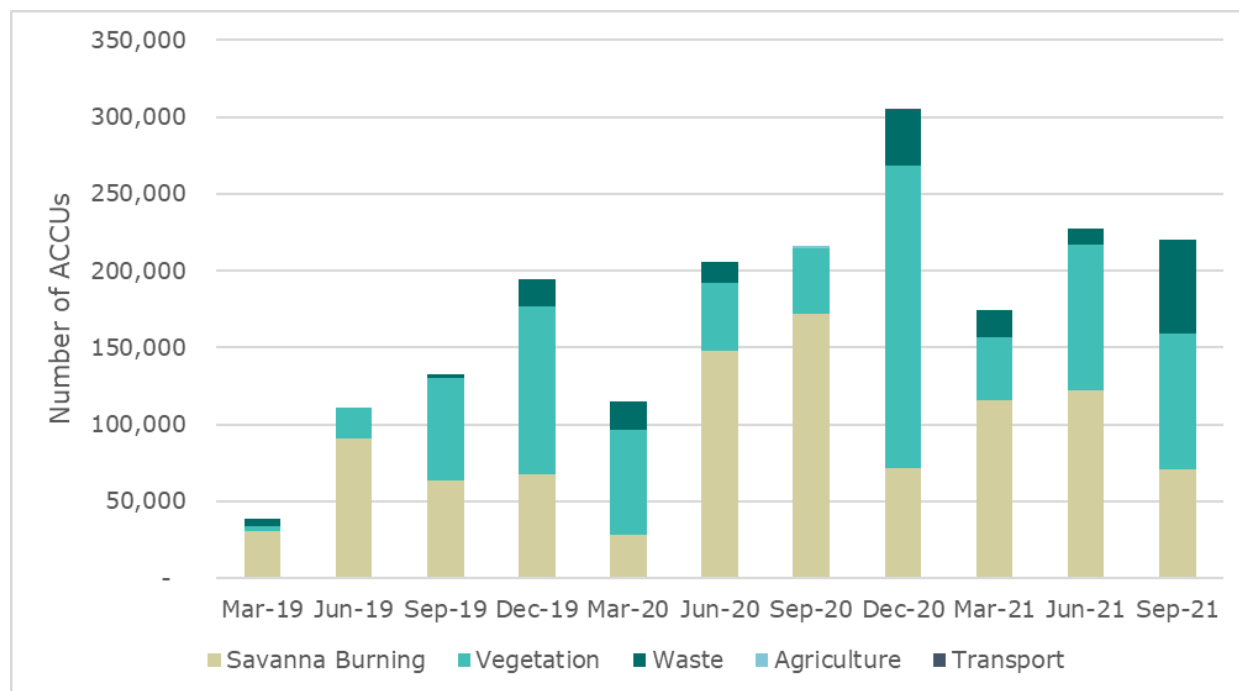


<sup>44</sup> Q4 2019 and Q4 2020 accounted for 41% and 36% of total voluntary cancellations in those years.

More participants are taking an active role in the voluntary carbon market. A total of 54 entities cancelled ACCUs during Q3, with 25 entities cancelling ACCUs for the first time. Participants from the finance and utility sector drove voluntary demand this quarter, accounting for 46% of the cancelled volume. Demand from the finance sector is likely to grow further with the Commonwealth Bank introducing [a new program](#) which will allow retail customers to view their carbon footprint and offset emissions using ACCUs.

Buyers continued to favour ACCUs from savanna burning and vegetation projects, which accounted for 72% of cancellations in Q3 (see Figure 4.3). A record number of waste credits (61,000 ACCUs) were also cancelled in the quarter.

Figure 4.3 Voluntary private and state and territory government demand for ACCUs by method type, March quarter 2019 to September quarter 2021



## 4.2. 2020 retrospective - voluntary markets grow their share

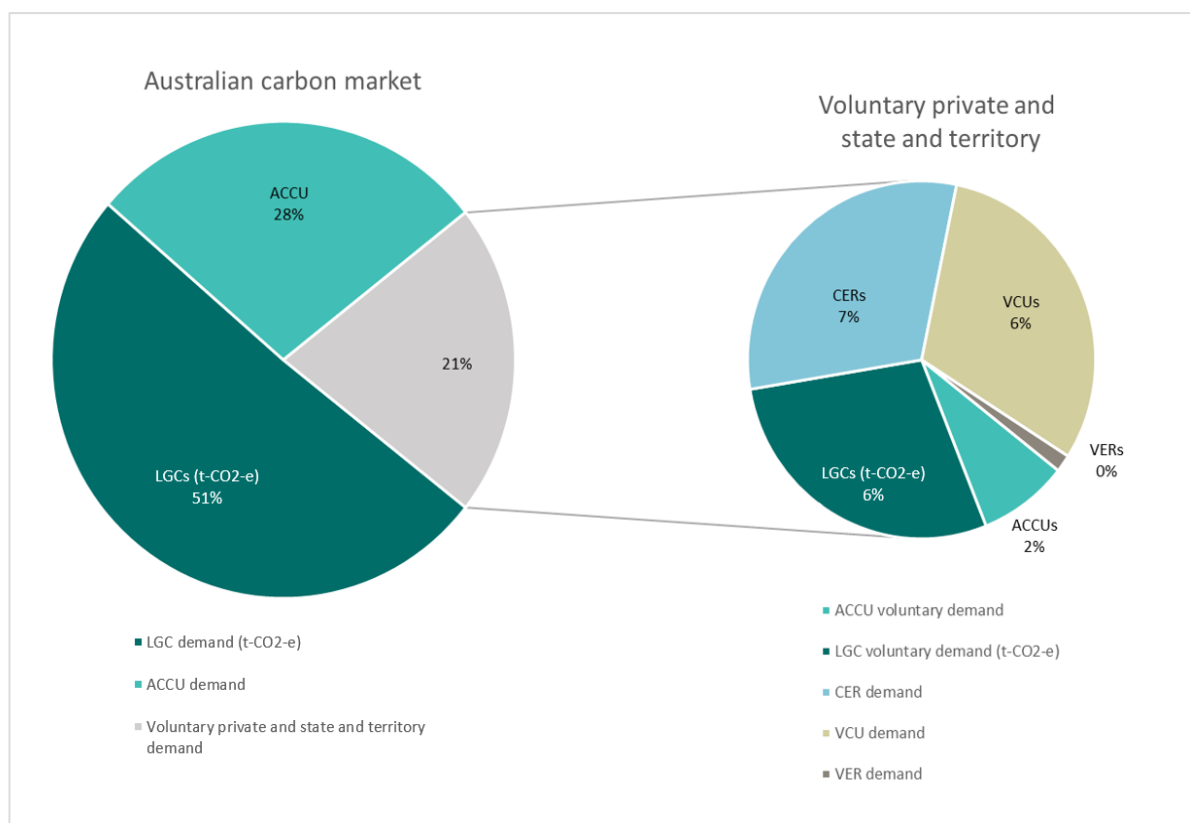
The Australian carbon market is evolving to support increasing demand from corporations, states and territories, and the public. In 2020, voluntary demand represented 21% of Australia’s carbon market or 10.1 million tonnes of emissions reduction<sup>45 46 47</sup>, up from 16% or the equivalent of 6.6 million tonnes of emissions reduction in 2019 (see Figure 4.4).

<sup>45</sup> This analysis is published by the Clean Energy Regulator in Q3 each year for the previous reporting year, due to the Climate Active reporting period extending until the end of the following year. Data may not be complete for the year but is expected to capture the key trends for the period.

<sup>46</sup> Data is aggregated from the Clean Energy Regulator and the Department of Industry, Science, Energy and Resources. The international unit total is a conservative estimate and includes Certified Emissions Reductions (CERs), Voluntary Emissions Reductions (VERs) and Verified Carbon Units (VCUs) cancelled for Climate Active for the 2019-20 and 2020 reporting period, and CERs cancelled in ANREU for other domestic purposes. CERs cancelled in ANREU for international purposes or where there is insufficient information provided to determine the reason of cancellations are excluded. Other voluntary cancellations made in registries not administered by the Clean Energy Regulator or for Climate Active are excluded.

<sup>47</sup> Voluntary demand does not include ACCUs delivered against Commonwealth contracts or cancelled against Safeguard obligations.

Figure 4.4: Market composition of renewable energy certificates and carbon units, 2020<sup>48</sup>



International units remained the biggest source of cancelled units and certificates in 2020, likely due to their availability in high volumes (see Table 4.1) and low cost when compared to Australian carbon credit units. Consistent with Q3 trends, Climate Active carbon neutral certification dominated the voluntary market in 2020, accounting for 63% of voluntary demand.

Table 4.1: Provenance of units and certificates cancelled in the voluntary, state and territory market, 2020<sup>49</sup>

Certificate	Renewable energy generation	Methane destruction and other emission avoidance <sup>^</sup>	Land-based projects	Total volume* 2020	Year on year growth (%)
ACCU	-	69,000	772,000	<b>841,000</b>	+76%
LGC (t-CO <sub>2</sub> - e) <sup>50</sup>	2,864,000	-	-	<b>2,864,000</b> <sup>51</sup>	+427%
CER	2,408,000	792,000	-	<b>3,112,000</b>	-0.1%
VER	25,000	12,000	-	<b>157,000</b>	-17%
VCU	2,767,000	37,000	61,000	<b>3,108,000</b>	+39%
<b>Total*</b>	<b>8,063,000</b>	<b>909,000</b>	<b>833,000</b>	<b>10,081,000</b>	<b>+54%</b>

<sup>48</sup> LGC demand (tCO<sub>2</sub>-e) refers to legislated demand from the Renewable Energy Target, this figure includes 2.3 million LGCs cancelled by the ACT government. ACCU demand refers to demand from Commonwealth contract deliveries from the Emissions Reduction Fund and cancellations made against Safeguard surrender obligations.

<sup>49</sup> Provenance of units and certificates refers to method and country of origin for this analysis, for examination of trends between units of the same certificate/unit type but of different provenance.

<sup>50</sup> The average emissions intensity of generation in the National Electricity Market (NEM) across all fuel sources is used to convert LGC supply into offset equivalent units comparable to ACCUs at one tonne CO<sub>2</sub>-e.

<sup>51</sup> This figure includes 2.3 million LGCs cancelled by the ACT government.

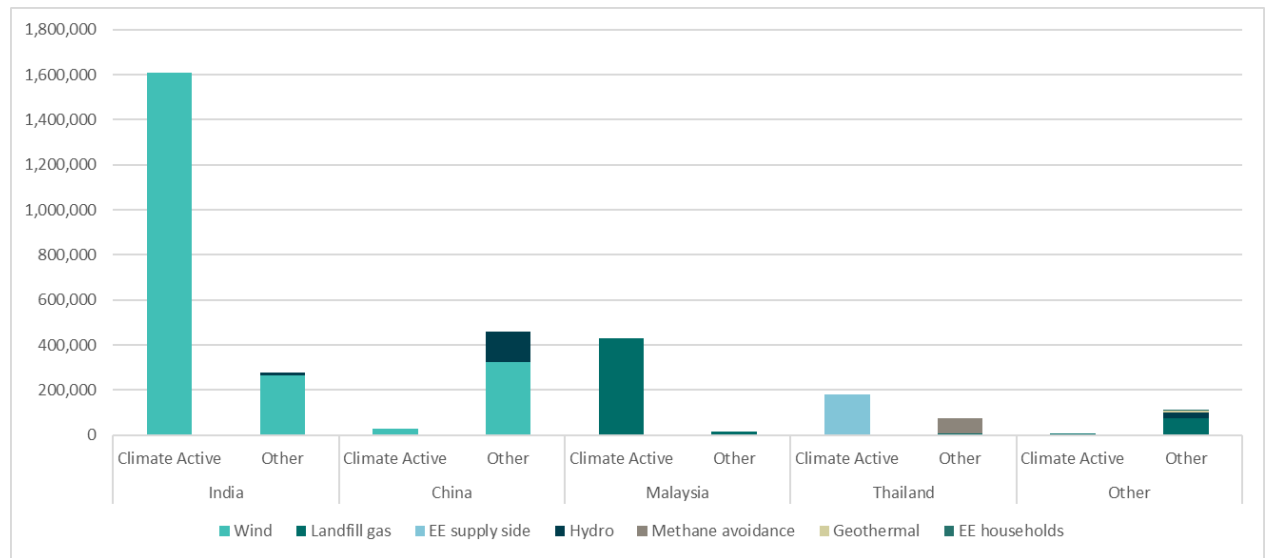
<sup>^</sup>Includes energy efficiency and other large- and small-scale emissions avoidance methods.

<sup>\*</sup>Unit provenance is provided where data is available. Data is incomplete for cancellations made in registries not administered by the Clean Energy Regulator, and as such the provenance data may not sum to the total for 2020.

Almost 85% of international carbon units cancelling in 2020 originated from overseas renewable energy projects – a similar share of volumes to 2019. As shown in Figure 4.5, almost three quarters of CERs cancelled in 2020 originated from wind energy projects in India and China. Malaysian landfill gas projects and Thai energy efficiency projects accounted for another 14% and 6% of the cancelled CERs respectively.

Clean Energy Regulator registries also show an increase in voluntary cancellation of international units by players other than Climate Active participants, although volumes are still low.

Figure 4.5: Volume of Certified Emission Reduction units cancelled in ANREU for Climate Active certification and other domestic purposes by provenance, 2020<sup>52</sup>

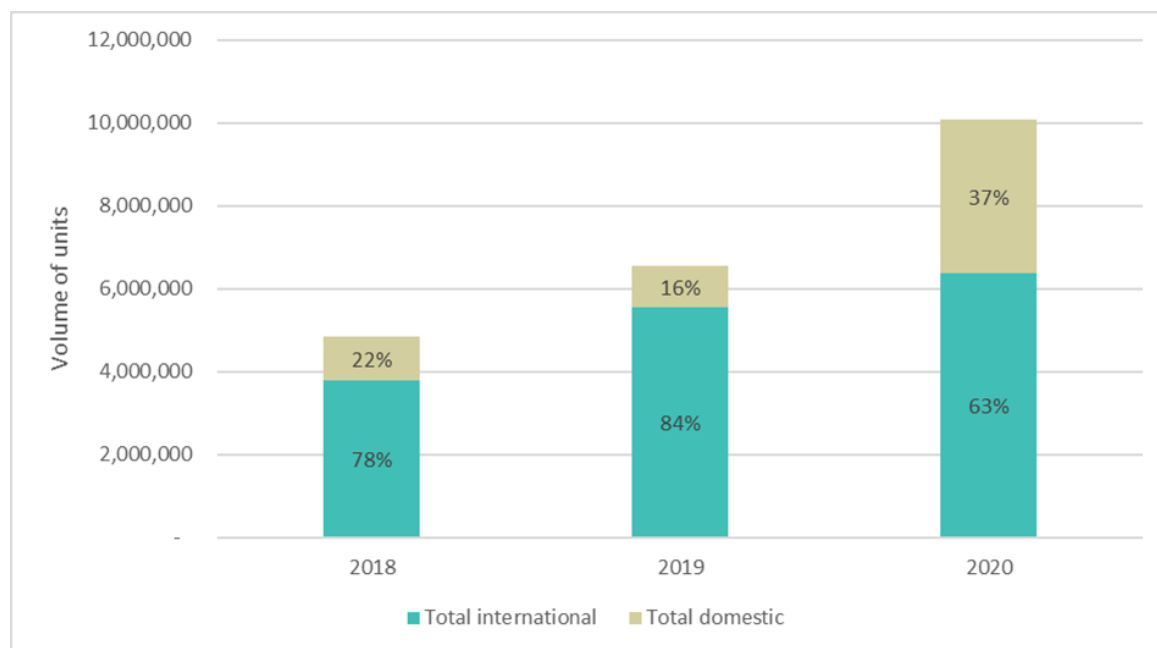


Despite the preference for international units, the proportion of cancelled Australian certificates and units more than doubled in 2020 compared to 2019 and delivered approximately 3.7 million tonnes of abatement (see Figure 4.6). Australian certificates and units comprise of 0.8 million ACCUs and 4 million LGCs (2.9 million tonnes CO<sub>2</sub>-e of LGCs).<sup>53</sup> The volume of LGCs cancelled increased five-fold between 2019 and 2020, while the volume of ACCUs cancelled increased by 76% in 2020 compared to 2019. The ACT Government cancelled 2.3 million LGCs (1.6 million tonnes CO<sub>2</sub>-e of LGCs) against its 100% renewable energy target for 2019-20 and there was also strong growth from the private sector.

<sup>52</sup> CERs cancelled in ANREU include 2.3 million cancellations for Climate Active certification for the 2019-20 and 2020 reporting period and 0.8 million CERs cancelled for other domestic purposes. CERs cancelled in ANREU for international purposes, or where there is insufficient information provided to determine the reason of surrender are excluded.

<sup>53</sup> For this analysis, LGCs are converted into the carbon abatement equivalent by multiplying the unit by the emissions intensity factor for the Australian electricity network.

Figure 4.6: Volume of domestic and international units and certificates cancelled in the domestic market for voluntary purposes, 2018 to 2020



### 4.3. Looking forward

Australian carbon units and certificates are likely to gain a greater share of the Australian voluntary market due to a range of factors.

Future supply of international units is uncertain. New large-scale renewable energy projects are no longer eligible under voluntary offset standards administered by Verra<sup>54</sup> and Gold Standard<sup>55</sup>, except where carbon finance is required for implementation. This may see VERs and VCUs lose further market share in the future, as supply of these units from international renewable projects decreases over time. Credits generated between 2015 and 2021 from reduced deforestation and forest degradation in the UN scheme known as REDD++ are to be excluded.

The 26th UN Climate Change Conference of the Parties (COP26) made progress in settling market rules under the Paris Agreement. The ‘Clean Development Mechanism’ under the Kyoto Protocol will be replaced by the ‘Sustainable Development Mechanism’ under the Paris Agreement. Existing projects can transfer by 2025, subject to meeting the new methodologies. Credits from these projects will be clearly labelled and can only be used towards countries’ targets in the period to 2030. CERs already issued under the CDM may continue to be used towards countries’ targets, provided the project was registered after 2012 and certain other conditions are met. However, the CDM will no longer register, renew crediting periods, or issue CERs for post-2020 emissions reduction activities.

Countries will be able to use markets to help meet their targets and new rules have been agreed to prevent double counting of emissions reductions. Bilateral and multi-lateral co-operative approaches can also be established between countries for the purpose of trading International Traded Mitigation Outcomes, like the Australian Government’s Indo-Pacific Carbon Offsets Scheme.

There has been increasing media interest in providing transparency on the provenance of international carbon units being cancelled in large numbers by Australian corporates. This is expected to continue, progressively shifting demand to high quality ACCUs.

<sup>54</sup> Verra, [Revision to Scope of VCS Program](#), April 2019.

<sup>55</sup> Gold Standard, [Renewable Energy Eligibility](#), August 2019.

In contrast, ACCU supply has increased year on year at an average rate of 10% since 2017. A further step up in growth is expected as supply from new methods emerge and ACCU spot prices increase (see ACCU chapter for further information).

Future LGC supply expectation also remains positive owing to strong investment in new projects as corporations and industry switch to electrification from renewables. As statutory demand for LGCs remains fixed from 2021 until 2030, supply of LGCs available for the voluntary market is expected to progressively increase moving forward.

It is likely that Australian companies with voluntary ambition to reduce their net emissions in Australian operations will increasingly focus on buying high quality Australian carbon units and certificates where the emissions reduction has a high level of integrity and delivers economic benefits in Australia.

**Future development of carbon markets**

As interest in developing effective carbon markets grows, the need to ensure the integrity of carbon units, governance of carbon markets, and standardisation of market frameworks across the industry is taking a particular focus. A private sector-led initiative has resulted in the formation of the [Taskforce on Scaling Voluntary Carbon Markets](#) (TSVCM) which aims to scale an effective and efficient voluntary carbon market to help meet the Paris Agreement goals and address these key needs. Six key topics for action spanning the entire carbon markets value chain have been identified which look to support the scale-up of voluntary carbon markets. Table 4.2 below shows the 6 principles and provides high-level insight into Australia’s progress.

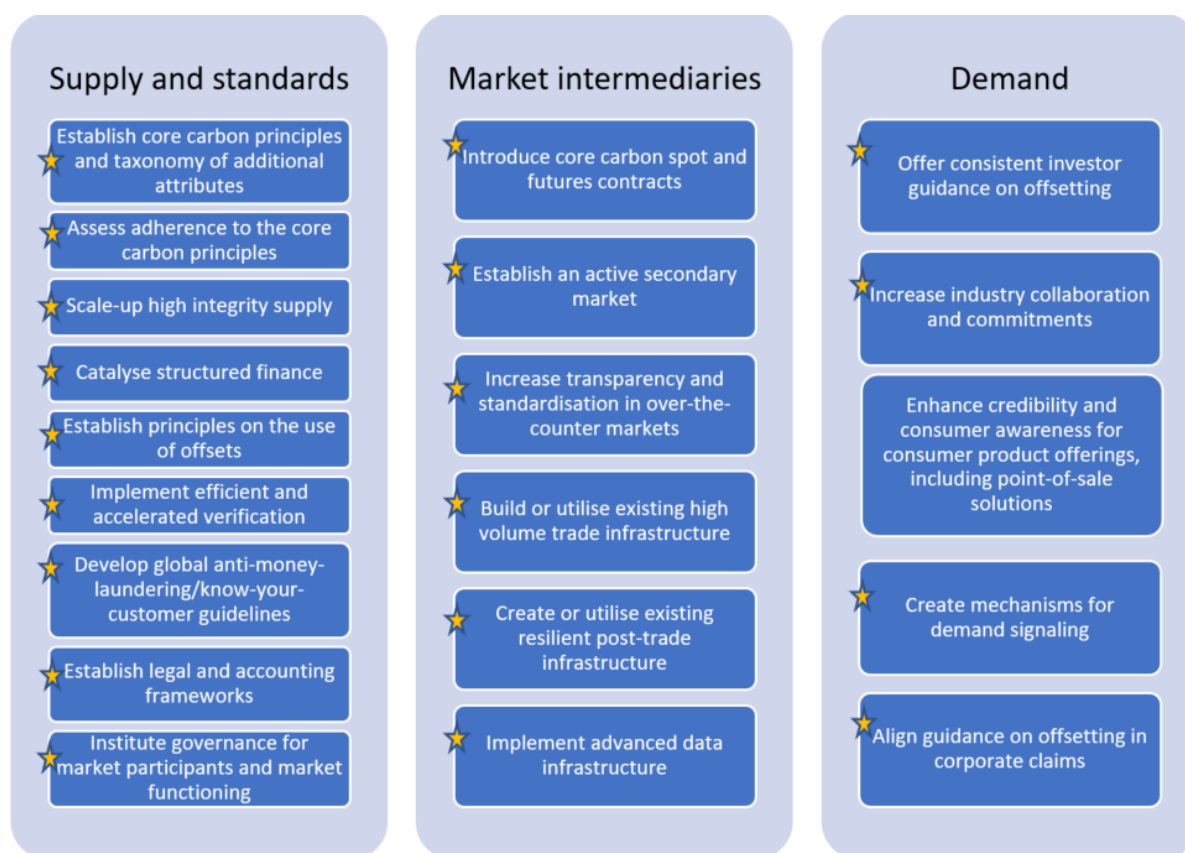
Table 4.2 Taskforce on Scaling Voluntary Carbon Markets guiding principles as they apply to Australian carbon markets

Topics for action	Australian Carbon Markets
Core carbon principles and attribute taxonomy	The ERF framework delivers credits of high integrity. Clearly defined methodologies under which credits are issued allows for easy establishment of taxonomy of attributes.
Core carbon reference contracts	Regular reporting provisions facilitates transparency. Optional Delivery contracts de-risk investment in projects while facilitating liquidity in the secondary market.
Infrastructure: Trade, post-trade, financing, and data	Development of an exchange traded carbon exchange will increase market transparency including pricing, lowering transaction costs and reducing red tape.
Consensus on the legitimacy of offsetting	The Climate Active initiative and Climate Active Carbon Neutral Standard provide support and guidance for businesses in accounting for and reducing carbon emissions.

Market integrity assurance	<p>Australia’s ERF has a range of independent and rigorous governance arrangements including ERAC for method development and review and the CER for monitoring and verification of abatement.</p> <p>In addition, the Australian Carbon Industry Code of Conduct (the Code) developed by the Carbon Market Institute aims to promote market integrity, consumer protection and appropriate interaction with carbon project stakeholders, including Native Title Holders, representative bodies, land managers and project owners.</p>
Demand signals	<p>Initiatives like the Corporate Emissions Reduction Transparency report, and ClimateActive, will likely facilitate further growth of voluntary carbon markets as the volume and type of offsets used to attain a net emissions position will be on the public record.</p>

The TSVCM has published a blueprint which provides recommended actions against the 6 key topics (see Figure 4.7). Australia’s carbon market already rates well against most actions and is well-placed to develop and advance all metrics, through already established frameworks, recent initiatives like the CERT report and the proposed Australian Carbon Exchange and through rapidly increasing private participation in the market.

Figure 4.7: The TSVCM blueprint - recommended actions for a voluntary carbon market (repurposed)<sup>56</sup>



★ Australian market has established frameworks, or has made significant progress towards recommendations

<sup>56</sup> [The Taskforce on Scaling Voluntary Carbon Markets – Final Report](#) (see Page 6, Overview of recommended actions)

The TSVCM blueprint considers clear and measurable impacts in reducing carbon emissions and full environmental and social integrity. Australia’s carbon market is closely aligned with the TSVCM principles, producing high-integrity units underpinned by government legislation. ACCUs issued under the ERF can deliver environmental, social and economic co-benefits, which is a consideration for the TSVCM. The Clean Energy Regulator has observed the market is starting to distinguish different types of offset projects and is willing to pay a premium for co-benefits.

The government’s [Long-term Emissions Reduction Plan](#) highlights the crucial role the carbon market will play in achieving Australia’s net zero emissions by 2050 target. This includes supporting new low emission technologies such as carbon capture and storage as well as providing a new income stream for the land sector.

Transparency initiatives like the CERT report will likely facilitate further growth of voluntary carbon markets as the volume and type of offsets used to attain a net emissions position will be on public record. It is possible that this additional scrutiny may also influence unit preferences. [Consultation on the CERT guidelines](#) has recently concluded. Eleven corporations across multiple sectors have already indicated they will participate in the CERT pilot when it is formally launched later this year. Interest from these early movers is encouraging, and a lot more engagement is expected before the pilot opt-in cut-off date of 30 January 2022 . There is no limit on the number of NGER reporters (above the publication threshold) who can participate in the CERT pilot.

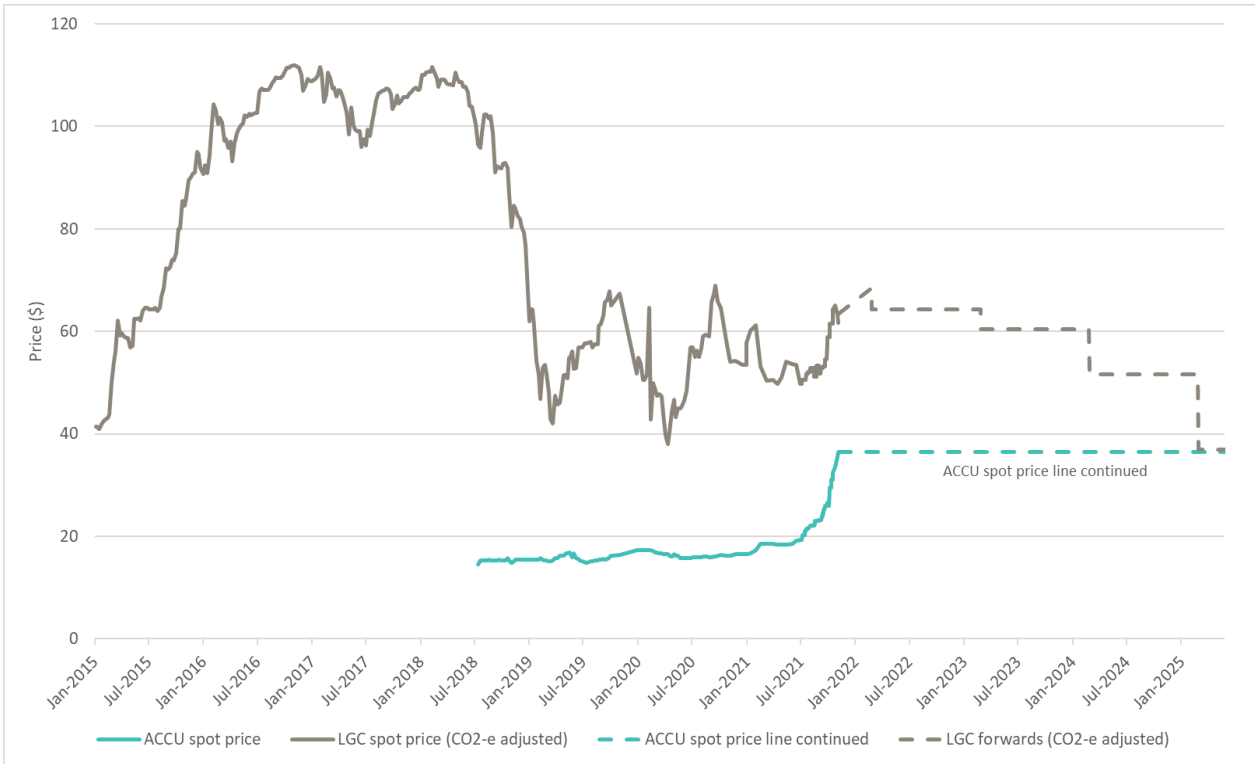
### 4.4. Prices

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.

While a forward market for ACCUs continues to develop, trades are still sporadic and of relatively low volumes. In lieu of ACCU forward prices, if the current ACCU spot price were to stay flat, the point of convergence will be in early 2025 (see Figure 4.8).

The convergence may occur earlier depending on the actual future LGC and ACCU prices. An increasing forward LGC price will shift the timeline out, whereas increasing forward ACCU prices will draw it closer.

Figure 4.8 ACCU and LGC price convergence (\$AUD), 2015 to 2025





## 4.5. Other units

European Union Allowance (EUA) prices have seen an 11% increase over Q3, reaching a record high of AUD\$99. Increased use of coal-fire power due to high global gas prices is resulting in a surge in demand for EUAs, and a further rise in EUA prices.<sup>57</sup>

New Zealand emission units (NZU) prices rose over 50% to finish the quarter at AUD\$61 following the New Zealand government's decision to increase the cost containment reserve trigger price (essentially a market cap) for New Zealand ETS auctions from NZ\$51 to NZ\$70 for 2022. The cost containment reserve trigger price will then rise by a minimum of 10% plus inflation per year out to 2026, which could see the price rise to NZ\$110 in that period.<sup>58</sup>

Certified emissions reduction (CER) units cancelled in ANREU in 2021 totalled 8.7 million at the end of Q3, more than double the volume cancelled over the same period in 2020. It will be interesting to see if this trend continues as transparency of units cancelled increases.

Table 4.2 Domestic and international unit and certificate market spot prices (\$AUD)

Product	Spot price AUD (30 June 2021) <sup>59</sup>	Spot price AUD (30 September 2021) <sup>60</sup>	Quarterly trend <sup>61</sup>
ACCU	\$19.30	\$26.50	+\$7.20 (+37%)
LGC (tCO <sub>2</sub> -e)	\$50.57	\$61.44	+\$10.87 (+21%)
Energy Saving Certificates (ESC, NSW)	\$33.40	\$33.75	+\$0.35 (+1%)
Victorian Energy Efficiency Certificates (VEEC)	\$62.60	\$65.00	+\$2.40 (+4%)
European Union Allowances (EUA)	\$89.12	\$99.03	+\$9.91 (+11%)
New Zealand Carbon Units (NZU)	\$40.60	\$61.60	+\$21.0 (+52%)
Korean Allowance Units (KAU)	\$18.41	\$34.70	+\$16.29 (+88%)
Prices for Certified Emissions Reduction (CER) units, Verified Carbon Units (VCU) and Verified Emissions Reductions (VER) units are not available through verifiable open sources. However, market sources suggest CERs are trading in the range of at \$2 - \$3, VCU at \$4 - \$5 and VERs at \$5 - \$8.			

<sup>57</sup> Reuters, [Analysts raise EU carbon price forecasts as gas rally drives up coal power](#), sourced 14 October, 2021

<sup>58</sup> [Annual updates to emission unit limits and price control settings | Ministry for the Environment](#)

<sup>59</sup> Prices are converted to Australian dollars and were correct at time of conversion at 30 June 2021. Data sourced from Jarden, TFS Green, ICE, Korea Exchange.

<sup>60</sup> Prices are converted to Australian dollars and were correct at time of conversion at 30 September 2021. Data sourced from Jarden, TFS Green, ICE, Korea Exchange.

<sup>61</sup> This is the quarterly trend from the end of Quarter 2 2021 to the end of Quarter 3 2021.

## 5. Market spotlight: Small and mid-scale solar PV outlook

Earlier this year, the Clean Energy Regulator commissioned GHD, Green Energy Markets (GEM) and Jacobs Australia to model the near-term outlook for Australia's small and mid-scale solar PV sectors (0-30MW).<sup>62</sup>

### Modelling approach

Modellers combined industry research with regression modelling, agent-based modelling and machine learning to obtain projections for installation numbers, installed capacity and STC creation from 2021 to 2025. Projections were made in a variety of subcategories including system capacity bands and by state and territory. GEM also modelled an additional scenario in which favourable market conditions accelerate the uptake of highly distributed energy resources.

Results from the three modellers have been averaged to produce the installed capacity estimates for the capacity bands discussed below.

The modelling reports are available on the Clean Energy Regulator's website.<sup>63</sup>

### Results

Overall, installed capacity of small and mid-scale (0kW-30MW) solar PV is estimated to be 3.8GW per year on average from 2021 to 2022, before increasing to 4.5GW per year at end of 2025. If installed, this would result in 20.3GW of additional capacity by 2025, more than doubling Australia's current small and mid-scale capacity to 34.6GW.

#### Small-scale (0-100kW) results

Total installed capacity of small-scale technologies is estimated to grow by approximately 3.5GW per year in 2021 and 2022. From 2023 to 2025, yearly growth is expected to increase steadily, with 4.2GW installed in 2025. In total, 18.7GW of additional small-scale capacity is expected from 2021 to 2025 (see Figure 1.1). For comparison, 8.6GW of additional small-scale capacity was installed from 2016 to 2020.

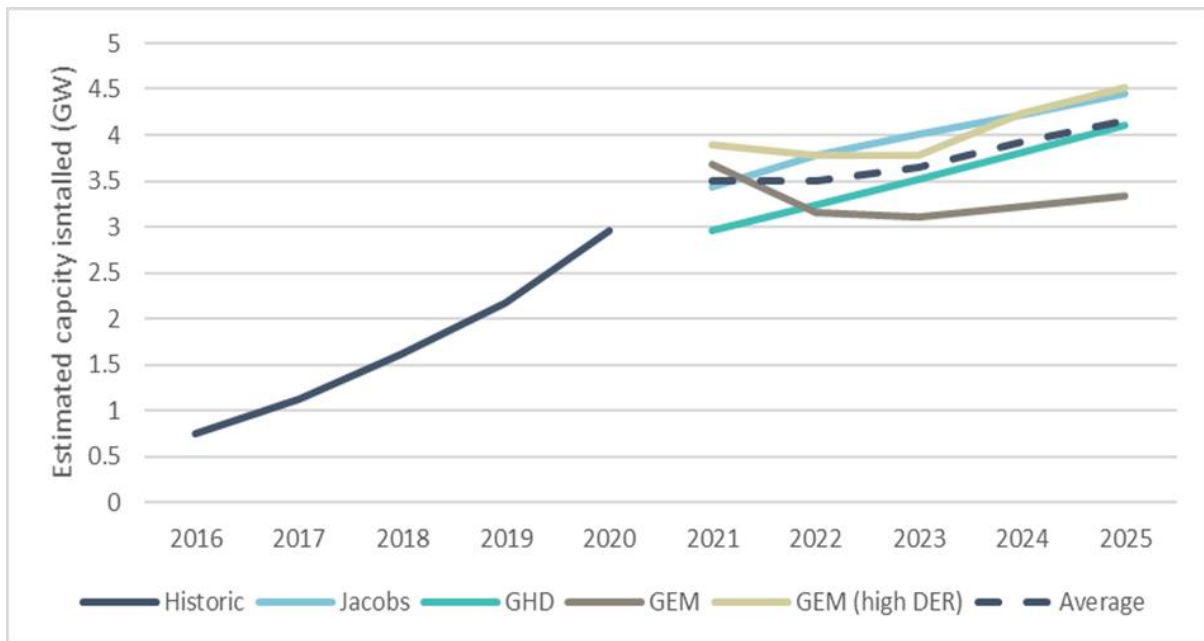
The small-scale sector includes both residential and commercial solar PV systems with a capacity less than 100kW. Factors influencing near-term uptake in this sector include electricity prices, feed-in tariffs, government incentives, capital costs, low interest rates and increasing consumer awareness.

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<sup>62</sup> Note that this modelling does not inform the setting of the Small-scale Technology Percentage (STP). Modelling to inform the STP will be completed in early 2022.

<sup>63</sup> [Small-scale technology percentage modelling reports](#)

Figure 5.1: Small-scale ( $\leq 100$  kW) installed capacity additions, 2016 to 2025



### Mid-scale (100 kW to 30 MW) results

Installed capacity of mid-scale solar PV is estimated to grow by approximately 1.6GW during the 2021-2025 period. This can be further split into two capacity bands exhibiting different trends.

Installed capacity of systems in the 100kW-5MW band shows potential yearly growth of approximately 160MW between 2021 to 2023. This increases from 2024, reaching 210MW in 2025 (see Figure 1.2). Total installed capacity between 2021 and 2025 is expected to reach 860MW. Growth in this capacity band is supported by ongoing cost reductions resulting from low module prices, government incentives and voluntary emissions reduction commitments made by corporations.

In contrast, installation of systems in the 5MW-30MW band is expected to slow by 40%, from 190MW to 110MW per year, over the 5 years to 2025 (see Figure 1.3). The estimate for total installed capacity between 2021 and 2025 is 700MW. Declining growth in the 5MW-30MW capacity band can be attributed to falling wholesale electricity prices, which are expected to impact the financial viability of in-front-of-the-meter power plants.

It should be noted that mid-scale results differ significantly among the modellers. This reflects the relative immaturity of the mid-scale market and the diverse range of applications and incentives driving its near-term growth. Behind-the-meter systems are installed to generate electricity for self-consumption, while systems installed as power plants with limited self-use generally participate in the wholesale market. In addition, off-grid or micro-grid power systems are often built to avoid the cost of diesel generation. Mid-scale solar uptake moderated in 2020 owing to the COVID-19 pandemic. However, the sector has shown signs of recovery in 2021 and any longer-term effects remain to be seen.

Figure 5.2: Mid-scale solar PV (100 kW–5 MW) capacity additions, 2016 to 2025

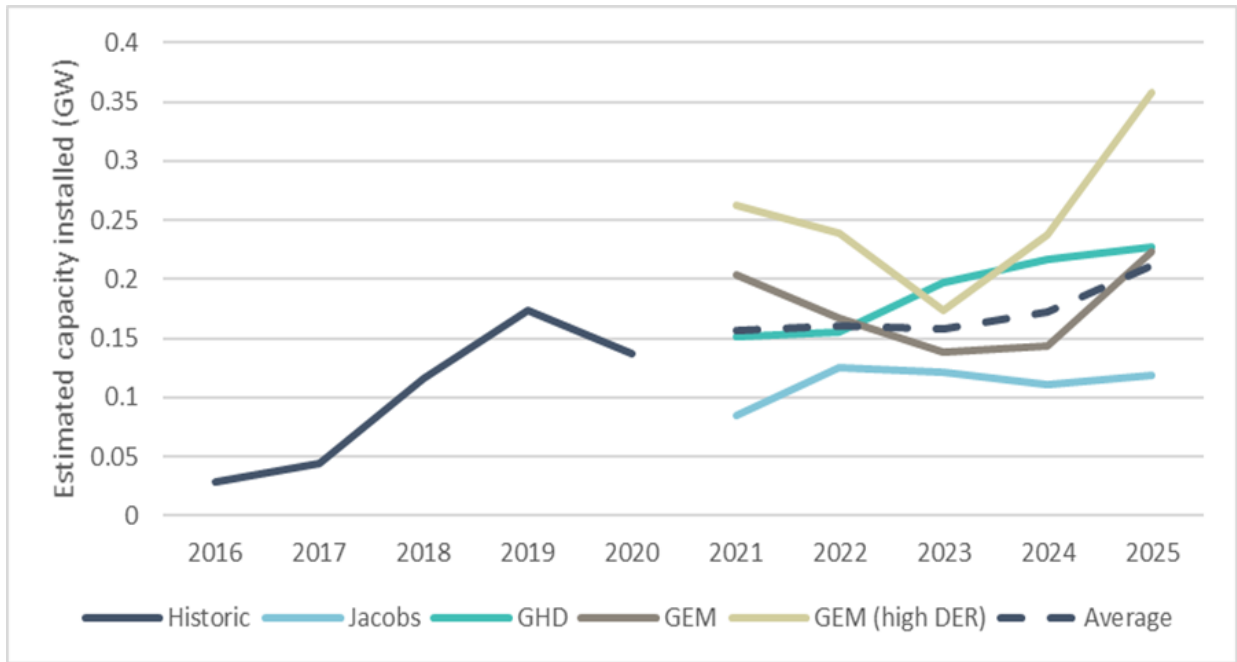
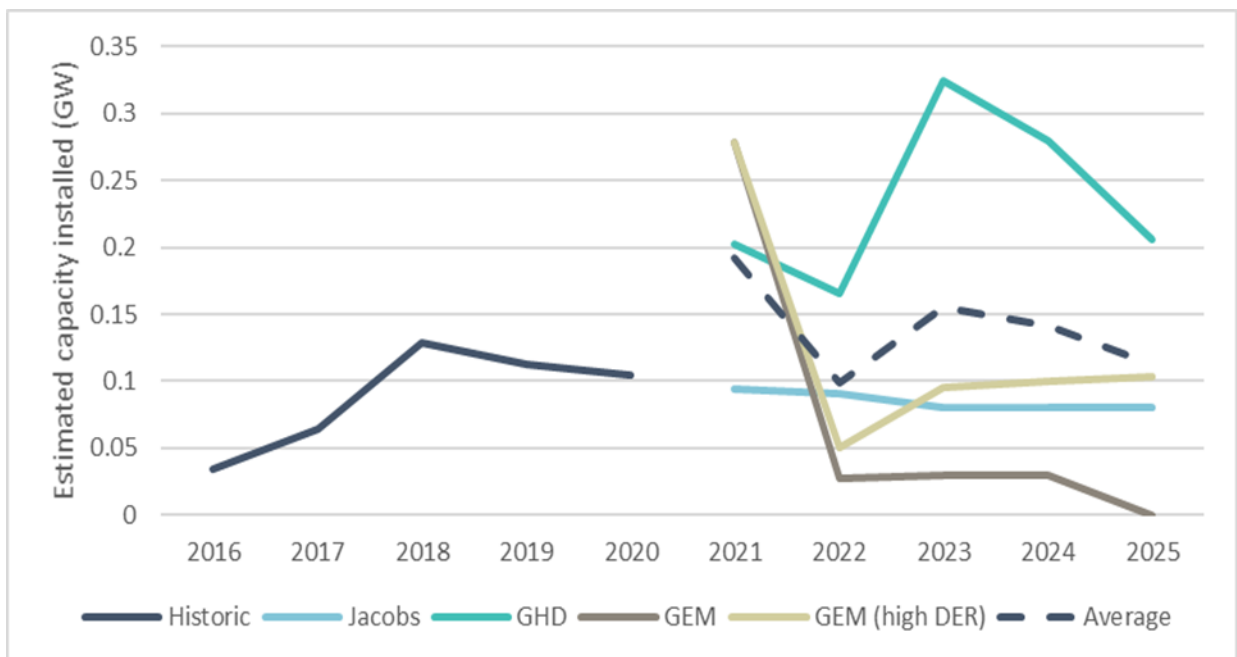


Figure 5.3: Mid-scale solar PV (5MW–30 MW) capacity additions, 2016 to 2025



## 6. Emissions reduction

Emissions reduction associated with schemes administered by the Clean Energy Regulator remains on track to deliver a conservative 57 million tonnes of carbon dioxide equivalent (CO<sub>2</sub>-e) in 2021.

The Emissions Reduction Fund (ERF) is expected to deliver ACCUs equivalent to 17.3 million tonnes of CO<sub>2</sub>-e emissions abatement in 2021, an 8% increase on 2020.

The Large-scale Renewable Energy Target (LRET) is expected to contribute 24.3 million tonnes CO<sub>2</sub>-e of emissions reduction in 2021.

The Small-scale Renewable Energy Scheme (SRES) is expected to deliver 15.5 million tonnes CO<sub>2</sub>-e of emissions reduction in 2021.

These conservative estimates calculate an implicit 'carbon content' for LGCs and STCs by using the annual average emissions intensity of the National Electricity Market. This convention provides an equivalence between 1 MWh of large or small-scale generation and 1 tonne of CO<sub>2</sub>-e of emissions reduction. Over time, the average emissions intensity of the grids will continue to decline and this will eventually dominate the increase in renewable generation. If a 100% renewable grid were to be achieved, the emissions reduction delivered by the next 1 MWh of large or small-scale generation would be zero, because there would be no further emissions to reduce. This approach accords most with accounting frameworks such as that used in Climate Active reporting and prospectively in CERT where scope 2 emissions are deemed according to average grid emissions intensity.

An alternative method is to assume that LRET and SRES generation 'avoid emissions' by displacing thermal generation. This is supported by the fact that electricity generated from thermal fuel sources has a higher marginal cost than electricity from renewables. Under this approach, emissions reduction from the LRET and SRES is proportional to the weighted average emissions intensity of thermal generation in the NEM. That is, each MWh of renewable electricity displaces 1 MWh of thermal generation, resulting in a higher emissions reduction estimate of 75.4 million tonnes of CO<sub>2</sub>-e for 2021. In other words, this estimate is based on an assumption that all renewables generation would otherwise be generated by thermal generation. It may well be that this assumption is not fully met because the low cost of renewables is likely to stimulate additional demand.

Figure 6.1 compares emissions reduction estimates using the two approaches. It shows both following the same trend until 2018 when they started to diverge as a result of the renewables investment boom, causing a faster decline in the emissions intensity of the grid.

Figure 6.1 Estimated emissions reduction from ERF and RET (t CO<sub>2</sub>-e, millions), 2011 to 2021<sup>64</sup>

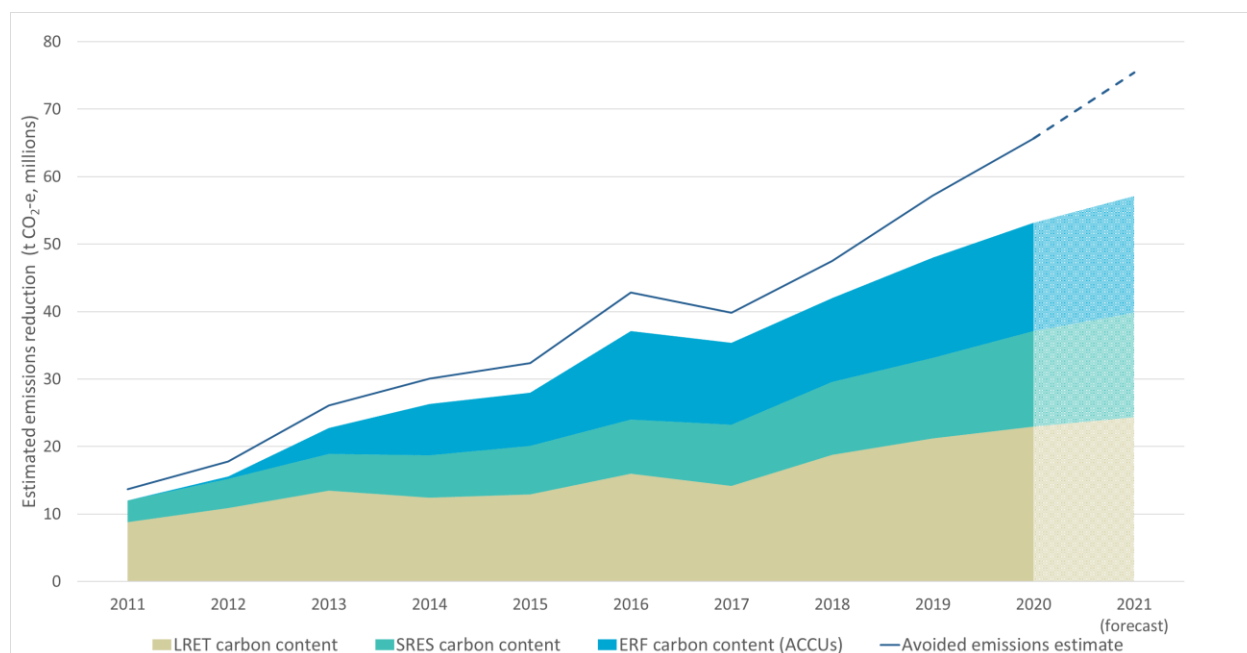


Table 6.1 shows the difference between the two estimation methods when they are applied to the 2021 forecast. By either estimation method, renewables generation is forecast to achieve record emissions reduction in 2021.

Table 6.1 Forecast emissions reduction estimates for 2021 using different methods.

2021 Emissions Reduction by scheme (million tonnes CO <sub>2</sub> -e)	'carbon content' estimate (conservative approach)	'avoided emissions' estimate (thermal displacement with sequestration buffers included)
<b>LRET</b>	24.3	35.5
<b>SRES</b>	15.5	22.6
<b>ERF</b>	17.3	17.3
<b>Total</b>	<b>57.1</b>	<b>75.4</b>

<sup>64</sup> Annual values used in this graph may differ slightly from those reported in previous Quarterly Carbon Market reports for some years due to updated generation, scheme information and minor revisions to the methodology.

## Glossary

Term	Meaning
<b>Australian carbon credit unit (ACCU)</b>	<p>One Australian carbon credit unit represents one tonne of verified carbon dioxide equivalent abatement. ACCUs are created from eligible offsets projects and issued by the Clean Energy Regulator in accordance with section 147 of the <i>Carbon Credits (Carbon Farming Initiative) Act 2011 (CFI Act)</i>.</p> <p>Transactions of ACCUs occur through the Australian National Registry of Emissions Units (ANREU).</p>
<b>Australian National Registry of Emissions Units (ANREU)</b>	The registry in which all transactions of Australian carbon credit units takes place. A seller must have an Australian National Registry of Emissions Units account to participate in the Emissions Reduction Fund.
<b>Baseline</b>	The baseline is the reference point against which an entity's emissions or electricity generation can be measured. A power station which generates renewable energy in excess of their baseline can earn large-scale generation certificates under the Renewable Energy (Electricity) Regulations 2001. An entity with obligations under the safeguard mechanism must keep its net emissions at or below its baseline.
<b>Cal prices</b>	This is the forward trade price for large-scale generation certificates traded for the calendar year it is referring to. For example, Cal24 is the calendar year 2024.
<b>Carbon abatement</b>	Carbon abatement refers to a reduction in atmospheric carbon dioxide through emissions avoidance or carbon sequestration.
<b>Certificate spot price</b>	Certificate spot price refers to the secondary market price for small-scale technology certificates, large-scale generation certificates and ACCUs.
<b>Committed projects</b>	Committed projects refers to large-scale renewable energy projects that have received all development approvals and reached a final investment decision.
<b>Emissions avoidance</b>	Emissions avoidance refers to projects that generate abatement by reducing or avoiding greenhouse gas emissions which would otherwise have occurred. For example, savanna fire management may reduce carbon dioxide emissions by reducing the frequency and extent of late dry season fires. Capturing and flaring landfill gases converts methane to carbon dioxide, which has lower global warming potential than methane.
<b>Emissions Reduction Fund (ERF)</b>	The Emissions Reduction Fund is a scheme where the Government purchases the lowest cost abatement (in the form of Australian carbon credit units) from a wide range of sources, providing an incentive to businesses, households and landowners to proactively reduce their emissions.
<b>Greenhouse gas emissions</b>	<p>Greenhouse gas emissions are gases which trap heat in the atmosphere, such as carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O).</p> <p>Greenhouse gas emissions are measured as kilotonnes of carbon dioxide equivalence (CO<sub>2</sub>-e). This means that the amount of a greenhouse gas that a business emits is measured as an equivalent amount of carbon dioxide, which has a global warming potential of one.</p>

<b>Global warming potentials (GWPs)</b>	Global warming potentials (GWPs) are values that allow direct comparison of the impact of different greenhouse gases in the atmosphere by comparing how much energy one tonne of a gas will absorb compared to one tonne of carbon dioxide.
<b>GreenPower</b>	GreenPower is the only voluntary government accredited program for renewable energy in Australia. A joint initiative of the governments of the Australian Capital Territory, New South Wales, South Australia, Victoria and Tasmania, GreenPower guarantees that any GreenPower-accredited energy sold by Australian energy retailers is renewably sourced.
<b>National Greenhouse and Energy Reporting Scheme (NGER)</b>	The National Greenhouse and Energy Reporting scheme is a single, national framework for corporations to report on greenhouse gas emissions, energy use and energy production.
<b>Optional delivery contract</b>	An optional delivery contract is an agreement that gives proponents the right, but not the obligation, to sell up to a nominated quantity of ACCUs to the Commonwealth at a fixed price. Under optional delivery contracts, the Clean Energy Regulator is essentially underpinning the project with project proponents retaining the flexibility to sell ACCUs on the secondary market.
<b>Project proponent</b>	A project proponent is an individual, a collective of individuals or an organisation with the legal responsibility for running a project under the ERF. This means they will hold the legal right to the project and will be issued any ACCUs created from project activities.
<b>Safeguard Surrender</b>	Safeguard surrender is the statutory obligation to surrender carbon units above an entity's baseline.
<b>Secondary market</b>	<p>The secondary market consists of financial institutions, traders, agents and installers; parties that are involved in the buying and selling of renewable energy certificates or ACCUs between private entities. For example, the price of an ACCU on the secondary market is the price at which private entities agree to trade ACCUs.</p> <p>While the Clean Energy Regulator does not intervene in the secondary market, the Clean Energy Regulator's Renewable Energy Certificate Registry facilitates transactions between parties.</p>
<b>Scope 1 emissions</b>	Scope 1 emissions are greenhouse gas emissions released into the atmosphere as a direct result of an activity or activities at the facility level, such as fuel combustion for electricity generation or cement production. Scope 1 emissions, sometimes referred to as direct emissions, must be reported under National Greenhouse and Energy Reporting legislation.
<b>Scope 2 emissions</b>	<p>Scope 2 emissions are greenhouse gas emissions released into the atmosphere as a result of a facility's energy consumption. For example, if a facility is powered by coal combusted at a power station, the facility's scope 2 emissions would include the gases emitted from that coal combustion. The facility's scope 2 emissions are therefore the power station's scope 1 emissions.</p> <p>Scope 2 emissions, sometimes referred to as indirect emissions, must be reported under National Greenhouse and Energy Reporting legislation.</p>



<b>Sequestration</b>	Sequestration refers to the capture and storage of carbon dioxide. It typically refers to the absorption of carbon by ecosystems, including oceans, soils and vegetation.
<b>Small-scale technology certificate</b>	A renewable energy certificate created by the owner of a small-scale system, or their installer, for the electricity generated or displaced by that system. While the number of certificates that can be created per system is based on several factors, including its geographical location, installation date, and other factors, one certificate is typically equal to one megawatt hour of eligible renewable electricity.

## List of acronyms and abbreviations

Term	Term
ACCU	Australian carbon credit unit
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
ANREU	Australian National Registry of Emissions Units
CERT	Corporate Emissions Reduction Transparency
ERF	Emissions Reduction Fund
ESC	Energy saving certificate
EUA	European Union allowance unit
FID	Financial Investment Decision
GW	Gigawatt
HIR	Human-Induced Regeneration
LRF	Land Restoration Fund
LGC	Large-scale generation certificate
LRET	Large-scale Renewable Energy Target
LRF	Land Restoration Fund
MW	Megawatt
NEM	National Electricity Market
NGER	National Greenhouse and Energy Reporting Act 2007
REC Registry	Renewable Energy Certificate Registry
RPP	Renewable Power Percentage
RET	Renewable Energy Target
SRES	Small-scale Renewable Energy Scheme
STC	Small-scale technology certificate
STP	Small-scale technology percentage
TSVCM	Taskforce on Scaling Voluntary Carbon Markets
VEEC	Victorian energy efficiency certificate