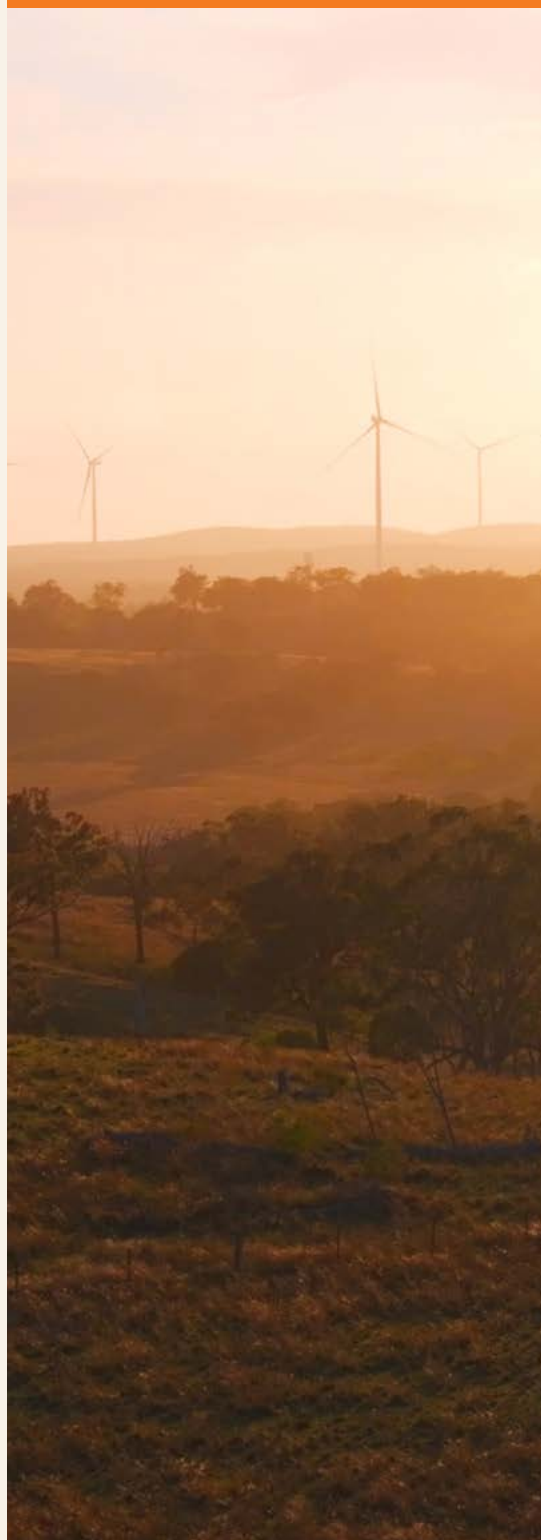


Renewable projects quarterly report

Q3 2024





Chinchilla Battery, CS Energy
Western Downs, QLD
Barunggam Country
(CS Energy)

About this report

The Clean Energy Council's quarterly investment report tracks projects from the financial investment commitment stage through to the completion and operation of the plant.

The financial investment commitment stage – in which projects receive agreement for access to debt and equity, based on the necessary project development and connection approvals and contracting arrangements being in place – is considered a crucial lead indicator for new capacity build. Once projects have received a financial investment commitment, they are considered likely to proceed.

The Clean Energy Council is aware that variations exist in development stage definitions across the industry and, as such, the Clean Energy Council's data may differ from other datasets for the same period. It should also be noted that the Clean Energy Council's project data is retrospective and is subject to change depending on updated public information.

Investment figures for specific projects and quarterly/ annual totals within the report are expressed in nominal terms (not adjusted for inflation). When a chart references investment trends, it is expressed in real terms to adjust for inflation. The base month used with a **CPI value of 100 is September 2017**, and is drawn from the Australian Bureau of Statistic's Monthly Consumer Price Index Indicator.

← Cover image:
MacIntyre Wind Farm
Warwick, QLD
Gidhabal Country
(Acciona)

Acknowledgement of Country

We respect and acknowledge the diversity of communities, identities, and clan groups for all First Nations peoples throughout Australia and recognise the continuing connection to lands, waters and communities. We pay our respect to Aboriginal and Torres Strait Islander cultures; and to Elders past and present.

As a collective of diverse businesses operating on a national scale, we understand that the success of our endeavours is intrinsically linked to the wellbeing and prosperity of the communities we operate within. We acknowledge that Aboriginal and Torres Strait Islander communities are rich and diverse, reflecting a tapestry of cultures and backgrounds. This diversity underscores the importance of embracing a range of holistic solutions to address the unique challenges and opportunities that lie ahead.

We recognise the impact of human activity on the cultural landscape of Australia. We understand that these practices have not always been in harmony with the profound attachment and cultural custodianship that First Nations peoples have with the land.

We are committed to forging strong relationships with First Nations communities and stakeholders, recognising their unique perspectives and aspirations. We strive to engage in genuine, meaningful partnerships that honour their rights, culture, and self-determination.

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Highlights

- Investment commitments in new generation projects continue to trend upwards, with 1,405 MW **achieving financial commitment in Q3, worth \$3.3 billion**. This quarter alone was higher than the entirety of 2023.
- The rolling 12-month quarterly average for capacity of financially committed generation projects has now increased for three quarters in a row. The level of new generation investment in this quarter is close to the level that would be required to be sustained to reach **Australia's target of 82 per cent renewable energy generation by the end of 2030**.
- New financially committed energy battery storage projects continue to reach new heights. Eight projects representing **1,235 MW (capacity) / 3,862 MWh (energy output)** have contributed to a new record for the rolling 12-month quarterly average of energy generation for committed projects, at 3,282 MWh.
- New onshore wind projects continue their comeback, with **1,758 MW of financially committed projects so far in 2024**.
- Thirty-four generation and battery storage projects have reached financial close so far in 2024. This equates to 3 GW of new generation capacity, and **2.8 GW / 8.0 GWh of new energy storage across Australia**.

New generation projects show encouraging signs

Ten renewable energy generation projects totalling 1,405 MW achieved financial commitment in Q3. This is the first time new generation projects reaching financial commitment have surpassed 1 GW in a quarter since Q4 2022.

The largest of these projects was Queensland's Broadsound Solar Farm, with a capacity of 376 MW. Queensland also had the largest new wind farm reach financial commitment for the quarter, the Lotus Creek Wind Farm has a capacity of 285 MW. The rolling 12-month quarterly average for capacity of financially committed generation projects continues to trend upward and is now sitting at 930 MW.

From an investment perspective, Q3 recorded \$3.3 billion* worth of financially committed large-scale renewable energy generation projects. The largest single share of this investment went to Queensland's Lotus Creek Wind Farm with a value of \$1.3 billion.

Despite this positive quarterly result, more is required to meet the Federal Government's target of 82 per cent renewable energy generation by 2030. With a range of 6-7 GW of new generation renewable energy needing to come online annually to achieve the target, an average of at least 1.5 GW of new generation projects needs to be committed each quarter, highlighting the need for a continued focus on policy that addresses barriers to investment including planning and environmental assessment processes, transmission build and grid connection, and Renewable Energy Zone strategic planning and engagement.

Storage continues as a reliable focus of investment

Large-scale battery energy storage continued a strong run in the third quarter of 2024, with eight projects representing 1,235 MW (capacity) / 3,862 MWh (energy output) reaching financial commitment. The largest of these projects was the four-hour Orana Battery Energy Storage System in New South Wales with a size of 415 MW / 1,660 MWh. The revised rolling 12-month quarterly average for storage project capacity of 1,290 MW is 95 per cent higher than in the same quarter 12 months ago.

Of these eight projects, five are storage components of an overall hybrid generation/storage project. The average capacity/energy output of these hybrid projects was 96 MW / 194 MWh respectively for Q3.

By state, New South Wales had the largest share of financially committed battery storage projects in both capacity (655 MW) and energy (2,690 MWh). Western Australia meanwhile, saw the most projects (three) reach this stage.

Promising signs further along the project pipeline

Construction commenced for 10 generation projects, worth 1.2 GW of capacity. Some of the larger projects include the aforementioned Broadsound Solar Farm, the Lotus Creek Wind Farm, Goorambat East Solar Farm in Victoria (250 MW) and Glenellen Solar Farm in New South Wales (200 MW). This was approximately 52 per cent higher than the updated rolling 12-month quarterly average of 781 MW of generation projects that have commenced construction.

Meanwhile nine storage projects, all of which are battery energy storage systems, commenced construction in the quarter, totalling a record 1,385 MW / 3,432MWh. Of these projects, five are attached to an accompanying generation project.

Four projects connected to the grid

Three renewable electricity generation projects, totalling 168 MW of new capacity, were commissioned in Q3 2024. These were the Mortlake South Wind Farm in Victoria (158 MW), the Narromine Renewable Energy Project in New South Wales (5 MW), and the Werris Creek Solar Farm also in New South Wales (5 MW). Meanwhile, one battery energy storage project, Queensland's 100 MW / 200 MWh Chinchilla Battery, reached commissioning.

*Total investment figures mentioned are most likely higher, as not all projects provide publicly available capital investment data

CEC definitions

Financial commitment: publicly available information stating that a project's financing agreements have been signed and the owner can begin drawing on the financing to commence work on the project. Typically this aligns with execution of connection agreement and generator performance standards with the relevant Network Service Provider and AEMO.

Under construction: publicly available information that a project has started construction work.

Commissioned: publicly available information that a project is fully completed and operational (a project that is currently operational but not commissioned falls under the category under construction).

Q3 2024

Project tracker

Generation and storage projects reaching financial commitment

Name	Owner	Type	State	MW (MWh)
Generation				
Boulder Creek Wind Farm	Aula Energy/ CS Energy	Onshore Wind	QLD	228
Storage				
Eraring Battery Energy Storage System - Stage 2	Origin Energy	Storage	NSW	240 (1,030)
Orana Battery Energy Storage System	Akaysha Energy	Storage	NSW	415 (1,660)

Generation and storage projects commencing construction

Name	Owner	Type	State	MW (MWh)
Generation				
Atlas-Campaspe Mine Hybrid Microgrid	Pacific Energy Group	Solar	NSW	11
Broadsound Solar Farm	Iberdrola Australia	Solar	QLD	376
Exmouth Power Station	Pacific Energy Group	Hybrid (solar, battery)	WA	10 (50)
Glenellen Solar Farm	Global Power Generation	Solar	NSW	200
Goorambat East Solar Farm	ENGIE	Solar	VIC	250

Note: Projects which have reached multiple stages in the same quarter have only been included in the latest stage.

Project tracker

Name	Owner	Type	State	MW (MWh)
Gove Solar Project	Aggreko	Solar	NT	11
Lotus Creek Wind Farm	CS Energy	Onshore Wind	QLD	285
Moama Solar Farm	Cleanpeak Energy	Solar	NSW	8
Mt Magnet Gold Mine Solar	PWR Hybrid	Hybrid (solar, battery)	WA	7 (10)
Mt Weld Power Station	Zenith Energy	Hybrid (solar, onshore wind, battery)	WA	31 (12)
Storage				
Brendale Battery	Akaysha Energy	Storage	QLD	205 (410)
Broadsound Solar Farm Battery Energy Storage System	Iberdrola Australia	Storage	QLD	180 (360)
Mortlake Power Station Battery	Origin Energy	Storage	VIC	300 (650)
Stanwell Big Battery	Stanwell Corporation	Storage	QLD	300 (1,200)
Terang Battery Energy Storage System	Fotowatio Renewable Ventures	Storage	VIC	100 (200)

Generation and storage projects reaching commissioning

Name	Owner	Type	State	MW (MWh)
Generation				
Mortlake South Wind Farm	Acciona	Onshore wind	VIC	158
Narromine Renewable Energy Project	MPower	Solar	NSW	5
Werris Creek Solar Farm	SEI	Solar	NSW	5
Storage				
Chinchilla Battery	CS Energy	Storage	QLD	100 (200)

View our [project tracker](#) for further details on all projects.

Note: Projects which have reached multiple stages in the same quarter have only been included in the latest stage.

Q3 2024

Project pipeline

Currently there are eighty-nine renewable electricity generation projects that have either reached financial commitment or are under construction, representing 13.9 GW of capacity in the pipeline. Forty-nine storage projects are currently in the pipeline from financial commitment onwards, equivalent to 9.7 GW / 24.3 GWh in capacity/energy output.

Since 2017, 220 generation and storage projects have been commissioned, representing 16.4 GW of installed electricity generation capacity and 1.8 GW / 2.5 GWh of storage.

A breakdown of all projects currently in financial commitment or under construction stages across states and territories is shown below.

Current generation and storage projects either in financial commitment or under construction

State	Project count	Total project capital investment (\$M)	Generation project capacity (MW)	Storage project capacity (MW)	Storage project energy output (MWh)
ACT	1	71	-	100	100
NSW	34	8,747	4,215	3,135	7,720
NT	5	102	45	41	39
QLD	29	10,648	4,932	2,575	5,750
SA	16	2,250	940	847	1,964
TAS	0	-	-	-	-
VIC	27	8,891	2,960	1,836	4,527
WA	25	6,558	836	1,206	4,163
TOTAL	137	37,267	13,926	9,740	24,263

Project pipeline

Current onshore wind projects either in financial commitment or under construction

State	Project count	Total project capital investment (\$M)	Generation project capacity (MW)
ACT	0	-	-
NSW	6	2,522	1,510
NT	0	-	-
QLD	8	6,071	2,882
SA	1	435	412
TAS	0	-	-
VIC	4	4,359	1,648
WA	1	200	76
TOTAL	20	13,587	6,528

Current solar projects either in financial commitment or under construction

State	Project count	Total project capital investment (\$M)	Generation project capacity (MW)
ACT	-	-	-
NSW	14	2,821	2,455
NT	3	49	45
QLD	9	1,549	1,624
SA	8	1,184	528
TAS	-	-	-
VIC	14	1,659	1,307
WA	3	862	312
TOTAL	51	8,124	6,271

Generation projects

Quarterly generation project performance

Iberdrola Australia's Broadsound Solar Farm was the largest generation project reaching financial commitment in Q3 2024, with a capacity of 376 MW. The total new capacity of generation projects reaching financial commitment in Q3 at 1,405 MW was larger than the entire total of 2023 combined.

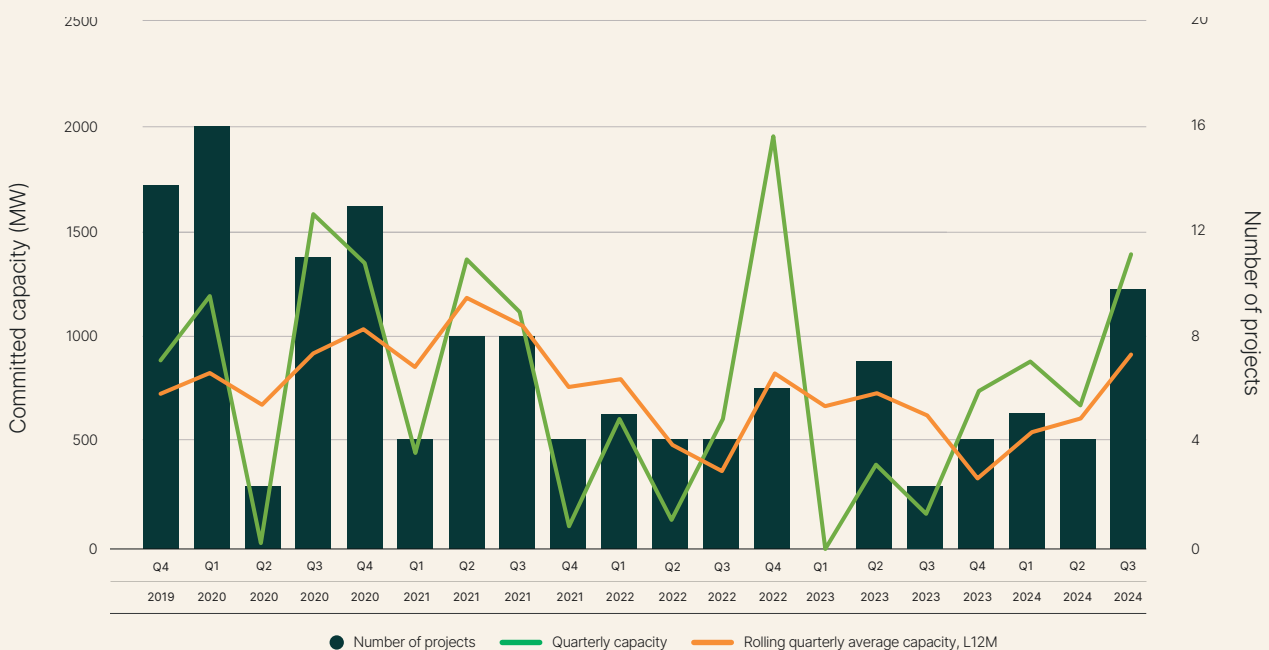
Onshore wind as a technology has now committed more than 1.7 GW of newly financed capacity so far in 2024, a strong result after a challenging 2023. Meanwhile, 1 GW of solar projects have reached financial commitment over the same period, as well as 6 hybrid projects totalling 210 MW. 2024 has now seen just under 3 GW worth of

generation projects reach financial commitment, which is more than double the total seen in 2023.

In terms of investment, new large-scale renewable energy generation projects achieving financial commitment reached \$3.3 billion in Q3. This was primarily due to Queensland's Lotus Creek Wind Farm with a capital value of \$1.3 billion.

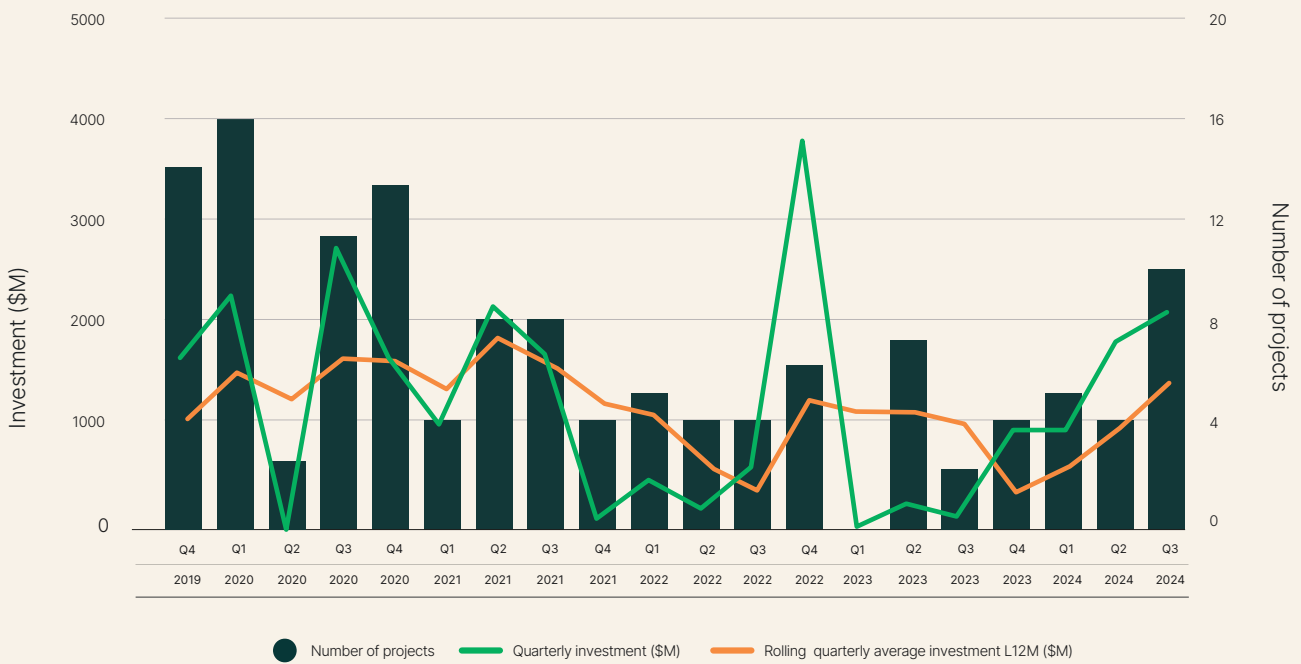
The chart below shows the average quarterly capacity reaching 930 MW, the highest seen for generation capacity since Q3 2021. Despite the promising results this quarter, more investment is required to reach the run rate of at least 1.5 GW per quarter to achieve Australia's target of 82 per cent renewables by 2030.

Financially committed generation projects and megawatt capacity, quarterly

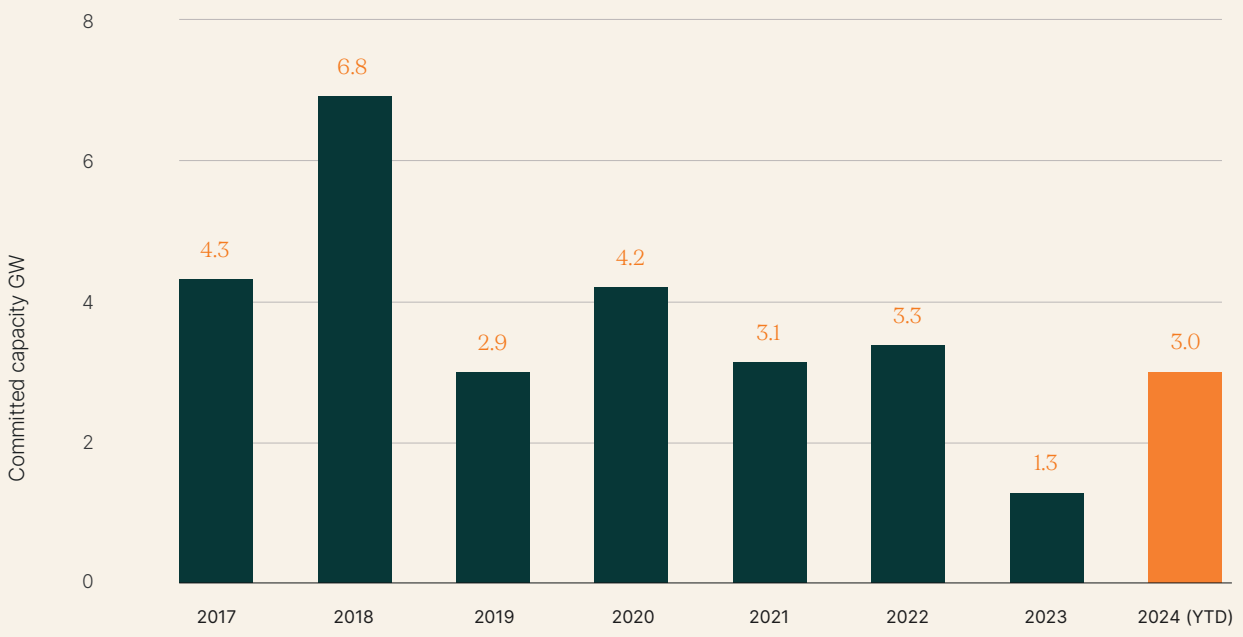


Generation projects

Financially committed generation projects and real investment, quarterly

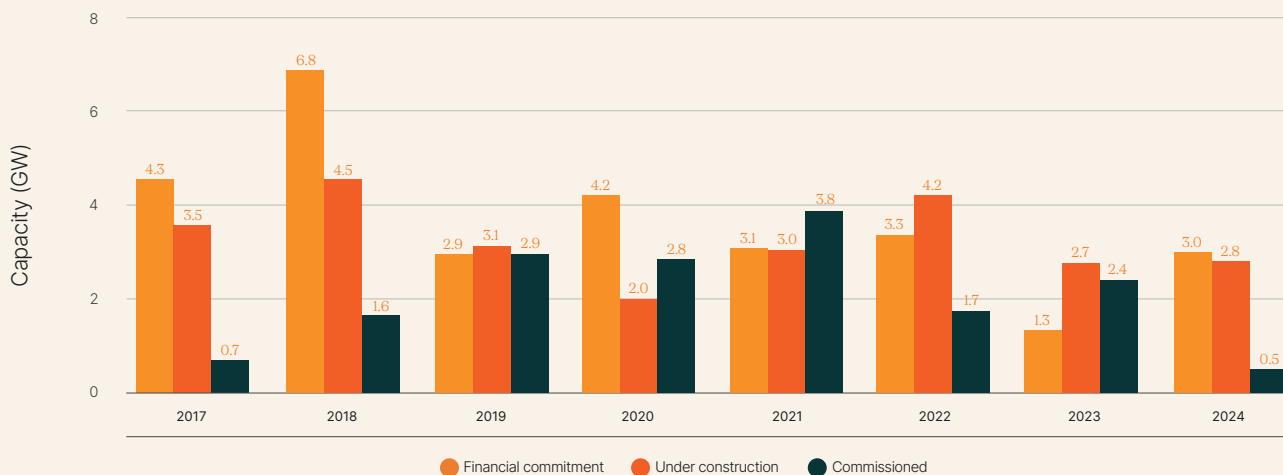


Total annual capacity of financially committed generation projects (GW)



Generation projects

Total capacity of generation projects by development status, annually (GW)



Generation projects by development stage reached, Q3

	Financially committed	Under construction	Commissioned	
Q3 results	Projects	10	10	3
	Total capacity	1,405 MW	1,188 MW	168 MW

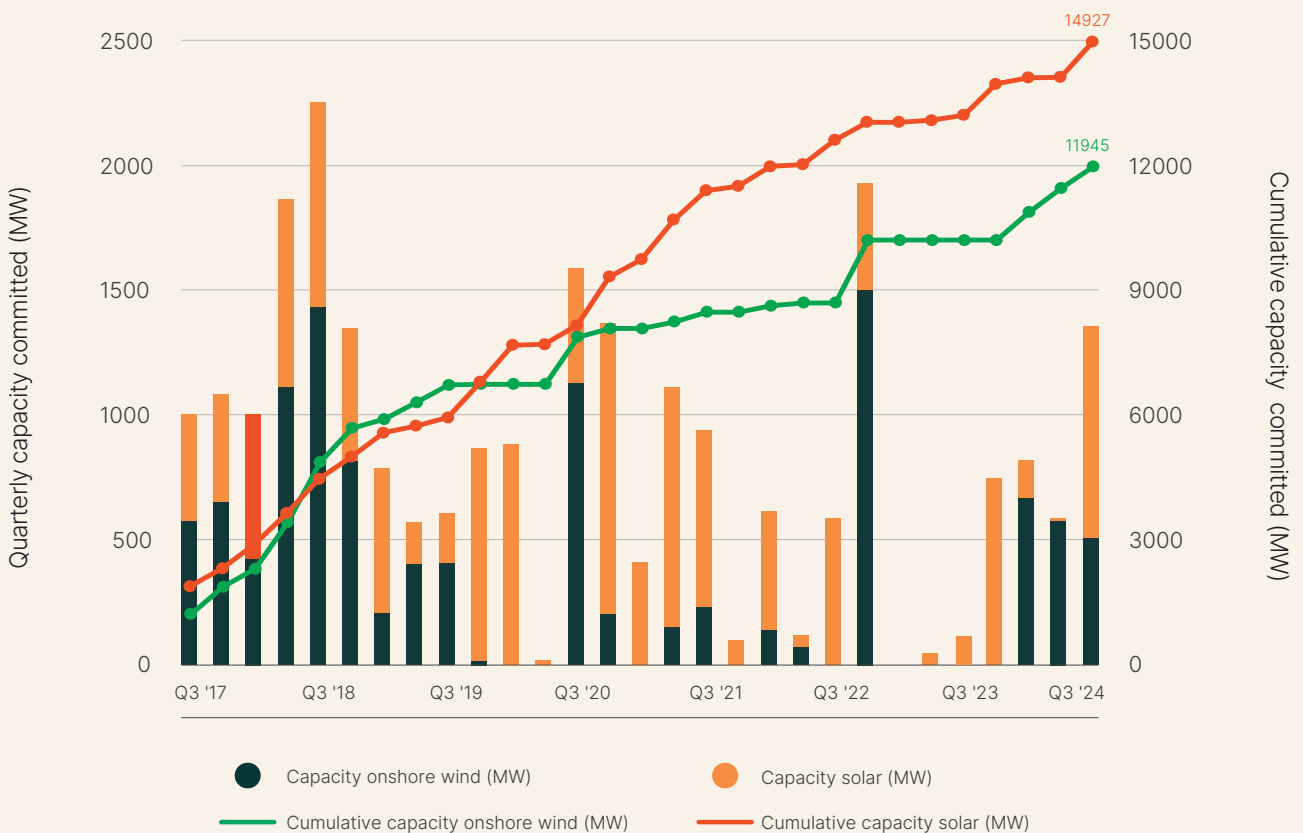
Note - Projects which reach multiple stages have been included in each stage

Generation projects

Solar and onshore wind capacity

After flatlining in 2023, investment in onshore wind generation projects is steadily making up ground on utility photovoltaic in terms of cumulative capacity committed, with totals of 11.9 GW and 14.9 GW respectively since 2017.

Cumulative capacity of financially committed wind and solar projects, by quarter



Wind and solar are natural complements in terms of operation and a balanced mix of both technology types supports more stable operation of the power system and is key to keeping costs down for consumers.

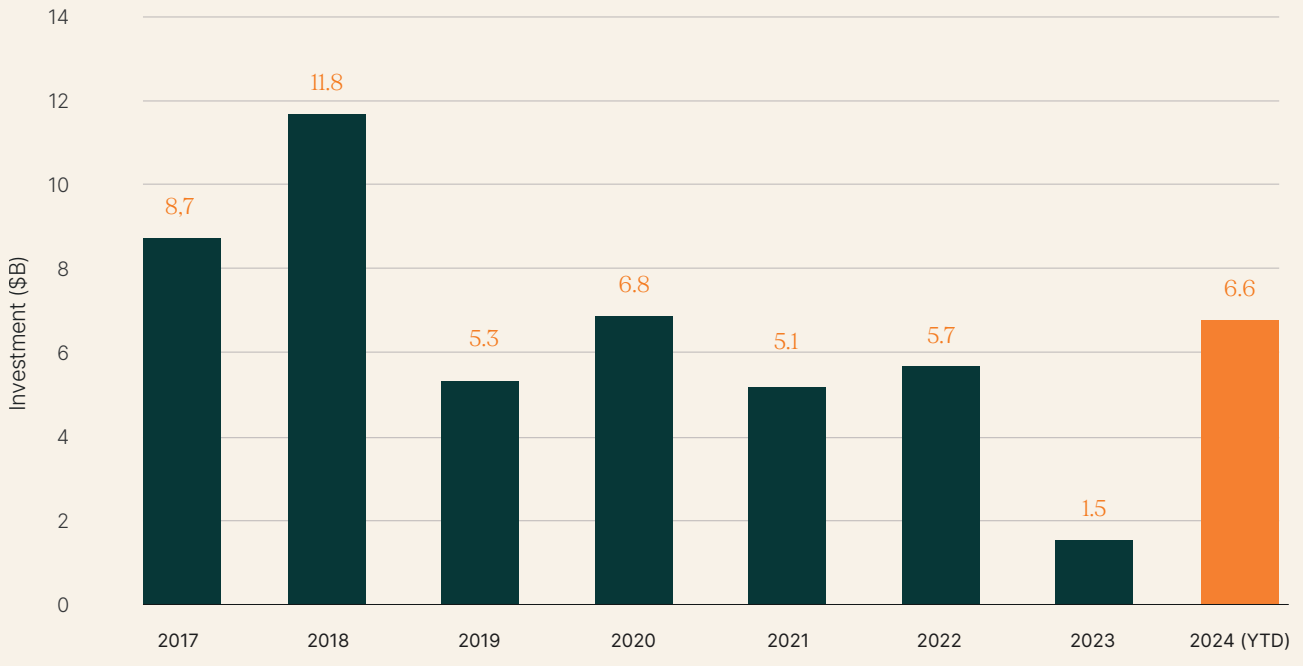
such as technical connection issues, planning and environment considerations, continue to be addressed to support the maintenance and acceleration of this upward growth trajectory for both forms of technology.

Onshore wind has shown a promising upward trend in new investment commitments after a poor 2023. It is critical that specific issues impacting wind investment,

Generation projects

Generation project investment

Total annual investment (\$) of financially committed generation projects, nominal



Breakdown of generation project investment by development stage reached, Q3

		Financially committed	Under construction	Commissioned
Q3 results	Investment	\$3.3 billion	\$1.2 billion	\$302 million

Note - Projects which reach multiple stages have been included in each stage

Generation projects

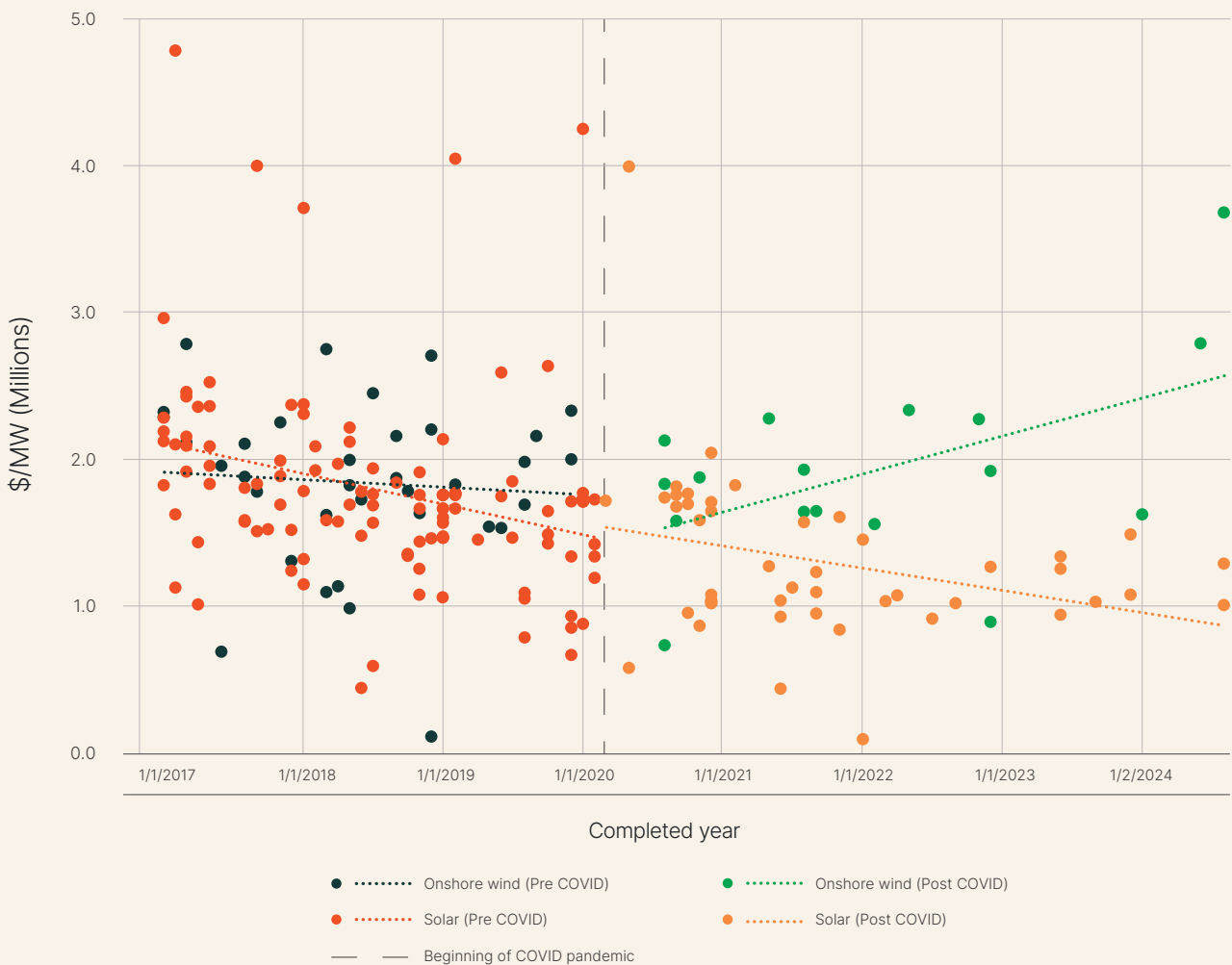
Generation project capital investment spend per megawatt (\$m/MW), real terms

The chart below shows the relationship between the amount of capital investment required for each MW of capacity of generation projects. Expressed in millions of dollars, all solar and onshore wind projects that reached financial commitment from 2017 onwards have been included to show the trend over time. It is expressed in real terms, using monthly CPI values extracted from the Australian Bureau of Statistics, with September 2017 as the base month. The months of January 2017 – August

2017 use CPI values with an assumed annual inflation growth of 2.5 per cent.

It is typically expected that as technologies and project delivery systems mature, costs will decrease and, while this is reflected in utility PV and its downward trend, onshore wind has seen an increase since the COVID-19 pandemic. As the pandemic became a major influence on supply chains and cost of raw materials, including steel, the \$/MW value of onshore wind started to increase.

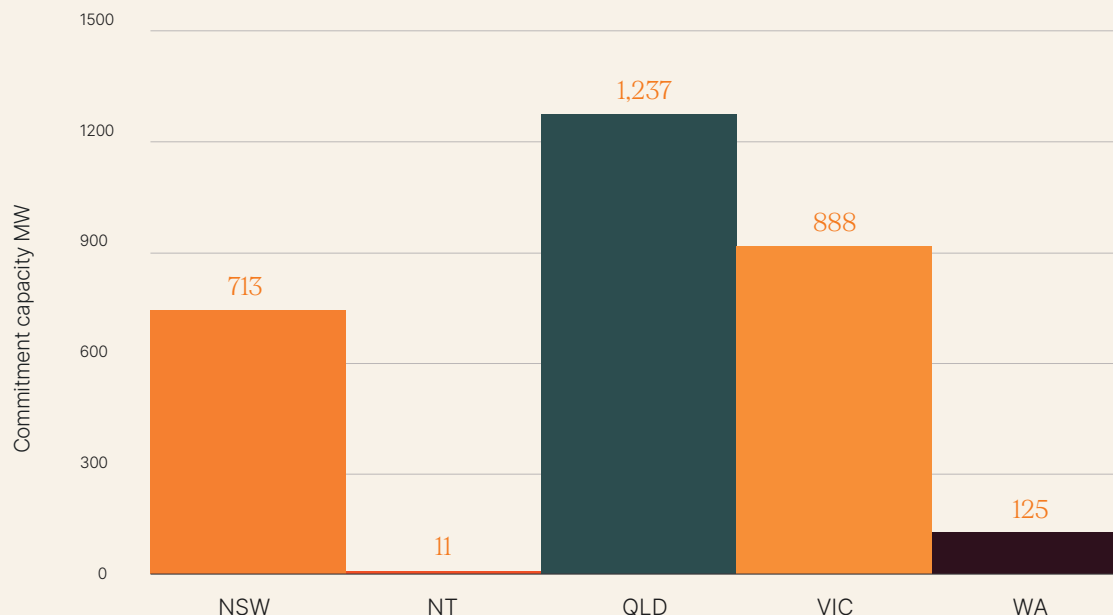
\$/MW for wind and large-scale solar projects, real terms



Generation projects

Generation projects by state

Total capacity of projects financially committed in 2024, by state



Project completion time – from financial commitment to commissioning

On average across Australia, it takes solar projects six months less than wind projects to progress from financial commitment to commencing construction, then to the final commissioned stage. South Australia leads all states

when it comes to average time from financial commitment to commissioning for all technology types. Western Australia is the only state with a sufficient sample size for hybrid projects to be included in the data.

Time from financial commitment to commissioning by state & technology (months)**

State	Solar	Onshore wind	Battery	Hybrid
VIC	18	26	19	N/A
NSW	20	29	N/A	N/A
QLD	22	N/A	N/A	N/A
SA	17	21	17	N/A
WA	20	N/A	30	14
Total average by tech:	19	25	22	14

Notes - Average based on solar, onshore wind and battery projects that have reached commission since 2017.

The stated timeframe excludes the project development phases (e.g. Project design, planning & environmental assessments etc.) prior to Financial Commitment.

Each technology type needs to have at least five commissioned projects in a state for the average to be included.

Energy storage projects

Battery energy storage systems (BESS)

Large-scale battery projects have had another strong quarter, with eight new battery systems totalling 1,235 MW (capacity) / 3,862 MWh (energy generation) reaching financial commitment in Q3. These were the third highest quarterly results for both these storage metrics. A new record was set for the rolling 12-month quarterly average for new battery project energy generation at 3,282 MWh.

Investment commitments reached at least \$1.2 billion, with several projects not providing publicly available investment data. There has now been at least \$1 billion of new investment commitments for new battery energy storage projects for the last 6 quarters.

The largest battery reaching financial commitment for the quarter was New South Wales’ Orana Battery Energy Storage System with a size of 415 MW / 1,660 MWh, and duration of 4 hours. Western Australia had the most projects reaching financial commitment with 3, New South Wales and Queensland with 2, while Victoria had one.

The majority of these projects commenced construction in the same quarter, and overall there were nine projects reaching this stage, totalling 1,385 MW / 3,432 MWh. Meanwhile, one project, Queensland’s Chinchilla Battery, reached the commissioning stage with a size of 100 MW / 200 MWh.

BESS projects by development stage reached, Q3

Battery Storage	Financially committed	Under construction	Commissioned
Project count	8	9	1
Project capacity	1,235 MW	1,385 MW	100 MW
Q3 results			
Project energy output	3,862 MWh	3,432 MWh	200 MWh
Project investment*	\$1.2 billion	\$1.4 billion	\$150 million

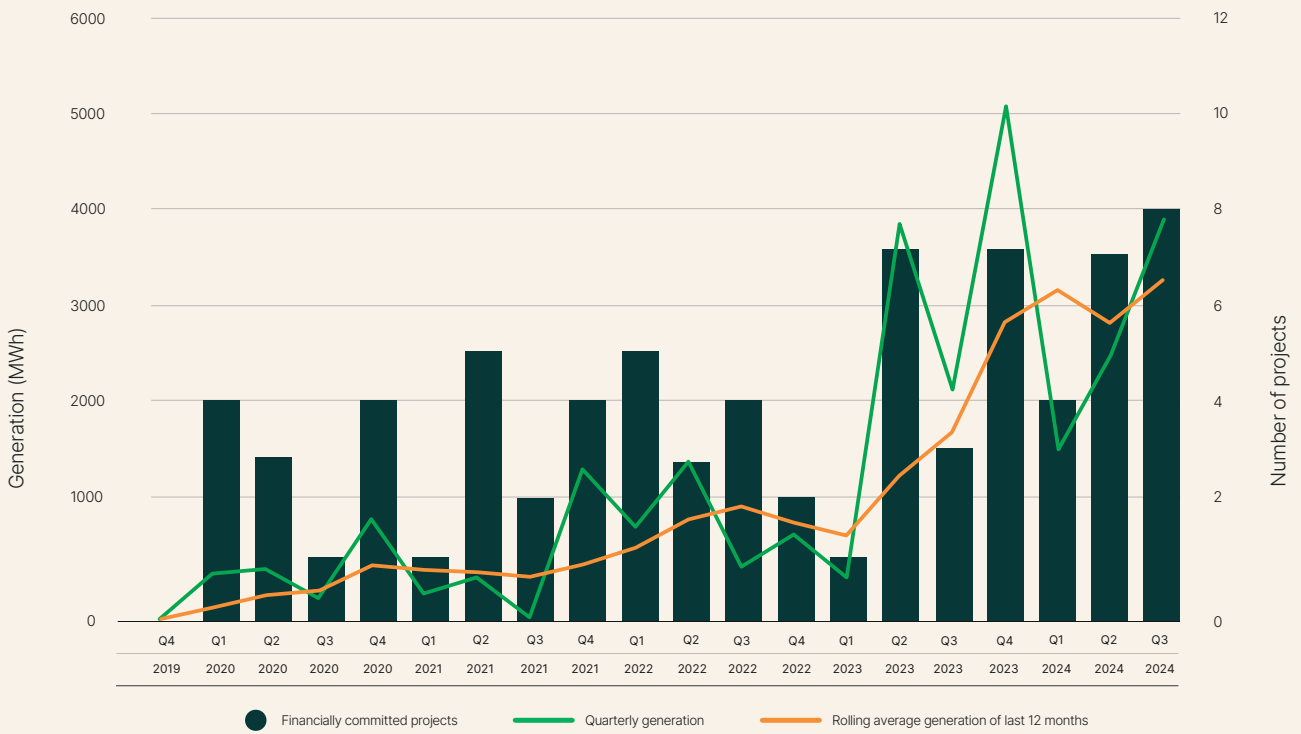
Notes - Includes hybrid projects with a storage component

Projects which reach multiple stages have been included in each stage

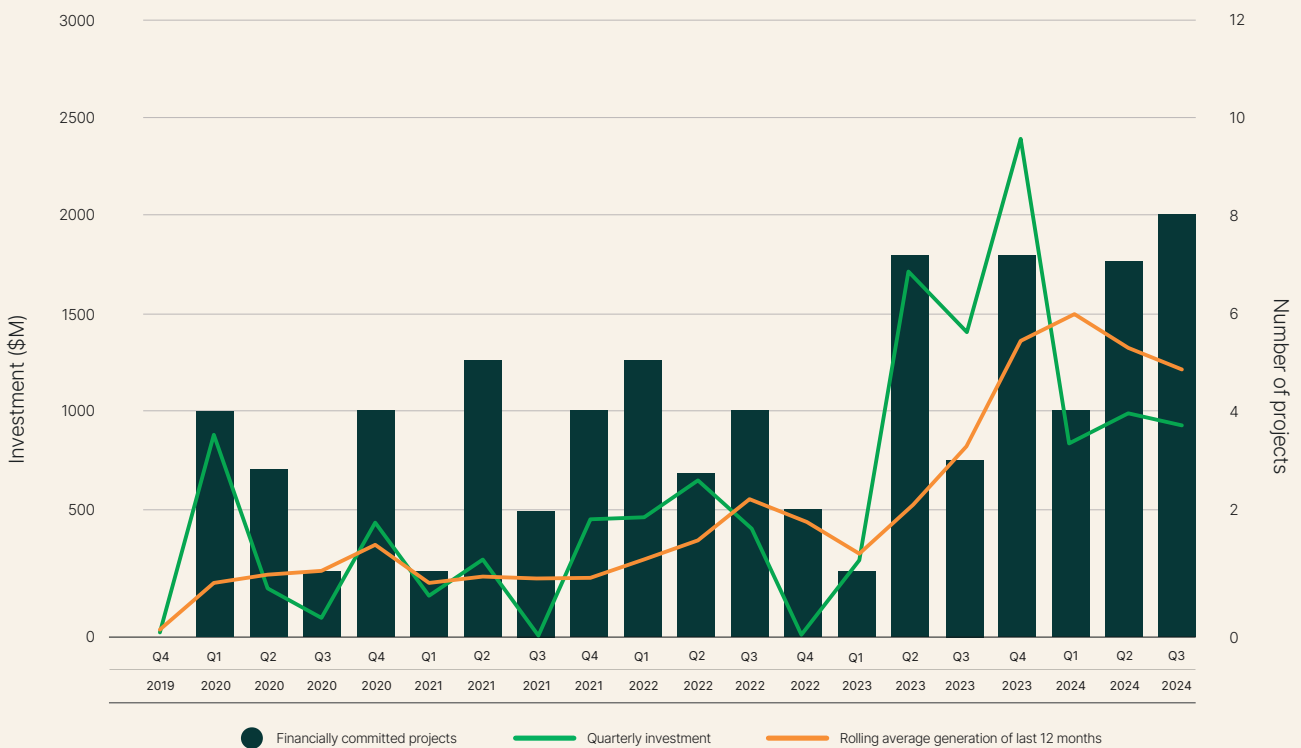
*Investment results are expected to be higher as not all projects provide this data publicly

Energy storage projects

Financially committed BESS projects by energy output (MWh), quarterly

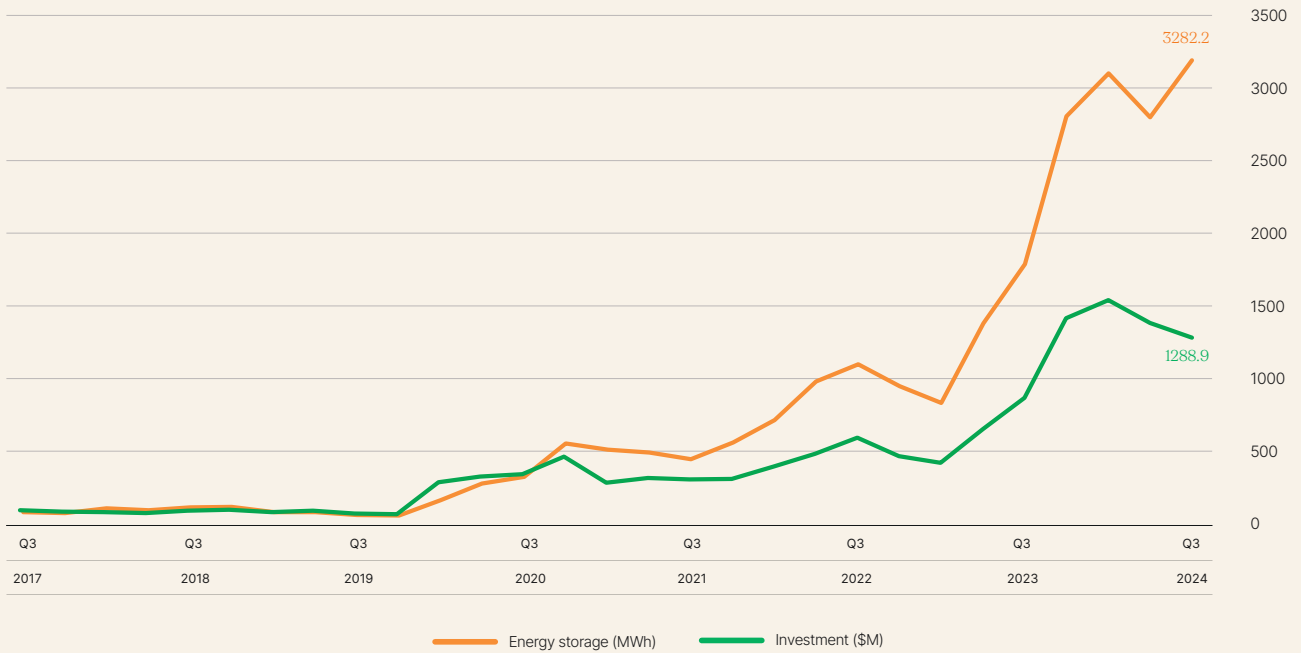


Financially committed BESS projects by real value investment, quarterly



Energy storage projects

Rolling 12-month quarterly average of energy (MWh) and real investment (\$M) of BESS projects



Commissioned battery energy storage system projects by year

Commissioned energy BESS projects

	2017	2018	2019	2020	2021	2022	2023	2024
Number of projects	1	3	3	1	4	4	8	3
Nominal investment (A\$m)	90	129	72	42	353	87	960	250
MW	150	90	130	13	426	69	724	200
Average MW	150	30	43	13	107	17	91	67
MWh	194	115	135	4	647	101	947	400
Average MWh	194	38	45	4	162	25	118	133
Average storage duration (hours)	1.3	1.3	1.0	0.3	1.5	1.5	1.3	2.0

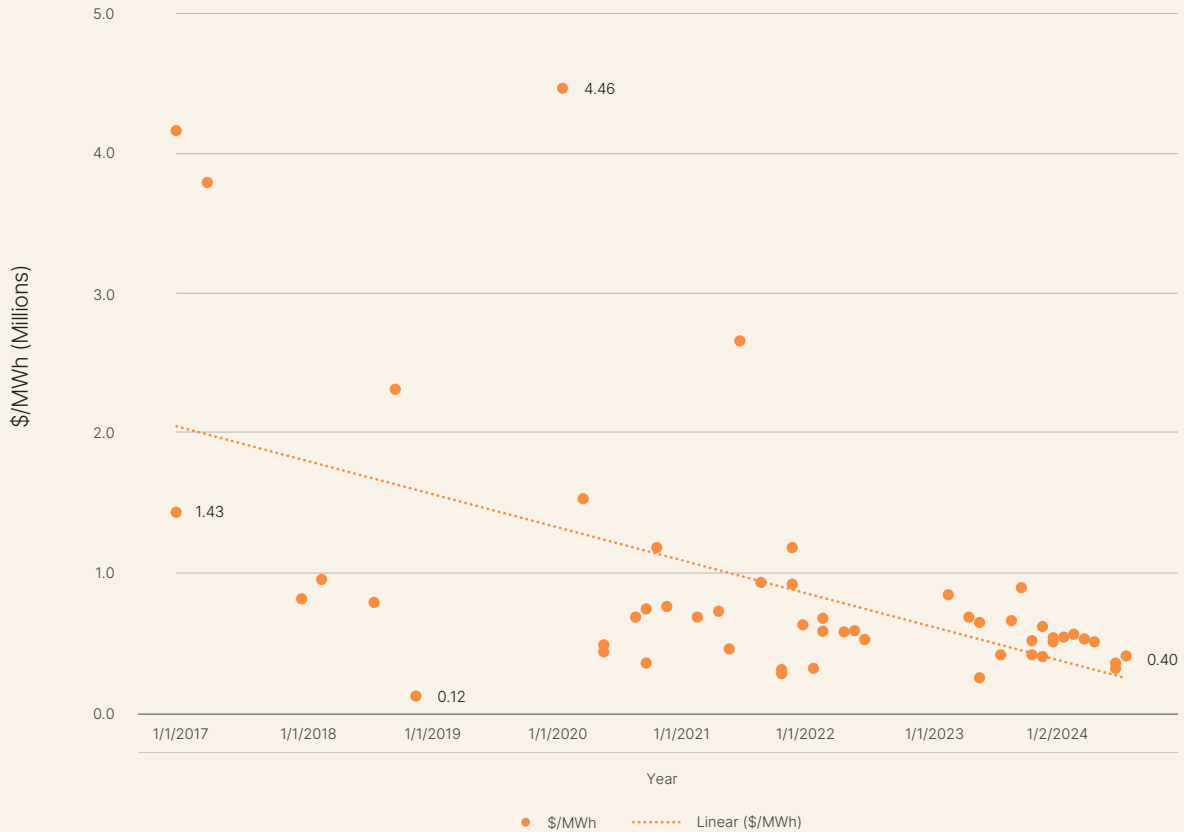
Energy storage projects

Battery energy storage system project capital investment spend per MWh

The chart below shows the relationship between the amount of capital investment required for each MWh of energy for battery energy storage system projects.

Expressed in millions of dollars, all battery energy storage system projects that reached financial commitment from 2017 onwards have been included to show the trend over time. The chart below indicates battery energy storage system costs have fallen as they move towards higher energy (MWh) levels.

\$m/MWh of BESS projects, real value



Long duration storage systems (LDES)

Long duration energy storage (LDES) is a general term that refers to various technologies that exhibit a range of similar characteristics. The duration of LDES projects is generally held to be anything greater than 8 hours at maximum rated power output, however, there are multiple other characteristics that are relevant, such as the synchronous capability of many LDES technologies, cycling capability and the ability to help manage seasonal energy shortfalls (the dunkelflaute effect). In this report,

the LDES projects captured are large-pumped hydro energy projects. There are, however, a number of other LDES projects in development. These will be captured in future reports, once they hit financial investment decision phase.

While there were no pumped hydro projects that reached financial close in Q3, there are two projects across Australia currently under construction. A table summarising these projects is provided below:

Project name	State	Owner	Capacity (MW)	Energy generation (MWh)	Duration
Goat Hill Pumped Storage Hydro Project	South Australia	Altura Group	230	1,840	8
Snowy 2.0	New South Wales	Snowy Hydro	2,000	350,000	175

The Kidston Pumped Storage project is listed within the "Hybrid" section of this report due to its accompanying solar farm.

Q3 2024

Hybrid projects (NEM only)

Hybrid projects, with systems comprising solar and battery, wind and battery, solar and pumped hydro (PHES), or a combination of these, are becoming more prevalent. Across the National Electricity Market, there are 36 projects at various stages of development. Most of these projects are solar and battery systems. Eight projects have durations in excess of two hours, including a solar and PHES project with a duration of eight hours.

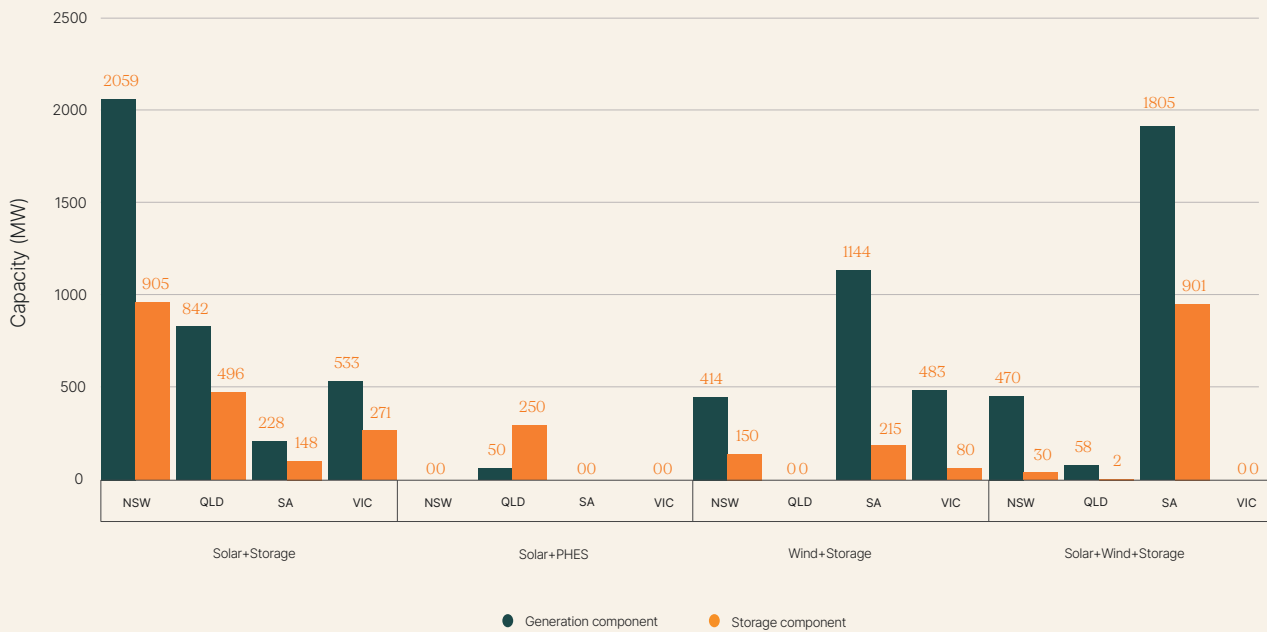
Project breakdown of hybrid projects

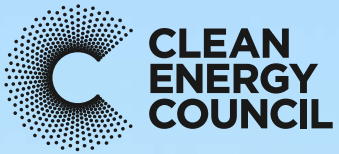
		Solar + Battery	Solar + PHES	Wind + Battery	Wind + Solar + Battery
Generation component	Solar capacity	3,662 MW	50 MW	-	1,219 MW
	Wind capacity	-	-	2,041 MW	2,341 MW
Storage component	Capacity	1,820 MW	250 MW	445 MW	933 MW
	Energy	3,438 MWh	2,000 MWh	718 MWh	1,835 MWh
Average duration (hrs)		1.9 hrs	8 hrs	1.6 hrs	2 hrs
Total number of projects		24	1	7	5
Total build cost		\$5 bn	\$0.1bn	\$2.3 bn	\$1.8 bn

Hybrid projects (NEM only)

Some of the largest hybrid projects are in New South Wales, predominantly solar and battery systems, and South Australia, which are predominantly wind and battery systems and solar, wind and battery systems. When batteries are attached to solar systems, the assets have a larger capacity compared to wind and battery hybrid systems.

Hybrid project capacity breakdown by state and type





Level 20, 180 Lonsdale Street
Melbourne VIC Australia 3000

+61 3 9929 4100
info@cleanenergycouncil.org.au



cleanenergycouncil.org.au

