Quarterly investment report: Large-scale renewable generation and storage

Q1 2025

CLEAN ENERGY COUNCIL

Girgarre Solar Farm
Girgarre, VIC
Yorta Yorta Country

About this report

The Clean Energy Council's Quarterly investment report: *Large-scale renewable generation and storage report* tracks utility-scale 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 a crucial lead indicator for new capacity build.

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.

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 beyond 12 months, 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.

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.

Contents

Highlights

- The first quarter of 2025 saw the remarkable run of investment commitments to energy storage projects continue, while new generation projects experienced a slow start to the year after a bumper fourth quarter in 2024.

- Six storage projects representing 1,510 MW (capacity) / 5,016 MWh (energy output) reached financial close – the second highest quarterly result for new financially committed storage projects.

- Two generation projects representing 386 MW of new capacity reached financial commitment in the quarter. The large number of advanced-stage development projects in the pipeline suggests that investment activity should improve over the course of the year ahead.

- Five generation projects were commissioned in the quarter for a total operating capacity of 756 MW. Meanwhile, two storage projects were commissioned, adding a total of 56 MW / 98 MWh of capacity / energy output.

- There are currently 82 renewable electricity generation projects that have been financially commited or are under construction, representing 12,544 MW of capacity. There are also 69 committed storage projects (either standalone or hybrid projects) currently in this pipeline, equivalent to 12,532 MW / 32,078 MWh in capacity / energy output.

Best annual start for new storage projects on record

Large-scale energy storage kicked off 2025 with a strong first quarter, with six projects representing 1,510 MW (capacity) / 5,016 MWh (energy output) reaching financial commitment. This is the second-best quarterly result on record in terms of energy output.

The largest of these projects was the four-hour Wooreen Battery Energy Storage System in Victoria with a size of 350 MW / 1,400 MWh. By state, South Australia had the largest share of financially committed storage projects in both capacity (640 MW) and energy (1,760 MWh).

The Wooreen project, as well as the South Australia's Limestone Coast North Energy Park project, were both successful recipients of the pilot Capacity Investment Scheme tender for South Australia – Victoria, announced in September 2024.

Of the six storage projects committed, only one – Stage 1 of the Bungama Battery Energy Storage System (150 MW / 300 MWh) – was a hybrid storage asset, connected directly to some form of generation capacity.

These six projects represent $2.4 billion worth of capex investment, which is 83 per cent higher than the revised rolling 12-month quarterly average for investment in new storage projects, which now stands at $1.3 billion.

Three battery storage projects commenced construction in Q1 2025, totalling 840 MW / 2,860 MWh. Meanwhile, two storage projects were commissioned this quarter, with a value of 56 MW / 98 MWh.

New generation projects off to a slow start for 2025

New investment commitments to large-scale energy generation projects got off to a slow start for the year after a bumper final quarter in 2024. Two renewable energy generation projects totalling 386 MW – AMP Energy's Bungama Solar Farm in South Australia (280 MW), and European Energy's Lancaster Solar Farm (106MW) in Victoria – achieved financial close in Q1 2025. This is the lowest quarterly result for new investment commitments in generation projects seen since Q3 2023.

These two projects totalled $410 million of investment for newly financially committed large-scale renewable energy generation projects, and the rolling 12-month quarterly average for investment of financially committed renewable generation projects remained above $2 billion, despite the lower level of investment activity.

It should be noted that the first quarter of the calendar year is usually a quieter period for investment decisions than later quarters. Over the past five years, new investment commitments in the first quarter of the year have averaged 427 MW, compared to a Q4 average of 1,153 MW over the same period.

The Clean Energy Council expects to see investment activity grow as the year progresses, with a large pipeline of advanced stage development projects (almost 10GW of wind and solar, according to Rystad Energy) considered likely to proceed to investment in the near term (next 24 months), many of which are supported by Government underwriting contracts (e.g. Capacity Investment Scheme) or existing power purchase agreements.

Despite this improving outlook, the pace of investment will need to accelerate to meet the Australian Government's target of 82 per cent renewable energy by 2030. This requires annual investment commitments in the range of 6-7 GW for new generation capacity, equivalent to at least 1.5 GW of new commitments per quarter.

Joint government and industry efforts to lower barriers to investment – including network development, grid access and connection, environmental and planning assessment rules and processing, supply chain bottlenecks and long-term policy certainty – require continued focus for the speed of deployment to accelerate.

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 the Australian Energy Market Operator (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).

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Project tracker

Generation and storage projects reaching financial commitment

Name	Owner	Type	State	MW (MWh)
Generation				
Bungama Solar Farm	Amp Energy	Solar	SA	280
Lancaster Solar Farm	European Energy	Solar	VIC	106
Storage				
Bungama Battery Energy Storage System - Stage 1	AMP Energy	Battery	SA	150 (300)
Calala Battery Energy Storage System	Equis Australia	Battery	NSW	250 (500)
Limestone Coast North Energy Park	Intera Renewables	Battery	SA	250 (500)
Summerfield Battery Energy Storage System	Copenhagen Infrastructure Partners	Battery	SA	240 (960)
Supernode Battery Energy Storage System - Stage 2	Quinbrook Infrastructure Partners	Battery	QLD	270 (1,356)
Wooreen Battery Energy Storage System	Energy Australia	Battery	VIC	350 (1,400)

Generation and storage projects reaching commissioning

Name	Owner	Type	State	MW (MWh)
Generation				
Girgarre Solar Project	Potentia Energy	Solar	VIC	93
Hawkesdale Wind Farm	Global Power Generation	Onshore Wind	VIC	97
Ryan Corner Wind Farm	Global Power Generation	Onshore Wind	VIC	218
Tropicana Gold Mine Power Station	AngloGold Ashanti Australia	Hybrid (onshore wind, solar and battery)	WA	48 (14)
Walla Walla Solar Farm	FRV	Solar	NSW	300
Storage				
Tailem Bend Battery Project	Vena Energy	Battery	SA	42 (84)

View our project tracker for further details on all projects.

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

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Project pipeline

There are currently 82 renewable electricity generation projects that have either reached financial commitment or are under construction, representing 12,544 MW of capacity. There are 69 storage projects (either standalone or hybrid projects) in the pipeline, equivalent to 12,532 MW / 32,078 MWh in capacity / energy output.

Since 2017, 233 generation and storage projects have been commissioned, representing 18,128 MW of installed electricity generation capacity and 2,277 MW / 3,918 MWh of energy storage.

A breakdown of all projects currently in financial commitment or under construction stages across the 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	2	471	-	350	700
NSW	32	7,882	3,304	3,420	8,255
NT	5	102	45	41	39
QLD	30	10,752	4,460	3,390	8,442
SA	16	2,360	813	1,745	4,030
TAS	-	-	-	-	-
VIC	30	9,498	3,048	2,153	5,862
WA	24	6,427	875	1,433	4,750
TOTAL	**139**	**37,491**	**12,544**	**12,532**	**32,078**

Current onshore wind projects either in financial commitment or under construction

State	Project count	Total project capital investment ($M)	Generation project capacity (MW)
ACT	-	-	-
NSW	2	922	472
NT	-	-	-
QLD	8	6,071	2,882
SA	1	435	412
TAS	-	-	-
VIC	2	4,000	1,333
WA	2	913	208
TOTAL	**15**	**12,341**	**5,307**

Current solar projects either in financial commitment or under construction

State	Project count	Total project capital investment ($M)	Generation project capacity (MW)
ACT	-	-	-
NSW	15	3,251	2,747
NT	3	49	45
QLD	7	930	1,152
SA	6	534	401
TAS	-	-	-
VIC	17	2,325	1,710
WA	3	862	312
TOTAL	**51**	**7,951**	**6,367**

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Generation projects

New investment activity in large-scale solar and wind generation projects got off to a slow start in 2025, following a strong final quarter in 2024.

Just two projects totalling 386 MW – AMP Energy's Bungama Solar Farm in South Australia (280 MW), and European Energy's Lancaster Solar Farm (106MW) in Victoria – achieved financial close in the quarter, together representing $410 million in capital investment.

Cumulatively, onshore wind and utility-scale solar have now reached financial commitment on 11,656 and 15,573 MW worth of capacity respectively since 2017.

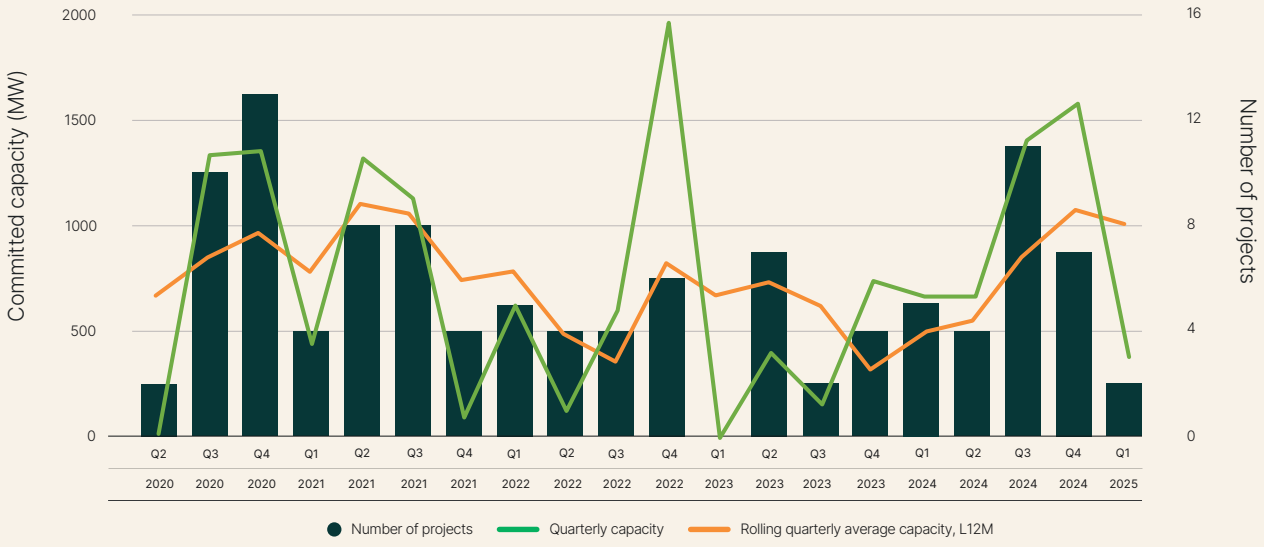
We note that it is common to see lower investment activity in the first quarter of the year for new generation projects. Over the past five years, the average quarterly capacity of generation projects reaching financial commitment in Q1 has been 427 MW. By comparison, the Q4 average over the past five years has been 1,153 MW.

Meanwhile, five generation projects totalling 756 MW of new generation capacity completed commissioning in Q1 and are now fully operational. These new projects are:

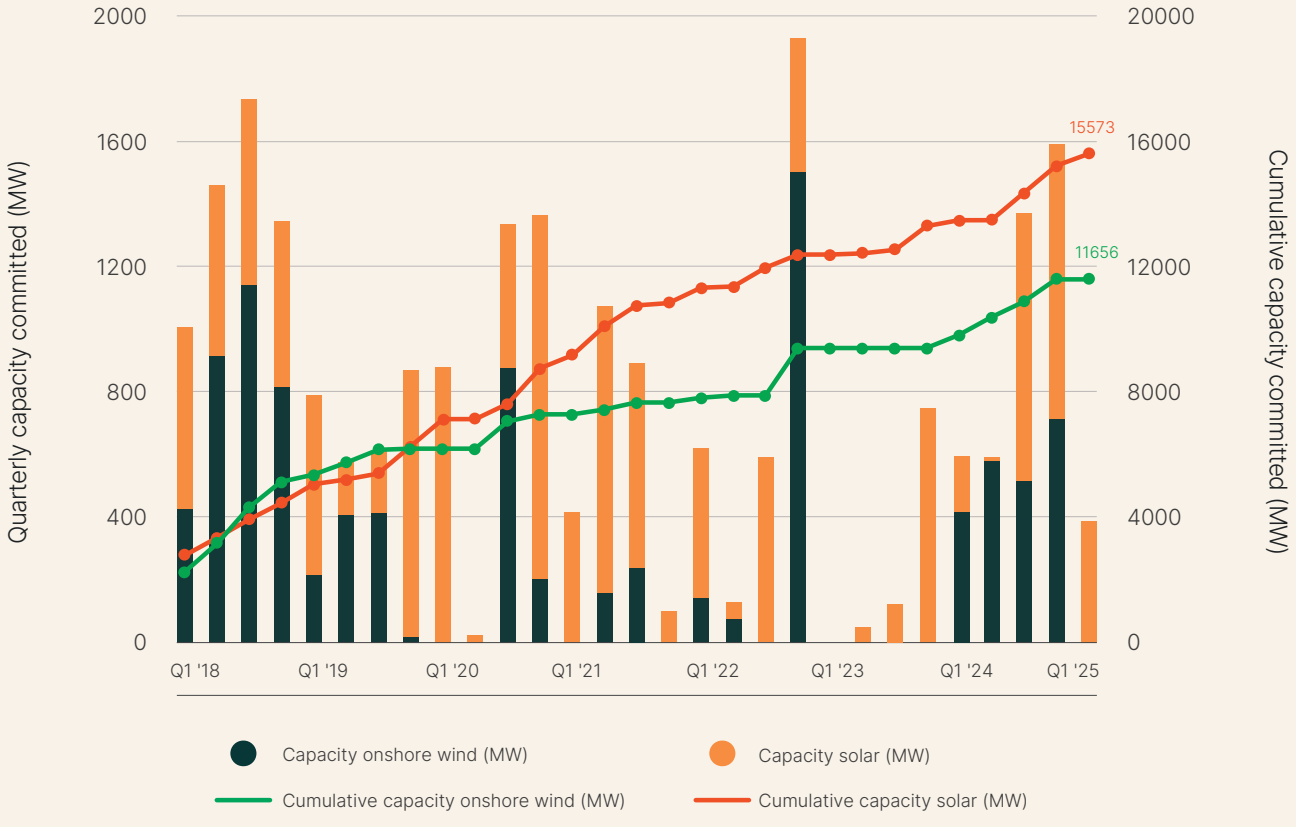
- Girgarre Solar Farm in Victoria, with a capacity of 93 MW
- Hawkesdale Wind Farm in Victoria, 96 MW
- Ryan Corner Wind Farm in Victoria, 218 MW
- Tropicana Gold Mine Power Station in Western Australia, 48 MW
- Walla Walla Solar Farm in New South Wales, 300 MW.

The Clean Energy Council expects to see investment activity grow as the year progresses, with a large pipeline of advanced-stage development projects (almost 10 GW of wind and solar, according to Rystad Energy) considered likely to proceed to investment in the near term (next 24-months), many of which are supported by Government underwriting contracts (e.g. Capacity Investment Scheme) or existing power purchase agreements.

Financially committed generation projects and capacity, quarterly MW



Wind and solar capacity by quarter against cumulative capacity of financially committed wind and solar projects, quarterly MW

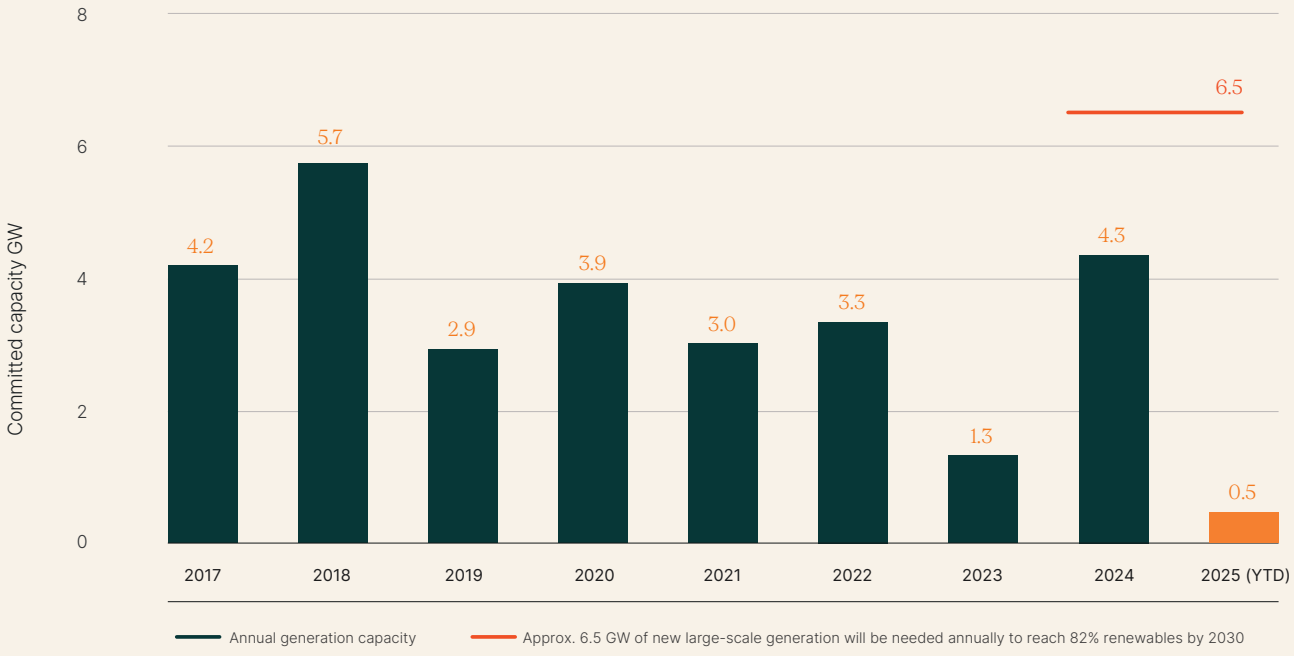


Generation projects

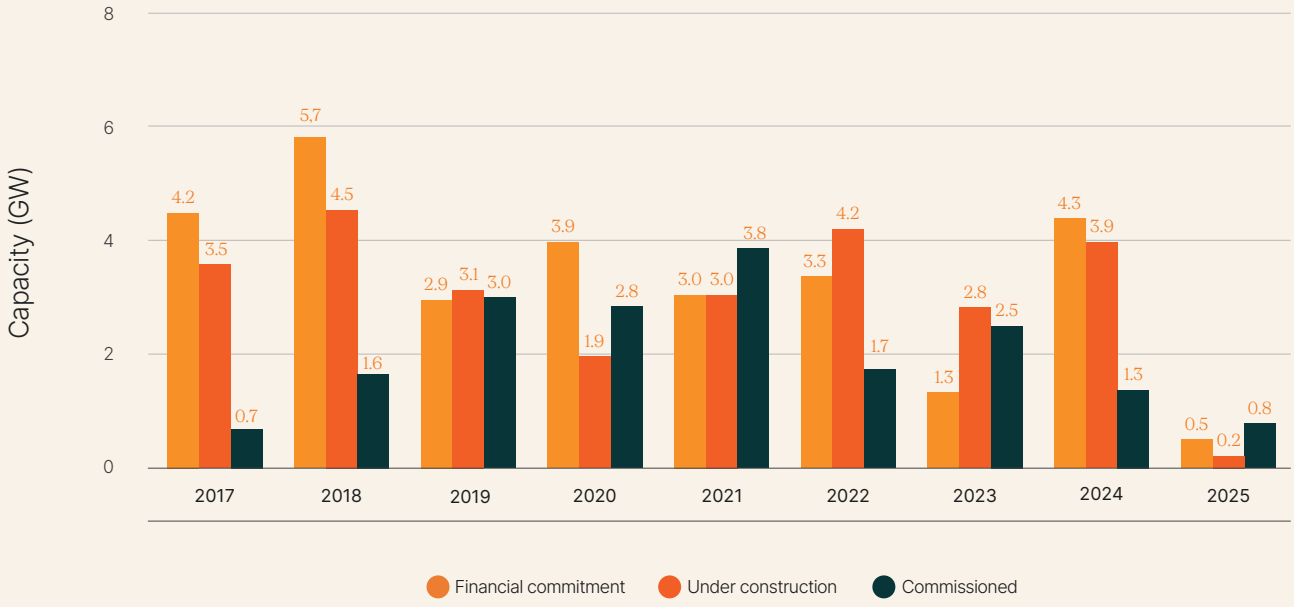
Wind and solar are natural complements in terms of operation, and a balanced mix of both technology types supports more stable operation of the power system. It is also key to keeping costs down for consumers.

It is critical that specific issues impacting wind investment, such as technical connection issues and planning and environment considerations, continue to be addressed in order to maintain and accelerate the upward growth trajectory for both forms of technology.

Total capacity of financially committed generation projects, annual GW



Total capacity of generation projects by development status, annual GW



Generation projects by development stage reached, capacity

		Financially committed	Under construction	Commissioned
Q1 results	Projects	2	1	5
	Total capacity	386 MW	106 MW	756 MW

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

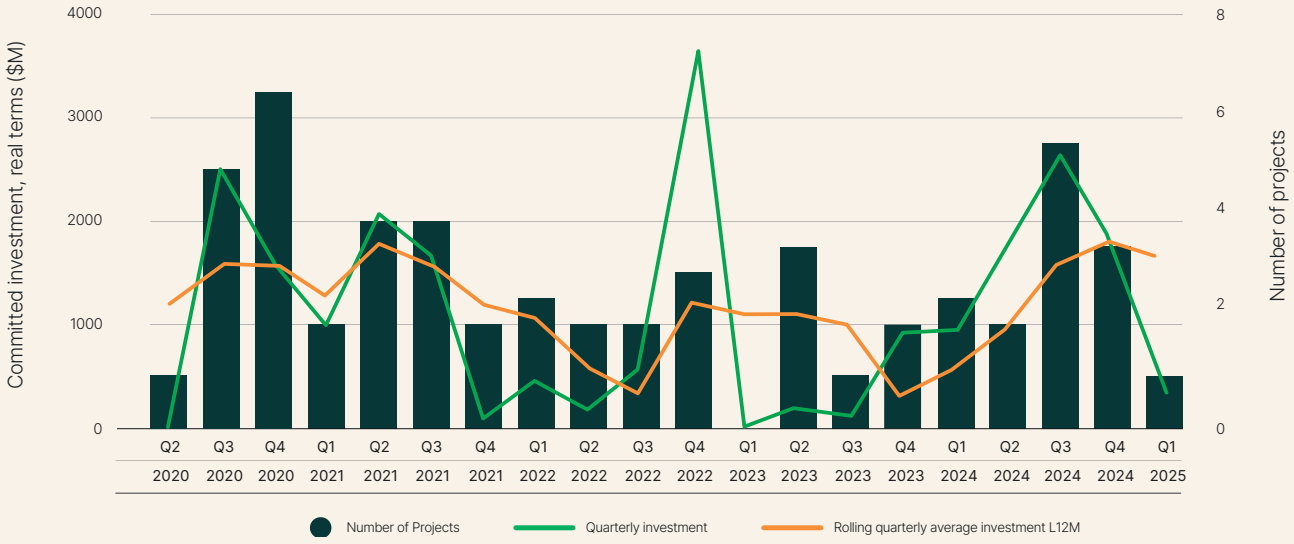
Generation project investment

New large-scale renewable energy generation projects achieving financial commitment reached $410 million in the quarter. The quarter total is 80 per cent lower than the revised rolling 12-month quarterly average for investment of generation projects, which is now just over $2 billion.

This quarter was the first since Q3 2023 when investment in financially committed generation projects fell below $1 billion.

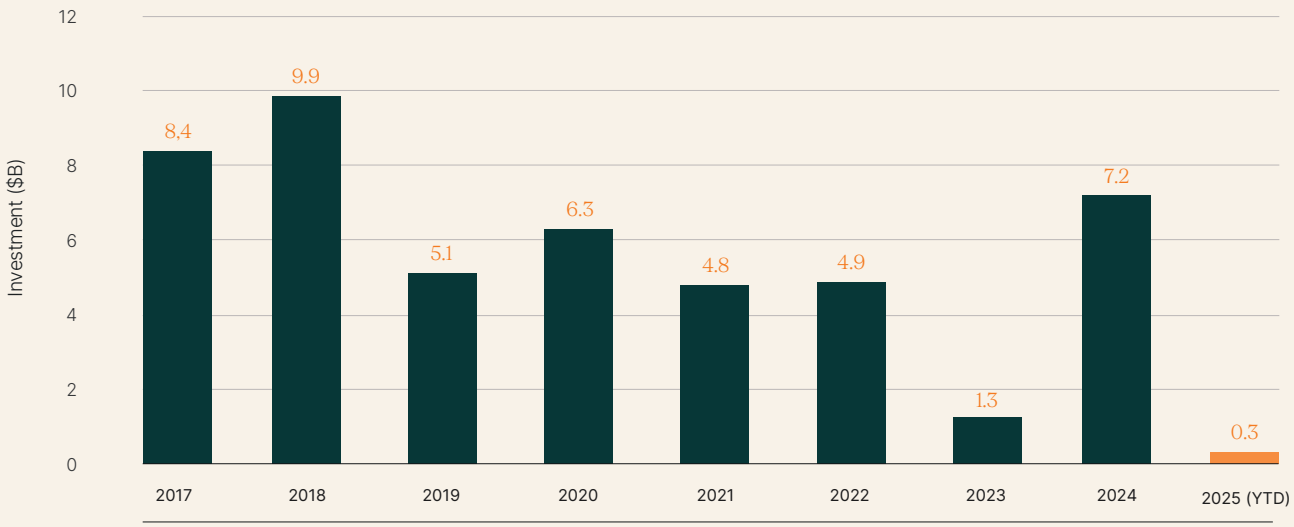
The below graphs are expressed in real investment values to better reflect trends over time, with 2017 as the base year.

Financially committed generation projects quarterly investment, real $AUD (million)



Generation project investment

Total real investment of financially committed generation projects, annual $AUD (billion)



Breakdown of generation project investment by development stage reached, nominal terms

		Financially committed	Under construction	Commissioned
Q1 results	**Investment**	$410 million	$110 million	$949 million

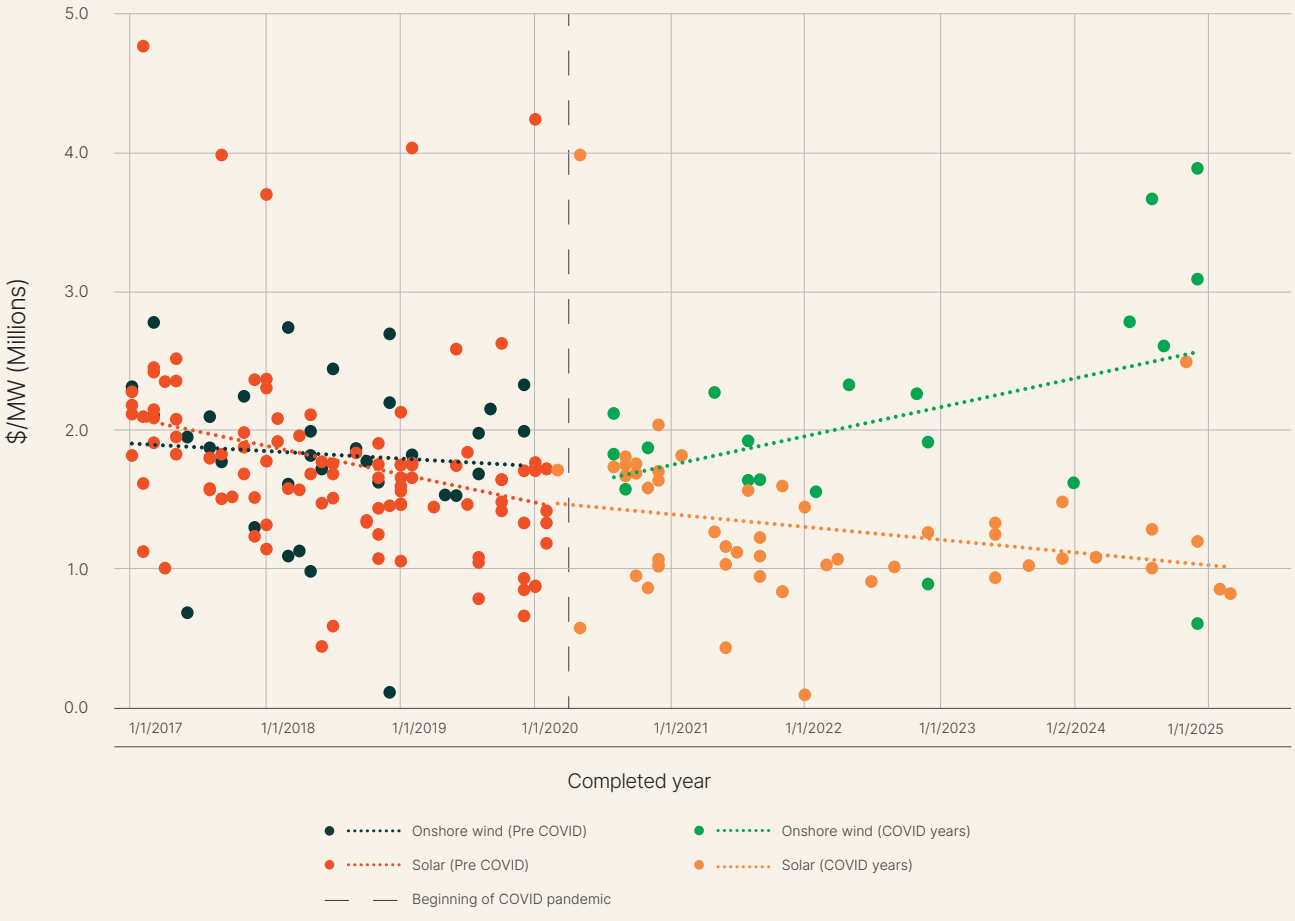
Note - Projects which reach multiple stages have been included in each stage

Generation project capital investment spend per MW

The below chart shows the change in capital investment required for each MW of capacity of generation projects over time. Expressed in millions of dollars, all solar and onshore wind projects that reached financial commitment from 2017 onwards have been included to view the trend over time. 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 2020.

There are a wide range of reasons explaining the increasing costs associated with onshore wind projects including: higher commodity (particularly steel) and equipment prices; transportation and labour costs as a result of constrained supply chains throughout the COVID pandemic; and following the Russian invasion of Ukraine. Manufacturing scale and a rapid rate of technological development in solar PV have seen a continued downward trend in the capital costs for solar projects.

Unit cost trends for wind and large-scale solar projects, $M/MW (real)



Note – The chart above shows $/MW values expressed in millions of dollar (AUD). It is expressed in real terms, using monthly CPI values extracted from the ABS, 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%.

Project completion time by state

On average across Australia, it takes solar projects six fewer months than wind projects to progress from financial commitment through to the final commissioned stage.

South Australia leads all states when it comes to average time from financial commitment to commissioning for both wind and solar technology types, with only a two-month difference between the two. Meanwhile, Victoria has the shortest timeframe for storage projects at 19 months. Western Australia is the only state with a sufficient sample size for hybrid projects to be included in the data, where it takes 14 months to progress from financial commitment to commissioning.

Project completion time – from financial commitment to commissioning

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

State	Solar	Onshore wind	Storage	Hybrid
VIC	21	28	19	N/A
NSW	20	30	N/A	N/A
QLD	23	N/A	N/A	N/A
SA	19	21	20	N/A
WA	20	N/A	28	15
Total average by tech:	**20**	**26**	**22**	**15**

Notes - Average based on solar, onshore wind and storage 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.

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Energy storage projects

It was one of the strongest quarters on record for large-scale battery projects, with six new battery systems totalling 1,510 MW (capacity) / 5,016 MWh (energy output) reaching financial commitment. This was the second-highest level of new energy generation from battery energy storage systems (BESS) projects reaching financial commitment in a quarter on record. As a result, the rolling 12-month quarterly average for new battery project energy generation increased by 31 per cent to 3,606 MWh. The average duration of these six projects was 3.2 hours, which has increased from the average duration of 2.2 hours for projects reaching financial commitment in Q1 2024. The total capex investment for these projects was $2.4 billion.

The largest battery reaching financial commitment for the quarter was Victoria's Wooreen Battery Energy Storage System with a size of 350 MW / 1,400 MWh and duration of four hours.

South Australia had the most projects reaching financial commitment with three, while New South Wales, Queensland and Victoria had one each. Queensland's Stage 2 of Supernode Battery Energy Storage System has the largest duration at five hours.

Of these projects, three commenced construction in the same quarter, representing an overall total of 840 MW / 2,860 MWh. Two batteries were commissioned in the quarter with a combined capacity/output of 56 MW / 98 MWh.

Battery energy storage system projects by development stage reached

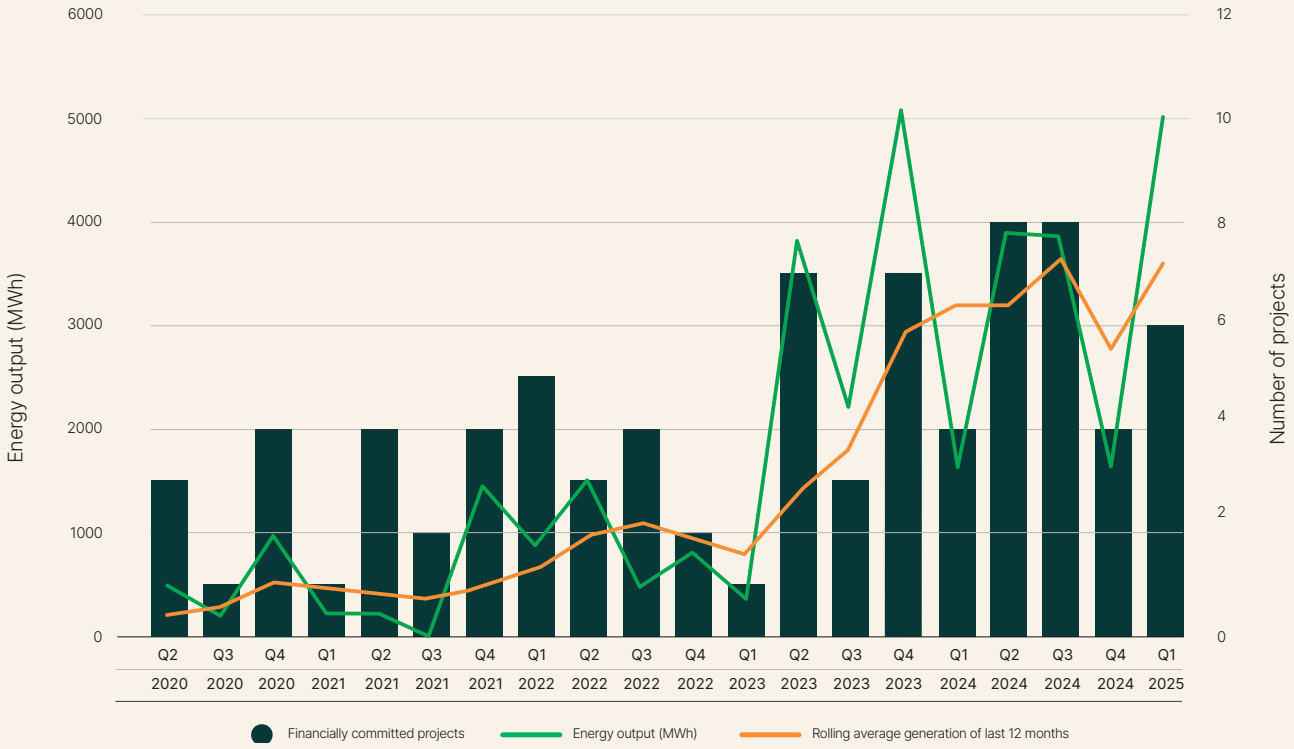
Battery Storage		Financially committed	Under construction	Commissioned
Q1 results	Project count	6	3	2
	Project capacity	1,510 MW	840 MW	56 MW
	Project energy output	5,016 MWh	2,860 MWh	98 MWh
	Project investment	$2.4 billion	$1.2 billion	$50 million

Notes - Includes hybrid projects with a storage component

Projects which reach multiple stages have been included in each stage

Project investment is underrepresented as not all projects have publicly available information

Financially committed storage projects by energy output, quarterly MWh



Commissioned storage projects by year

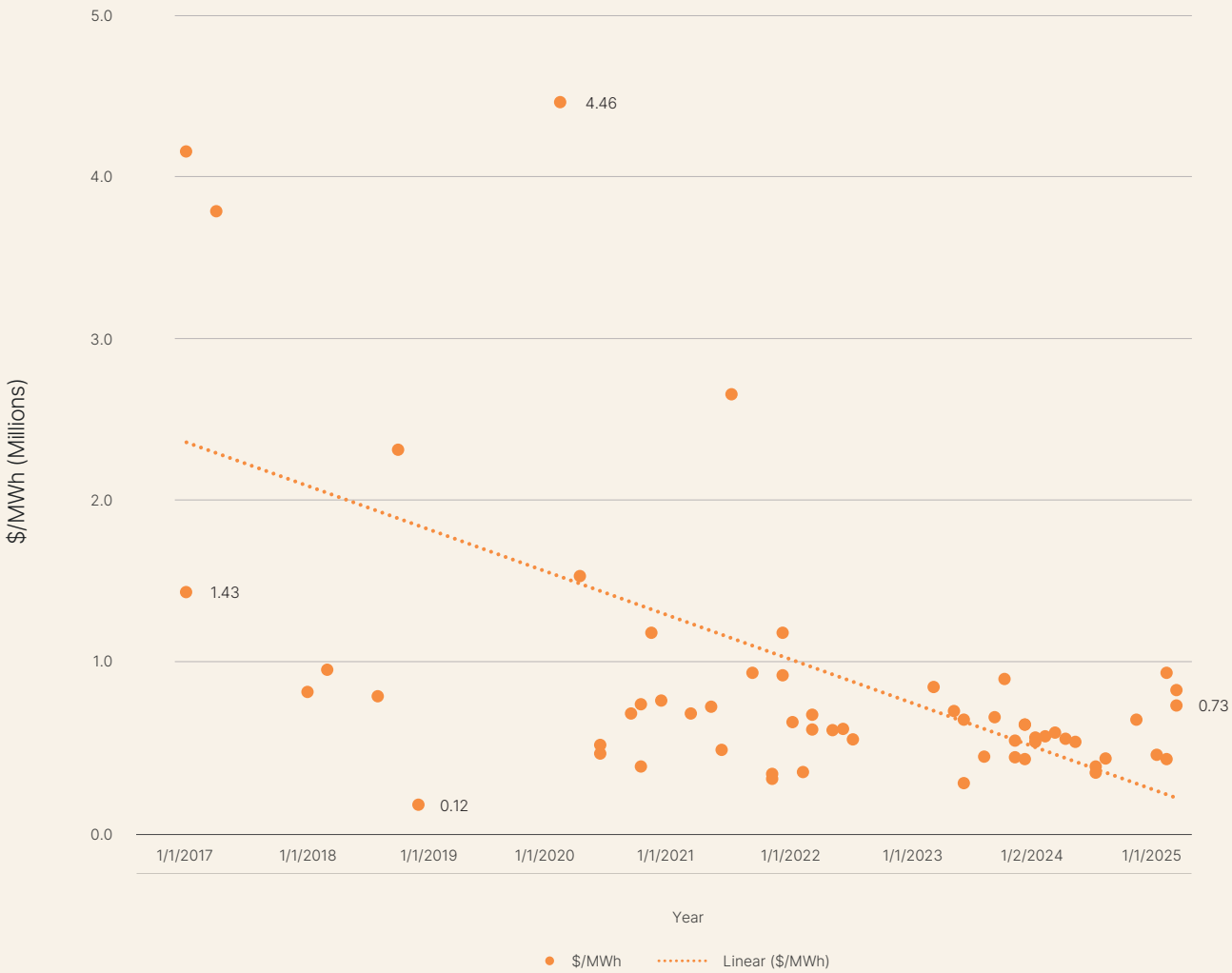
Commissioned energy storage projects

	2017	2018	2019	2020	2021	2022	2023	2024	2025
Number of projects	1	3	3	1	4	4	8	5	2
Investment (AUD $M)	90	129	72	42	353	87	960	1325	50
MW	150	90	130	13	426	69	724	619	56
Average MW	150	30	43	13	107	17	91	124	28
MWh	194	115	135	4	647	101	947	1677	98
Average MWh	194	38	45	4	162	25	118	335	49
Average storage duration (hours)	1.3	1.3	1.0	0.3	1.5	1.5	1.3	2.7	1.8

Battery energy storage system project capital investment spend per MWh

The below chart shows the relationship between the change in capital investment required for each MWh of energy for battery energy storage system projects over time. Expressed in millions of dollars, all battery energy storage system projects which reached financial commitment from 2017 onwards have been included to view the trend over time. The chart below indicates battery energy storage system costs have fallen steeply as they move towards higher energy (MWh) levels.

$/MWh of storage projects, real $AUD



Long-duration energy storage (LDES)

Long-duration energy storage (LDES) is a general term that refers to a wide range of energy storage technologies which are typically held to provide energy output in excess of 8 hours at maximum rated power and may exhibit a range of other characteristics, such as synchronous capability, cycling capability and the ability to help manage seasonal energy shortfalls.

In this report, the LDES projects captured are large pumped hydro energy projects. However, there are a number of other types of LDES projects currently in development, and these will be captured in future reports once they reach financial commitment.

While no pumped hydro projects reached financial close in the quarter, there are three projects across Australia currently under construction. A table summarising these projects is provided below:

Pumped hydro energy storage (PHES) projects under construction

Project name	State	Owner	Capacity (MW)	Energy generation (MWh)	Duration
Goat Hill Pumped Storage Hydro Project	South Australia	Altura Group	230	1,840	8
Kidston Pumped Storage Hydro Project	Queensland	Genex Power	250	2,000	8
Snowy 2.0	New South Wales	Snowy Hydro	2,000	350,000	175

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Hybrid projects

Hybrid projects are becoming more prevalent, with systems consisting of solar and storage, wind and storage, solar and pumped hydro (PHES), or a combination of these. Across the nation, there are 58 projects at various stages of development. Most of these projects are solar and storage systems. Twelve projects offer energy output durations in excess of two-hours, including a solar + pumped hydro energy storage project with a duration of eight hours.

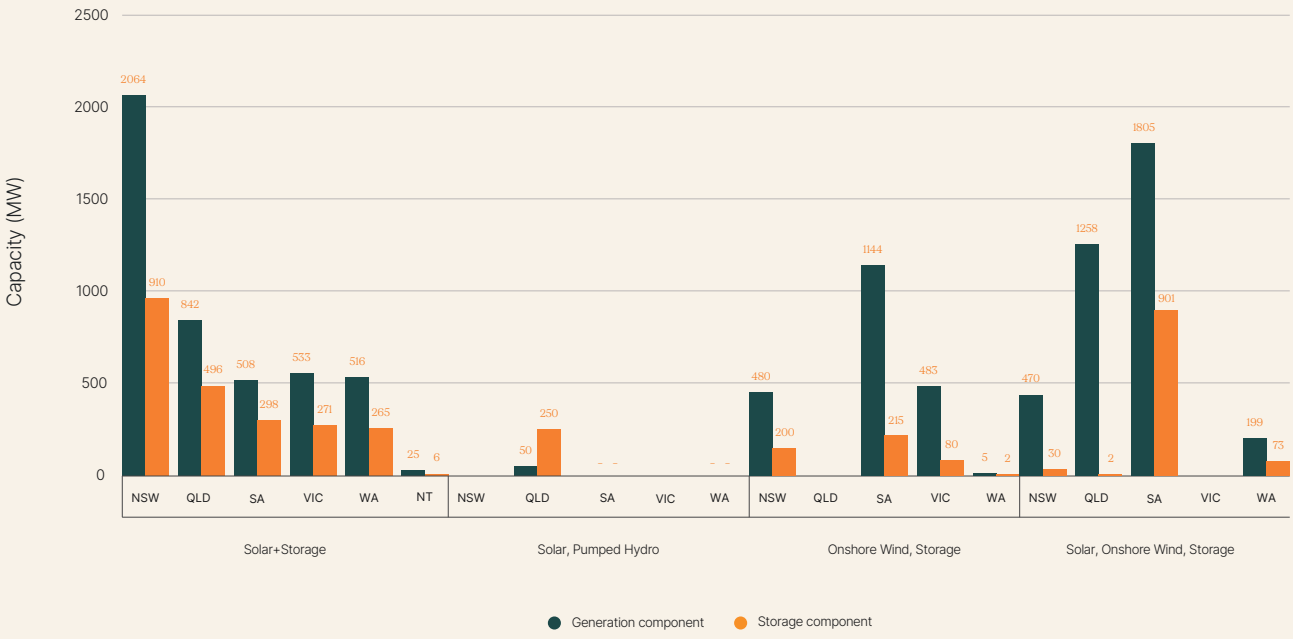
Project breakdown of hybrid projects

		Solar + Battery	Solar + PHES	Wind + Battery	Wind + Solar + Battery
Generation component	Solar capacity (MW)	4,488	50	-	1,291
	Wind capacity (MW)	-	-	2,046	2,445
	PHES (MW)	-	250	-	-
Storage component	Capacity (MW)	2,245	250	447	1,006
	Energy (MWh)	4,507	2,000	720	3,902
Average duration (hrs)		2.0	8.0	1.6	3.9
Total number of projects		37	1	8	12
Total build cost ($AUD billion)		$6.7	$0.9	$2.3	$2.5

Hybrid projects

Some of the largest hybrid projects are in New South Wales (predominantly solar and storage systems), and South Australia (predominantly wind, storage and wind, and solar and storage). When storage is attached to solar systems, the assets tend to have a larger capacity compared to wind and storage hybrid systems.

Hybrid project capacity breakdown by state and type, MW



CLEAN ENERGY COUNCIL

Level 20, 180 Lonsdale Street
Melbourne VIC Australia 3000

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

cleanenergycouncil.org.au

Girgarre Solar Farm
Girgarre, VIC
Yorta Yorta Country
(Potentia Energy)