

ENNA

We are ARENA

16/17

We're innovating
energy

Annual Report



Australian Government
Australian Renewable
Energy Agency

RDV

Australian Renewable Energy Agency

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Letter of transmittal



ARENA

Office of the Chair

14 September 2017

The Hon Josh Frydenberg MP
Minister for the Environment and Energy
PO Box 6022
Parliament House
CANBERRA ACT 2600

Dear Minister

ARENA ANNUAL REPORT 2016-17

I am pleased to present to you the annual report of the Australian Renewable Energy Agency (ARENA) for the financial year 2016-17, in accordance with the requirements of the *Australian Renewable Energy Agency Act 2011* (ARENA Act) and the *Public Governance, Performance and Accountability Act 2013* (PGPA Act).

The ARENA Board is responsible for preparing and providing the annual report to you in accordance with s46 of the PGPA Act. The report was approved by a resolution of ARENA's Board on 14 September 2017.

This report incorporates ARENA's Annual Performance Statement (APS) for 2016-17, as required by s39 of the PGPA Act. In the opinion of the Board, the APS accurately presents information about ARENA's performance for the reporting period and complies with s39(2) of the PGPA Act.

The report also includes ARENA's audited financial statements prepared according to s42 of the PGPA Act.

Yours sincerely

A handwritten signature in black ink, appearing to read "Martijn Wilder". The signature is fluid and cursive, with a long horizontal stroke at the end.

Martijn Wilder AM
Chair

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About this report

This annual report provides information about ARENA's activities and achievements in 2016-17 to give readers a better understanding of our purpose, priorities, and how our work matters.

Section 01	Overview	Provides a review of ARENA's impact in 2016-17.
Section 02	About ARENA	Explains ARENA's purpose, objective and funding priorities.
Section 03	Performance	Describes our activities for 2016-17, indicating whether they met the performance measures identified in the ARENA corporate plan for the year.
Section 04	ARENA showcase	Provides case studies that demonstrate how ARENA's work makes a difference.
Section 05	Management and accountability	Explains ARENA's governance arrangements and management practices.
Section 06	Financial statements	Provides our audited financial statements for 2016-17.
Section 07	Appendices and glossary	Provides a list of projects that received ARENA funding during 2016-17, information on ARENA's environmental performance, a compliance index, and a glossary of terms, acronyms and abbreviations.
Section 08	Index	Alphabetically lists the topics covered in the report.



Chair and CEO review

ARENA's purpose is to accelerate Australia's shift to more affordable and reliable renewable energy. We seek to anticipate and understand how the energy system is evolving and what must be done to lower the cost of renewable energy, boost its supply, and ease the integration of clean energy.

This section provides a review by the ARENA Chair and CEO of our performance in 2016-17, as well as an overview of our highlights for the year.

This past year saw a strong public focus on ARENA due to the nation's rapidly changing energy sector. ARENA was at the forefront of that transition, with the Finkel Review emphasising our vital contribution and role in driving the innovation that will strengthen the security and reliability of Australia's electricity supply.

Every ARENA activity is driven by the determination to have maximum impact and provide the best value possible for the investment of taxpayers' funds. We operate at the leading edge of new energy technology where both risk and potential reward are high, connecting the best renewable energy innovations with the resources needed to solve problems facing us now, and help to sow the seeds of long term structural changes in the energy sector.

ARENA's work during 2016-17 involved a broad range of renewable technologies and solutions, from research and development to demonstration and early-stage deployment. Our focus on the future of energy resulted in three particularly significant streams of activity: large-scale solar, storage, and solutions that strengthen the grid.

Making an impact with big solar

Our two-year effort to accelerate Australia's large-scale solar (LSS) sector came to fruition in 2016-17. Twelve new big solar farms are now either complete or under construction due to support provided

by ARENA and, in a number of cases, the Clean Energy Finance Corporation (CEFC).

This initiative attracted almost \$1 billion in additional investment to the nation's fleet of large-scale solar farms, and helped to drive down the price of big solar to almost the same level as wind power. In doing so, ARENA helped to create another cost-competitive option for Australia to reduce emissions from its electricity sector.

Every ARENA project boosts the economy as well as that technology's progress along the commercialisation pathway. In the case of our big solar projects, each helped to build industry capacity in the sector, strengthen skills and deepen supply chains. The projects also created jobs in regional and remote communities, developed new skills in the Australian workforce, and increased the competitiveness of the sector.

Now that ARENA has helped to accelerate large-scale solar down the cost curve in Australia, at least another six new plants are being developed without the need for our support.

Easing the transition with storage

The rapid innovation in renewable energy this year began to include batteries and other forms of energy storage and flexible capacity to overcome the variability of renewable energy.

ARENA anticipated the need for development of these technologies with projects in our investment portfolio exploring energy storage. In line with calls from our Minister and the Prime Minister for further investment in storage to provide security and reliability, we are developing a suite of new approaches to accelerate the commercialisation of renewable energy storage and flexible capacity solutions just as we did with large-scale solar. These may use hydroelectric schemes, retired mine pits, large or small batteries, and demand response. ARENA is accelerating the development of storage solutions and other flexible capacity to realise the same benefits we were able to achieve with large-scale solar through reduced cost and widened availability.

Our focus on energy storage and other flexible capacity also delivers on the Government's agenda, in accordance with our Minister's statement of expectations, by supporting research and development of technologies that will improve the electricity system's security and reliability, taking into account the findings of the Finkel Review. Both the Minister's statement and ARENA's reply are available at arena.gov.au/about/publications.

Strengthening the grid

ARENA is making a significant contribution to transitioning our energy sector by identifying and overcoming barriers to the creation and uptake of affordable and reliable renewable energy. An implicit part of ARENA's work to accelerate the shift to renewable energy has been to ease this energy transition and demonstrate how renewables can strengthen the grid.

That work has included exploring ways to take pressure off the grid. During 2016-17 ARENA supported a range of projects, including one that intelligently reduces or shifts electricity demand to reduce the amount of power required at peak times. We are funding the trial of an online market where Australians with rooftop solar and batteries can trade power with each other as well as grid operators. ARENA is also helping a project to create a virtual power plant through the linking of household and business premises that have rooftop solar and batteries, so the electricity generated can be stored and shared when needed.

Innovations like these should eventually reduce network costs, which make up a large part of electricity prices, by delaying or even removing the need to build additions to the grid. Two of these ideas came from ARENA's innovation laboratory, A-Lab, which we created to accelerate out-of-the-box solutions to integrating renewables and grids.

Accelerating the shift

ARENA made funding commitments of \$123 million to 35 new projects in 2016-17, helping to unlock a total of \$1.2 billion in additional renewable energy investment. Taking into account the 45 projects that were successfully completed this year, and

the two that were terminated/closed, ARENA's investment portfolio at the end of 2016-17 had 172 projects. Our commitment of \$856 million to support those projects will leverage \$2 billion in additional third party investment.

Since our inception in 2012, ARENA has supported a total of 320 projects with \$1 billion in grant funding, unlocking \$2.5 billion in additional funds to secure a \$3.5 billion investment in the Australian renewable energy sector.

ARENA is helping to establish the nation's first advanced biofuel laboratory, making it possible for innovative bio-crude development companies to finally be able to test and refine their products in Australia. We are also funding a unique study into producing biogas and electricity from waste streams such as treated sewage or fats, oils and greases discarded from industry and businesses like restaurants and cafes.

We are helping to build resilience in our energy system by supporting renewables that can provide more reliable power to businesses and communities on the fringes of grids. This supports isolated communities wanting to move away from expensive diesel-based electricity.

We helped to scale-up the deployment of a reusable mini solar farm that can be packed up and moved to where it is needed most, whether that is a remote mining or construction site, or a disaster zone. ARENA also co-located wind and solar farms to improve reliability, and investigated or helped to create hybrid systems using wind, solar, and sometimes wave energy to produce clean, reliable and affordable energy for remote communities.

Our vision

Our agenda is large but our focus is sharp. ARENA's funding, knowledge and networks helped bridge the gap between innovation and commercialisation during 2016-17, easing the transition to Australia's renewable energy future while also accelerating it.

Working closely with energy innovators, suppliers, regulators and users we reviewed and refined ARENA's strategic direction this year, as well as

the organisation's capacity and capability. ARENA has adopted four investment priorities where we will focus our efforts over coming years: delivering secure and reliable electricity, accelerating solar photovoltaic (PV) innovation, improving energy productivity, and exporting renewable energy.

These priorities chart a path for ARENA to support innovation and facilitate change in a way that achieves the desired balance of security, reliability, affordability and emissions reduction, while developing substantial new industries for Australia.

Acknowledgments

ARENA's contribution is made possible with the commitment and guidance provided by the Board; the hard work and commercial focus of the ARENA team; the vision, ingenuity and determination of our project proponents; and the support of the Australian community. We welcome the broad support for our work that was demonstrated in the submissions to the Finkel Review.

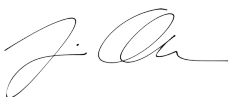
We also thank the Australian Government for demonstrating its confidence in ARENA this year, and our portfolio Ministers Greg Hunt and Josh Frydenberg for their support.

Knowledge sharing is a critical part of our role as is engagement with stakeholders, sharing insights that run across the whole energy sector. As our portfolio builds, we look forward to broadening our engagement.

ARENA thanks you all for your vital contribution, and we look forward to our continued work together.



Martijn Wilder AM- Chair



Ivor Frischknecht- CEO

ARENA highlights 2016-17

35 new projects received a total of \$123 million in ARENA funding commitments during 2016-17, helping to attract a total of \$1.2 billion in new renewable energy investment



12 large-scale solar farms established with ARENA's support this year, tripling Australia's future solar output



Knowledge and lessons learned to be shared from 45 ARENA-supported projects successfully completed in 2016-17



\$2.5 billion worth of projects in ARENA's pipeline of potential new projects



First solar farms fast-tracked in Australia by co-locating with Australian wind farms



Scaled-up the deployment of a mobile and re-useable mini solar farm



ARENA projects capable of generating 263 MW of electricity - enough to power a city bigger than Newcastle, NSW



Successful study into turning a disused mine pit into a giant battery



ARENA and CEFC working together on battery and pumped-hydro renewable energy storage



First funding commitments for projects developed in ARENA's innovation incubator A-Lab



Examined ways for homes and businesses to pool, share and trade energy from rooftop solar systems



Renewables made electricity more reliable for remote towns and isolated island communities



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About ARENA

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This section details ARENA's mission and purpose, as well as our objective and funding priorities.

ARENA is innovating energy

ARENA is the Australian Renewable Energy Agency, established by the Australian Government in 2012 to improve the competitiveness of renewable energy and increase its supply in Australia.

Our purpose is to accelerate Australia's shift to an affordable and reliable renewable energy future (see Fig. 1). We do this by finding and funding the renewable energy innovations that have the best chance of guaranteeing Australia's power supply for the future, helping to bring those projects to life, and then sharing the knowledge gained through the projects to inform and grow the whole industry.

ARENA is committed to achieving maximum impact and value from the projects we fund. We do this by focusing our efforts on ways we can make the most difference for innovators, policy-makers, the energy industry and the broader Australian community.

Our complementary role

To ensure our activities have the best impact, we work to complement other government programs and initiatives that operate along the innovation chain such as those shown in Fig. 2.

Figure 1: Our mission, purpose, objective and funding priorities

Mission

Our focus and inspiration



Enable more renewables and lower emissions by driving innovation and commercialisation



Purpose

Our role



Accelerate Australia's shift to an affordable and reliable renewable energy future



Objective

Our goal (set by legislation)



Improve the competitiveness of renewable energy technologies

Increase the supply of renewable energy in Australia



Funding priorities

Areas where we can achieve maximum impact



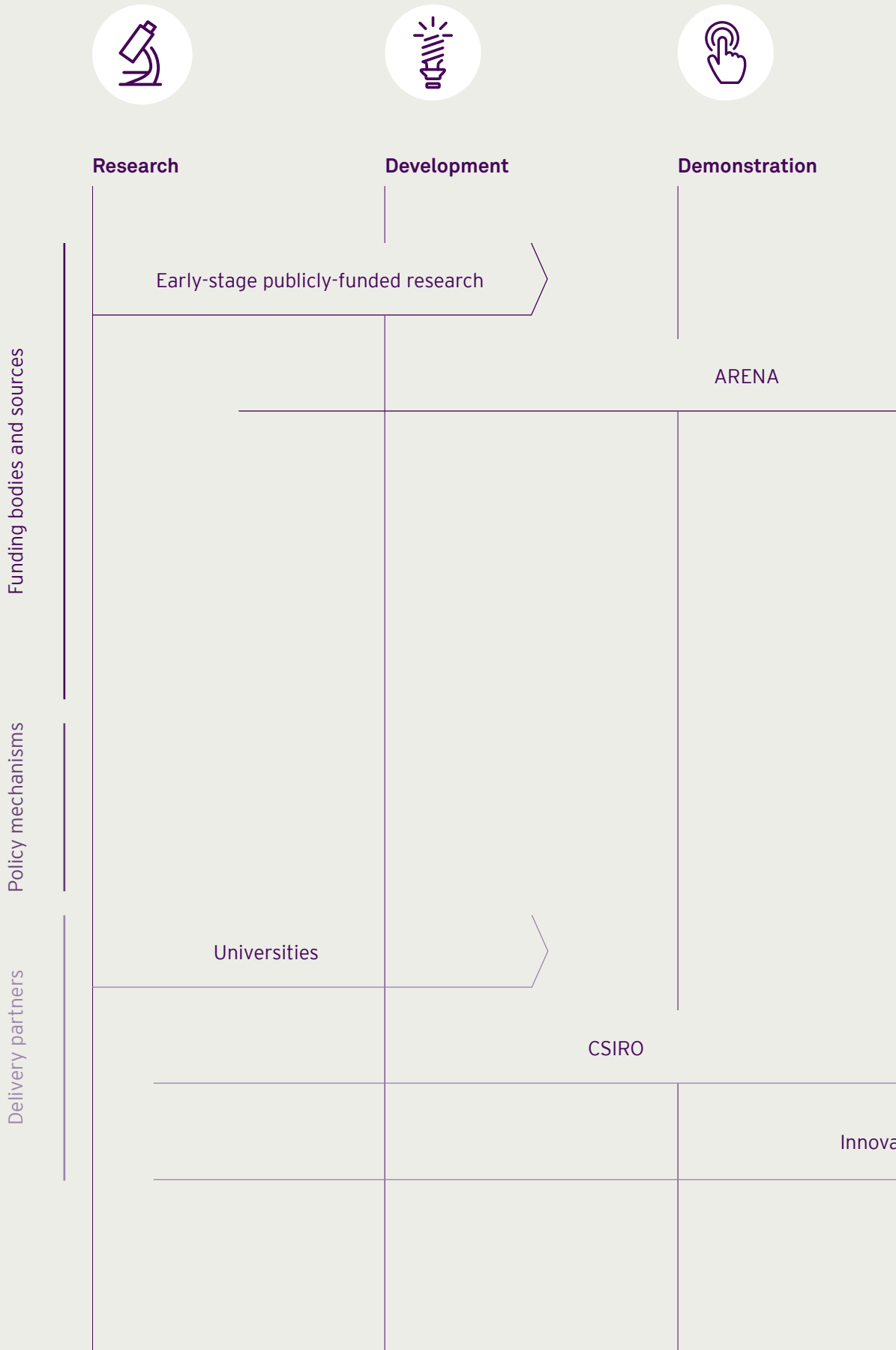
Delivering secure and reliable electricity

Accelerating solar PV innovation

Improving energy productivity

Exporting renewable energy

Figure 2: ARENA's complementary role





Deployment

Market Accumulation

Diffusion

Clean Energy Innovation Fund (CEFC & ARENA)

Clean Energy Finance Corporation

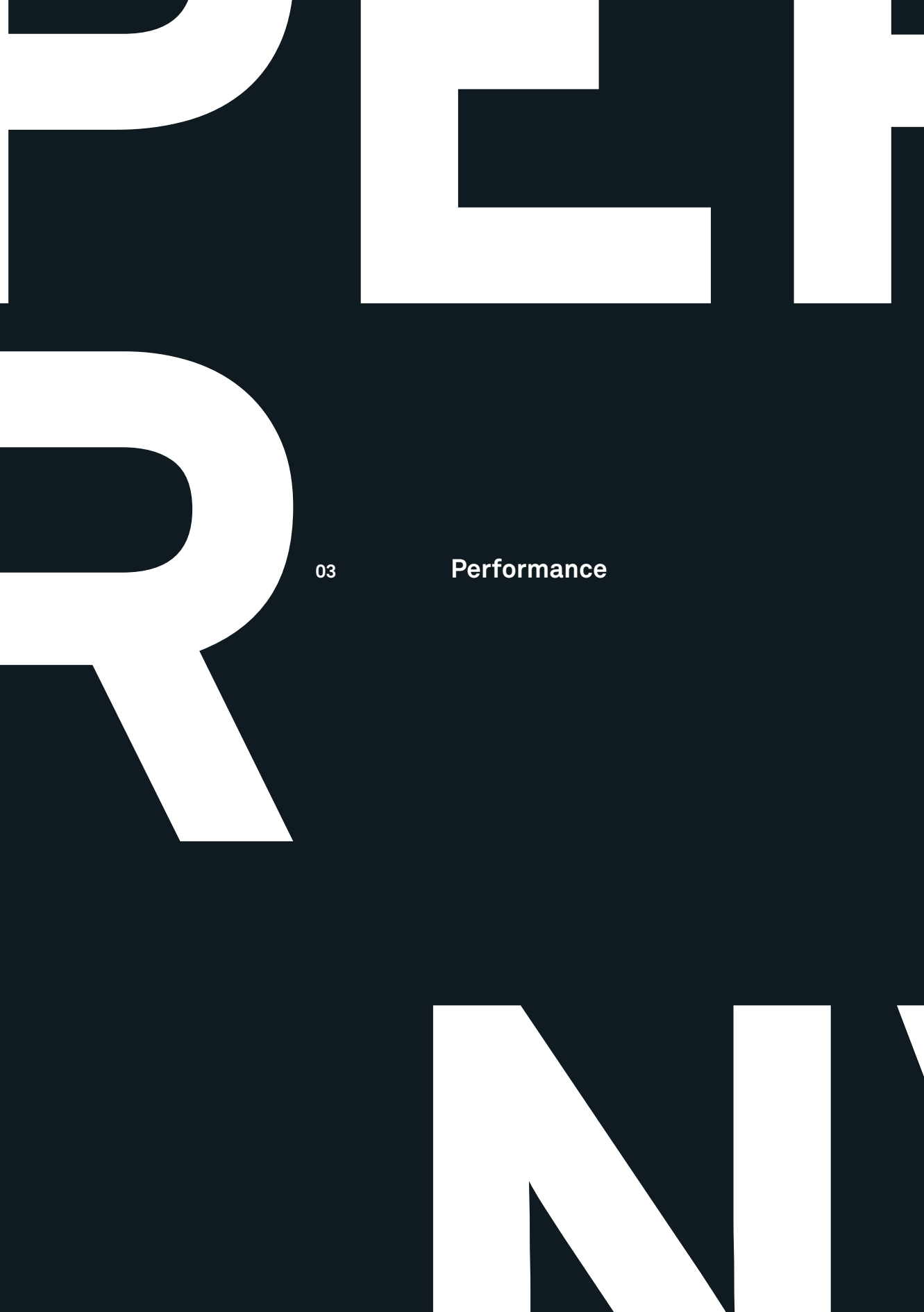
Emissions Reduction Fund

Renewable Energy Target

EE Disclosure & Standards

actors and established industry





03

Performance

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This section provides ARENA's annual performance statement for 2016-17, in accordance with paragraph 39(1)(b) of the *Public Governance, Performance and Accountability Act 2013* (PGPA Act) and section 16F of the *Public Governance, Performance and Accountability Rule 2014* (PGPA Rule).

ARENA Annual Performance Statement 2016-17

Introductory statement

The Board, as the accountable authority of the Australian Renewable Energy Agency, presents the annual performance statement as required under paragraph 39(1)(a) of the *Public Governance, Performance and Accountability Act 2013* (PGPA Act).

In our opinion, the annual performance statement is based on properly maintained records, accurately reflects ARENA's performance, and complies with subsection 39(2) of the PGPA Act.

Entity purpose

ARENA's purpose for this annual performance statement is described in the 2016-17 Corporate Plan. It is to accelerate Australia's shift to a more sustainable, affordable and reliable energy future.

This role is based on ARENA's objective, as set out in the *Australian Renewable Energy Agency Act 2011* (ARENA Act), which is to:

- improve the competitiveness of renewable energy technologies
- increase the supply of renewable energy in Australia.

Results

Since ARENA was established in 2012, we have unlocked \$3.5 billion of public and private investment in the nation's renewable energy sector, supporting a total of 320 projects with \$1 billion in grant funding to create the confidence needed to attract another \$2.5 billion in third party support.

By supporting those projects, ARENA has been instrumental in creating Australian jobs, developing new skills and experience in the workforce, and accelerating the development of renewable technologies and solutions that will make electricity supply more affordable, reliable and secure.

A summary of our performance outcomes is provided in Fig. 3. Performance has been assessed against the criteria set out in the ARENA 2016-17 Corporate Plan, as well as the outcome set out in the 2016-17 Portfolio Budget Statements.

Since 2012, ARENA has unlocked a total of \$3.5b with \$1b in support for 320 renewable energy projects

Figure 3: ARENA performance summary 2016-17

Performance criterion	Criterion source	Outcome
<p>Provide financial assistance to new projects in accordance with the principles and priorities outlined in ARENA’s General Funding Strategy and Investment Plan</p>	<p>2016-17 Corporate Plan, page 7</p>	<p>Achieved</p> <ul style="list-style-type: none"> • 35 projects received new funding commitments of \$123 million in 2016-17 • Every \$1 of new ARENA funding committed in 2016-17 matched by almost \$10 on average from third party sources • General Funding Strategy and Investment Plan reviewed and updated
<p>Jointly manage the Clean Energy Innovation Fund (Innovation Fund)</p>	<p>2016-17 Corporate Plan, page 7</p>	<p>Achieved</p> <ul style="list-style-type: none"> • Signed memorandum of understanding with CEFC on management arrangements for Innovation Fund • Innovation Fund committed \$30 million to 4 projects in 2016-17
<p>Effectively manage projects in accordance with agreement terms to deliver intended outcomes, learn and improve</p>	<p>2016-17 Corporate Plan, page 7</p>	<p>Achieved</p> <ul style="list-style-type: none"> • 45 projects successfully completed in 2016-17 and 2 projects terminated • Quality of assessment processes reaffirmed • Value and impact of knowledge sharing demonstrated in reduced project development times and increased stakeholder interest in ARENA’s Knowledge Bank and other relevant activities

Figure 4: ARENA's key performance documents 2016-17

Portfolio budget statements



Outcome 1: Support improvements in the competitiveness of renewable energy and related technologies and the supply of renewable energy by administering financial assistance, developing analysis and advice about, and sharing information and knowledge with regard to, renewable energy and related technologies

Corporate plan



Purpose

Accelerate Australia's shift to a more sustainable, affordable and reliable energy future

Annual performance statement



Program 1.1
Australian Renewable Energy Agency

Linked programs

1.1 Clean Energy Finance Corporation

2.1 Reducing Australia's Greenhouse Gas Emissions

2.2 Renewable Energy Technology Development

Activities

- Strategic investment
- Strong project assessment, negotiation and delivery

Performance measures

- Provide financial assistance to new projects in accordance with the principles and priorities outlined in ARENA's General Funding Strategy and Investment Plan
- Jointly manage the Clean Energy Innovation Fund
- Effectively manage projects in accordance with agreement terms to deliver intended outcomes, learn and improve

-
- Report against performance measures

1. Strategic investment

1.1 Financial assistance to new projects

Performance criterion	Provide financial assistance to new projects in accordance with the principles and priorities outlined in ARENA's General Funding Strategy and Investment Plan
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Criterion source	Corporate plan
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Performance measures for 2016-17	Provide financial assistance to one or more new projects in each of the Agency's priority areas, including conclusion and contracting of large-scale solar projects in accordance with ARENA's \$100 million competitive round
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Performance measures for 2016-17 and future years	Provide financial assistance to one or more new projects in each of the Agency's priority areas, including other research, development and demonstration projects in accordance with ARENA's Investment Plan
--	--

Interpreting this performance measure	<p>Provision of financial assistance for research, development and demonstration of renewable energy technologies is the primary means by which we fulfil our purpose</p> <p>We do so by selecting the most relevant and highest quality projects for support to ensure our allocated funding delivers the greatest impact</p>
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Result: Achieved

Strengthened strategic approach, high-impact investment priorities

Financial assistance provided according to General Funding Strategy and Investment Plan

The 2015 Investment Plan was in force for most of the reporting period, which had the following priorities for new investment:

- integrating renewables and grids
- renewables for industrial processes
- off-grid areas
- fringe-of-grid and network-constrained areas
- large-scale solar PV.

We committed financial assistance to projects that ranked highly on merit criteria set out in the relevant funding program guidelines. To determine the ranking, each new project underwent a rigorous assessment process according to the principles and priorities outlined in the General Funding Strategy and Investment Plan. The process drew on advice from independent experts and involved independent financial and technical due diligence.

Funding for new projects in 2016-17

ARENA committed \$123 million in funding support for 35 new projects worth \$1.2 billion in 2016-17. In past years we leveraged around \$2 of additional funding for every \$1 of ARENA grant funding. This changed in 2016-17 with our large-scale solar competitive funding round, which saw a significant drop in the amount of ARENA funding needed to develop big solar farms.

As a result, every \$1 of new ARENA funding committed in 2016-17 was matched by almost \$10 on average from third party sources.

In 2016-17, \$1.2b unlocked with \$123m support for 35 projects

Accelerating large-scale solar

Twelve new large-scale solar farms were established this year in NSW, Queensland and Western Australia after securing support through our LSS competitive funding round. Our commitment of almost \$92 million in grant funding helped to unlock third party funding for the projects that will yield additional total investment of approximately \$1 billion in Australia's large-scale solar sector.

Once fully operational, these facilities will triple the amount of solar energy that can be generated from big solar in Australia, and bring the cost of delivering solar energy to almost the same level as wind energy five years earlier than expected.

With ARENA's support, and that of the Clean Energy Finance Corporation, Australia's large-scale solar industry has grown from zero to 20 solar farms in five years. Market confidence in the sector has grown with that experience, and now six new plants are being developed without the need for ARENA support.

Read more about ARENA making an impact with big solar in the showcase section of this annual report.

Other investment priorities

We also awarded almost \$35 million in grant funding to 23 projects in other ARENA investment priority areas during 2016-17, leveraging total investment of almost \$97 million in the projects.

Some of the new projects may reflect investment priorities from previous Investment Plans as well as the current version. This is because it takes time to originate, assess and negotiate a contract for a project, which may extend beyond the timeframe of the current Investment Plan.

In keeping with ARENA's long-lens approach, our new projects span the innovation chain, with one research and development project, 15 demonstration projects and 19 deployment projects.

Ensuring our investment priorities are relevant

ARENA worked closely with energy innovators, suppliers, regulators and users during the past 18 months to review and strengthen our investment priorities and strategic approach.

In May 2017 we adopted four investment priorities in an updated Investment Plan, which will build upon the innovation, achievements and knowledge produced by our projects to date. By funding projects that best meet our investment priorities, we can achieve maximum value from the projects with minimal capital investment.

Our updated investment priorities are:

- delivering secure and reliable electricity
- accelerating solar PV innovation
- improving energy productivity
- exporting renewable energy.

These priorities chart a path for ARENA to support innovation and facilitate change in a way that achieves the desired balance of security, reliability, affordability and emissions reduction in Australia's energy system, while developing substantial new industries for Australia.

The updated General Funding Strategy that resulted from the review process was approved by our Minister on 22 June 2017.

Table 1: New projects by investment focus area and innovation stage

Investment focus area 2016-17	Number of projects*	ARENA grant (\$million)
Integrating renewables and grids	11	16.0
Renewables for industrial processes	1	6.4
Off-grid areas	3	2.8
Fringe-of-grid and network-constrained areas	2	3.7
Large-scale solar PV	12	92.0
Solar PV (not including large-scale)	2	9.1
Marine	2	2.8
Bioenergy	4	2.9
Hybrid	1	1.2
Enabling	13	19.0
Storage	1	0.5

*Note: The total number of projects exceeds 35. Some projects have been counted twice because they fall into more than one category.

Innovation stage	Number of projects	ARENA grant (\$million)
Research and development	1	4.1
Demonstration (including 12 studies)	15	11.3
Deployment (including 12 LSS PV)	19	107.9

1.2 Management of the Clean Energy Innovation Fund

Performance criterion	Jointly manage the Clean Energy Innovation Fund (Innovation Fund)
Criterion source	Corporate plan
Performance measures for 2016-17	Innovation Fund managed in accordance with arrangements established between ARENA and the Clean Energy Finance Corporation (CEFC)
Performance measures for 2016-17 and future years	Innovation Fund managed in accordance with arrangements established between ARENA and the CEFC
Interpreting this performance measure	<p>The Innovation Fund was created to draw on the complementary experience and expertise of ARENA and the CEFC</p> <p>It does so by investing in clean energy businesses and technologies that build on ARENA's support, or are ready to take the next step towards commercialisation</p>

Result: Achieved

Management of Innovation Fund

ARENA and the CEFC are jointly responsible for operating the Clean Energy Innovation Fund. The Innovation Fund is a \$200 million program available to provide debt and/or equity finance for innovative clean energy projects and businesses which support renewables, energy efficiency and low emissions technologies. Investments from the Innovation Fund will help eligible projects and businesses get to the next stage of commercialisation.

ARENA signed a memorandum of understanding (MoU) with the CEFC in December 2016 that set out how the Innovation Fund would be managed. In accordance with the MoU, our active participation in the Innovation Fund involves:

- identifying transactions
- making recommendations to the CEFC Board through a Joint Investment Committee (which includes two members each from ARENA and CEFC)
- members of ARENA's Advisory Panel providing technical assessments of investment opportunities
- ARENA personnel managing submissions from potential investment proponents.

Building on ARENA's support

Our productive working relationship with the CEFC during 2016-17 produced four investments by the Innovation Fund. The investments, totalling \$30 million, either complement ARENA-supported projects or will accelerate the commercialisation of clean energy solutions. They are:

- \$10 million cornerstone commitment to the \$20 million Clean Energy Seed Fund managed by Artesian Venture Partners, which focuses on unearthing and financing emerging innovations and startups in clean energy
- \$10 million to the \$50 million capital raising of Carbon Revolution, a Geelong-based company that produces carbon fibre wheels that reduce the weight of cars, which helps to reduce energy consumption and carbon emissions

- \$5 million to GreenSync, an innovative Melbourne-based company that aims to bring smart technology solutions to the energy grid of the future, as part of an \$11.5 million Series B capital raising
- \$5 million to Victorian-based manufacturer SEA Electric, to ramp up its conversion of medium-duty trucks and commercial vans to electric vehicles.

We will continue to provide commercial investment opportunities for the Innovation Fund from our pipeline of ARENA grant funded projects.

2. Strong project assessment, negotiation, delivery and knowledge sharing

Performance criterion	Effectively manage projects in accordance with agreement terms to deliver intended outcomes, learn and improve
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Criterion source	Corporate plan
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Performance measures for 2016-17	Significant project outcomes and lessons learned published
---	--

Performance measures for 2016-17 and future years	Significant project outcomes and lessons learned published
--	--

Interpreting this performance measure	By accumulating and applying knowledge, we can fast-track technological innovation and progress
--	---

We do so by ensuring each new project benefits from preceding projects' outcomes and lessons learned, as well as improving on the projects that came before it and informing policy

Result: Achieved

Strong project assessment and negotiation

During 2016-17 ARENA looked for the best funding proposals that aligned with our objective and investment priorities, to get the best possible return for the investment of taxpayer funds. We used robust technical and commercial capabilities and procedures, including access to independent external experts, to assess projects and negotiate contracts.

The ARENA Advisory Panel assessed in excess of 90 funding applications and presentations on potential future projects. Applications were assessed against the merit criteria for the Advancing Renewables Program and recommendations were made to the ARENA Executive and Board about whether to offer funds, as well as the terms and conditions of any funding offer.

Our due diligence activities during the assessment process were commensurate with the value, size and complexity of each application. These activities include the commissioning of independent research, analysis and modelling to support assessments, and consultation with other government agencies and relevant parties.

The strength of our project assessment processes was demonstrated by the final outcome of our large-scale competitive funding round this year. The 12 successful project proposals announced in September 2016 were selected from 22 finalists, out of a initial field of 77 full applications. Not only did all 12 projects successfully reach financial close before the end of this reporting period, they are all on track for on-time completion.

A 100 per cent success rate is unusual for projects of this type, and was due at least in part to our high quality assessment processes, which included specialised incentives, such as the use of bid bonds. Extensive and early discussions with the CEFC also helped inform the design and execution of the LSS funding round.

Strong project delivery

Effectively manage projects

This year saw the highest number of ARENA project completions to date, with 45 projects successfully concluded.

We also terminated/closed two projects during the year, with the unspent funds either returned to ARENA or released for other commitments. Our decision to terminate a project is based on a judgment that a project is not meeting, or is unlikely to meet, its intended outcomes or that it has achieved its objectives prior to completion of the project.

Delivering intended outcomes

- **Solar research and development**

An independent review found that ARENA-funded projects have entrenched Australia's world-leading solar research capabilities, achieving new world records in solar efficiency and supporting nearly 1000 research positions. The independent review also found that ARENA's support was helping to create new companies, jobs and export opportunities.¹

- **Strategic research initiatives**

ARENA's two flagship strategic research initiatives, the Australian Centre for Advanced Photovoltaics (ACAP) and the Australian Solar Thermal Research Institute (ASTRI), were found to provide stable research funding to their constituent institutions, fostering systemic national collaboration that links complementary activity at research institutions to deliver jointly agreed outcomes, as well as greater international linkages.²

- **Advanced biofuels**

A review found that three ARENA-funded projects improved Australia's capability to grow and harvest algal biomass and to convert organic biomass to bio-crude and bio-crude to biofuels. The outcomes have cast Australian companies into the international spotlight in algal research and put Australia in a world-leading position in hydrothermal liquefaction technology. The high level of knowledge shared and collaboration between grant recipients increased the biofuel sector's technical capacity to produce commercial quantities of advanced biofuels.³

Learn and improve

Knowledge sharing a condition of ARENA funding

We require every one of our grant recipients to share the knowledge they gain during their projects as a condition of receiving ARENA's public funding.

Specialised knowledge sharing projects

We also fund knowledge sharing projects through our Advancing Renewables Program. These projects create, collect, analyse, store, use or share knowledge, in addition to building networks that strengthen industry capacity, collaborations and partnerships.

Knowledge sharing activities in 2016-17

Highlights of our knowledge sharing activities for the reporting period include:

- **Big solar presentations and conversations**

Through a series of presentations and analyses provided at conferences, workshops and other events, we contributed to the maturation of the local large-scale solar sector by sharing the knowledge generated by our big solar projects. We also facilitated frank discussions about real world problems encountered by the sector and how best to overcome them.

- **Powering the mining sector**

In mid-2017 we helped to host a site visit to the DeGrussa Solar Project for 64 mining industry leaders. The other hosts were Sandfire Resources, owners of the DeGrussa mine, Neoen, the owners of the solar farm, and Juwi Renewable Energy, the project's developers/operators. The day was dedicated to sharing what happens at the leading edge of a renewable energy development to increase the mining sector's confidence in clean energy technologies.

- **Knowledge Bank additions and promotion**

Eight new reports were added to the Knowledge Bank, and promotion of the online resource through our digital platforms helped to boost its audience. The number of Knowledge Bank page views over the three months from May to July 2017 was four times greater than for the same period in 2016.

- **Off-grid newsletter launched**

We established an off-grid portfolio newsletter to share relevant knowledge from our projects with subscribers, along with updates on upcoming knowledge sharing opportunities.

- **Digital platforms updated**

We updated the ARENA website and extended our digital platforms to include the ReWired podcasts and ARENAWIRE blog (arena.gov.au/blog).

¹ *Advancing solar in Australia through RD&D investment*, report on an independent review of ARENA's solar research and development activities, November 2016

² Findings of independent mid-term reviews of ACAP and ASTRI

³ Findings of an independent evaluation of the Advanced Biofuels Investment Readiness Program (ABIR), November 2016

Our operating environment

ARENA's operating environment was powerfully shaped by a number of developments during 2016-17, particularly within the electricity sector. These occurred against the backdrop of longer-term domestic and global trends that are fundamentally changing how electricity is generated, supplied and used.

Domestic context

Passage through Parliament of the Budget Savings (Omnibus) Bill in September 2016 resolved uncertainty about ARENA's funding. Following that decision, we reviewed and refreshed our investment priorities, releasing a new Investment Plan in May 2017.

The Investment Plan ensures that we focus our funding decisions and other activities on the areas where ARENA can deliver the greatest benefit. This approach builds on our previous investments while providing a framework that helps us identify the projects that have the best prospect of delivering outcomes in areas where there is the greatest need and opportunity for innovation.

Important domestic trends that influenced ARENA's planning and activities during the year included the changing patterns of demand for electricity, particularly peak demand events, as well as the changing balance of supply and demand brought about by dramatic growth in distributed electricity generation and unprecedented rises in the price of electricity.

A number of important reviews and reports also occurred during the reporting period:

- the Council of Australian Governments (COAG) energy ministers agreed in October 2016 to an independent review conducted by Australia's Chief Scientist, Dr Alan Finkel, to develop a national energy security and reliability blueprint
- Dr Finkel presented the review's final report to COAG Leaders on 9 June 2017

- over 350 submissions were made from March to May 2017 to the Government's review of climate change policies
- the CSIRO published a Low Emissions Technology Roadmap in June 2017, which explores major shifts in electricity generation and energy use in buildings, industry and transport.

Global trends

Australia's ratification of the Paris Agreement in November 2016 put domestic developments into a global context. CSIRO's Low Emissions Technology Roadmap highlighted the importance of energy productivity and decarbonisation of the electricity sector in reaching Australia's Paris target.

Industry trends

Business activity levels in the Australian renewable energy sector increased significantly during 2016-17. This activity included notable asset sales and a number of overseas renewable development groups looking to take advantage of Australia's accelerating shift to power generated from renewable sources.

There were also promising developments for Australian companies seeking international markets. Perth-based and ARENA-supported Carnegie Wave Energy launched a \$90 million commercial wave energy project in Cornwall, UK, after receiving \$15.5 million from the European Regional Development Fund.

Domestic and overseas interest continued in SunSHIFT's reusable mini solar farm, which ARENA helped to scale-up to pre-commercial stage deployment. SunSHIFT is ramping up its manufacturing of the mobile modular system to meet strong demand from mining companies, independent power providers, and infrastructure investors active in emerging markets and developing economies.

Delivering on our purpose

Every ARENA activity in 2016-17 contributed to the fulfilment of our purpose as it is described in the 2016-17 Corporate Plan, which is to accelerate Australia's shift to a more sustainable, affordable and reliable energy future.

Making renewables more affordable

ARENA-funded projects during 2016-17 helped build confidence in the market for the take up and deployment of innovative technologies and business models. The information, skills and experience generated during development of our large-scale solar projects helped improve the bankability of similar projects so that new projects are proceeding on the basis of private sector funding requiring no ARENA subsidy.

The competitive tension created by the LSS competitive funding round helped drive down the cost of big solar, delivering more than twice the anticipated amount of additional large-scale solar capacity for Australia. Once complete, the new solar farms will triple the amount of energy produced from big solar in Australia. Over the course of the competitive round, total project costs reduced by around forty per cent.

By bringing forward the time when utility-scale solar is competitive with established electricity generation technologies, including wind power, ARENA has helped to lower the cost of achieving the Renewable Energy Target.

The growth in the local large-scale solar sector is also providing a significant boost for Australia's regional economy, with more than 1400 direct jobs expected during construction of the solar farms, and thousands more indirect jobs in the associated supply chains and nearby communities.

Producing more reliable and secure electricity

We helped to ease Australia's energy transition during 2016-17 by supporting innovation that makes a real difference in addressing some of the pressing challenges facing the nation's electricity system.

ARENA and the CEFC announced in February 2017 that we would use a two-phase approach to prioritise financial support for flexible capacity and large-scale energy storage. During the first phase we are accelerating a number of flexible capacity demonstration projects, and then in the second phase will use the experience gained from those projects to design a competitive funding round aimed at fast-tracking the adoption of flexible capacity approaches around the nation.

Energy storage is also a key enabling technology for renewable energy projects located in remote areas. During the reporting period we supported projects located outside the national electricity market to provide a range of benefits to communities and businesses operating in off-grid and fringe-of-grid areas.

The outcomes of these projects included:

- increasing the reliability and security of electricity supply to remote and isolated communities and primary industries (Weipa Solar Farm and Neoen's DeGrussa Solar Project)
- pairing demand side management with a water desalination plant (Hydro Tasmania's Rottnest Island Water and Renewable Energy Nexus)
- establishing a containerised, modular hybrid system that is quick to install (Hydro Tasmania's Flinders Island Hybrid Energy Hub)
- scaling-up a modular hybrid system (EDL's Coober Pedy Renewable Diesel Hybrid)
- transforming businesses with solar hybrid systems (Indigenous Essential Services' SETuP sites across the Northern Territory)
- demonstrating a solar and storage hybrid system suitable for future roll out (SETuP Daly River site).

We also collaborated with the Australian Energy Market Operator in May 2017 to establish a three-year pilot program that will trial the use of demand management (also known as voluntary load shedding) to manage electricity supply during extreme peaks and grid emergencies.

Case studies on a selection of our projects can be found in the showcase section of this annual report.

Our research and development funding supported ground-breaking projects that will increase the use of renewable energy technologies in Australia by making them competitive with conventional energy sources.

- **Solar research and development**

Solar innovation is a major investment area for ARENA. Around \$288 million, or almost one third of the approximately \$922 million we committed to renewable energy projects from 2012 to 2016, has gone to solar research and development projects. An additional \$490 million was committed to solar demonstration and deployment projects.

During 2016-17 our solar research and development projects delivered scientific advances that are leading to the next generation of efficient and reliable solar technologies by increasing solar cell efficiency and lifetime reliability, which are the most effective ways of lowering the cost of solar energy.

Our third competitive funding round for research and development was launched this year, devoting an additional \$20 million to accelerating innovations that will make solar PV more affordable, efficient and competitive. The competitive round will also contribute to Australia reaching its 2020 Mission Innovation target.

- **Solar scholars**

ARENA put in place arrangements during 2016-17 to extend support for solar research fellowships and scholarships. During the reporting year, we supported 42 PhD scholars and post-doctoral fellows.

- **Storage research and development**

During the year we supported research and development into storage technologies and solutions that will improve the reliability and security of Australia's electricity supply. The research includes development of advanced lithium-sulphur batteries by the University of Technology, Sydney, establishment of a mobile energy storage test facility at the University of Adelaide, and a number of projects involving CSIRO's patented UltraBattery.

Accelerating the commercialisation of innovative technologies and business models

During 2016-17, our projects continued to advance the technical and commercial readiness of renewable energy technologies and business models. These included:

- Kidston Pumped Storage feasibility study, which confirmed the technical viability of a Genex Power proposal to convert a disused mine into a giant battery
- Australia's first advanced green fuels laboratory, established by Southern Oil to test and refine bio-crude
- Vast Solar's modular concentrating solar thermal power technology
- demonstration by the University of NSW's solar industrial research facility of the potential of a technology known as hydrogenation to increase solar cell performance and reduce costs
- processes for generating energy from various waste sources, including investigating the feasibility of Unitywater's Kawana sewage treatment facility
- Carnegie Wave Energy's CETO 5 technology, which successfully completed a fully operational trial of the world's first grid-connected wave energy array.

We also made funding commitments during the year for 35 new projects. These will develop or demonstrate renewable energy solutions that benefit electricity users, networks, regulators, researchers and innovators. They include:

- Emu Downs Solar Farm, which will demonstrate the financial benefits of co-locating wind and solar generation, while improving grid reliability by enabling complementary renewable sources to generate power at different times
- Barcaldine Remote Community Solar Farm, which will alleviate peak demand pressure, provide voltage control and help improve reliability of the grid's power supply
- Lakeland Solar & Storage project, a world-first trial involving "islanding" that will demonstrate the benefits of coupling storage with solar PV in fringe-of-grid locations

- Institute for Sustainable Futures' smart grid project, which taps into the little-known potential of smart inverters to improve power quality on the grid and reduce the need for costly new network infrastructure
- trials of technologies and business models such as AGL Energy's Virtual Power Plant and peer-to-peer trading project as well as GreenSync's Digital Exchange project, which will benefit households by increasing the value of the electricity they generate, and networks by increasing the stability of the local grid
- Australian National University's atlas of pumped hydro energy storage, which is identifying potentially thousands of suitable sites for off-river pumped hydro energy storage (STORES).

More information about these and other ARENA-funded projects is available in the showcase section of this annual report.

Complementing other government programs and initiatives

During the reporting period ARENA-funded projects contributed towards the Renewable Energy Target, and diversified the range of electricity generation technologies. We also helped to reduce the cost of future projects more quickly than would have been the case without initiatives such as the large-scale solar competitive round, on which we worked closely with the CEFC and state governments.

The CEFC and ARENA drew on our complementary expertise to efficiently identify, assess and transact investment opportunities to provide support through the Innovation Fund to the Australian clean energy industry.

Sharing knowledge to promote better decision-making and projects

Building the evidence base

ARENA believes in the power of shared knowledge. We share insights, data and knowledge from our projects to amplify their impact, driving improvements and the adoption of promising renewable energy technologies and business models to fast-track Australia's shift to affordable and reliable renewable energy.

Knowledge sharing incorporates a broad range of activities that includes forums, workshops, conferences, site visits, our online Knowledge Bank (arena.gov.au/knowledge-bank) as well as the ARENA website, media reports, social media and our blog ARENAWIRE (arena.gov.au/blog).

Examples of our work this year to build the knowledge and evidence base include:

- **LSS knowledge sharing workshop**
We held a very successful workshop in October 2016 at which a number of project teams shared knowledge with the successful LSS competitive round applicants on how to bring their projects to financial close. This information was particularly beneficial to project developers who had never worked in Australia before. As a result, they were better able to identify and mitigate their project risks.
- **Lithium Ion Battery Test Centre**
Located in Canberra, the Centre compares various lithium-ion battery chemistries and products tested under Australian conditions against claims made by manufacturers. The Centre displays real-time results from trials as well as lessons learned to help system designers, installers and consumers make informed investment decisions.
- **Heat Stress Management Guidelines**
Commissioned by ARENA, these guidelines have been well received by solar developers in fringe-of-grid areas and off-grid locations, and are helping to improve worker health and safety practices and outcomes.

Facilitating collaboration

ARENA's innovation lab (A-Lab) continued to build on the success of last year's pilot phase. Over 200 people and 75 organisations have now participated in an A-Lab event, with these figures expected to double over the first six months of 2017-18.

Three projects have been funded following A-Lab ideate and incubate workshops:

- **deX**
The Decentralised Energy Exchange, or deX, project involves a consortium of organisations led by GreenSync. It is developing a prototype digital marketplace for network services delivered by customer-owned distributed energy resources (DER), and has garnered significant national and international attention for being a world-first in the DER space.
- **AGL P2P**
Led by AGL Energy, the AGL peer-to-peer (P2P) project is examining whether the addition of blockchain technology would add further value to peer-to-peer energy markets. Data from real customers is being used to simulate peer-to-peer trading scenarios, which will allow researchers to examine what activity would have occurred and what energy would have been generated. A final report is due for release before the end of 2017.
- **Demand Management Incentives Review**
ARENA engaged the Institute for Sustainable Futures from the University of Technology, Sydney, to undertake the Demand Management Incentives Review (DMIR) after A-Lab participants consistently raised network incentives as a barrier to the adoption of demand management. The study used a multi-stakeholder engagement approach and has helped to support the Australian Energy Regulator, which is designing a demand management incentive scheme.

ARENA formed a new partnership with the Australian Energy Market Operator (AEMO) this year to help improve the uptake of demand response solutions by energy users. This would help AEMO to better manage extreme peaks in electricity demand and respond to grid emergencies.

A-Lab launched a Demand Response Accelerate pilot in May 2017 and has been working with industry, with support from AEMO, to develop a \$30 million funding program that will drive innovation in demand response.

A-Lab also received national and international acclaim this year for its approach to design and innovation. At the Australian Good Design Awards, A-Lab was identified as an "outstanding project" in the design strategy field. Denmark's INDEX Award, the world's biggest sustainable design prize, listed A-Lab as a finalist for delivering quality education to communities.

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ARENA showcase

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Case studies of ARENA's work in 2016-17 are provided in this section to demonstrate our purpose, performance and impact.

Each year in our annual report we showcase a number of the projects we are supporting to demonstrate how ARENA is having an impact by helping Australia shift to affordable and reliable renewable energy.

This year's showcase highlights:

- ARENA's investment footprint
- Making an impact with big solar
- Easing the transition with storage
- Strengthening the grid



Figure 5: ARENA's investment across Australia 2016-17

(Funds committed or spent by ARENA during 2016-17)

State	ARENA grant (\$million)	Total projects
NSW	\$458.1	73
QLD	\$125.2	21
WA	\$77.3	14
SA	\$32.6	10
NT	\$36.0	3
ACT	\$21.1	23
VIC	\$33.1	23
TAS	\$12.2	4
National	\$60.0	1

Figure 6: ARENA's investment across the innovation chain 2016-17

(Funds committed or spent by ARENA during 2016-17)



Research & development

40 projects
42 PhD scholars & post-doctoral fellows

ARENA funding

\$154 million

Early stage
research

Development

Demonstration

68 projects

ARENA funding

\$315 million

Pilot scale

Large scale

ARENA funding



Deployment

Fully commercial

22 projects

ARENA funding

\$386 million

Pre-commercial

Commercial

Fully commercial



Making an impact with big solar

Since ARENA was established in 2012, we have supported big solar projects as part of our work to reduce the cost of renewable energy and increase its supply in Australia.

Previous years' successes included the nation's largest solar power plant, the AGL Solar Farm, the world's largest off-grid solar PV system used for mining at the DeGrussa Solar Project, and Moree Solar Farm, which pioneered the use in Australia of solar panels that follow the sun.

During 2016-17 we provided support to 24 solar farms, including 12 big solar projects through our large-scale solar (LSS) competitive funding round. LSS projects are five megawatts or more, generating enough solar energy to power at least 1700 average homes. We did this to help drive down the cost of solar energy and boost the development of a domestic LSS sector by sharing knowledge from previous projects and building a support network that includes local skills and services.

ARENA has helped to create confidence that solar farms can be built affordably in Australia. As a result, at least another six new plants are being developed without the need for our support.

The following case studies provide a selection of new big solar projects supported by ARENA in 2016-17:

- DeGrussa Solar Project
- Emu Downs Solar Farm
- Barcaldine Remote Community Solar Farm
- Lakeland Solar & Storage Project

DeGrussa Solar Project



Much of Australia's mining sector operates in remote locations, far from the electricity grids that provide power to other industries. These mining operations depend on gas or trucked-in diesel to run their power plants. However gas can be expensive, while the price of diesel is unpredictable. Flooding and poor road conditions can also prevent diesel trucks from regularly getting to the mine sites.

Solar energy can provide mines located in the sunniest parts of remote Australia with a way to lower the cost of power generation while improving its reliability. However the biggest barrier to miners adopting renewable energy into their operations has been the high cost of doing something for the first time, and a lack of projects from which to draw knowledge, experience and confidence.

ARENA stepped in to fill this gap, supporting Neoen's DeGrussa Solar Project with a \$20.9 million recoupable grant to demonstrate to the rest of the mining sector how renewable energy can be more affordable, reliable and secure than their current power supply.

Located alongside Sandfire Resources' DeGrussa copper/gold mine in remote Western Australia, the project integrates a 10.6 megawatt solar PV farm with the mine's existing 19 megawatt diesel generator, along with advanced lithium-ion batteries that can store up to 6 megawatts or 1.8 megawatt hours of power. Smart control systems are used to link these components and maximise the production of solar energy.

The solar farm covers 20 hectares (about eight times the size of the playing field at the Melbourne Cricket Ground or ANZ Stadium), and has more than 34,000 solar panels that track the sun to absorb as much sunlight as possible. This makes it the largest off-grid solar PV system in the world providing power to a mining operation.

The solar power generated by the panels has the potential to meet 90 per cent of the mine's daytime electricity needs, while the power stored in the batteries helps to smooth out power supply when clouds pass across the sun. This will save the operation from having to use around five million litres of diesel each year, which is 20 per cent of its total diesel use.

The renewable energy firm juwi partnered with construction company OTOC to construct the solar project, which was completed on time and on budget in June 2016. ARENA ramped up the knowledge-sharing component of the project in 2016-17, taking two groups of mining industry and other interested people on tours of the project to increase knowledge and confidence in the use of renewable energy to power off-grid mine sites.

A video and photos of the solar project are available at the online version of this report, which can be found at report.arena.gov.au.



Quick facts

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The DeGrussa Solar Project covers 20 hectares - about 8 times the size of the playing field at the Melbourne Cricket Ground or ANZ Stadium

 5m litres

How does ARENA make a difference by supporting this project?

By supporting the world-leading real-life demonstration at the DeGrussa Solar Project, and providing opportunities for this practical knowledge to be shared, ARENA is helping to increase industry and investor confidence that solar plus storage can reduce a mining operation's dependence on diesel by providing more consistent, clean and cost-effective electricity.

Image credit:
DeGrussa Solar Project

Lead organisation:
DeGrussa Solar Project /
Neoen

Size:
10.6 MW (DC) + 6 MW /
1.8 MWh storage

Location:
Western Australia

ARENA funding:
\$20.9 million

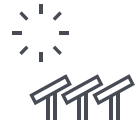
Total project cost:
\$40 million

CEFC debt finance:
\$15 million

Tech:
Solar PV

The solar power generated by the 34,000 solar panels has the potential to save the mining operation from having to use around 5 million litres of diesel each year

Emu Downs Solar Farm



ARENA took action in 2015 to help boost the nation's large-scale solar sector, and following completion of our LSS competitive funding round in September 2016 there are now 12 new solar farms either completed or under construction around Australia.

Once fully operational, these will bring the total number of large-scale solar farms feeding power into Australia's electricity grids to 21, meeting the average power needs of 250,000 Australian homes.

In addition to substantially increasing the supply of renewable energy in Australia, ARENA's big solar projects played a crucial role in reducing the cost of solar power by around 40 per cent in just a few years. The early solar projects supported by ARENA required grants of almost half the total project capital cost to support the delivery of these projects. However this year, during the LSS competitive funding round, the amount required from ARENA to make the net generation of big solar projects viable dropped to ten per cent of the total capital cost.

This made it possible for us to triple the amount of electricity that can be generated from large-scale solar farms in Australia, by leveraging \$10 for every dollar of ARENA funding invested during the LSS round. We secured \$1 billion (or \$1000 million) of investment in Australia's solar energy sector with \$92 million in grants.

One of the projects awarded funding through the LSS competitive round, APA Group's Emu Downs Solar Farm, would not have been viable without this significant cost drop. Less than 12 per cent

of the project's \$47.2 million cost was requested from ARENA to deliver the project.

The solar farm has 75,000 panels that track the sun to maximise the amount of sunlight collected, stretching across 70 hectares, which is nearly 30 times the size of the MCG's playing field.

The Emu Downs project also demonstrates how ARENA has focused on ways to speed up development of the sector while reducing its costs. The 20 megawatt project sits alongside the 80 megawatt Emu Downs Wind Farm, also owned by APA, which together will generate enough clean energy to power around 30,000 average homes.

By supporting this project, ARENA is demonstrating that the co-location of the two power plants makes it possible for the new solar farm to save time and money by having access to the wind farm's already-approved and established site, as well as sharing its transmission connection and facilities. An ARENA-supported study has found that co-location is a way to fast-track many more solar plants around Australia, potentially powering up to 700,000 more homes.

In addition to demonstrating how to make solar farms more affordable, this project shows how wind and solar can work together to deliver more continuous renewable energy. The solar farm's panels generate electricity during the day, while the location's windy conditions drive the turbines to generate power day and night, combining to produce more continuous supply overall.



Quick facts

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The Emu Downs Solar Farm has 75,000 panels stretching across 70 hectares, which is nearly 30 times the size of the MCG's playing field

How does ARENA make a difference by supporting this project?

ARENA's LSS funding round is delivering a \$1 billion boost to Australia's large-scale solar sector, creating jobs, developing new skills in the workforce, and contributing to local economies. By supporting the Emu Downs Solar Farm, we demonstrated how solar farms can be fast tracked by co-locating them with wind farms, which can also smooth the supply of renewable energy.

Image credit:
APA Group

Lead organisation:
APA Group

Size:
20 MW (AC)

Location:
Western Australia

ARENA funding:
\$5.5 million

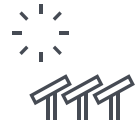
Total project cost:
\$47.2 million

Tech:
Solar PV

 40%

In addition to substantially increasing the supply of renewable energy in Australia, ARENA's big solar projects played a crucial role in reducing the cost of solar power by around 40% in just a few years

Barcaldine Remote Community Solar Farm



Many Australian outback communities, like the sheep and cattle-grazing town of Barcaldine in central Queensland, are located on the furthest edges of the nation's electricity network. Power supply in these fringe-of-grid locations can be unreliable, with frequent voltage issues and blackouts.

Renewable energy can help to provide these communities with a more reliable power supply.

The Barcaldine Remote Community Solar Farm was one of the first big solar farms to be supported by ARENA as it could demonstrate how renewable energy linked to the grid could deliver this benefit.

Elecnor Australia developed this project as well as the Moree Solar Farm (MSF), another project supported by ARENA. By applying the knowledge and skills gained during the planning and construction of MSF, Elecnor was able to complete the Barcaldine Remote Community Solar Farm two months ahead of schedule. Elecnor also shared this knowledge with potential developers of large-scale solar at our knowledge sharing workshops, which will help the whole sector become more proficient and faster at developing big solar projects.

Knowledge sharing is a critical part of the work we do to accelerate the development of Australia's renewable energy sector. Many of the lessons learnt during ARENA's early solar farm projects have involved addressing the specific challenges posed by Australian conditions. Special insights delivered at knowledge sharing events have included the need to carefully manage workers' exposure to the extremely hot working conditions, and the benefits of letting sheep roam among the

solar panels to reduce the cost of keeping the grass down.

The 20 megawatt Barcaldine Remote Community Solar Farm is the first of its kind in Queensland and also the biggest solar power plant in the state. It has 78,000 solar panels stretching across 80 hectares, which is an area similar in size to 32 MCG playing fields. The facility will generate enough clean energy to power 9,800 average homes and reduce Australia's national greenhouse gas emissions by 50,000 tonnes each year.

Being connected to the national grid, the solar farm can provide the voltage and frequency controls that help to make electricity supply more reliable. The extra electricity generated by the solar farm also takes pressure off the grid by meeting some of the peaks in consumer demand for power during the day.

Demand for electricity is expected to grow in central Queensland as the resources sector is further developed in the Galilee Basin region. When that occurs, the Barcaldine Remote Community Solar Farm will further demonstrate how renewables can support the grid, improving the quality of the electricity delivered to customers and also reducing the need to build expensive extensions to the network.

This would be a valuable service to network providers, and possibly an additional way for solar farms located on the edges of grids to earn additional revenue. This income would help to further reduce the cost of solar energy in Australia.



Quick facts

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The 20 MW Barcaldine Remote Community Solar Farm has 78,000 solar panels stretching across 80 hectares, which is an area similar in size to 32 MCG playing fields

 9,800

The facility will generate enough clean energy to power 9,800 average homes each year

How does ARENA make a difference by supporting this project?

ARENA supported the Barcaldine Remote Community Solar Farm to demonstrate how a solar farm connected at the edge of a power grid can help meet the energy demands of a growing customer base with more reliable electricity, as well as providing the technical controls that support and strengthen the network.

Lead organisation:
Foresight Group (purchased from Elecnor Australia)

Size:
20 MW (AC)

Location:
Queensland

ARENA funding:
\$22.8 million

Total project cost:
\$69.0 million

CEFC debt finance:
\$20 million

Tech:
Solar PV

Image credit:
The University of Queensland

Lakeland Solar & Storage Project



The Lakeland Solar & Storage Project aims to be the first in the world to study the economic viability of large-scale solar and storage working together to protect remote towns such as Lakeland from grid power failures. Lakeland will essentially become an “island” during the tests, separated from the grid and powered solely by solar and battery storage for several hours.

The project will also fill an important gap in the energy sector’s understanding of how renewables interact with the electricity grid. It will confirm the benefits that large-scale solar combined with battery storage can bring to remote Australian communities receiving low-quality and intermittent grid power.

Lakeland was chosen for the project because the town is located at one of the most northern points of Australia’s east-coast power grid. Most power quality issues, interruptions and blackouts experienced in regional and remote Australia are due to the vast distances that electricity must travel along the transmission network. In Lakeland’s case, the main power station that supplies the community is 1200 km away.

Solar farms with energy storage can be particularly useful in helping to overcome power reliability problems for electricity users living and working at the fringes of grids. In a world first, the Lakeland Solar & Storage Project will combine a large-scale smart controller and battery system with a large-scale solar farm to identify how the technologies can work best at a fringe-of-grid location.

The project combines a 10.8 megawatt AC solar farm featuring over 40,000 solar panels and a

1.4 megawatt battery system that can store up to 5.3 megawatt hours of electricity. It covers 23 hectares, which is around the same size as nine MCG playing fields.

The combination of big solar and big battery storage with a smart controller system will make it possible to supply renewable energy overnight and at peak demand periods. Demonstrating that renewables can supply this “baseload” power will help to increase the confidence of energy users in fringe-of-grid locations that clean energy can improve the quality and reliability of electricity.

Energy providers are also interested in the cost savings that solar with battery storage can offer, such as postponing or avoiding costly network upgrades for other regional communities that are supplied by the grid. A study prepared for ARENA by the global infrastructure company AECOM has predicted that network businesses may be prepared to pay renewable energy producers for this service.

Information generated during the project will be shared with the industry through a knowledge sharing steering committee involving major resource company BHP as well as energy providers Ergon Energy and Origin Energy. The development and exchange of knowledge is a critical part of the project and a condition for receiving ARENA funding. By sharing this information, ARENA helps to deliver better-designed and more efficiently-developed projects, which speeds up Australia’s transition to renewable energy.

The Lakeland Solar & Storage Project will be completed during the second half of 2017.



Quick facts

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The Lakeland Solar & Storage Project features a 10.8 MW solar farm covering 23 hectares, which is around the same size as 9 MCG playing fields

How does ARENA make a difference by supporting this project?

ARENA is supporting this world-first project to move renewables closer to providing “baseload” electricity, and demonstrate that a large-scale integrated solar, storage and fringe-of-grid project can improve energy reliability and security.

Lead organisation:

Lakeland Solar & Storage / Conergy

Size:

10.8 MW (AC) + 1.4 MW / 5.3 MWh storage

Location:

Queensland

ARENA funding:

\$17.4 million

Total project cost:

\$42.5 million

Tech:

Solar PV



The combination of big solar and big battery storage with a smart controller system will make it possible to supply renewable energy overnight and at peak demand periods

Image credit:
Conergy



Easing the transition with storage

ARENA's ability to take a long-lens view means we have been able to take early action to identify and develop emerging renewable energy technologies and solutions such as storage. We identified storage as a breakthrough solution that could smooth out energy supply and allow increased amounts of renewable energy to enter Australia's electricity grids.

ARENA has invested over \$200 million across more than 40 projects involving flexible capacity, including energy storage. Flexible capacity also includes demand response and generation that can be quickly ramped up and down to help balance energy supply and demand. Our flexible capacity projects cover a wide variety of technologies and applications, from storing solar heat in molten salts, to using home batteries to store electricity generated by rooftop solar panels, and using an old mine pit as a giant battery (see Kidston Pumped Hydro Storage Project below).

During 2016-17, we also accelerated a number of storage/flexible capacity demonstration projects already in our pipeline, and sought further expressions of interest for new projects. Eligible projects could include grid-scale battery storage, concentrated solar thermal, pumped hydro and biomass. Experience gained from these projects will help us to design a competitive funding round for flexible capacity.

The following case studies provide a selection of new storage projects supported by ARENA in 2016-17:

- Atlas of Pumped Hydro Energy Storage
- Kidston Pumped Hydro Storage Project and Kidston Solar Project (Phase 1)
- South Australian seawater pumped hydro energy storage feasibility study
- Virtual Power Plant

Atlas of Pumped Hydro Energy Storage



Australia's oldest form of renewables, pumped hydro energy, offers a way to significantly increase the amount of solar and wind energy feeding into the electricity grid while keeping the network stable. Pumped hydro energy can be generated in minutes, making it possible to meet peaks in consumer demand for electricity or maintain energy supply when the wind drops or a cloud passes across the sun.

Pumped hydro energy is not only a source of electricity but a way to store excess energy for later use. Pumped hydro energy storage (PHES) currently accounts for 97 per cent of global energy storage, with three pumped hydro facilities in Australia (Tumut 3, Wivenhoe Dam and Shoalhaven) providing stability support to existing coal-fired power stations.

ARENA has provided funding support to an Australian National University (ANU) project that will improve our understanding of the potential for PHES to provide the nation with a low-cost, mass-storage option that can help to smooth out increasing amounts of variable renewable energy flowing into the grid.

The ANU has identified potentially thousands of suitable off-river sites that could provide this support. The Short Term Off-River pumped hydro Energy Storage (or STORES) sites typically involve a pair of reservoirs, with one located much higher than the other. When joined by a pipeline, the water in the lower reservoir can be pumped to the higher one using solar or wind power.

The renewable energy is essentially “stored” in the pumped water that sits in the top reservoir, and can be “discharged” when needed by dropping the water through a hydroelectric turbine into the lower reservoir.

The ANU project includes the development of a comprehensive rank-ordered online map of the nation's most prospective STORES sites. The project will also explore the potential for STORES to support renewables in the network, analysis of potential environmental and water consumption impacts, and a costing tool that will allow users to estimate the cost of developing a STORES system at a site identified in the atlas.

Once complete, the ANU Atlas of Pumped Hydro Energy Storage will be made publicly available as a knowledge sharing initiative on the AREMI website (nationalmap.gov.au/renewables) to promote the development of pumped hydro energy storage projects around the nation.



Quick facts

⚡ 97%

Pumped hydro energy storage (PHES) currently accounts for 97 per cent of global energy storage

🌊 1000s

The ANU has identified potentially thousands of suitable off-river sites that could provide this support

How does ARENA make a difference by supporting this project?

ARENA is supporting the project to unlock a pathway for renewable energy to provide a larger share of electricity generation to the grid. The project will increase industry's awareness and confidence that cost-effective and large-scale energy storage can be provided using STORES, making it possible to provide renewable energy on demand, at peak times or when it is needed to stabilise the grid.

Lead organisation:
Australian National University

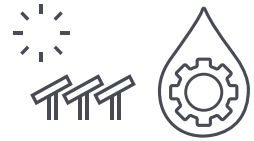
Location:
ACT

ARENA funding:
\$449,000

Total project cost:
\$1.08 million

Tech:
Enabling

Kidston Pumped Hydro Storage Project and Kidston Solar Project (Phase 1)



ARENA is supporting a unique project by Genex Power to see whether a large-scale pumped hydro energy storage system would be technically feasible at the former Kidston Gold Mine. One of the advantages of pumped hydro is that it can store energy wherever two appropriate reservoirs are located together. In the case of the Kidston Pumped Hydro Storage Project, the reservoirs in question are two flooded open-cut mine pits.

ARENA is also supporting development of a large-scale solar farm alongside the reservoirs, through our LSS competitive funding round. Together, the two projects will be a world-first demonstration that co-locating PHES with a grid-connected large-scale solar farm will produce a more reliable and secure electricity network.

As wind and solar energy become more affordable, and increasing proportions of renewable energy are feeding into the nation's grids, ARENA is placing an increased focus on flexible capacity technologies such as PHES to balance out the variability in renewable energy supply and provide stability to the network.

Using electricity supplied by the solar farm during the day, water can be pumped from the lower pit to the higher one, essentially converting the upper reservoir into a giant battery. The stored energy can then be released by returning the water through a hydroelectric turbine into the lower pit. Hydro power can be generated almost immediately and at any time, making it possible for renewable energy to be fed into the grid when it is needed, to help reduce surges, avoid blackouts, or meet spikes in electricity demand.

The Phase 1 solar farm is being built on the old mine's tailings dam, where 540,000 solar panels covering 300 hectares (or 120 MCG playing fields) are mounted on a tracking system that shifts the angles of the panels to follow the sun. This ensures the panels capture the maximum amount of sunlight available to be converted into electricity.

In addition to repurposing the mine pits and tailings dam, Genex Power is using infrastructure left from the previous mining operation to save time and money as well as minimise any additional environmental impact. These include the mine's accommodation camp, airstrip, road access and an electricity substation and transmission line.

Once the Phase 1 solar farm is complete, Genex Power aims to construct the 250 megawatt pumped hydro storage facility and a 270 megawatt solar farm. The two solar farms combined would provide around 145,000 megawatt hours of renewable energy each year, increasing the nation's total amount of clean energy by about six per cent.

The renewable energy generated by the first solar farm will be fed into the grid, while the second solar farm will pump water from the lower to the higher reservoir for the hydro project. These three elements working together could be capable of continuously delivering renewables into the grid, day and night.



Quick facts

 **120**

The Kidston Solar Project has 540,000 solar panels covering 300 hectares or 120 MCG playing fields

How does ARENA make a difference by supporting this project?

ARENA is supporting the two projects because they are a unique combination of pumped hydro energy storage and solar that could lead to an affordable way of providing reliable renewable energy 24 hours a day.

Image credit:
Genex Power

Kidston Pumped Hydro Storage Project

Lead organisation:
Genex Power

Location:
Queensland

ARENA funding:
\$4.0 million

Total project cost:
\$6.2 million

Tech:
Enabling

Kidston Solar Project (Phase 1)

Lead organisation:
Genex Power

Size:
50 MW (AC)

Location:
Queensland

ARENA funding:
\$8.9 million

Total project cost:
\$126 million

CEFC debt finance:
\$54 million

Tech:
Solar PV

South Australian seawater pumped hydro energy storage feasibility study



An out-of-the-box approach to pumped hydro energy storage could be the key to smoothing out the large amounts of variable renewable energy being generated in South Australia. ARENA is supporting a feasibility study by EnergyAustralia into using seawater instead of freshwater reservoirs to store and release energy into the grid when it is most needed.

If the approach is proven to be technically and economically feasible in the state, it could potentially be adopted elsewhere in Australia to support the grid as increasing amounts of renewable energy are fed into the network.

Seawater is an option for South Australia because the flat, dry state lacks the rainfall, rivers and mountains to run a conventional pumped hydro system. The project's initial work has identified a site in the Cultana region that appears to have the appropriate elevation above sea-level along with proximity to the coast and an existing transmission line.

The Cultana development would involve a purpose-built upper reservoir connected by approximately two kilometres of pipeline to a turbine at sea-level, as well as input/output pipes to the sea.

The grid-connected facility would use the cheap power available at times of low demand to pump seawater into the reservoir for storage. The system could then deliver power on demand by releasing the water through the turbine and back into the sea, which could be used to smooth out a dip in solar or wind power, or help the grid supply power during peak demand.

The project's final report will be delivered by the end of 2017. If proven to be viable and subsequently developed, the Cultana seawater PHES would be the second such facility in the world but the largest. The first seawater PHES was established on the island of Okinawa in Japan, running from 1999 to 2016 to support a coal-fired power station.



How does ARENA make a difference by supporting this project?

If proven to be feasible, seawater PHES could be deployed around Australia's coastline to produce the on-demand electricity needed to help the grid reliably deliver large amounts of variable renewable energy.

Lead organisation:
EnergyAustralia

Location:
South Australia

ARENA funding:
\$453,000

Total project cost:
\$1.02 million

Tech:
Enabling

Quick facts



Study will examine the use of seawater instead of freshwater reservoirs to store and release energy into the grid when it is most needed



If proven to be viable and subsequently developed, the Cultana seawater PHES would be the second such facility in the world but the largest

Virtual Power Plant



ARENA's support for the world's largest development of its kind, AGL's virtual power plant (VPP), is part of our work to find smarter ways to produce and use energy. That effort includes helping industry to develop, test and commercialise solutions that will improve the grid's stability even as the amount of variable renewable energy being fed into the network increases.

The VPP project will demonstrate that distributed energy services involving rooftop solar, battery storage and the grid can provide network stability while helping customers manage their energy bills.

The prototype VPP will be a centrally-controlled network of approximately 1000 grid-connected battery systems installed in households and businesses with rooftop solar. Developed by AGL, the VPP was designed to help stabilise the grid while providing a way for the nation's 1.7 million owners of rooftop solar to have access to more of their own renewable energy. Adelaide in South Australia was chosen for the project because the state has high levels of rooftop solar ownership, and a higher proportion of intermittent renewable energy supply than anywhere else in the nation.

The five megawatt VPP will be created by installing and connecting approximately 1000 battery systems "behind the meter" in homes and businesses in metropolitan Adelaide. Intelligent energy management software built into the battery systems will allow AGL to operate the batteries like mini power stations.

Being able to store any excess electricity generated by their rooftop solar panels for use at a later time

means households and businesses can use more of their own renewable energy.

At other times, the VPP may export electricity from participants' battery systems to support the grid when there is high demand or instability. The VPP could therefore provide a cost-effective solution in the medium term to smoothing out intermittent renewable energy generation and avoiding expensive upgrades to network infrastructure to meet seasonal spikes in demand.

Once all batteries are installed, they will form the world's largest battery storage VPP with a combined capacity of seven megawatt hours.

The VPP concept is not yet economically viable because it has not yet been deployed at a commercial scale, and home batteries are still relatively expensive. However additional VPP prototypes could potentially be rolled out nationally, and the price of home storage is expected to drop by around 50 per cent over the next five years. Both developments would help the VPP concept become commercially viable without subsidy.

AGL will share knowledge generated by this project by producing detailed reports on the deployment and operation of the energy storage and control system, including how the system was able to respond to network and market events in ways that maximised benefits for both energy consumers and the grid. This knowledge is expected to help future developers of VPPs drive down costs and refine their business models, inform the decisions of regulators, and identify a path to commercialisation.



Quick facts



1000

The prototype VPP will be a centrally-controlled network of around 1000 grid-connected battery systems installed in households and businesses with rooftop solar



7 MWh

Once all batteries are installed, they will form the world's largest battery storage VPP with a combined capacity of 7 MWh

How does ARENA make a difference by supporting this project?

By supporting the trial of this world-leading prototype of a virtual power plant, ARENA is helping to identify a renewable energy solution that could cost effectively stabilise the grid while delivering extra value to customers, network operators and energy providers.

Lead organisation:
AGL

Size:
5.0 MW / 7.0 MWh storage

Location:
South Australia

ARENA funding:
\$5.0 million

Total project cost:
\$19.2 million

Tech:
Enabling



Strengthening the grid

By continuing to support projects in 2016-17 that focus on finding real solutions to difficult energy problems, ARENA increased business and community confidence that renewable energy could affordably and reliably integrate into the existing electricity system.

This year we launched our A-Lab initiative to accelerate that confidence-building process. A-Lab is ARENA's innovation lab on grid integration, a place where people from across the energy sector are brought together in a fresh and creative way to examine and find solutions to the challenge of integrating renewables. The A-Lab process has already delivered three potential real-world solutions that are being developed through ARENA-funded projects.

We also spent the past year supporting a range of renewable energy projects that can either take pressure off electricity grids or strengthen them.

The following case studies provide a selection of those new projects.

- Decentralised Energy Exchange (deX)
- Peer-to-peer (P2P) energy trading trial
- Networks Renewed

Decentralised Energy Exchange (deX)



ARENA is building on Australia's rich history of invention by helping local companies like the energy tech company GreenSync develop world-leading technologies, solutions and markets that will help smooth the nation's transition to a renewable energy future.

Our support assisted GreenSync to begin developing a revolutionary digital marketplace that will change the way energy is produced, stored, used and traded in Australia. The decentralised energy exchange (deX) will make it possible for the owners of rooftop solar systems or battery storage to earn money for helping to keep their neighbourhood's lights on.

Australia is a world-leader when it comes to rooftop solar, with around 1.7 million or 15 per cent of the nation's roofs hosting miniature solar power farms. When rooftop solar is combined with batteries, households and businesses can use the stored renewable energy when they need it most. deX will make it possible for them to also sell the electricity back to network companies when it is needed to meet peaks in demand or strengthen the grid.

The deX project brings together the expertise of two network operators, United Energy and ActewAGL, with that of GreenSync.

The CSIRO has predicted that by 2027 over 40 per cent of Australia's energy consumers will have adopted onsite energy resources such as rooftop solar and home battery storage.

With deX supporting the emerging "peer to grid" market, it could encourage more households and businesses to install solar PV and batteries to earn revenue from their energy retailer or service provider for helping to support the grid. This would ultimately bring down the cost of renewables and also reduce the need for network companies to invest in new grid infrastructure.

deX is the first successful project to come out of ARENA's innovation hub, A-Lab, demonstrating that A-Lab can develop new ideas into fully-fledged, funded projects. The A-Lab multi-stage innovation process is designed to operate in rapid cycles of "ideate, incubate and accelerate" to foster breakthrough thinking on complex challenges facing the electricity sector.

The deX concept was formed during A-Lab's inaugural session in April 2016, and further developed in an intensive two-day workshop in July 2016.



How does ARENA make a difference by supporting this project?

One of the biggest challenges facing Australia's electricity system is to find ways to maintain grid stability while increasing the supply of variable renewable energy. ARENA is supporting this project because it has the potential to do both by creating a marketplace where householders and other energy market participants can tap into the full value of rooftop solar and battery storage systems, while increasing the reliability of the grid.

Lead organisation:
GreenSync

Location:
Victoria

ARENA funding:
\$450,000

Total project cost:
\$983,400

Tech:
Enabling

Quick facts

1.7m

Australia is a world-leader when it comes to rooftop solar, with around 1.7 million or 15% of the nation's roofs hosting miniature solar power farms

 40%

The CSIRO has predicted that by 2027 over 40% of Australian energy consumers will have adopted onsite energy sources like rooftop solar and home batteries

Peer-to-peer (P2P) energy trading trial



Australia has experienced a rooftop solar boom in the past decade, which ARENA expects to be followed by a residential battery boom. Together, these two technologies will give consumers more control over their energy use, and a way to take pressure off the grid by using more of their own renewable energy.

ARENA is helping that happen by supporting the development of ways for the owners of rooftop solar combined with battery storage to get more value out of those assets.

AGL's peer-to-peer (P2P) energy trading project is examining whether that value could be delivered through a mechanism that makes it possible for households and businesses to trade their solar energy with each other, as well as the grid.

That mechanism is blockchain, a secure online ledger that was created for the trading of Bitcoin digital currency and is now being used by a growing number of other industries.

As a first step in researching whether blockchain could deliver a P2P market for rooftop solar, the project is running a virtual trial or simulation. The trial uses existing data from a previous study involving households in Melbourne, Victoria equipped with solar panels, battery storage and "smart" air conditioners that can be controlled remotely. The real-time data gathered during that study is being re-used to simulate peer-to-peer trading between the households.

The trial will identify whether there is value in a P2P market and whether blockchain is a cost-effective way to run that market. It will also provide valuable information for regulators, energy service companies, start-ups, retailers and networks on the ways P2P trading can affect energy markets and participants.

AGL is being partnered by IBM Australia and Marchment Hill Consulting for the project. IBM is focusing on the ability of blockchain to recognise, authenticate and settle the energy trades, while Marchment Hill will provide the market analysis.

The P2P trial is the second project to successfully obtain ARENA funding after being developed in ARENA's innovation hub, A-Lab.



How does ARENA make a difference by supporting this project?

By supporting this project, ARENA is helping to create a more flexible and modern marketplace for energy consumers to trade their solar energy, which could make renewable energy more affordable and better able to support the grid.

Lead organisation:
AGL

Location:
Victoria

ARENA funding:
\$120,000

Total project cost:
\$279,500

Tech:
Enabling

Quick facts



The P2P project is examining whether households and businesses could trade their solar energy with each other, as well as the grid



The trial will identify whether blockchain technology could be used to run the market



Networks Renewed



A crucial part of ARENA's work to ease Australia's transition to a renewable energy future is to find and support Australian innovations that stabilise or strengthen the electricity grid. The Networks Renewed project by the University of Technology, Sydney (UTS) does this by taking an existing technology, the inverter, and applying it in a new way to help the grid manage variations in voltage.

Electricity users can experience low or high voltage problems depending on where they are located on the network. Users connected very close to a power station can experience high voltage issues while those living furthest away may have to deal with low voltages and interrupted supply.

Instead of increasing voltage challenges on the grid through the addition of variable renewable energy from rooftop solar systems, the Networks Renewed project is examining how inverters can support the grid by smoothing out the voltage.

An inverter is the technology used to feed electricity generated by solar panels or stored in home battery systems back into the grid. The latest in "smart" inverter technology can be controlled to vary the amount of renewable energy that enters the network, feeding it in to help increase voltage at locations where it is low, or stopping the renewable energy from entering the grid at locations where it could contribute to high voltage issues.

UTS is collaborating with a team of energy industry experts to deliver this project. The team includes network business Essential Energy in NSW, start-up

company Reposit Power, solar technology provider Fronius Australia, and the Australian Photovoltaic Institute. In addition to Australian Government involvement through ARENA, the NSW and Victorian governments are also participating.

The project will run a trial involving up to 150 households in NSW and Victoria, to demonstrate how smart inverters can work alongside rooftop solar and home energy storage to improve network power quality. It will provide project participants with a practical understanding of the commercial value that smart inverters could bring to the owners of rooftop solar as well as network businesses.

If successful, the project would pave the way for Australia's booming rooftop solar community to help improve the quality and reliability of electricity from the grid. This would ultimately make it possible for Australia to significantly increase rooftop solar as well as other forms of renewable energy flowing into the electricity network. If a market could be created for the owners of rooftop solar to be paid for providing such a support service to the grid, this would also bring down the cost of renewable energy.

The project's initial pilot-scale trial will be completed in 2017. The market-scale trial will involve up to 150 households and be completed in 2018.



Quick facts

150

The project will run a trial involving up to 150 households in NSW and Victoria, to demonstrate how smart inverters can work alongside rooftop solar and home energy storage to improve network power quality



If owners of rooftop solar could be paid for providing a grid support service, this would bring down the cost of renewable energy

How does ARENA make a difference by supporting this project?

ARENA is supporting the Networks Renewed project because it will demonstrate how variable renewables and enabling technologies can provide the grid services required to maintain a secure and reliable electricity system.

Lead organisation:
University of Technology,
Sydney

Location:
NSW and Victoria

ARENA funding:
\$1.8 million

Total project cost:
\$5.1 million

Tech:
Enabling

MIA

G

05

**Management and
accountability**

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Management and accountability

This section provides information about:

- legislation that guides our work
- engagement with our portfolio minister
- our Board, its governance practices and activities
- our management and people
- how we are held accountable.

Enabling legislation

ARENA was established in 2012 by the *Australian Renewable Energy Agency Act 2011* (ARENA Act). The agency is a corporate Commonwealth entity under the *Public Governance, Performance and Accountability Act 2013* (PGPA Act).

ARENA's objective and function are set out in the ARENA Act. Our objective is to improve the competitiveness of renewable energy technologies and increase the supply of renewable energy in Australia.

Our function is to provide financial assistance to projects that accelerate the transition of renewable energy technologies along the innovation chain from research and development to demonstration and large-scale pre-commercial deployment activities.

ARENA also develops analysis and advice, and shares information and knowledge on renewable energy and related technologies. We provide advice to the portfolio Minister on renewable energy and related technologies.

Engagement with our portfolio minister

ARENA has worked with a succession of portfolio Ministers since the agency was established in 2012. During 2016-17 the Ministers responsible for ARENA were Hon Greg Hunt MP, Minister for the Environment (until 19 July 2016) and Hon Josh Frydenberg MP, Minister for the Environment and Energy (from 19 July 2016).

The Hon Josh Frydenberg MP wrote to the ARENA Board on 23 November 2016 setting out his expectations and priorities for ARENA. The Minister's letter is published on ARENA's website (arena.gov.au/about/publications), along with the Chair's reply outlining ARENA's intentions.

We kept the Minister informed about our operations during the year by providing updates on our progress towards meeting the objective of the ARENA Act. We also provided the Minister with reports of each ARENA Board meeting, including key deliberations, meeting outcomes and significant correspondence.

Ministerial approval

The Australian Government put safeguards into the ARENA Act to ensure that we are transparent and accountable in our funding decisions.

Accordingly, the portfolio Minister must approve our General Funding Strategy (GFS) and any

guidelines for programs that could grant funding over \$15 million for projects. The Minister must also approve individual projects where grants over \$50 million are to be awarded.

The GFS 2017-18 to 2019-20 was approved by the Minister on 22 June 2017.

Ministerial requests and directions

The Minister made no requests of ARENA under s11 of the ARENA Act during 2016-17, and issued no directions under s13.

Under s22 of the PGPA Act, ARENA must comply with Government Policy Orders (made by the Finance Minister) to the extent that they apply. No Government Policy Orders applied to ARENA during 2016-17.

Reports to the Minister

There were nil significant issues reported to the Minister under paragraph 19(1)(e) of the PGPA Act that relates to non-compliance with the finance law in relation to ARENA.

Responsibilities

The ARENA Board sets the investment strategies and priorities, oversees the running of the organisation, and approves funding for projects up to \$50 million. The Minister responsible for ARENA approves funding over \$50 million, while the ARENA CEO has board-delegated authority to approve funding that is less than \$500,000. The Board may delegate to the CEO specific powers or functions, subject to any directions specified by the Board and any applicable ARENA policies and legislation.

The Board met formally nine times during 2016-17.

Membership

The Board consists of up to six appointed members and the Secretary of the Department responsible for the agency. Board members are appointed by the Minister.

Appointed members of the Board must have experience or knowledge in renewable energy technology, commercialisation, business investment or corporate governance. This ensures expert administration of ARENA's funds. Board members may be appointed for a term of up to two years, and may be reappointed for a total of up to six continuous years.

At 30 June 2017, members of the ARENA Board were Mr Martijn Wilder AM (Chair), Ms Maria Atkinson AM, Ms Susan Jeanes, Mr Jonathan Jutsen, Ms Meg McDonald, Dr Katherine Woodthorpe AO and Dr Gordon de Brouwer PSM (ex officio as Secretary of the Department of the Environment and Energy).

With the exception of Dr de Brouwer, these Board members were appointed by the portfolio Minister on 13 April 2016 for a two-year term.



Mr Martijn Wilder AM

Chair / Non-executive director

Start date: April 2016

Board meeting attendance:
9/9 meetings.

Martijn Wilder is head of Baker & McKenzie's Global Environmental Markets and Climate Change practice specialising in climate change law, international carbon and broader environmental markets, climate and conservation finance and conservation projects. He is also Chair of the Baker & McKenzie Law for Development Initiative and Professor of Climate Change Law at the Australian National University.

In addition to being Chair of ARENA, Martijn is a Director of the Clean Energy Finance Corporation, WWF (Australia) and the Climate Council. He also holds advisory roles as Chair of the NSW Climate Change Council and Governing Board Member of the Renewable Energy and Energy Efficiency Partnership, and is a member of the Wentworth Group of Concerned Scientists. Martijn is also Deputy Chair of the Private Sector Roundtable of the Asia Pacific Rainforest Recovery Plan.

Martijn chaired the Independent Review Committee of the Victorian Climate Change Act, was formerly Chairman of Low Carbon Australia and for many years chaired TRAFFIC (Oceania).

In 2012, Martijn was awarded a Member of the Order of Australia in recognition of his "service to environmental law, particularly in the area of climate change through contributions to the development of law, global regulation, public policy and the promotion of public debate, and to the community".

Martijn holds a BEcon (Hons) from the University of Sydney, LLB Honours from the Australian National University, LLM from the University of Cambridge and studied at the Hague Academy Centre for Studies and Research in International Law and International Relations. He is also a Graduate Member of the Australian Institute of Company Directors.



Ms Maria Atkinson AM

Non-executive director

Start date: April 2016

Board meeting attendance:
8/9 meetings

Maria Atkinson is a sustainability strategist with extensive experience in governance, strategy, organisational and market transformation, business development and stakeholder engagement.

As Director of Maria Atkinson Consultancy Pty Ltd, she helps clients ranging from governments to non-government organisations and research institutions to articulate and deliver sustainability outcomes for projects or organisations.

On top of her consultancy services, Maria sits on a number of boards such as The Ethics Centre and the Royal Botanic Gardens and Domain Trust. She was a previous Chair of the UN Environment Program Sustainable Buildings & Climate Initiative in 2010 and 2011, and a Co-Chair of the World Economic Forum Global Agenda Council on Sustainable Construction in 2008 and 2009.

In 2012 Maria was honoured to be awarded a Member of the Order of Australia for “service to the construction and real estate sector, particularly as a leader and contributor to environmentally sustainable building development in Australia”.



Ms Susan Jeanes

Non-executive director

Start date: April 2016

Board meeting attendance:
9/9 meetings

Susan Jeanes is a consultant at Jeanes Holland and Associates, which assists companies that are developing and promoting the goals of sustainability, particularly in the emerging renewable energy sector.

She has worked closely with the Australian renewable energy and sustainability sectors for more than two decades, most recently in her roles as the Chief Executive Officer of the Australian Geothermal Energy Association, the national body representing the Australian geothermal energy industry, and previously as the Chief Executive Officer of the Renewable Energy Generators Australia.

Susan is a Director of The Climate Institute, and Chair of the South Australian Centre for Geothermal Energy Research and the Centre for Energy Technology. Prior to 2002, she worked exclusively in the political area as Advisor to the former Federal Environment Minister Robert Hill on climate change, renewable energy and the urban environment, and serving the Federal Parliament as the Member for Kingston. Susan has tertiary qualifications in politics and environmental studies.



Mr Jonathan Jutsen
Non-executive director
Start date: April 2016
Board meeting attendance:
9/9 meetings

Jonathan Jutsen is Chair of the Australian Alliance to Save Energy (A2SE), a not-for-profit organisation committed to making Australia an energy productive country, and is leading the program to double Australia's energy productivity (2xEP). A2SE also has an active energy productivity innovation initiative, and runs the annual Summer Study on Energy Productivity.

Jonathan is also a steering committee member of the Global Alliance for Energy Productivity.

He has been a leading figure in Australia and internationally in the energy and carbon management field for over three decades. In 1984 he founded Energetics, a leading consulting company on greenhouse gas mitigation and energy management, which he recently left after 32 years.

Jonathan has tertiary qualifications in chemical engineering and energy technology. He has been selected as one of the 100 most influential engineers in Australia by IEAust.



Ms Meg McDonald
Non-executive director
Start date: April 2016
Board meeting attendance:
9/9 meetings

Meg McDonald has career experience at senior levels in business and government across the fields of energy and environment.

From 2013 to 2015 she served as Chief Operating Officer of the Clean Energy Finance Corporation (CEFC). Previously, from 2010 to 2013, Meg was CEO of Low Carbon Australia Limited (LCAL), leading the organisation's development of innovative financial solutions for energy efficiency and investment partnerships for financing projects deploying low emissions technologies. Over three years, LCAL financed more than \$80 million in projects valued at over \$270 million. LCAL merged with the CEFC in 2013.

From 2002 to 2010, Meg held roles with the global resources and manufacturing corporation, Alcoa, including as Director, Global Issues, Alcoa Inc. in New York and as Global President of Alcoa Foundation. The Foundation was one of the largest US corporate foundations, managing a fund with assets of over US\$500 million and which made annual grants up to US\$50 million across 24 countries in environment, sustainability and social projects. While in the Australian Public Service from 1978 to 2002, Meg had roles across a variety of portfolios.

Meg McDonald cont.

She served as a senior Australian diplomat, including in Geneva, as Assistant Secretary, Environment and Antarctic Branch, and in the Australian Embassy in Washington as Australia's Deputy Chief of Mission to the United States.

As Australia's Ambassador for the Environment from 1997 to 1998, Meg was Australia's lead negotiator for the Kyoto Protocol and played a key role in shaping those negotiations and other environment treaties.

Meg holds an Honours Degree in Applied Science from the University of NSW and has served on boards and a variety of advisory bodies in Australia and the United States.



Dr Katherine Woodthorpe AO

Non-executive director

Start date: April 2016

Board meeting attendance:
8/9 meetings

Katherine Woodthorpe is an experienced non-executive director, serving for over 19 years on boards ranging from ASX-listed companies to research institutions and government entities.

She currently serves on nine boards, is an adviser to others and is a Council member of the Australian Institute of Company Directors. Among her appointments, Katherine chairs the National Climate Science Advisory Committee and the Antarctic Climate and Ecosystem Cooperative Research Centre.

Katherine was Chief Executive of the Australian Private Equity and Venture Capital Association Ltd (AVCAL) between 2006 and 2013. Prior to AVCAL, she held a broad range of management and board positions, both in Australia and overseas.

Katherine has a deep understanding of the private equity and venture capital industries as well as the superannuation industry in the financial sector. She also has a strong track record in a broad range of technology-orientated industries including mining and healthcare.

Katherine has been cited in various media as one of Australia's most influential people in innovation.



Dr Gordon de Brouwer PSM

Ex-officio director

Start date: October 2015

Board meeting attendance:

9/9 meetings (attended by

Dr de Brouwer or his

delegate)

Gordon de Brouwer has been portfolio Secretary of the Department of the Environment and Energy since September 2013 and is responsible for the design and implementation of the Australian Government's environment, heritage, energy and climate policy. He leads a department of around 2000 staff, including operations in Antarctica and key national parks.

He has 30 years' experience in public policy. At the time of his appointment, Gordon was Associate Secretary in the Domestic Policy Group at the Department of the Prime Minister and Cabinet, having worked on domestic and international economic, financial, industry, natural resource management and climate change policy in various positions from July 2008 to September 2013. He was Prime Minister Gillard's G20 sherpa and supported Australia's prime ministers at the eight G20 summits before Australia's host year.

Gordon has worked at the Treasury (1987, 2003-08), Australian National University (2000-03), Reserve Bank of Australia (1991-99) and Westpac Bank in Tokyo (1989-90).

At Treasury he worked on budget policy, led the G20 and APEC Secretariat during Australia's host years of the finance ministers process, and domestic and international macroeconomic forecasting and policy.

Gordon was Professor of Economics in the Crawford School of Economics and Government at the ANU, working on Asian economies, macroeconomics, international finance, regionalism and international institutions. He worked in both Economic Group and Markets Group at the RBA, on macroeconomic modelling, monetary policy, international finance and the Asian financial crisis. He was a credit analyst at the Tokyo Branch of Westpac Bank in the late 1980s.

Gordon has a doctorate in economics from the ANU and first-class honours bachelor and master degrees in economics from the University of Melbourne. He was awarded Monbusho and Japan Foundation scholarships for study in Japan in 1987-89 and 1994. He received a Public Service Medal in 2011 for outstanding public service in the development of international economic policy and the G20. In 2013 Gordon was awarded the Knight in the Légion d'honneur by the President of the French Republic for G20 and public service.

Reporting

Following each Board meeting, our Chair provided the Minister with a report on the key outcomes of that meeting.

Risk and Audit Committee

Our Board has a Risk and Audit Committee (RAC), established in compliance with s45 of the PGPA Act and authorised by s48 of the ARENA Act. The RAC formally met four times during 2016-17.

The RAC is responsible and accountable to the ARENA Board for the performance of its functions, which are to provide independent advice and assurance to the Board on the appropriateness of ARENA's financial reporting, performance reporting, system of risk oversight and management and system of internal control. It also provides a forum for communication between the Board and the internal auditor (Callida Consulting) as well as the external auditor (Australian National Audit Office).

The Board has authorised the RAC, within the scope of its responsibilities, to:

- seek any information that it requires from an ARENA official, consultant or external party (subject to any legal obligation to protect information)
- discuss any matters with the external auditor or other external parties (subject to confidentiality considerations)
- obtain legal or other independent professional advice, as considered necessary to meet its responsibilities, at ARENA's expense and in accordance with its Charter.

RAC members are expected to understand and observe the requirements of the PGPA Act and PGPA Rules. In 2016-17 the RAC was made up of the following Board members and independent members:

- Ms Meg McDonald (Board member)
- Dr Katherine Woodthorpe AO (Board member)
- Ms Jenny Morison (RAC Chair)
- Ms Judith Smith (from 21 November 2016)
- Mr Peter Thomas (until 15 October 2016)

Board governance practices

ARENA places strong emphasis on governance. The Board's business and meetings were conducted during the reporting period in accordance with the requirements of applicable legislation. Board members regularly review the Board's operation as part of their responsibility to continually improve the efficiency and effectiveness of the Board's processes.

Risk management

The ARENA Board is ultimately responsible for the operation of ARENA and its management of risk. Effective risk management is an essential part of performance management. While the Board and ARENA executive are ultimately accountable for risk management, it is the responsibility of all ARENA personnel to manage risk.

ARENA has adopted a comprehensive Risk Management Framework and policies that embed risk management practices and mitigation measures into all processes and operations.

Our Risk Management Framework is provided to the Board at each meeting and is regularly reviewed. Our Risk Management Framework is supported by a Strategic Risk Management Dashboard and Risk Register.

ARENA categorises risks as either Preventative (risks to be avoided as much as practically possible), Strategic (risks inherent in ARENA's activities that could result in ARENA not being seen as an effective mechanism for Government), and External (risks that are beyond ARENA's influence and control but which can be planned for).

Overall ARENA has assessed 12 major risks, of which two remain outside the Board's risk appetite and for which steps have been put in place to reduce risk.

ARENA's RAC provides independent assurance and advice to the Board on ARENA's risk management. In 2016-17, the RAC was provided with information on ARENA's approach to managing ARENA's major risks including those associated with individual programs, projects and significant procurements.

Conflict of interest

In 2016-17 our Board continued to implement the conflict of interest policy that was adopted in December 2015. The policy describes:

- the duties in respect of the disclosure of actual or potential conflicts for all ARENA personnel, including:
 - members of the Board
 - members of the Risk and Audit Committee (and any other committee of the Board)
 - the Chief Executive Officer and the Chief Financial Officer
 - all ARENA staff, including employees of the Department who are made available to ARENA
 - contractors and consultants engaged by ARENA, including probity advisers, expert due diligence advisers and other independent specialist or technical advisers
 - members of the ARENA Advisory Panel
- how individuals are to discharge their duties under the policy
- how declarations are managed.

In June 2017 the Board approved an updated Conflict of Interest Policy which further defined reporting processes and declaration forms.

Fraud control

ARENA has taken all reasonable measures to minimise the incidence of fraud and, where applicable, to investigate and recover the proceeds of fraud against ARENA. Our fraud control arrangements comply with section 10 of the PGPA Rule and the Commonwealth Fraud Control Policy.

ARENA's Fraud Control Plan was approved by the Board in October 2016 to ensure that ARENA's fraud prevention, detection, investigation,

reporting and data collection procedures and processes continue in place. ARENA's ongoing adherence to the plan encompasses fraud risk assessment and periodic review.

All of ARENA's personnel are provided with fraud awareness training. Interactive fraud awareness refresher training was provided to ARENA's personnel during the year, with personnel also having access to an online training module.

Indemnities and insurance premiums of officers

During 2016-17, ARENA was a member of the Comcover self-managed fund, which includes cover for directors and officers against liability claims. The premium paid for ARENA's insurance policy was \$194,980 (excluding GST).

ARENA has entered into a Deed of Indemnity, Access and Insurance with the CEO of ARENA.

Environmental performance

Appendix 2 sets out ARENA's performance against section 516A of the *Environment Protection and Biodiversity Conservation Act 1999*.

Key governance events and other activities affecting ARENA

During 2016-17 the ARENA Act was amended by the *Budget Savings (Omnibus) Act 2016* to reduce the total amount of funding available for ARENA to invest in renewable energy projects.

The Prime Minister requested advice from ARENA in January 2017 about the role large-scale storage and other flexible capacity projects, such as pumped hydro, could play in stabilising the electricity grid. The Prime Minister subsequently requested on 1 February 2017 that ARENA and the CEFC work together to encourage the development of flexible capacity and large-scale storage projects in Australia as it transitions to low emissions technologies.

ARENA is a dynamic and outcomes-oriented agency, staffed by highly qualified and experienced people. We also aim to be agile, with the ability to respond quickly to any changes in our operating environment.

Chief Executive Officer

Throughout the reporting period, our Chief Executive Officer (CEO) was Mr Ivor Frischknecht.

The CEO is appointed by the portfolio Minister on the recommendation of the Board for a period of up to three years and can be eligible for reappointment.

As CEO, Ivor has responsibility for the day-to-day business of ARENA, including:

- executing directions of the Board
- overseeing administration of existing projects
- supporting the Board to develop and execute its General Funding Strategy, forward work plan and initiatives
- representing ARENA at public events and managing stakeholder engagement
- analysing and sharing knowledge and information about renewable energy technologies
- developing advice to the Minister on renewable energy technology innovation.

Chief Financial Officer

Our CEO is supported by an executive team, including a Chief Financial Officer (CFO). The CFO during 2016-17 was Mr Ian Kay.



Ivor Frischknecht
Chief Executive Officer

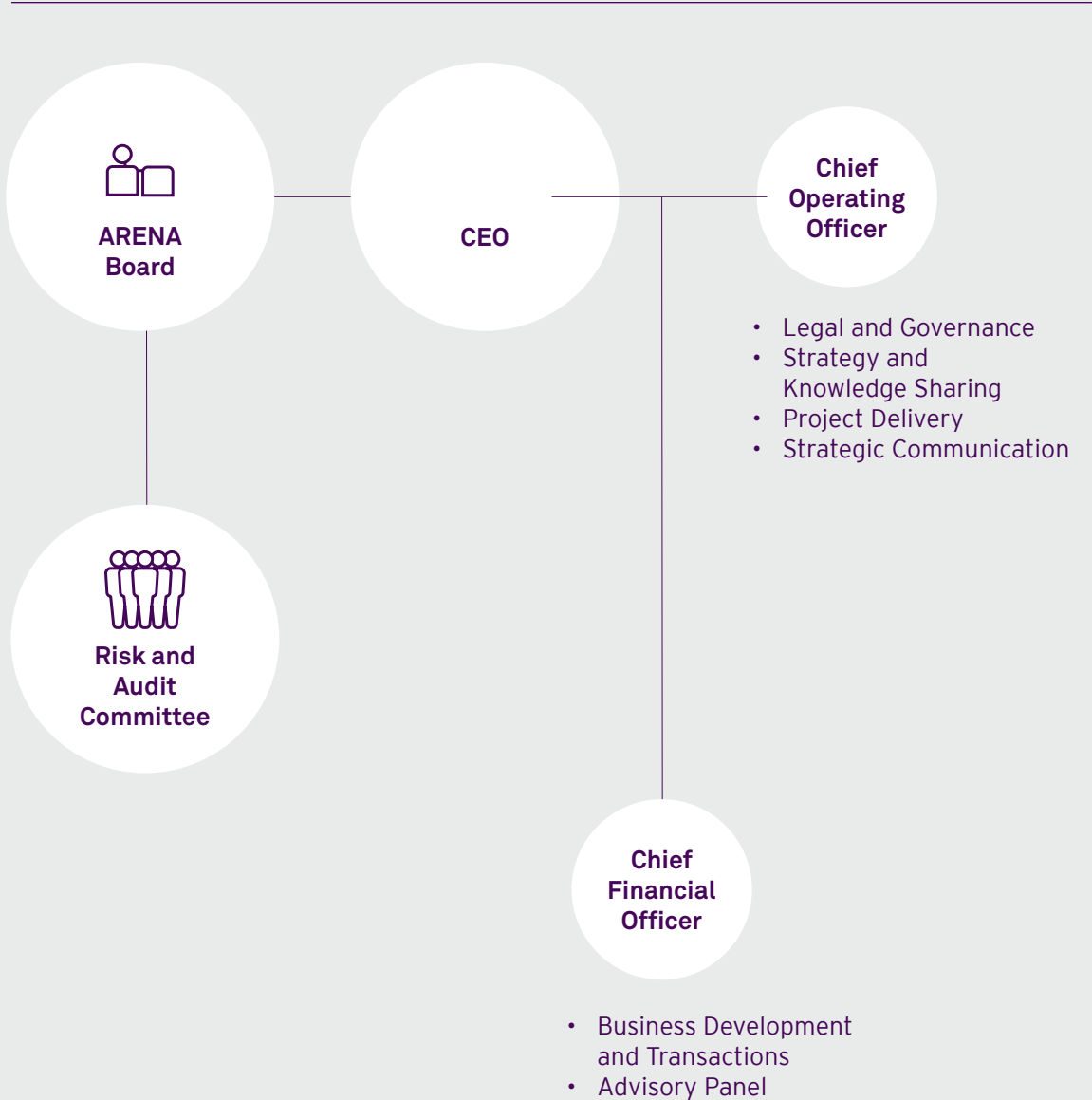
Ivor Frischknecht was appointed as ARENA's inaugural Chief Executive Officer in August 2012. He is widely acknowledged as an expert and innovator in the rapidly evolving energy industry, and has led ARENA's efforts to accelerate the commercialisation and integration of renewable energy into Australia's energy system.

Ivor brings decades of private sector experience to ARENA, particularly involving smart investment in clean technology start-ups and growth companies.

Before joining ARENA, he was responsible for clean tech investments at venture capital firm, Starfish Ventures, which manages \$400 million primarily on behalf of Australian superannuation funds. Before that Ivor was CEO and investor in the clean tech sector in Silicon Valley, California.

Ivor has degrees in law and economics from the University of Sydney, and an MBA and Public Management Certificate from the Stanford University Graduate School of Business.

Figure 7: ARENA organisational structure



Staff

ARENA has two employees, the Chief Executive Officer and Chief Financial Officer. All other ARENA staff are employed by the portfolio Department under the *Public Service Act 1999* and made available to ARENA by the Secretary of the Department. ARENA also engages consultants, contractors and service providers as necessary.

At 30 June 2017, the agency had two ARENA staff (CEO and CFO), 40 departmental staff (37.3 FTE) including staff in non-ongoing positions, and a number of consultants and contractors. ARENA has three offices, which are located in Canberra, Sydney and Melbourne.

Training and development

ARENA's commitment to quality, innovation and professionalism are core elements of the organisation's culture and operations.

ARENA has a strong commitment to building the skills and expertise of its people. Our personnel have participated in a wide range of training including postgraduate study, leadership training and secondment opportunities within the Department and other agencies.

New ARENA personnel meet members of the executive and learn about current activities in ARENA. They also receive a comprehensive induction before undergoing in-house training.

Workplace diversity

For the reporting period, the gender ratio for the ARENA Board and senior personnel within ARENA was:

- of the seven Board members, four were female
- of the nine personnel in ARENA's Executive Leadership Team (excluding the CEO), six were female
- of the four personnel in other senior roles at ARENA, one was female.

Of the 40 departmental staff working at ARENA, 15 per cent advised they were born overseas, and none identified as Indigenous. One staff member reported as having a disability.

Work health and safety

In accordance with the *Work Health and Safety Act 2011* (WHS Act), ARENA aims to ensure so far as reasonably practicable the health and safety of workers (who are engaged by us or whose work is influenced or directed by us) and other persons who may be put at risk by work carried out as part of the conduct of our business or undertaking.

Our officials promote a positive safety culture at ARENA, and our Board closely monitors health and safety in the projects we support as well as in ARENA workplaces.

ARENA considers health and safety throughout the life cycle of the funding process, and is supported in securing the health and safety of its workers during its day-to-day operations by arrangements put in place by the portfolio Department.

Those arrangements include:

- agreed responsibilities in maintaining a safe and healthy working environment for workers
- agreed WHS frameworks and consultative forums
- systems for identifying hazards and effectively managing risk
- measures for monitoring, evaluating and striving for continual improvement in WHS performance
- procedures for the reporting and resolution of WHS issues.

In respect of ARENA employees, no investigations were conducted and no notifiable incidents were reported during 2016-17. Reporting in respect of Departmental staff made available to ARENA is covered in the Department of the Environment and Energy's Annual Report 2016-17.

Figure 8: ARENA's WHS culture

-
-  **Recognition that people will make mistakes** **01**
-
-  **Recognition that even the best people will make mistakes** **02**
-
-  **A fierce intolerance for reckless conduct** **03**
-
-  **An organisation in which people are prepared, and encouraged to report incidents, errors, near misses and hazards** **04**
-
- A commitment to continuous improvement and information sharing on safety lessons learnt** **05**

ARENA service charter

ARENA aims to provide a high standard of service to all our stakeholders, focusing on the achievement of honest and ethical working relationships that are underpinned by genuine consultation and feedback. As we continue to help drive the development and deployment of renewable energy in Australia, we anticipate an increase in the volume of contact with stakeholders. ARENA aims to continue to deliver professional and timely services to an expanded customer base.

Complaints handling

ARENA has an established internal complaints and review process, and a complaints policy, which allows reviews of ARENA decisions and complaints about service quality to be resolved fairly and simply.

Information on the complaints and review process is available at arena.gov.au/contact/.

Freedom of information and Information Publication Scheme

Australian Government entities that are subject to the *Freedom of Information Act 1982* (FOI Act) are required to publicly publish information as part of the Information Publication Scheme. ARENA's publications covered by the scheme are accessible from the ARENA website at arena.gov.au.

Consistent with our knowledge sharing agenda, ARENA also publishes information on the renewable energy sector, including information from financial assistance recipients. There were three requests for information under the FOI Act received in 2016-17.

Information on how to make a request under the FOI Act is available on the Department of the Environment and Energy's website. Contact details are:

FOI Contact Officer
Legal Section
Department of the Environment and Energy
GPO Box 787 CANBERRA ACT 2601
Email: foi@environment.gov.au
Phone: +61 2 6274 2098

Judicial decisions and reviews by outside bodies

During 2016-17 ARENA was not subject to any judicial decisions or reviews by administrative tribunals, the Auditor-General, the Commonwealth Ombudsman or the Office of the Australian Information Commissioner.

The Senate Economics and Legislation Committee reviewed the Budget Savings (Omnibus) Bill 2016, which amended the ARENA Act to reduce the total amount of funding available for ARENA to invest in renewable energy projects.

ARENA received an unqualified audit report on its financial statements for 2016-17. The Auditor-General's independent report is presented in the financial statements section of this annual report.

Public interest disclosure

There were no disclosures under the *Public Interest Disclosure Act 2013* in 2016-17.

This section should be read in conjunction with our audited financial statements for 2016-17, which appear in the financial statements section of this report.

Legal expenditure

ARENA outsources all legal work. During 2016-17 we incurred \$3,476,939 (excluding GST) in external legal service expenditure. ARENA reported the expenditure to the Office of Legal Services Coordination as required under the Legal Services Directions 2017.

Material matters

ARENA did not have any 'material' matters disclosed in the financial statements as defined in paragraph 7 of the Public Governance, Performance and Accountability (Financial Reporting) Rule 2015.

Related entity transactions

There were no related entity transactions, as shown in Note 3.3 of the financial statements section of this report.

Service level agreement

The portfolio Department provides corporate support for ARENA's day-to-day operations. The Department and ARENA negotiated a new service level agreement during 2016-17, which sets out the services to be provided by the Department to ARENA, along with the applicable services standard. The service level agreement will be subject to annual review.

Subsidiaries

ARENA did not have any subsidiaries during 2016-17.

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This section contains ARENA's audited financial statements for the year ended 30 June 2017

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INDEPENDENT AUDITOR'S REPORT

To the Minister for the Environment and Energy

Opinion

In my opinion, the financial statements of the Australian Renewable Energy Agency for the year ended 30 June 2017:

- (a) comply with Australian Accounting Standards – Reduced Disclosure Requirements and the *Public Governance, Performance and Accountability (Financial Reporting) Rule 2015*; and
- (b) present fairly the financial position of the Australian Renewable Energy Agency as at 30 June 2017 and its financial performance and cash flows for the year then ended.

The financial statements of the Australian Renewable Energy Agency, which I have audited, comprise the following statements as at 30 June 2017 and for the year then ended:

- Statement by the Board, Chief Executive and Chief Financial Officer;
- Statement of Comprehensive Income;
- Statement of Financial Position;
- Statement of Changes in Equity;
- Cash Flow Statement; and
- Notes to the financial statements, comprising a summary of significant accounting policies and other explanatory information.

Basis for Opinion

I conducted my audit in accordance with the Australian National Audit Office Auditing Standards, which incorporate the Australian Auditing Standards. My responsibilities under those standards are further described in the *Auditor's Responsibilities for the Audit of the Financial Statements* section of my report. I am independent of the Australian Renewable Energy Agency in accordance with the relevant ethical requirements for financial statement audits conducted by the Auditor-General and his delegates. These include the relevant independence requirements of the Accounting Professional and Ethical Standards Board's APES 110 *Code of Ethics for Professional Accountants* to the extent that they are not in conflict with the Auditor-General Act 1997 (the Code). I have also fulfilled my other responsibilities in accordance with the Code. I believe that the audit evidence I have obtained is sufficient and appropriate to provide a basis for my opinion.

Other Information

The Accountable Authority is responsible for the other information. The other information comprises the information included in the annual report for the year ended 30 June 2017 but does not include the financial statements and my auditor's report thereon.

My opinion on the financial statements does not cover the other information and accordingly I do not express any form of assurance conclusion thereon.

In connection with my audit of the financial statements, my responsibility is to read the other information identified above and, in doing so, consider whether the other information is materially inconsistent with the financial statements or my knowledge obtained in the audit, or otherwise appears to be materially misstated.

If, based on the work I have performed, I conclude that there is a material misstatement of this other information, I am required to report that fact. I have nothing to report in this regard.

GPO Box 707 CANBERRA ACT 2601
19 National Circuit BARTON ACT
Phone (02) 6203 7300 Fax (02) 6203 7777



Accountable Authority's Responsibility for the Financial Statements

As the Accountable Authority of the Australian Renewable Energy Agency the Board is responsible under the *Public Governance, Performance and Accountability Act 2013* for the preparation and fair presentation of annual financial statements that comply with Australian Accounting Standards – Reduced Disclosure Requirements and the rules made under that Act. The Board is also responsible for such internal control as the Board determines is necessary to enable the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, the Board is responsible for assessing the Australian Renewable Energy Agency's ability to continue as a going concern, taking into account whether the entity's operations will cease as a result of an administrative restructure or for any other reason. The Board is also responsible for disclosing matters related to going concern as applicable and using the going concern basis of accounting unless the assessment indicates that it is not appropriate.

Auditor's Responsibilities for the Audit of the Financial Statements

My objective is to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes my opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with the Australian National Audit Office Auditing Standards will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of the financial statements.

As part of an audit in accordance with the Australian National Audit Office Auditing Standards, I exercise professional judgement and maintain professional scepticism throughout the audit. I also:

- identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for my opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control;
- obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control;
- evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by the Accountable Authority;
- conclude on the appropriateness of the Accountable Authority's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the entity's ability to continue as a going concern. If I conclude that a material uncertainty exists, I am required to draw attention in my auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify my opinion. My conclusions are based on the audit evidence obtained up to the date of my auditor's report. However, future events or conditions may cause the entity to cease to continue as a going concern; and
- evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

I communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that I identify during my audit.

Australian National Audit Office



Peter Kerr
Executive Director
Delegate of the Auditor-General
Canberra
14 September 2017



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Australian Renewable Energy Agency

STATEMENT BY THE BOARD, CHIEF EXECUTIVE AND CHIEF FINANCIAL OFFICER

In our opinion, the attached financial statements for the year ended 30 June 2017 comply with subsection 42(2) of the *Public Governance, Performance and Accountability Act 2013* (PGPA Act), and are based on properly maintained financial records as per subsection 41(2) of the PGPA Act.

In our opinion, at the date of this statement, there are reasonable grounds to believe that the Australian Renewable Energy Agency will be able to pay its debts as and when they fall due.

This statement is made in accordance with a resolution of the directors.



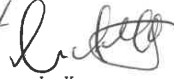
Martijn Wilder AM
Chair of the Board

14 September 2017



Ivor Frischknecht
Chief Executive Officer

14 September 2017



Ian Kay
Chief Financial Officer

14 September 2017

Statement of Comprehensive Income

for the period ended 30 June 2017

		2017	2016	Original ¹
	Notes	\$'000	\$'000	Budget \$'000
NET COST OF SERVICES				
Expenses				
Employee benefits	1.1A	977	907	1,226
Suppliers	1.1B	26,872	24,055	25,864
Grants	1.1C	160,738	113,001	164,750
Depreciation and amortisation	2.2	175	182	85
Write-down and impairment of assets		-	5	-
Total expenses		188,762	138,150	191,925
Own-source revenue				
Interest	1.2A	1,163	252	-
Other revenue	1.2B	10,173	59,370	10,676
Total own-source revenue		11,336	59,622	10,676
Net cost of services		(177,426)	(78,528)	(181,249)
Revenue from Government	1.2C	192,104	114,611	190,258
Surplus on continuing operations		14,678	36,083	9,009
OTHER COMPREHENSIVE INCOME				
Items not subject to subsequent reclassification to net cost of services				
Decrease in the value of investment		4,080	2,293	-
Total other comprehensive income		4,080	2,293	-
Total comprehensive income		10,598	33,790	9,009

The above statement should be read in conjunction with the accompanying notes.

¹ ARENA's budget as published in the 2016-17 Portfolio Budget Statements.

Statement of Financial Position

as at 30 June 2017

	Notes	2017 \$'000	2016 \$'000	Original ¹ Budget \$'000
ASSETS				
Financial assets				
Cash and cash equivalents	2.1A	55,738	41,660	556
Trade and other receivables	2.1B	2,586	11,676	3,737
Investments	2.1C	22,502	19,929	33,461
Other financial assets		-	-	329
Total financial assets		80,826	73,265	38,083
Non-financial assets				
Leasehold improvements	2.2	1,307	-	-
Plant and equipment	2.2	220	-	-
Computer software	2.2	414	536	548
Prepayments		317	174	-
Total non-financial assets		2,258	710	548
Total assets		83,084	73,975	38,631
LIABILITIES				
Payables				
Suppliers - trade creditors and accruals		1,479	2,208	1,036
Grants	2.3	1,815	2,979	3,186
Other payables - salaries and wages		12	2	2
Total payables		3,306	5,189	4,224
Provisions				
Employee provisions	3.1	205	158	188
Other provisions	2.4	347	-	-
Total provisions		552	158	188
Total liabilities		3,858	5,347	4,412
Net assets		79,226	68,628	34,219
EQUITY				
Retained surplus		79,226	68,628	34,219
Total equity		79,226	68,628	34,219

The above statement should be read in conjunction with the accompanying notes.

¹ ARENA's budget as published in the 2016-17 Portfolio Budget Statements.

Statement of Changes in Equity*for the period ended 30 June 2017*

	2017	2016	Original ¹
	\$'000	\$'000	Budget
			\$'000
TOTAL EQUITY			
Retained Surplus			
Opening balance			
Balance carried forward from previous period	68,628	34,838	25,210
Adjusted opening balance	68,628	34,838	25,210
Comprehensive income			
Surplus for the period	14,678	36,083	9,009
Other comprehensive income	(4,080)	(2,293)	-
Total comprehensive income	10,598	33,790	9,009
Closing balance as at 30 June	79,226	68,628	34,219

The above statement should be read in conjunction with the accompanying notes.

¹ ARENA's budget as published in the 2016-17 Portfolio Budget Statements.

Cash Flow Statement

for the period ended 30 June 2017

	Notes	2017 \$'000	2016 \$'000	Original ¹ Budget \$'000
OPERATING ACTIVITIES				
Cash received				
Receipts from Government		192,104	114,720	190,258
Interest		1,127	76	-
Net GST received		16,073	12,923	-
Return of grant funds from prior years		13,835	40,899	-
Total cash received		223,139	168,618	190,258
Cash used				
Employees		(920)	(853)	(1,226)
Suppliers		(22,536)	(15,301)	(15,188)
Grants		(177,719)	(102,109)	(164,750)
Total cash used		(201,175)	(118,263)	(181,164)
Net cash from operating activities		21,964	50,355	9,094
INVESTING ACTIVITIES				
Cash used				
Purchase of property, plant and equipment		(1,233)	-	-
Investments		(6,653)	(9,164)	(9,007)
Total cash used		(7,886)	(9,164)	(9,007)
Net cash used by investing activities		(7,886)	(9,164)	(9,007)
Net increase in cash held		14,078	41,191	87
Cash and cash equivalents at the beginning of the reporting period		41,660	469	469
Cash and cash equivalents at the end of the reporting period	2.1A	55,738	41,660	556

The above statement should be read in conjunction with the accompanying notes.

¹ ARENA's budget as published in the 2016-17 Portfolio Budget Statements.

Notes to the financial statements

Overview

Objectives of the Australian Renewable Energy Agency

The Australian Renewable Energy Agency (ARENA) is an Australian Government controlled entity under the *Public Governance, Performance and Accountability Act 2013* (PGPA Act). It is a not-for-profit entity. The objective of ARENA is to improve the competitiveness of renewable energy technologies and increase the supply of renewable energy in Australia.

ARENA is structured to meet the following outcome:

Outcome 1: To support improvements in the competitiveness of renewable energy and related technologies and the supply of renewable energy by administering financial assistance, developing analysis and advice about and sharing information and knowledge with regard to renewable energy and related technologies.

ARENA operates under the following legislation:

- *Australian Renewable Energy Agency Act 2011 (as amended)*;
- *Australian Renewable Energy Agency (Consequential Amendments and Transitional Provisions) Act 2011*;
- *Australian Renewable Energy Agency (Consequential Amendments and Transitional Provisions) Determination 2012*; and
- *Australian Renewable Energy Agency Determination No 1 of 2013*; and
- *Australian Renewable Energy Agency Regulation 2016*.

ARENA is governed by an independent, decision-making Board. The members of the Board draw together skills in renewable energy technology, commercialisation, business investment and corporate governance to provide expert administration of ARENA funds.

Basis of preparation

The financial statements are general purpose financial statements and are required by section 42 of the PGPA Act.

The financial statements have been prepared in accordance with:

- a) *Public Governance, Performance and Accountability (Financial Reporting) Rule 2015* (FRR) for reporting periods ending on or after 1 July 2015; and
- b) Australian Accounting Standards and Interpretations - Reduced Disclosure Requirements issued by the Australian Accounting Standards Board that apply for the reporting period.

The financial statements have been prepared on an accrual basis and in accordance with the historical cost convention, except for certain assets and liabilities at fair value. Except where stated, no allowance is made for the effect of changing prices on the results or the financial position. The financial statements are presented in Australian dollars and values are rounded to the nearest thousand dollars unless otherwise specified.

Events after the reporting period

ARENA is not aware of any subsequent Adjusting Events that have a potential to significantly affect its ongoing structure or financial activities.

Financial Performance

This section analyses the financial performance of the Australian Renewable Energy Agency for the year ended 2017.

1.1 Expenses

	2017	2016
	\$'000	\$'000
1.1A: Employee Benefits		
Board remuneration fees	229	133
Salaries and wages	585	559
Superannuation - defined contribution plans	82	129
Leave and other entitlements	81	86
Total employee benefits	977	907

Accounting Policy

Accounting policies for employee related expenses is contained in the People and Relationships section.

1.1B: Suppliers

Goods and services supplied or rendered

Audit fees	102	99
Consultants	12,613	10,485
Department support costs (resources received free of charge) ¹	7,338	8,939
IT services	872	541
Legal fees	3,477	2,857
Travel	372	251
Other	1,431	657
Total goods and services supplied or rendered	26,205	23,829

Other suppliers

Operating lease rentals in connection with:

Operating lease rentals - external parties:

Minimum lease payments	659	221
Workers compensation expenses	8	5

Total other suppliers

Total other suppliers	667	226
Total suppliers	26,872	24,055

¹ Department support costs represent the cost of staff and associated costs made available by the Secretary of the Portfolio Department (also refer to resources received free of charge in note 1.2B).

Leasing commitments

Canberra ACT - Commencing on 1 July 2017 a 5 year lease was initiated in respect of the Canberra office. Lease payments are subject to a fixed annual increase of 3.75% on review date (1 July each year).

Sydney NSW - Commencing on 31 March 2017 a 1.5 year lease was initiated in respect of the Sydney office. Lease payments are subject to a fixed annual increase of 4.25% on review date (1 January 2018).

Commitments for minimum lease payments in relation to non-cancellable

operating leases are payable as follows:

Within 1 year	963	134
Between 1 to 5 years	2,206	157
Total operating lease commitments	3,169	291

Accounting Policy

Operating lease payments are expensed on a straight-line basis which is representative of the pattern of benefits derived from the leased assets. The lessor effectively retains substantially all such risks and benefits of ownership.

1.1 Expenses (contd.)

	2017	2016
	\$'000	\$'000
1.1C: Grants		
Public sector		
Australian Government entities	4,224	8,368
Private sector		
Australian private companies	135,389	88,155
Australian not-for-profit companies	1,292	4,569
Other entities ¹	19,833	11,909
Total grants	160,738	113,001

¹ This includes the Australian Government's contribution to the Clean Energy Solutions Centre and the International Renewable Energy Agency.

Accounting Policy

Grants are recognised to the extent that services required to be performed by the grantee have been performed or the grant eligibility criteria has been satisfied. A commitment is recorded when ARENA has a binding agreement to make these grants but services have not been performed or criteria satisfied. Where grant monies are paid in advance of performance or eligibility, a prepayment is recognised. Grants payable are settled within twelve months of recognition.

Locked Box Arrangements

ARENA's Locked Box funding arrangements relate to grant funding agreements whereby ARENA deposits the total amount of the grant into a prescribed bank account, in the recipient's name, after the execution of a legally binding funding agreement. ARENA retains sole control of the Locked Box until withdrawal conditions precedent (WCPs) have been satisfied. At the time of payment, the transaction is recorded as a Prepayment in the Statement of Financial Position. After all WCPs have been met, ARENA relinquishes sole control over the Locked Box and the recipient is able to withdraw money from the Locked Box in accordance with the funding agreement. At this point, the Prepayment is expensed as Grants in the Statement of Comprehensive Income.

Withdrawals from Locked Boxes require joint signatures from the recipient and ARENA. ARENA can only refuse the release of funds if there is a breach of conditions in the funding agreement. ARENA continues to be responsible and accountable for ensuring that the funds are only released from the Locked Boxes when conditions specified in the grant funding agreement have been met. Accordingly, the value of Locked Boxes at balance date is deemed to be held by ARENA in trust and is disclosed under Note 5.1: Assets Held in Trust.

1.2 Own-Source Revenue and Gains

	2017	2016
	\$'000	\$'000

Own-Source Revenue**1.2A: Interest**

Deposits	1,163	252
Total interest	1,163	252

Accounting Policy

Interest revenue is recognised using the effective interest method.

1.2B: Other Revenue

Resources received free of charge

Department of the Environment and Energy	7,338	5,986
Department of Industry, Innovation and Science	-	2,953

Return of grants	2,835	50,431
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Total other revenue	10,173	59,370
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Accounting Policy***Resources Received Free of Charge***

Resources received free of charge are recognised as revenue when, and only when, a fair value can be reliably determined and the services would have been purchased if they had not been donated. Use of those resources is recognised as an expense (see Note 1.1B: Suppliers). Resources received free of charge are recorded as either revenue or gains depending on their nature.

Return of Grant

Return of grant is reported as other revenue if the grant was fully expensed in the previous financial year(s).

1.2C: Revenue from Government

Payments from Portfolio Department	192,104	114,611
Total revenue from Government	192,104	114,611

Accounting Policy

Amounts appropriated through ARENA's enabling legislation totalling \$1.937 billion up to 2021-22 are recognised as Revenue from Government when ARENA receives the cash from the Portfolio Department.

Financial Position

This section analyses the Australian Renewable Energy Agency's assets used to conduct its operations and the operating liabilities incurred as a result. Employee related information is disclosed in the People and Relationships section.

2.1 Financial Assets

	2017	2016
	\$'000	\$'000
2.1A: Cash and Cash Equivalents		
Cash on hand	1,100	922
Cash on deposit	54,638	40,738
Total cash and cash equivalents	55,738	41,660

Accounting Policy

Cash is recognised at its nominal amount. Cash and cash equivalents include:

- cash on hand; and
- demand deposits in bank accounts with an original maturity of 12 months or less that are readily convertible to known amounts of cash and subject to insignificant risk of changes in value.

2.1B: Trade and Other Receivables

Other receivables

GST receivable from the Australian Taxation Office	2,374	1,500
Return of grant receivable	-	10,000
Other receivables	212	176
Total other receivables	2,586	11,676
Total trade and other receivables (gross)	2,586	11,676

There is no impairment allowance for receivables as at 30 June 2017 (2016: 0).

2.1 Financial Assets (contd.)

	2017	2016
	\$'000	\$'000

2.1C: Investments

REVC Fund Commonwealth Participation Trust	22,502	19,929
Total investments	22,502	19,929

Accounting Policy

Investments are expected to be recovered in more than 12 months.

At 30 June 2017 ARENA held 25,501,807 (2016: 19,928,644) fully paid "A" class units in the Renewable Energy Venture Capital (REVC) Fund Commonwealth Participation Trust (Trust). The fair value of this investment is ARENA's share of the net assets of the audited Trust. The change in the value of the investment is shown under Other Comprehensive Income.

The principal activity of the Trust is to invest in the commercialisation of renewable energy companies.

ARENA's return from the Trust is initially limited to the capital committed plus interest at the long term bond rate. Any additional returns from the Trust is split amongst the unit holders, including ARENA, on an agreed basis.

The valuation of investments is based on the annual audited financial statements of the Trust. The Trust's financial statements are relied upon in the absence of an active market to determine a fair value. This approach provides a reasonable valuation as the financial statements are prepared in accordance with the Australian Accounting Standards and are independently audited to ensure the statements are a true and fair representation.

The significant unobservable inputs used in the fair value measurement of investments are the cost of investments disclosed in the Trust's audited financial statements. The cost of these investments is the basis of the fair valuation.

2.2 Non-Financial Assets

2.2: Reconciliation of the Opening and Closing Balances of Property, Plant and Equipment and Intangibles

	Leasehold Improvements \$'000	Plant and Equipment \$'000	Computer Software \$'000	Total \$'000
As at 1 July 2016				
Gross book value	-	-	854	854
Accumulated depreciation, amortisation and impairment	-	-	(318)	(318)
Total as at 1 July 2016	-	-	536	536
Additions:				
Purchase	1,307	273	-	1,580
Depreciation and amortisation	-	(53)	(122)	(175)
Total as at 30 June 2017	1,307	220	414	1,941
Total as at 30 June 2017 represented by				
Gross book value	1,307	273	854	2,434
Accumulated depreciation, amortisation and impairment	-	(53)	(440)	(493)
Total as at 30 June 2017 represented by	1,307	220	414	1,941

All software assets were assessed for indications of impairment as at 30 June 2017 and no evidence of impairment was found.

Accounting Policy

Acquisition of Assets

Assets are recorded at cost on acquisition except as stated below. The cost of acquisition includes the fair value of assets transferred in exchange and liabilities undertaken. Financial assets are initially measured at their fair value plus transaction costs where appropriate.

Leasehold Improvements

Leasehold improvements are carried at fair value.

Plant and Equipment

Plant and equipment are valued at cost in accordance with the FRR.

Intangibles

ARENA's intangibles comprise internally developed software for internal use. These assets are carried at cost less accumulated amortisation and accumulated impairment losses. Software is amortised on a straight-line basis over its anticipated useful life. The useful lives of ARENA's are between 3 and 10 years (2016: 7 years).

Impairment

All assets are assessed for impairment at the end of each reporting period. When indications of impairment exist, the asset's recoverable amount is estimated and an impairment adjustment made if the asset's recoverable amount is less than its carrying amount.

Revaluations

Following initial recognition at cost, all asset classes except for Intangibles are carried at fair value less subsequent accumulated

depreciation and accumulated impairment losses. Valuations are conducted with sufficient frequency to ensure that the carrying amounts of assets did not differ materially from the assets' fair values as at the reporting date. The regularity of independent valuations depended upon the volatility of movements in market values for the relevant assets.

Revaluation adjustments are made on a class basis. Any revaluation increment is credited to equity under the heading of Asset Revaluation Reserve except to the extent that it reversed a previous revaluation decrement of the same asset class that was previously recognised in the surplus/deficit. Revaluation decrements for a class of assets are recognised directly in the surplus/deficit except to the extent that they reversed a previous revaluation increment for that class.

Any accumulated depreciation as at the revaluation date is eliminated against the gross carrying amount of the asset and the asset restated to the revalued amount.

Depreciation

Depreciable plant and equipment assets are written off to their estimated residual values over the estimated useful lives, using the straight-line method of depreciation.

Leasehold improvements are depreciated over the lease term.

Depreciation rates (useful lives), residual values and methods are reviewed at each reporting date and necessary adjustments are recognised in the current, or current and future reporting periods, as appropriate.

2.3 Payables		
	2017	2016
	\$'000	\$'000

2.3: Grants

Public sector		
Australian Government entities	-	1,939
Private sector		
Australian private companies	1,632	1,035
Other entities	183	5
Total grants	1,815	2,979

2.4 Other Provisions

2.4 Other Provisions

	Provision for restoration
	\$'000
Opening Balance as at 1 July 2016	-
Additional provisions made	
Amounts recognised	347
Total as at 30 June 2017	347

ARENA currently has two (2016: nil) agreements for the leasing of premises which have provisions requiring ARENA to restore the premises to their original condition at the conclusion of the lease. ARENA has made a provision to reflect the present value of these obligations.

People and Relationships

This section describes a range of employment and post employment benefits provided to our people.

3.1 Employee Provisions

	2017	2016
	\$'000	\$'000
Employee provisions		
Leave	205	158
Total employee provisions	205	158

Accounting policy

Liabilities for short-term employee benefits and termination benefits expected within twelve months of the end of the reporting period are measured at their nominal amounts. Other long-term employee benefits are measured as net total of the present value of the defined benefit obligation at the end of the reporting period.

Leave

The liability for employee benefits includes provision for annual leave and long service leave.

The leave liabilities are calculated on the basis of employees' remuneration at the estimated salary rates that will be applied at the time the leave is taken, including the entity's employer superannuation contribution rates to the extent that the leave is likely to be taken during service rather than paid out on termination.

The liability for long service leave has been determined by reference to the 'short hand method' as per the FRR. The estimate of the present value of the liability takes into account attrition rates and pay increases through promotion and inflation.

3.2 Key Management Personnel Remuneration

Key management personnel (KMP) are those persons having authority and responsibility for planning, directing and controlling the activities of an entity, directly or indirectly, including any director (whether executive or otherwise) of that entity. ARENA has determined its KMP to be the Directors, the Chief Executive Officer and the Chief Financial Officer. KMP remuneration is reported in the table below.

	2017
	\$
Short-term employee benefits	799,959
Post-employment benefits	106,711
Other long-term employee benefits	70,223
Total KMP remuneration expenses	976,893

The total number of KMP that are included in the above table are 8 individuals (2016:9) and includes 6 ARENA Directors (2016:7). One Director is from the Portfolio Department and is not remunerated by ARENA.

The above KMP remuneration excludes the remuneration and other benefits of the Portfolio Minister. The Portfolio Minister's remuneration and other benefits are set by the Remuneration Tribunal and are not paid by ARENA.

3.3 Related Party

Related party relationships:

ARENA is an Australian Government controlled entity. Related parties of ARENA include:

- i) KMP (see Note 3.2: Key Management Personnel Remuneration)
- ii) Portfolio Ministers;
- iii) Close family members of the persons identified in (i) and (ii) above; and
- iv) An entity which is controlled or jointly controlled by a member of the KMP.

Transactions with related parties:

Given the breadth of Government activities, related parties may transact with the Government sector in the same capacity as ordinary citizens. Such transactions include receipt of financial assistance for renewable energy projects, payment of taxes or purchase of goods and services. These transactions have not been separately disclosed in this note.

Giving consideration to relationships with related entities, and transactions entered into during the reporting period by ARENA, it has been determined that there are no related party transactions that are not on normal business terms and conditions.

Managing Uncertainties

This section analyses how the Australian Renewable Energy Agency manages financial risks within its operating environment.

4.1 Financial Instruments

	2017	2016
	\$'000	\$'000
4.1A: Categories of Financial Instruments		
Financial assets		
Loans and receivables		
Cash and cash equivalents	55,738	41,660
Trade and other receivables	212	10,176
Total loans and receivables	55,950	51,836
Available-for-sale financial assets		
Investments	22,502	19,929
Total available-for-sale financial assets	22,502	19,929
Total financial assets	78,452	71,765
Financial liabilities		
Trade creditors	1,479	2,208
Grant payables	1,815	2,979
Total financial liabilities	3,294	5,187

Accounting Policy

Financial Assets

ARENA classifies its financial assets in the following categories:

- available-for-sale financial assets; and
- loans and receivables.

The classification depends on the nature and purpose of the financial assets and is determined at the time of initial recognition. Financial assets are recognised and derecognised upon trade date.

Available-for-Sale Financial Assets

Available-for-sale financial assets are non-derivatives that are either designated in this category or not classified in any of the other categories.

Available-for-sale financial assets are recorded at fair value. Gains and losses arising from changes in fair value are recognised as a "below the line item" in the Statement of Comprehensive Income with the exception of impairment losses. Interest is calculated using the effective interest method. Where the asset is disposed of or is determined to be impaired, part (or all) of the cumulative gain or loss previously recognised in the Asset Revaluation Reserve is included in surplus or deficit for the period.

Loans and Receivables

Trade receivables, loans and other receivables that have fixed or determinable payments that are not quoted in an active market are classified as loans and receivables. Loans and receivables are measured at amortised cost using the effective interest method less impairment. Interest is recognised by applying the effective interest rate.

Effective Interest Method

The effective interest method is a method of calculating the amortised cost of a financial asset and of allocating interest income over the relevant period. The effective interest rate is the rate that exactly discounts estimated future cash receipts through the expected life of the financial asset, or, where appropriate, a shorter period.

Impairment of Financial Assets

Financial assets are assessed for impairment at the end of each reporting period.

Financial Liabilities

Trade creditors and other payables are recognised at amortised cost. Liabilities are recognised to the extent that the goods or services have been received (and irrespective of having been invoiced). Trade creditors and other payables are derecognised on payment.

4.1 Financial Instruments (contd.)

	2017	2016
	\$'000	\$'000
4.1B Net Gains or Losses on Financial Assets		
Loans and receivables		
Interest revenue	1,163	252
Net gains on loans and receivables	1,163	252
Available-for-sale financial assets		
Fair value changes	(4,080)	(2,293)
Net losses on available-for-sale financial assets	(4,080)	(2,293)
Net losses on financial assets	(2,917)	(2,041)

Credit Risk

ARENA was exposed to minimal credit risk as loans and receivables were cash and trade receivables. The maximum exposure to credit risk was the risk that arises from potential default of a debtor. This amount was equal to the total amount of other receivables of \$212,000 (2015-16 \$10.176m). ARENA held no collateral to mitigate against credit risk. The risk of interest rate movements is deemed to be immaterial due to the way ARENA manages its cash requirements.

Liquidity Risk

ARENA's financial liabilities are payables. The exposure to liquidity risk was based on the notion that ARENA will encounter difficulty in meeting its obligations associated with financial liabilities. This was highly unlikely due to government funding mechanisms available to ARENA and internal policies and procedures in place to ensure there were appropriate resources to meet its financial obligations.

Market Risk

ARENA is indirectly exposed to currency risk through its investment in the Renewable Energy Venture Capital Fund Commonwealth Participation Trust (the Trust). The movements associated with ARENA's investment in the Trust are accounted for through the Statement of Comprehensive Income.

Other Information

5.1 Assets Held in Trust

	2017	2016
	\$'000	\$'000
Cash held in Locked Boxes		
Balance as at 1 July	32,155	98,406
Receipts ¹	99,869	62,200
Payments ²	(89,751)	(128,451)
Balance as at 30 June	42,273	32,155
Total monetary assets held in trust	42,273	32,155

This note should be read in conjunction with Note 1.1C: Grants. The transaction values mentioned above are not linked to any other Statement or Note within these Financial Statements.

This note has been added to the Financial Statements for information purposes only. It provides the reader with an indication of Locked Box funding levels where ARENA continues to be responsible and accountable for ensuring that the funds are only released when conditions specified in the grant funding agreement have been met.

¹ Receipts were the amounts paid into Locked Boxes by ARENA. These amounts include interest received from the balances of the Locked Boxes.

² Payments are those amounts which have been withdrawn by projects in accordance with agreed milestones.

Note 5.2: Budget Variance Commentary

ARENA's financial performance is measured against its original budget as published in the 2016-17 Portfolio Budget Statements.

Variances are considered to be 'major' if they are core to ARENA's activities and based on the following criteria:

- the variance between budget and actual is greater than +/- 10% of the original budget for a line item; and
- the variance between budget and actual is greater than \$1,000,000; or
- an item is below this threshold but is considered important for the reader's understanding or is relevant to an assessment of the discharge of accountability and to an analysis of the ARENA's performance.

The budget is not audited.

Budget Variance Commentary	Affected statements and line items
<p>The Agency received significant refunds of grants that were not budgeted for. These funds were not immediately required for the purposes of ARENA and, in accordance with s59 of the PGPA Act, have been placed in demand deposits in Australian bank accounts.</p> <p>Interest revenue in excess of \$1m was received as a result of these deposits.</p>	<p>Statement of Comprehensive Income:</p> <ul style="list-style-type: none"> - Interest - Other revenue <p>Statement of Financial Position:</p> <ul style="list-style-type: none"> - Cash and cash equivalents - Interest <p>Cash Flow Statement:</p> <ul style="list-style-type: none"> - Interest - Return of grant funds from prior years
<p>Investment calls made by the Renewable Energy Venture Capital Fund Commonwealth Participation Trust (the Trust) were less than expected. The principal activity of the Trust is to invest in the commercialisation of renewable energy companies.</p> <p>All investment decisions are to be made by the fund manager within an agreed timeframe ending in 2024. Actual investments made from year to year may vary from budget.</p> <p>\$2.354m less in investment calls were received than originally budgeted. As a result of the restatement of investments at fair value, there was a decrease of \$4.080m in the value of the investment. This is reported under Other Comprehensive Income.</p>	<p>Statement of Comprehensive Income:</p> <ul style="list-style-type: none"> - Decrease in the value of investment <p>Statement of Financial Position:</p> <ul style="list-style-type: none"> - Other investments <p>Cash Flow Statement:</p> <ul style="list-style-type: none"> - Investments
<p>ARENA's Canberra office was supplied as a resource received free of charge by the respective Portfolio Department. The provision of the Canberra premises ceased upon the expiry of the lease in 2016-17.</p> <p>ARENA subsequently entered into a separate lease arrangement and acquired the necessary leasehold improvement, plant, and equipment assets.</p> <p>ARENA's Sydney office has entered into a lease agreement which includes a fitout and a provision to makegood at the end of the lease in August 2018.</p>	<p>Statement of Financial Position:</p> <ul style="list-style-type: none"> - Leasehold improvements - Plant and equipment - Other provisions <p>Cash Flow Statement:</p> <ul style="list-style-type: none"> - Purchase of property, plant and equipment
<p>The original budget cash flow statement was prepared with GST refunds netted against Suppliers and Grants.</p>	<p>Cash Flow Statement:</p> <ul style="list-style-type: none"> - Net GST received - Suppliers - Grants
<p>The budget assumed Trade and Other Receivables and Payables would be consistent with prior year trends.</p> <p>The reduction in Trade and Other Receivables was primarily due to a decrease in GST receivable that was affected by expenditure incurred in the month of June.</p>	<p>Statement of Financial Position:</p> <ul style="list-style-type: none"> - Trade and other receivables

07

Appendices and glossary

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This section provides details of the projects to which ARENA committed or provided financial assistance during 2016-17. There is also information on ARENA's environmental performance, an index showing how this report complies with our legal reporting requirements, and a glossary that explains technical terms, acronyms and abbreviations.

Appendix 1: Financial assistance agreements and progress

During the reporting period ARENA committed or provided funding to 172 projects across the innovation chain. Details of those projects are provided in the tables below in accordance with the ARENA Act, which requires ARENA to publish details of financial assistance agreements and progress. The *Australian Renewable Energy Agency (Consequential Amendments and Transitional Provisions) Act 2011* also requires ARENA to report details of people to whom financial assistance is provided under a transferred Commonwealth funding agreement or Australian Solar Institute Limited agreement.

Table 2: Research and development projects

Proponent name	† Project status	Project description	Location	**Funding provided/ committed (ex.GST)	Primary technology
Australian National University	Complete	Improved high-temperature receivers for dish concentrators	ACT	\$1,486,210	Solar thermal
Australian National University	Complete	Machine-learning-based forecasting of distributed solar energy production	ACT	\$889,522	Enabling
Australian National University	Active	PV modules for the Australian environment (PV-MATE)	ACT	\$502,977	Solar PV
Australian National University	Active	Advanced surface and contact technologies for industrial silicon photovoltaics	ACT	\$4,102,000	Solar PV
Australian National University	Active	Eliminating material quality barriers to low cost, very high efficiency silicon solar cells and modules	ACT	\$2,023,407	Solar PV

Proponent name	† Project status	Project description	Location	**Funding provided/ committed/ (ex.GST)	Primary technology
Australian National University	Active	High-temperature solar thermal energy storage via manganese-oxide based redox cycling	ACT	\$1,193,534	Solar thermal
Australian National University	Active	Bladed receivers with active airflow control	ACT	\$1,361,327	Solar thermal
Australian National University	Active	A robotic vision system for automatic inspection and evaluation of solar plant infrastructure	ACT	\$876,183	Solar thermal
Australian National University	Active	Real-time operational distributed PV simulations for distribution network service providers	ACT	\$1,018,359	Solar PV
Australian National University	Active	CONSORT: Consumer energy systems providing cost-effective grid support	TAS	\$2,895,951	Enabling
CSIRO	Complete	Plug and Play Solar Power: Simplifying the integration of solar energy in hybrid applications	NSW	\$1,292,725	Enabling
CSIRO	Active	Optimisation of central receivers for advanced power cycles	NSW	\$1,150,879	Solar thermal
CSIRO	Active	Solar-driven supercritical CO ₂ Brayton Cycle	NSW	\$2,496,835	Solar thermal
CSIRO	Active	Australian Solar Thermal Research Initiative (ASTRI)	NSW	\$35,169,600	Solar thermal
CSIRO	Active	Novel concepts for low cost small heliostats in remote installations	NSW	\$1,000,000	Solar thermal
CSIRO	Active	Virtual Power Station 2	NSW	\$850,000	Enabling

Proponent name	† Project status	Project description	Location	**Funding provided/ committed/ (ex.GST)	Primary technology
CSIRO	Active	High efficiency solar Allam cycle	NSW	\$2,749,748	Solar thermal
Curtin University of Technology	Active	Increasing the uptake of solar PV using energy storage	WA	\$900,375	Enabling
IT Power (Australia) Pty Limited	Active	Testing the performance of lithium-ion batteries	ACT	\$870,000	Enabling
Queensland University of Technology	Active	Integration of biogas from sugarcane residues in sugarcane transport and milling to reduce fossil fuel usage	QLD	\$2,090,000	Bioenergy
Royal Melbourne Institute of Technology	Active	MUSIC: Micro-urban solar integrated concentrators	VIC	\$4,721,191	Solar thermal
*Smart Storage (Ecoults)	Active	Commercialisation of partial state of charge management and control systems for UltraBattery	NSW	\$4,100,000	Enabling
University of Adelaide	Active	Integrating concentrating solar thermal energy into the Bayer Alumina Process	SA	\$4,490,752	Solar thermal
University of New South Wales	Active	Development and commercialisation of high efficiency silicon solar cell technology	NSW	\$6,472,980	Solar PV
University of New South Wales	Active	40% efficient photovoltaic "Power Cube" power tower receiver	NSW	\$1,400,000	Solar PV
University of New South Wales	Complete	Towards a practical hot carrier solar cell	NSW	\$2,278,343	Solar PV
University of New South Wales	Active	Cost-effective GaAsP top solar cell grown on a high performance, low cost silicon solar cell	NSW	\$2,616,463	Solar PV

Research and development

Proponent name	† Project status	Project description	Location	**Funding provided/ committed/ (ex.GST)	Primary technology
University of New South Wales	Active	Multi-Junction c-Si solar cells based on virtual Ge substrates	NSW	\$1,455,000	Solar PV
University of New South Wales	Active	Tools for design and scale-up of solar thermochemical reactors	NSW	\$1,083,320	Solar thermal
University of New South Wales	Active	Low-cost, high-efficiency Copper-Zinc-Tin-Sulphide (CZTS) on silicon multi-junction solar cells	NSW	\$2,612,358	Solar PV
University of New South Wales	Active	Australia-US Institute for Advanced Photovoltaics (AUSIAPV)	NSW	\$35,914,000	Solar PV
University of New South Wales	Active	Advanced recombination-based loss analysis methods for silicon wafer and silicon solar cells	NSW	\$381,328	Solar PV
University of New South Wales	Active	High-efficiency silicon/perovskite tandem cells and modules: Demonstration and commercial evaluation	NSW	\$3,599,459	Solar PV
University of New South Wales	Active	Towards ultimate performance commercial silicon solar cells	NSW	\$2,970,702	Solar PV
University of South Australia	Complete	Barbara Hardy Institute: Development of high temperature phase change storage systems and test facility	SA	\$689,500	Enabling

Proponent name	† Project status	Project description	Location	**Funding provided/ committed (ex.GST)	Primary technology
University of South Australia	Complete	New photocathodes for solar hydrogen production	SA	\$500,000	Solar thermal
University of South Australia	Active	Maximising solar PV with phase change thermal energy storage	SA	\$995,290	Enabling
University of Technology, Sydney	Active	Develop lithium-sulphur batteries for large-scale electrical energy storage	NSW	\$750,000	Enabling
University of Western Australia	Active	From single to multiple wave energy converters: Cost reduction through location and configuration optimisation	WA	\$994,198	Marine
University of Wollongong	Active	Smart sodium storage system for renewable energy storage	NSW	\$2,707,000	Enabling
Total		40		\$145,651,516	

Table 3: Postgraduate scholarships and fellowships

University/ Institution	Project status	Scholar	Location	Type of funding	**Funding provided/ committed/ (ex.GST)	Primary technology
Australian National University	Closed	Keith Sue: Institutional rigidity in the Australian National Electricity Market - effects on technology integration and network adaptation	ACT	Scholarship	\$112,000	Enabling
Australian National University	Complete	Niraj Lal: Light trapping for tandem solar cells	ACT	Scholarship	\$284,886	Solar PV
Australian National University	Complete	Andrew Thomson: Reducing the cost of solar power by thin-film engineering strategies applied to crystalline silicon photovoltaic devices and modules	ACT	Fellowship	\$347,054	Solar PV
Australian National University	Active	Thomas Allen: Negatively-charged dielectric films for surface passivation of silicon solar cells	ACT	Scholarship	\$124,324	Solar PV
Australian National University	Active	Jose Zapata: Model predictive control of thermal components in point focus solar thermal systems	ACT	Fellowship	\$359,654	Solar thermal
Australian National University	Complete	Xinbo Yang: High efficiency n-type silicon solar cells with local laser doping by laser chemical processing (LCP)	ACT	Fellowship	\$370,622	Solar PV
Australian National University	Active	Katherine Booker: Metal-assisted chemical etching of Silver solar cells	ACT	Fellowship	\$356,749	Solar PV
Australian National University	Active	Qunyu Bi: Nanostructures design for light trapping in silicon wafer and chalcogenide thin-film solar cells	ACT	Fellowship	\$356,749	Solar PV

University/ Institution	Project status	Scholar	Location	Type of funding	**Funding provided/ committed/ (ex.GST)	Primary technology
CSIRO	Active	Kallista Sears: ITO free, efficient organic solar cells based on textured graphene electrodes	VIC	Fellowship	\$320,811	Solar PV
CSIRO	Complete	Hasitha Weerasinghe: Flexible barrier encapsulation for printed solar cells	VIC	Fellowship	\$332,039	Solar PV
CSIRO	Complete	Timothy Jones: Lateral optimisation of dye-sensitised thin film photovoltaics	NSW	Fellowship	\$329,231	Solar PV
CSIRO	Complete	Tianshi Qin: Novel solution-processed multilayer D-I-A organic solar cells: Can organic photovoltaic cells potentially be as efficient as their inorganic counterparts?	VIC	Fellowship	\$329,231	Solar PV
Murdoch University	Complete	Tobias Prosin: Development of a state of the art solid particle receiver CST system, optimised for commercialisation in the Australian market	WA	Scholarship	\$120,000	Solar thermal
Queensland University of Technology	Complete	Ajay K Pandey: Singlet exciton fission and multiexciton harvesting in organic solar cells	QLD	Fellowship	\$349,864	Solar PV
Royal Melbourne Institute of Technology	Complete	Ahmad Mojiri: Spectral beam splitting for improving the energy conversion efficiency in hybrid concentrating solar collectors	VIC	Scholarship	\$39,816	Solar thermal
Swinburne University of Technology	Complete	Ben Ekman: To optimise the use of solar thermal energy in the design and construction of a hybrid solar/electric reactor for high temperature processes by utilising a novel solar simulator design	VIC	Scholarship	\$96,667	Solar thermal

Postgraduate scholarships and fellowships

University/ Institution	Project status	Scholar	Location	Type of funding	**Funding provided/ committed/ (ex.GST)	Primary technology
University of Wollongong	Active	Joseph Giorgio: Light-weight and flexible solid-state dye-sensitised solar cells	NSW	Scholarship	\$49,227	Solar PV
University of Melbourne	Complete	Viktoras Dryza: Guiding the rational design of organic dye sensitisers for solar cell technologies	VIC	Fellowship	\$339,446	Solar PV
University of Melbourne	Complete	Kyra Schwarz: Time-resolved microspectroscopy of conjugated polymer films for organic photovoltaic applications	VIC	Scholarship	\$49,767	Solar PV
University of New South Wales	Complete	Simon Heslop: Facilitating high penetration PV integration into the electricity network	NSW	Scholarship	\$125,000	Enabling
University of New South Wales	Complete	Thilini Ishwara: Solar efficiency optimisation of hybrid organic-inorganic solar cells	NSW	Fellowship	\$351,048	Solar PV
University of New South Wales	Active	Clare Disney: Plasmonic light trapping for solar cells	NSW	Scholarship	\$109,944	Solar PV
University of New South Wales	Active	Adrian Shi: Stability of perovskite solar cells and modules	NSW	Scholarship	\$46,041	Solar PV
University of New South Wales	Active	Andrew Danos: The role of spin in triplet-triplet annihilation upconversion	NSW	Scholarship	\$70,000	Solar PV
University of New South Wales	Active	Vincent Allen: Fabrication of a new cost effective high efficiency solar cell structure	NSW	Scholarship	\$120,000	Solar PV

Postgraduate scholarships and fellowships

University/ Institution	Project status	Scholar	Location	Type of funding	**Funding provided/ committed/ (ex.GST)	Primary technology
University of New South Wales	Complete	Ning Song: Inkjet-enabled silicon solar cell fabrication - from lab to pilot production	NSW	Fellowship	\$396,843	Solar PV
University of New South Wales	Complete	Sammy Lee: The development of novel nanocluster-based buffer layers for multi-junction solar cells	NSW	Fellowship	\$330,195	Solar PV
University of New South Wales	Complete	Edward Law: Optimising concentrated solar thermal operation using solar energy forecasting	NSW	Scholarship	\$49,768	Enabling
University of New South Wales	Complete	Gough Lui: Feasibility and design study of point of use low energy photovoltaic-powered ultraviolet light emitting diode water disinfection	NSW	Scholarship	\$32,965	Solar PV
University of New South Wales	Complete	Sisi Wang: Laser technology in the fabrication of high performance solar cells	NSW	Scholarship	\$36,041	Solar PV
University of New South Wales	Active	Simon Chung: Practical realisation of a hot carrier solar cell using hafnium nitride	NSW	Scholarship	\$45,743	Solar PV
University of New South Wales	Active	Alexander To: Surface passivation of high voltage solar cell structures with ALD deposited aluminium oxide	NSW	Scholarship	\$51,015	Solar PV
University of New South Wales	Complete	Yajie Jiang: Characterisation of light distribution within silicon solar cells	NSW	Fellowship	\$330,195	Solar PV
University of New South Wales	Complete	Murad Tayebjee: Singlet heterofission in organic dimers	NSW	Fellowship	\$325,892	Solar PV

Postgraduate scholarships and fellowships

University/ Institution	Project status	Scholar	Location	Type of funding	**Funding provided/ committed (ex.GST)	Primary technology
University of New South Wales	Complete	Zi Ouyang: Self patterning dielectric/ metal nanostructures for advanced passivation and light trapping for high efficiency solar cells	NSW	Fellowship	\$391,717	Solar PV
University of New South Wales	Active	Bernard Mitchell: Advanced and industry-ready photoluminescence characterisation of silicon bricks	NSW	Fellowship	\$330,195	Solar PV
University of Newcastle	Complete	Dylan Cuskelly: Thermionic emissions from MAX phase materials	NSW	Scholarship	\$52,381	Solar thermal
University of Newcastle	Complete	Anthony Rawson: Modelling and applications of advanced thermal storage materials	NSW	Scholarship	\$49,661	Enabling
University of Queensland	Complete	Yuan Fang: Development of low bandgap polymeric acceptors for organic solar cells	QLD	Fellowship	\$349,864	Solar PV
University of South Australia	Active	Shane Sheoran: A direct contact heat exchanger for high temperature thermal storage in solar power plants	SA	Scholarship	\$120,000	Solar thermal
University of Sydney	Complete	Bjorn Sturmberg: Nanostructured and metamaterial photovoltaics	NSW	Scholarship	\$48,816	Solar PV
University of Sydney	Complete	Alexandre La Fontaine: High temperature stainless steels for concentrated solar power	NSW	Scholarship	\$123,684	Solar thermal
Total		42			\$8,555,144	

Table 4: Demonstration projects

Proponent name	† Project status	Project description	Location	**Funding provided/ committed/ (ex.GST)	Primary technology
*AGL Energy Limited	Active	P2P-DLT: A virtual trial of peer-to-peer energy trading including an assessment of the applicability of distributed ledger technology	VIC	\$120,000	Enabling
*Australian National University	Active	An atlas of pumped hydro energy storage	ACT	\$449,000	Enabling
*Australian Solar Energy Society Ltd	Active	Australian Energy Storage Council research and report	ACT	\$45,000	Storage
*Bundaberg Regional Irrigators Group Ltd	Active	Adapting renewable energy concepts to irrigated sugarcane production at Bundaberg	QLD	\$446,011	Enabling
*Carnegie Wave Energy Limited	Active	Garden Island Microgrid Project: Development and demonstration of the integration of CETO6 wave energy technology with solar PV, energy storage system and a desalination plant	WA	\$2,500,000	Enabling
*EnergyAustralia Development Pty Ltd	Active	EnergyAustralia South Australian pumped hydro energy storage (PHES) feasibility study	SA	\$453,000	Enabling
*GreenSync Pty Ltd	Active	Distributed Energy Exchange (deX) - design and pilot a prototype digital exchange for trading Distributed Energy Resources (DER) to support integrating renewables and grids	VIC	\$450,000	Enabling
*MASG Renewables P1 Operations Pty Ltd	Active	Feasibility study for integrated community waste to energy project for Mt Alexander Shire	VIC	\$145,468	Bioenergy

Demonstration

Proponent name	† Project status	Project description	Location	**Funding provided/ committed/ (ex.GST)	Primary technology
*Monash University	Active	Accelerating community and business support for a low carbon future	VIC	\$390,000	Enabling
*Northern SEQ Distributor - Retailer Authority	Active	Feasibility study to undertake an assessment of the commercial viability of a waste to energy project at Unity Water's sewerage treatment plant	QLD	\$296,500	Bioenergy
*Re.Group Pty Ltd	Active	Feasibility study into Mt Piper hybrid EfW Project	NSW	\$400,000	Bioenergy
*University of New South Wales	Active	Addressing barriers to efficient renewable integration: Frequency management, ancillary services and electricity market rules for achieving high renewables	NSW	\$982,000	Enabling
*University of Tasmania	Active	Tidal energy in Australia - Assessing resource and feasibility to Australia's future energy mix	TAS	\$2,494,860	Marine
*University of Technology, Sydney	Active	Networks Renewed: Using innovative inverter and battery storage technologies to improve network power quality, reduce costs and support solar PV	NSW	\$1,871,000	Enabling
*Worley Parsons Services Pty Limited	Active	Tidal turbine reef feasibility study	WA	\$280,000	Marine
Australian PV Institute Limited	Complete	Development of a climate-based PV module rating scheme	NSW	\$268,320	Enabling

Proponent name	† Project status	Project description	Location	**Funding provided/ committed/ (ex.GST)	Primary technology
Australian PV Institute Limited	Active	Australian involvement in the IEA PV power systems, and solar heating and cooling implementing agreements	NSW	\$440,500	Solar PV
Barcaldine Remote Community Solar Farm Pty Ltd	Active	Barcaldine 25MW Remote Community Solar Project	QLD	\$22,800,000	Solar PV
Bioenergy Australia	Active	Enhanced Australian participation in IEA bioenergy tasks and activities	NSW	\$474,577	Bioenergy
BioPower Systems Pty Ltd	Active	bioWAVE ocean pilot at Port Fairy	VIC	\$11,960,000	Marine
Carnegie Wave Energy Limited	Active	Perth Wave Energy Project	WA	\$13,095,381	Marine
Carnegie Wave Energy Limited	Active	CETO 6 Project	WA	\$13,000,000	Marine
Clean Energy Council Limited	Complete	Future-proofing in Australia's electricity distribution industry - Stage 2	VIC	\$408,377	Enabling
CSIRO	Active	Australian Wave Energy Atlas	TAS	\$1,329,900	Marine
CSIRO	Active	Specifying guidelines for assessing perovskite solar cells	NSW	\$892,000	Solar PV
CSIRO	Active	AIRAH PUSCH Australia - Promoting the use of solar cooling and heating in Australia	NSW	\$399,436	Solar thermal
DeGrussa Solar Project Pty Ltd / Neoen	Active	DeGrussa 10.56MW off-grid solar PV/storage project	WA	\$20,900,001	Solar PV

Demonstration

Proponent name	† Project status	Project description	Location	**Funding provided/ committed/ (ex.GST)	Primary technology
Dyesol Ltd	Complete	Perovskite solar cells: Establishing the basis for industrial development	NSW	\$449,823	Solar PV
EDL Group Operations Pty Ltd	Active	Cooper Pedy Renewable Diesel Hybrid	SA	\$18,410,879	Hybrid
Electricity Generation and Retail Corporation	Active	Alkimos Beach Energy Storage Project	WA	\$3,310,000	Enabling
Enwave Energy Pty Ltd	Complete	Delivering higher renewable penetration in new land and housing developments through off-grid microgrids	NSW	\$442,400	Enabling
Ergon Energy Queensland Pty Ltd	Active	Pilot a commercial and operational model for integrating solar and storage to provide energy services to residential customers	QLD	\$400,000	Enabling
First Solar	Active	Weipa Solar PV Project	QLD	\$11,300,000	Solar PV
First Solar	Closed	CuDECO / Rocklands Solar Farm	QLD	\$0	Solar PV
Frontier Carbon Pty Ltd	Active	Toolkit for renewable energy financing	VIC	\$467,717	Enabling
Fulcrum3D Pty Ltd	Complete	Cloud detection and prediction for maximising solar PV utilisation in off-grid hybrid power systems	NT	\$545,559	Enabling
Genex Power Limited	Active	Feasibility study to validate the construction of a large-scale pumped storage hydroelectric energy storage facility at a remote disused mine site in Northern Queensland	QLD	\$4,000,000	Enabling

Proponent name	† Project status	Project description	Location	**Funding provided/ committed/ (ex.GST)	Primary technology
Hydro-electric Corporation	Active	Flinders Island Renewable Energy Project	TAS	\$5,500,000	Hybrid
Hydro-electric Corporation	Active	Rottneet Island: Addressing the energy and water nexus	WA	\$4,800,000	Hybrid
Indigenous Essential Services Pty Ltd	Active	Northern Territory Solar Energy Transformation Program (SETuP)	NT	\$35,000,000	Hybrid
Karratha Solar Power No 1 Pty Ltd	Active	Karratha Airport Solar Project	WA	\$2,300,000	Solar PV
Laing O'Rourke Australia Pty Ltd	Complete	Redeployable solar first deployment	QLD	\$451,986	Hybrid
Lakeland Solar & Storage Pty Limited	Active	Lakeland Solar & Storage Project	QLD	\$17,419,000	Solar PV
LMS Energy Pty Ltd	Active	Joule Energy - Pilot landfill solar project - Phase 1	VIC	\$100,000	Solar PV
Lord Howe Island Board	Active	Lord Howe Island Hybrid Renewable Project	NSW	\$4,500,000	Hybrid
Moreland Energy Foundation Ltd	Complete	Feasibility and product design for inner city brown field off-grid solar	VIC	\$112,400	Solar PV
National ICT Australia Limited	Active	Australian Renewable Energy Mapping Infrastructure (AREMI)	NSW	\$2,197,150	Enabling
Raygen Resources Pty Ltd	Complete	RayGen Concentrating Solar PV (CSVP) - Stage 3	VIC	\$2,922,652	Solar PV

Proponent name	† Project status	Project description	Location	**Funding provided/ committed/ (ex.GST)	Primary technology
Regional Development Australia ACT Incorporated	Active	Establish the South East Region of Renewable Energy Excellence (SERREE) Industry Cluster	ACT	\$393,870	Enabling
Renergi Pty Ltd	Active	Advanced biomass gasification technology	WA	\$4,160,542	Bioenergy
Renergi Pty Ltd	Active	A low emission biofuel technology	WA	\$5,473,000	Bioenergy
Renewable Developments Australia Pty Ltd	Active	Feasibility study for Stage 1 of the Pentland Bioenergy Project	QLD	\$3,000,000	Bioenergy
Reposit Power Pty Ltd	Complete	A commercially viable application of electricity storage for Australia's national electricity grid	ACT	\$445,666	Enabling
Rural Industries Research & Development Corporation (RIRDC)	Active	Australian biomass for bioenergy assessment	ACT	\$3,160,669	Bioenergy
Scouler Energy Pty Ltd	Active	Normanton Solar Farm	QLD	\$8,380,000	Solar PV
Southern Cross Venture Partners	Active	Southern Cross Renewable Energy Fund	Aust	\$60,000,000	Various
Southern Oil Refining Pty Ltd	Active	Australian Biofuels from Australian Resources	QLD	\$2,611,480	Bioenergy
Swinburne University of Technology	Active	Towards an Australian capability in arrays of ocean wave-power machines	VIC	\$770,728	Marine
The Trustee for Biosystems Engineering Trust	Active	Final development of a full-scale woody crop harvester prototype and commercial biomass supply chain demonstration	NSW	\$463,417	Bioenergy

Proponent name	† Project status	Project description	Location	**Funding provided/ committed/ (ex.GST)	Primary technology
The Trustee for Sustainable Melbourne Fund	Active	Expansion of the Environmental Upgrade Agreement market in Victoria. How councils, building owners and tenants can access finance for commercial rooftop solar installations.	VIC	\$821,369	Solar PV
The Trustee for the NSW Electricity Networks Operations Trust	Active	New England Renewable Hub (Feasibility Study)	NSW	\$450,000	Enabling
University of Adelaide	Active	Establishing the Australian Energy Storage Knowledge Bank	SA	\$1,441,811	Enabling
University of Adelaide	Active	AusPERM - Structural permeability mapping in Australia	SA	\$450,000	Geothermal
University of Melbourne	Complete	Achieving cost-effective abatement from Australian electricity generation	VIC	\$1,030,069	Enabling
University of Technology, Sydney	Active	Mapping potential network opportunities for renewable energy & DM	NSW	\$538,240	Enabling
University of Technology, Sydney	Complete	Facilitating local use of system charging and virtual net metering	NSW	\$402,760	Enabling
Vast Solar Pty Ltd	Active	Vast Solar 6MWth grid-connected CSP research, development and demonstration facility with thermal energy storage	NSW	\$8,896,960	Solar thermal
Voyages Indigenous Tourism	Active	Yulara 1.8MW Dispersed PV	NT	\$447,525	Solar PV
Total		68		\$315,259,003	

Table 5: Deployment projects

Proponent name	† Project status	Project description	Location	**Funding provided/ committed/ (ex.GST)	Primary technology
*AGL Energy Services Pty Limited	Active	5 MW Virtual Power Plant	SA	\$5,000,000	Enabling
AGL Pty Ltd	Active	AGL Solar PV project	NSW	\$166,700,000	Solar PV
*APT Pipelines Limited	Active	Emu Downs Solar Farm Project	WA	\$5,500,000	Solar PV
*APT Pipelines Limited	Active	Darling Downs Solar Farm	QLD	\$20,000,000	Solar PV
*Canadian Solar (Australia) Pty Limited	Active	Longreach Solar Farm	QLD	\$1,300,000	Solar PV
*Canadian Solar (Australia) Pty Limited	Active	Oakey Solar Farm	QLD	\$2,162,000	Solar PV
*Echuca Regional Health	Complete	Case Study and implementation of solar field chilling and heating opportunities in a hospital environment	VIC	\$147,500	Enabling
*Genex Power Limited	Active	Kidston Solar Project	QLD	\$8,850,000	Solar PV
*Goldwind Australia Pty Ltd	Active	White Rock Solar Farm, co-located with White Rock Wind Farm	NSW	\$5,400,000	Solar PV
Gullen Solar Pty Ltd	Active	Gullen Range Solar Farm - co-located with Gullen Range Wind Farm	NSW	\$9,900,000	Solar PV
*Laing O'Rourke Australia Pty Ltd	Active	SunSHIFT pre-commercial deployment	NSW	\$2,100,396	Solar PV
*Manildra Solar Farm Pty Limited	Active	Manildra Solar Farm	NSW	\$9,810,000	Solar PV

Proponent name	† Project status	Project description	Location	**Funding provided/ committed/ (ex.GST)	Primary technology
Moree Solar Farm Pty Ltd	Active	Moree Solar Farm	NSW	\$101,700,000	Solar PV
*Neoen Australia Pty Ltd	Active	Dubbo Solar Hub	NSW	\$4,950,000	Solar PV
*Neoen Australia Pty Ltd	Active	Griffith Solar Farm	NSW	\$4,500,000	Solar PV
*Neoen Australia Pty Ltd	Active	Parkes Solar Farm	NSW	\$6,750,000	Solar PV
*NEV Power Pty Ltd	Active	Narara Ecovillage smart grid	NSW	\$1,158,660	Hybrid
*Quantum Power Limited	Active	Goulburn Bioenergy Project	NSW	\$2,100,000	Bioenergy
*RATCH Australia Corporation Limited	Active	Collinsville Solar PV Power Station Stage 1	QLD	\$9,500,000	Solar PV
*RayGen Resources Pty Ltd	Active	RayGen PV Ultra Series B equity investment opportunity	VIC	\$7,000,000	Solar PV
*Solar Analytics Pty Ltd	Active	Solar Monitoring for better energy outcomes for residential solar PV	NSW	\$2,144,000	Enabling
Whitsunday Solar Farm Pty Ltd	Active	Whitsunday Solar Farm	QLD	\$9,500,000	Solar PV
Total		22		\$386,172,556	

* ARENA entered into these agreements for the provision of financial assistance during the year. These agreements will each contribute to the continued progress of ARENA's objectives and priorities under its General Funding Strategy, including by improving the competitiveness of renewable energy technologies and by increasing the supply of renewable energy in Australia.

** Funds committed to ongoing projects or total funds paid to completed or closed/terminated projects.

† Projects listed as active include projects that are substantially complete but are still fulfilling knowledge sharing commitments.

Appendix 2: ARENA's environmental performance

This table sets out ARENA's performance against section 516A of the *Environment Protection and Biodiversity Conservation Act 1999*.

Reporting criteria	Performance
<p>Accordance with and contribution to ecologically sustainable development (ESD), including the development and implementation of policies, plans, programs and legislation</p>	<p>ARENA is specifically tasked with facilitating research, development, demonstration and deployment of renewable energy technologies with a view to driving the commercialisation and reducing the cost of renewable energy. ARENA's policies, plans and programs all accord with and contribute to the ESD principles by:</p> <ul style="list-style-type: none"> • helping to foster the long-term sustainability of Australia's energy sector while promoting the reduction of energy-related greenhouse gas emissions • taking into account economic, environmental and social considerations when developing renewable energy measures.
<p>Environmental performance, including the impact of the agency's activities on the natural environment, how any impacts are mitigated and how they will be managed</p>	<p>ARENA's accommodation and facilities arrangements are supported by the portfolio Department. The Department operates under the Energy Efficiency in Government Operations policy, which aims to reduce the energy consumption of government operations, with particular emphasis on the energy efficiency of buildings.</p> <p>The Department's Property and Security section works closely with the ARENA corporate team to provide supporting information on ARENA's intended and/or ongoing property and security arrangements.</p> <p>This has ensured ARENA meets its property and security obligations within government (ie. whole-of-government property changes from the Department of Finance) or through regulatory processes (eg. changes to the Building Code 2016).</p> <p>For the duration of 2016-17, ARENA's Canberra offices were located in the NewActon Nishi Building. The offices in the Nishi Building have a 6-star Green Star Design rating and NewActon Nishi is considered to be Canberra's most sustainable mixed use building complex.</p>

Appendix 3: Index of compliance with annual report requirements

This index lists the information ARENA is required by law to include this report, and where in the report the information is located.

P20-37 P121-139	<i>Australian Renewable Energy Agency Act 2011</i> (section 70)	<p>Funding provided under ARENA Act</p> <p>Provide particulars of each person to whom financial assistance was provided or committed during the year:</p> <ul style="list-style-type: none"> • name of the person • nature and amount of the financial assistance • renewable energy technology or technologies to which the assistance relates • an assessment of the extent to which agreements for the provision of financial assistance entered into during the year have progressed, or are expected to progress, the principal objectives and priorities as stated in the general funding strategy in force for the year
P121-139	<i>Australian Renewable Energy Agency (Consequential Amendments and Transitional Provisions) Act 2011</i> (Schedule 2, Part 2, section 28)	<p>Funding provided under a transferred agreement</p> <p>Provide particulars of each person to whom financial assistance has been provided during the year under a transferred Commonwealth funding agreement, or a transferred ASI Limited funding agreement:</p> <ul style="list-style-type: none"> • name of the person • nature and amount of the financial assistance • renewable energy technology or technologies to which the assistance relates
P77	<i>Australian Renewable Energy Agency Act 2011</i> (section 11)	<p>Ministerial requests</p> <p>Provide details of each request made by the Minister under s11 asking ARENA to consider providing financial assistance for a specified project</p>
P77	<i>Australian Renewable Energy Agency Act 2011</i> (section 13)	<p>Ministerial directions</p> <p>Provide details of each direction made by the Minister under s13 requiring ARENA to provide advice</p>

P3, 20	<i>Public Governance, Performance and Accountability Act 2013 (section 46), Public Governance, Performance and Accountability Rule 2014 (section 17BB)</i>	<p>Approval of annual report by accountable authority (ARENA Board)</p> <p>Be approved by the ARENA Board</p> <p>Be signed by the Board, or a member of the Board</p> <p>Include details of how and when approval of the annual report was given</p> <p>State that the Board is responsible for preparing and giving the annual report to ARENA's responsible minister in accordance with s46 of the Act</p>
Yes	<i>Public Governance, Performance and Accountability Act 2013 (section 46), Public Governance, Performance and Accountability Rule 2014 (section 17BC)</i>	<p>Parliamentary standards of presentation</p> <p>Comply with the guidelines for presenting documents to the Parliament</p>
Yes	<i>Public Governance, Performance and Accountability Act 2013 (section 46), Public Governance, Performance and Accountability Rule 2014 (section 17BD)</i>	<p>Plain English and clear design</p> <p>Provide information that is relevant, reliable, concise, understandable and balanced</p> <p>Follow standards of presentation, language and design</p> <p>Define acronyms and technical terms</p>
P20-88	<i>Public Governance, Performance and Accountability Act 2013 (section 46), Public Governance, Performance and Accountability Rule 2014 (section 17BE)</i>	<p>Contents of annual report</p> <p>P76 Details of the legislation that established ARENA</p> <p>P20, 22, 76 Summary of ARENA's objectives and functions as set out in the legislation</p> <p>P20, 22 ARENA's purpose as set out in the corporate plan for the period</p> <p>P77 Any ministerial directions given under the act or instrument</p> <p>P77 Any government policy orders under s22 of the Act Particulars of any non-compliance</p> <p>P20-37 Annual performance statement for ARENA for the period in accordance with paragraph 39(1)(b) of the Act and s16F of the Rule</p> <p>P77 Statement of any significant issue reported to the responsible Minister under paragraph 19(1)(e) of the Act that relates to non-compliance with finance law in relation to ARENA</p> <p>n/a An outline of the action taken to remedy that non-compliance</p> <p>P78-83 Information on each member of the ARENA Board:</p> <ul style="list-style-type: none"> • name, qualification and experience • number of meetings attended • whether executive or non-executive <p>P87 Organisational structure</p> <p>P88 Location/s of operations</p>

P84-141	<i>Public Governance, Performance and Accountability Act 2013 (section 46), Public Governance, Performance and Accountability Rule 2014 (section 17BE)</i>	Contents of annual report (continued)
		<p>P84-85 Main corporate governance practices used by ARENA during the period:</p> <ul style="list-style-type: none"> • board committees and their main responsibilities • education and performance review processes for members of the Board • ethics and risk management policies <p>P91 Related entity transactions</p> <p>P85 Any significant activities and changes that affected ARENA's operations or structure during the period</p> <p>P90 Particulars of judicial decisions or decisions of administrative tribunals made during the period that have, or may have, a significant effect on the operations of ARENA</p> <p>P90 Particulars of any report on ARENA given during the period by:</p> <ul style="list-style-type: none"> • the Auditor-General • a committee of either House, or both Houses, of the Parliament • the Commonwealth Ombudsman • the Office of the Australian Information Commissioner <p>P85 Details of any indemnity that applied during the period to the Board, any member of the Board or officer of ARENA against a liability (including premiums paid, or agreed to be paid, for insurance against the Board, Board member or officer's liability for legal costs)</p> <p>P141 An index identifying where the requirements of this section and s17BF (if applicable) are to be found</p>
P92	<i>Public Governance, Performance and Accountability Act 2013 (section 42), Public Governance, Performance and Accountability (Financial Reporting) Rule 2015</i>	Financial statements
		<p>Financial statements are prepared as soon as practicable after the end of the reporting period, and then provided to the Auditor-General as soon as practicable</p> <p>Statements comply with the accounting standards and any other requirements prescribed by the rules, and fairly present ARENA's financial position, financial performance and cash flows</p> <p>Written confirmation from the Board that statements meet these requirements</p>
Yes	<i>Public Governance, Performance and Accountability Act 2013 (section 46)</i>	Annual report presented to Minister
		ARENA Board must prepare and provide the annual report to the Minister by 15 October each year
P140	<i>Environment Protection and Biodiversity Conservation Act 1999 (section 516A)</i>	Environmental performance
		<p>Information on:</p> <ul style="list-style-type: none"> • accord between ARENA's activities and ecologically sustainable development (ESD) principles • ARENA's contribution of outcomes to ESD • effects of these activities on the environment • measures to review and minimise effects on the environment
P90	<i>Freedom of Information Act 1982 (Part II)</i>	Information Publication Scheme
		Actions taken to comply

Appendix 4: List of figures and tables

This is a list of the figures and tables provided in this report, as well as their location.

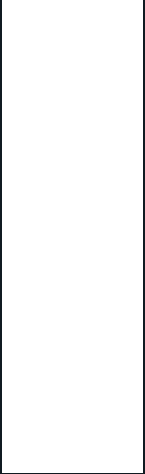
P15	Figure 1	Our mission, purpose, objective and funding priorities
P16	Figure 2	ARENA's complementary role
P21	Figure 3	ARENA performance summary 2016-17
P22	Figure 4	ARENA's key performance documents
P42	Figure 5	ARENA's investment across Australia 2016-17
P44	Figure 6	ARENA's investment across the innovation chain 2016-17
P87	Figure 7	ARENA organisational structure
P89	Figure 8	ARENA's WHS culture
P27	Table 1	New projects by Investment focus area and Innovation stage
P121	Table 2	Financial assistance: Research and development
P126	Table 3	Financial assistance: Scholarships and fellowships
P131	Table 4	Financial assistance: Demonstration
P138	Table 5	Financial assistance: Deployment

This is an alphabetical index that explains the acronyms, abbreviations and technical terms used in the report.

<u>AM</u>	Member of the Order of Australia
<u>AO</u>	Officer of the Order of Australia
<u>ANAO</u>	Australian National Audit Office
<u>APS</u>	Australian Performance Statement; Australian Public Service
<u>AREMI</u>	Australian Renewable Energy Mapping Infrastructure
<u>ARENA</u>	Australian Renewable Energy Agency
<u>ASI</u>	Australian Solar Institute
<u>ASTRI</u>	Australian Solar Thermal Research Initiative
<u>CEC</u>	Clean Energy Council
<u>CEFC</u>	Clean Energy Finance Corporation
<u>CEO</u>	Chief Executive Officer
<u>CFO</u>	Chief Financial Officer
<u>CO₂</u>	carbon dioxide
<u>CSP/CST</u>	concentrated solar power / concentrated solar thermal
<u>EE</u>	energy efficiency
<u>EIF</u>	Education Investment Fund

<u>energy efficiency</u>	energy efficiency includes energy conservation and demand management technologies
<u>energy productivity</u>	using less energy per unit of production or output
<u>EOI</u>	expression of interest
<u>ESD</u>	ecologically sustainable development
<u>flexible capacity</u>	includes energy storage, demand response, and generation that can be quickly ramped up and down to help balance energy supply and demand
<u>FOI</u>	freedom of information
<u>fringe-of-grid</u>	areas at the edges of an electricity grid
<u>FRV</u>	Fotowatio Renewable Ventures
<u>FTE</u>	full-time equivalent
<u>GFS</u>	General Funding Strategy
<u>GST</u>	goods and services tax
<u>GW</u>	gigawatt
<u>Innovation Fund</u>	Clean Energy Innovation Fund
<u>IP</u>	Investment Plan
<u>ISO</u>	International Organisation for Standardisation
<u>LCOE</u>	levelised cost of energy
<u>LGC</u>	large-scale generation certificate
<u>LSS</u>	large-scale solar
<u>MSF</u>	Moree Solar Farm
<u>MW</u>	megawatt
<u>off-grid</u>	not connected to the electricity grid, such as in remote areas
<u>PGPA</u>	Public Governance, Performance and Accountability
<u>PHES</u>	pumped hydro energy storage
<u>PPA</u>	power purchase agreement; an offtake agreement where a purchaser agrees to purchase and a supplier agrees to supply future generated electricity, usually at a specified price for a defined period
<u>PSM</u>	Public Service Medal

<u>PV</u>	photovoltaic; a type of technology that converts energy from the sun into electricity
<u>RAC</u>	Risk and Audit Committee
<u>RD&D</u>	research, development and demonstration
<u>RET</u>	Renewable Energy Target
<u>REVC</u>	Renewable Energy Venture Capital
<u>RIRDC</u>	Rural Industries Research and Development Corporation
<u>STORES</u>	Short Term Off-River pumped hydro Energy Storage
<u>WHS</u>	work health and safety



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