

**RESEARCH AND DEVELOPMENT PROGRAM ROUND 5:  
ADDRESSING SOLAR PV END-OF-LIFE ISSUES AND  
LOWERING THE COST OF SOLAR PV**

GUIDELINES  
DECEMBER 2019



Australian Government  
Australian Renewable  
Energy Agency

**ARENA**

## Research and Development Program Round 5: Addressing solar PV end-of-life issues and lowering the cost of solar PV

### EXECUTIVE SUMMARY

1. The ARENA Research and Development Program (the Program) is delivered by ARENA in competitive rounds.
  2. Under the 2019 ARENA Investment Plan, a need has been identified for new solutions for solar PV panel end-of-life issues, and for the continued reduction of the cost of solar PV through research and development (R&D). These focuses are areas within the *Integrating Renewables into the Electricity System* investment priority.
  3. As the rate of solar PV deployment continues to increase in Australia, innovations that can reduce the cost of sustainably managing panels at their end-of-life will become more important. The current recycling process for solar PV panels adds a cost to the supply chain that is not fully recovered simply by recovering materials. Innovations that give cost savings at the end-of-life stage will allow for the sustainable management of solar PV panel waste, without significantly impacting the overall cost of renewable electricity generation. It will also ultimately allow consumers and project developers to continue to deploy solar PV, with the assurance that an affordable, responsible solution for end-of-life is available.
  4. The continued reduction of the cost of solar PV has also been identified as a key mechanism for supporting the integration of renewables into the electricity system. Lower cost solar PV allows for the over-sizing of generators for the same investment amount, which helps unlock the capability to increase the security and reliability of the electricity system through storage and smoothing output. Lower costs may also open the possibility for new applications for solar PV, with innovative integration solutions.
  5. Several decades of Australian solar PV R&D has already cascaded through to global manufacturing supply chains, contributing to the dramatic decline in the cost of deployed solar PV as demonstrated today. Round 5 aims to build on Australia's world-leading solar PV R&D expertise, supporting innovation that has significant potential impact for renewable energy in both Australia and globally.
  6. The objective of Round 5 of the Program is to support research that aims to develop solutions to address costs associated with solar panels at end-of-life and to improve the cost-effectiveness of solar PV for new or established applications. Cost-effectiveness takes into consideration the cost of generation over the lifetime of a solar panel.
  7. The specific funding priorities for Round 5 are to support research and development that aims to deliver:
    - **End-of-life:** New solutions, including improved upfront solar PV panel designs and end-of-life processing, that increase the cost-effectiveness of sustainable end-of-life management of solar PV panels. Solutions that are not specifically addressing solar PV panel end-of-life issues are excluded. Collection of solar panels and associated logistics are excluded from ARENA funding.
    - **Advanced silicon:** Improvements to the overall cost-effectiveness of silicon-based panels already in mass-market production, and their production processes. Testing or analysis that is not part of the manufacturing process is excluded.
    - **Tandem silicon:** Increasing the cost-effectiveness of silicon-based solar PV through the use of tandem materials.
    - **New materials:** Development of new materials with the potential to either reach breakthrough cost-efficiencies, or the potential for new deployment applications.
- For a Project to be eligible for funding under this Program it must address one of the Round 5 priorities outlined at item 3.7 of these Guidelines.
8. Eligible Projects will be developing technologies and/or processes assessed at Technology Readiness Levels (TRLs) 2-4 at the time of applying as detailed under item 3.6 of these Guidelines.
  9. Eligible Projects must not be more than 2 years in length, as specified in item 3.3 of these Guidelines.

10. The total funding allocated for Round 5 is up to \$15 million. This amount may be reduced or increased at the discretion of the ARENA Board.
11. It is expected that ARENA Grants awarded to Projects under Round 5 will be between \$400,000 and \$4 million, with at least matched funding from the Applicant or a third party on a 1:1 basis.
12. Projects with a greater proportion of cash to In-Kind Contributions will be considered to deliver greater value for money. See item 4.19 of these Guidelines for further details. ARENA funds renewable energy projects to support commercialisation over the short, medium, and long-term.
13. The application and assessment process for Round 5 involves two stages: an expression of interest (EOI) and a full application. Part 2 of these Guidelines provides further details on the application process.
14. ARENA will award grant funding to eligible applications on the basis of a competitive Merit Criteria assessment, under Part 4 of these Guidelines. Merit will be assessed on the basis of:
  - applicant capability and capacity
  - contribution to Round Objectives and the relevant Round Priorities
  - project design and methodology
  - financial viability and co-funding commitment.
15. The sharing of Project knowledge and data that supports research and development outcomes is the return ARENA expects on its investment of public money in renewable energy projects. All successful Applicants will be expected to share knowledge from their Projects under Eligibility Criterion F (items 3.16 to 3.18), and items 5.10 to 5.12 of these Guidelines.
16. All applications must be completed online using ARENA's Grants Management System, ARENANet, which is accessible from the R&D [Program webpage](https://arena.gov.au) on ARENA's website <https://arena.gov.au>.
17. The key dates below signify when the online system will be open for Round 5 EOIs and full applications.

Stage	Opening Date	Closing Date and Time
Expression of Interest	Wednesday 11 December 2019	Wednesday 26 February 2020 5:00 pm Australian Eastern Daylight Time
Full application	6 April 2020. ARENA will notify all Applicants in writing as to whether their EOI has been successful. The expected timeframe for preparation of a full application will be 6 weeks from the date of notification from ARENA.	
Full application outcome	Notification to Applicants as to whether their full application has been successful is expected to take place in July 2020. ARENA will advise all Applicants in writing as to the outcome of their Application.	
Negotiation and finalisation of Funding Agreement	July - August 2020	

## TABLE OF CONTENTS

<b>Executive summary</b>	<b>2</b>
<b>Part 1. Overview</b>	<b>6</b>
Purpose	6
Objectives of the Program and the Round	6
Commencement and authority for Guidelines	6
Program funding model	6
<b>Part 2. Application and assessment process</b>	<b>7</b>
Overview	7
Expression of interest	7
Full application	7
Submitting an application	7
Assessment process	8
Collaboration	8
<b>Part 3. Eligibility Criteria</b>	<b>9</b>
Eligibility criterion A - eligible Applicant	9
Eligibility criterion B - eligible Project	9
Eligibility criterion C - take place in Australia	10
Eligibility criterion D - intellectual property	10
Eligibility criterion E - workplace gender equality	11
Eligibility criterion F - knowledge sharing	11
Eligibility criterion G - compliance with other requirements	11
<b>Part 4. Merit Criteria</b>	<b>12</b>
Merit criterion A - Applicant capability and capacity	12
Merit criterion B - contribution to the Round objective and priority areas	13
Merit criterion C - Project design and methodology	14
Merit criterion D - financial viability and co-funding commitment	15
<b>Part 5. Funding Agreements</b>	<b>18</b>
Funding offers	18
Funding Agreement	18
Use of funding	18
Knowledge sharing and publication of Project information	18

<b>Part 6. Further Program information</b>	<b>19</b>
Confidentiality and disclosure of information	19
Acknowledgement and publicity	19
Review of decisions and complaints	19
Conflicts of interest	19
No contract or liability	20
Work health and safety	20
Other applicable requirements	20
<b>APPENDIX A - Technology Readiness Levels</b>	<b>21</b>
Commercial Readiness Index	24
<b>APPENDIX B - Eligible Expenditure Guide</b>	<b>25</b>
General principles	25
Specific eligibility provisions	26
Labour	27
Contract expenditure	27
Expenditure prior to execution of the Funding Agreement	27
Overseas expenditure	27
Accounting systems	27
<b>Glossary</b>	<b>28</b>

## PART 1. OVERVIEW

### PURPOSE

- 1.1 The purpose of these Program Guidelines (Guidelines) is to provide a framework for the operation of ARENA's Research and Development (R&D) Program. The Program is delivered by way of competitive funding rounds and each round may have different priorities for funding.
- 1.2 Applicants should read the Guidelines in conjunction with any supporting information provided on the Program's webpage. These resources can be accessed at <https://arena.gov.au>.
- 1.3 In the Guidelines, the common meaning of the word applies, unless defined in the glossary at the end of the Guidelines.
- 1.4 In the event of any inconsistency between other ARENA materials and these Guidelines, the Guidelines will prevail.

### OBJECTIVES OF THE PROGRAM AND THE ROUND

- 1.5 The objectives of the Program are to provide funding to deliver the following outcomes:
  - a. a range of high quality and innovative Renewable Energy Technologies that enhance Australia's world-class research position and/or address conditions specific to Australia;
  - b. an increase in skills, capacity and knowledge relevant to the Round's Priority Renewable Energy Technologies within Australia; and
  - c. an increase in investment that improves the Technology Readiness and Commercial Readiness of the Round's Priority Renewable Energy Technologies.
- 1.6 The objective of the Round is to support research that aims to develop solutions to address costs associated with solar panels at end-of-life and improve the cost-effectiveness of solar PV for new or established applications. Cost-effectiveness takes into consideration the cost of generation over the lifetime of a solar panel.

### COMMENCEMENT AND AUTHORITY FOR GUIDELINES

- 1.7 The Guidelines have been approved by the ARENA Board and come into force on 6 December 2019. The Guidelines supersede the previous version dated 16 December 2017.
- 1.8 The Guidelines may be revoked or varied from time to time, pursuant to section 24(1)(b) of the *Australian Renewable Energy Agency Act 2011* (ARENA Act). Where this occurs, all current Applicants will be notified in writing of any such amendment.
- 1.9 Without limiting its rights, ARENA may, in its absolute discretion:
  - a. suspend, defer or terminate this Program at any time; or
  - b. extend the closing date and time.
- 1.10 The ARENA Board is responsible for approving financial assistance and entry into contracts under the Program and may delegate this responsibility in accordance with the ARENA Act.

### PROGRAM FUNDING MODEL

- 1.11 The amount of funding available under each round of the Program will be published in the relevant Guidelines for that round.
- 1.12 All funding provided through the Program will be in the form of Grants. No individual Grant under the Program will exceed \$5 million in total contract value, as set out in item 4.18 of these Guidelines.
- 1.13 It is expected that Project recipients will, at a minimum, match the ARENA Grant on a 1:1 basis, with a combination of cash and In-Kind Contributions, as set out in item 4.19 of these Guidelines.
- 1.14 The Round comprises four Priorities described in item 3.7. Eligible Projects will be assessed for merit and competitively ranked against other Projects in the same Round Priority.
- 1.15 While ARENA expects to allocate funding to successful Projects in each Round Priority, should projects in any Round Priority not be considered of sufficient merit, ARENA reserves the right to allocate funding across Round Priorities as appropriate. This may result in no funding being awarded to Projects in one or more Round Priorities. Portfolio fit may also be a consideration in allocating funding across Round Priorities.

## PART 2. APPLICATION AND ASSESSMENT PROCESS

### OVERVIEW

- 2.1 The application and assessment process under the Program is competitive and involves two stages:
  - a. an expression of interest (EOI); and
  - b. a full application.
- 2.2 Eligible Applicants can apply for funding under the Program for eligible Research and Development Projects (the Project). The Eligibility Criteria for Applicants and Projects are described in Part 3 of these Guidelines.

### EXPRESSION OF INTEREST

- 2.3 Applicants must submit their EOIs by the closing date and time of Wednesday 26 February 2020, 5:00 pm Australian Eastern Daylight Time.
- 2.4 ARENA may, acting in its sole discretion, elect to consider EOIs and Full Applications received after the closing date and time.

### FULL APPLICATION

- 2.5 Full applications must be submitted by the closing date and time specified by ARENA in due course.
- 2.6 ARENA may, acting in its sole discretion, elect to consider any full applications received after the closing date and time for receipt of full applications.

### SUBMITTING AN APPLICATION

- 2.7 All applications (including at EOI stage) must be completed online using ARENA's Grants Management System, ARENANet, or as otherwise directed by ARENA. ARENANet is accessible from the R&D [Program webpage](https://arena.gov.au) on ARENA's website <https://arena.gov.au>.
- 2.8 The online application system prescribed by ARENA may include a mix of mandatory fields, optional fields (including free text fields) and require attachments to be provided by the Applicant.
- 2.9 Strict word limits may apply at various fields when completing the online application.
- 2.10 Word and page limits may also apply to requested responses and attachments that accompany an EOI or full application. ARENA may, acting in its sole discretion, elect to read words beyond the specified word limit or any attached document beyond the last page of the specified page limit.
- 2.11 Applicants should ensure they have comprehensively completed each section of the online application form.
- 2.12 Different documents may be required to be completed and submitted at each stage of the application process. Required documents are listed under the Eligibility Criteria set out in Part 3 and the Merit Criteria set out in Part 4 of these Guidelines.
- 2.13 The information required from Applicants at the EOI stage is less detailed than that required at the full application stage. The full application stage requires detailed evidence and documentation to describe and support the Applicant's proposal and to support the Applicant's claims against the Eligibility Criteria and Merit Criteria.
- 2.14 If an EOI or full application (as the case may be) does not include the information required (and in the format set out in ARENA's prescribed online application system) ARENA may, acting in its sole discretion, decline to assess the EOI or full application. Alternatively, ARENA may, in its sole discretion, seek supplementary information or clarification from the Applicant.

## ASSESSMENT PROCESS

- 2.15 ARENA may engage Consultants or advisors to assist with the assessment of a proposal against the Eligibility Criteria or Merit Criteria.
- 2.16 ARENA will assess the eligibility of Applicants and their applications against the Program's Eligibility Criteria set out in Part 3 of these Guidelines. Applications that do not meet the Eligibility Criteria will not be assessed for merit.
- 2.17 Eligible applications will be assessed and ranked against the Program's Merit Criteria set out in Part 4 of these Guidelines. The merit assessment and ranking will be undertaken by the ARENA Advisory Panel in its role as advisor to ARENA. Information on the members of the ARENA Advisory Panel is available on the ARENA website at <https://arena.gov.au>.
- 2.18 ARENA may seek further information from the Applicant at any time throughout the application process in relation to any matter arising from the assessment of the EOI or full application.
- 2.19 ARENA may, at any time during the application process, modify the due diligence activities it proposes to undertake when assessing an application. Due diligence activities may include, but are not limited to: inviting the Applicant to present on its application to ARENA; commissioning or completing relevant research, analysis and modelling to support assessment of applications; and contacting any relevant Commonwealth, State, Territory and international government agencies, Project partners or other relevant parties about an application.
- 2.20 ARENA may take a portfolio approach to selecting Projects for funding. That is, it may consider how a Project will contribute to the Round objectives and Round Priorities, or as part of a suite of complementary ARENA Projects. ARENA may elect not to fund an otherwise meritorious Project if the aims or outcomes of that Project are the same as, or similar to, the aims and outcomes of a Project that has previously been funded or is currently under assessment. ARENA's current portfolio of Projects is listed on its website <https://arena.gov.au>.
- 2.21 Following its assessment of an EOI or full application (as the case may be) ARENA may:
- in the case of an EOI, invite shortlisted Applicants to progress to the full application stage; or
  - in the case of a full application, offer successful Applicants funding for their Project; or
  - in the case of an EOI or full application (as the case may be), not accept the application submitted by the Applicant.
- 2.22 Only eligible Applicants with applications that satisfy the Merit Criteria to a high standard will be successful.
- 2.23 The decision on whether funding will be offered to an Applicant under this Program will be made by the ARENA Board and this decision will be final. The ARENA Board may also stipulate conditions to this funding.
- 2.24 ARENA will advise the Applicant in writing of the outcome of the assessment of their EOI or full application, including the amount and nature of any funding support to be offered by ARENA and any conditions attached to the funding offer. A funding offer under the Program may be for less or more than the amount of funding requested by the Applicant. A funding offer may exclude parts of a Project submitted by an Applicant, or include additional parts as requested by ARENA.
- 2.25 All Applicants may request feedback from ARENA on the merit of their full application at the conclusion of the assessment process. Feedback will be provided in a form determined suitable by ARENA. Feedback on merit will not be provided at the EOI stage for unsuccessful applications.

## COLLABORATION

- 2.26 ARENA may seek to work with Applicants or potential Applicants and their participating or prospective institution(s) or entity(ies) to initiate or develop proposals, with the consent of the respective parties.
- 2.27 ARENA may facilitate collaboration between any Applicants with similar or complementary proposals or between Applicants and other research institutions or funding bodies, to develop consortia to finance and carry out Projects. Any such facilitation of collaboration, including the release of confidential information to another Applicant or person, will be subject to the Applicant's prior consent.
- 2.28 When facilitating collaboration, ARENA is not responsible or liable for any comments, consultation or assistance provided by ARENA, its staff or any Consultants. Any such facilitation does not constitute any commitment by ARENA that it will invite the Applicant to submit a full application or that ARENA will offer funding for the collaborative Project.



## PART 3. ELIGIBILITY CRITERIA

3.1 All of the following Eligibility Criteria must be met for both EOIs and full applications, and continue to be met throughout the process.

### ELIGIBILITY CRITERION A - ELIGIBLE APPLICANT

3.2 The Applicant must:

- a. at the time of applying, hold an Australian Business Number (ABN) and
- b. be either:
  - an Australian entity incorporated under the *Corporations Act 2001* (Cth); or
  - an eligible Australian research institution as set out below:
    - a. an Australian university (University);
    - b. the Australian Nuclear Science and Technology Organisation (ANSTO);
    - c. the Commonwealth Scientific and Industrial Research Organisation (CSIRO) including Data61;
    - d. the Australian Institute of Marine Science (AIMS);
    - e. the Defence Science and Technology Organisation (DSTO);
    - f. Cooperative Research Centres (CRCs);
    - g. the National Measurement Institute (NMI); or
    - h. Australian Research Council (ARC) Centres of Excellence.

### ELIGIBILITY CRITERION B - ELIGIBLE PROJECT

3.3 The Applicant must be able to demonstrate to the satisfaction of ARENA that the R&D Project described in the proposal:

- a. meets the definition of research and development activities as set out at item 3.4 of these Guidelines;
- b. involves development of technologies that are assessed as having achieved a Technology Readiness Level (TRL) between 2-4 (inclusive) at the time of applying (see item 3.6 of these Guidelines);
- c. involves Renewable Energy Technologies, which may include:
  - hybrid technologies; and/or
  - technologies (including enabling technologies) that are related to Renewable Energy Technologies; and
- d. meets one of the Program's priorities for Round 5 (see item 3.7 of these Guidelines)
- e. is no more than 2 years in duration.

3.4 For the purposes of the Program, R&D activities:

- a. are characterised by their originality, with the primary objective of the works being investigation, the outcomes of which will be new knowledge and may lead to practical applications, new improved materials, products, processes or services;
- b. include specialised scientific and technical information services, postgraduate research, and the design, construction and testing of prototypes (pilot plants where new data is evaluated); and
- c. do not include basic or blue-sky research (Technology Readiness Level (TRL) 1), the implementation of innovations (including trial production and copying of prototypes), education and training of students (except postgraduate research), maintenance of national and international standards, feasibility studies, business models or marketing and market studies.

3.5 The TRL index is a globally accepted benchmarking tool for tracking progress and supporting the development of a specific technology through the early stages of the innovation chain, from blue sky research (TRL 1) to actual system demonstration over the full range of expected conditions (TRL 9). More information on the TRL rating scale that ARENA uses for Renewable Energy Technologies is set out in Appendix A to these Guidelines.

- 3.6 For this Round, ARENA is seeking applications for the development of technologies that are assessed as having achieved a TRL between 2-4 (inclusive) at the time of applying. Projects should be aiming to progress the relevant technology beyond its starting TRL. Projects that focus on developing technologies that are already at TRL 5 or above may be eligible to receive funding through ARENA's Advancing Renewables Program and/or future rounds delivered under the Research and Development Program.
- 3.7 Cost-effectiveness takes into consideration the cost of generation over the lifetime of a solar panel. Recognising that individual funding applications may address more than one Round Priority, each application submitted under this Program must select one (most relevant) of the following priority areas of research:
- a. **End-of-life:** New solutions, including improved upfront solar PV panel designs and end-of-life processing, that increase the cost-effectiveness of sustainable end-of-life management of solar PV panels.  
Solutions that are not specifically addressing solar PV panel end-of-life issues are excluded. Collection of solar panels and associated logistics are excluded from ARENA funding.
  - b. **Advanced silicon:** Improvements to the overall cost-effectiveness of silicon-based panels already in mass-market production, and their production processes.  
Testing or analysis that is not part of the manufacturing process is excluded.
  - c. **Tandem silicon:** Increasing the cost-effectiveness of silicon-based solar PV through the use of tandem materials.
  - d. **New materials:** Development of new materials with the potential to either reach breakthrough cost-efficiencies, or the potential for new deployment applications.

#### ELIGIBILITY CRITERION C - TAKE PLACE IN AUSTRALIA

- 3.8 The Applicant must be able to demonstrate to the satisfaction of ARENA that the majority of the Project activities will take place in Australia.
- 3.9 No more than 10 per cent of any ARENA funds awarded to a single Project may be spent overseas, with the exception of the purchase or use of equipment and materials. ARENA may consider a specific request to increase this cap. Any such request should be made in writing at the EOI stage with an explanation of why Project research and development activity conducted overseas:
- a. cannot be done in Australia; and/or
  - b. would benefit from being performed outside Australia.

#### ELIGIBILITY CRITERION D - INTELLECTUAL PROPERTY

- 3.10 The Applicant must warrant it has ownership of, access to, or the beneficial use of, any intellectual property rights, including moral rights (IP) necessary to carry out the Project.
- 3.11 The Applicant must be able to provide evidence that they have the necessary rights to any IP required to undertake the Project. This includes identifying and dealing with:
- a. any third party background intellectual property, and the measures that will be put in place to ensure continuing access to this intellectual property and to protect it;
  - b. the effect any third-party ownership of background intellectual property will have on the ownership of intellectual property expected to be created by the Project;
  - c. any measures that may be needed to protect intellectual property created by the Project; and
  - d. any licensing arrangement required.
- 3.12 As part of its consideration of an EOI or full application, ARENA may request evidence or documentation supporting the Applicant's claim of access to the appropriate rights to any IP necessary to carry out the Project, or a documented plan detailing the proposed course of action to acquire such access. Evidence may include patents, licences or any relevant intellectual property agreements.

## ELIGIBILITY CRITERION E - WORKPLACE GENDER EQUALITY

- 3.13 The Commonwealth has a policy of not entering into agreements with, or providing discretionary Grants or loan funds, to organisations that do not comply with their obligations, if any, under the *Workplace Gender Equality Act 2012* (Cth).
- 3.14 The Applicant must not be named as an organisation that has not complied with the *Workplace Gender Equality Act 2012* (Cth). Any Applicant so named will be excluded from further consideration.
- 3.15 Applicants must make a declaration in the application form to demonstrate that they understand and meet their obligations, if any, under that Act. ARENA will check Applicants' names against the list of non-compliant organisations on the website of the Workplace Gender Equality Agency at <https://wgea.gov.au>

## ELIGIBILITY CRITERION F - KNOWLEDGE SHARING

- 3.16 The Applicant must agree that it will participate in any knowledge sharing events and activities related to the Round. The Applicant must agree to publicly share knowledge and information about, and resulting from, the Project described in its application.
- 3.17 Applicants must agree to ARENA's Knowledge Sharing Plan for this Round, which can be found on the ARENA website at <https://arena.gov.au>. ARENA may negotiate additional bespoke requirements for individual projects, which will be agreed upon with the Applicant and set out in the Funding Agreement.
- 3.18 ARENA will not request the Applicant to share commercially sensitive information, and the details of the knowledge sharing obligations will be agreed by the parties and set out in the Funding Agreement.

## ELIGIBILITY CRITERION G - COMPLIANCE WITH OTHER REQUIREMENTS

- 3.19 The Applicant must comply with the following mandatory requirements:
  - a. Completeness: Applicants must provide a response against all Merit Criteria and submit all mandatory attachments.
  - b. Comprehensiveness: Applicant's responses to Merit Criteria must be sufficiently detailed to allow an assessment of merit to be made by an independent expert.
- 3.20 The Applicant must accept all requirements outlined in Part 6 of these Guidelines.

## PART 4. MERIT CRITERIA

- 4.1 Eligible applications will be assessed for overall value for money and risk against the Merit Criteria. The Merit Criteria are equally weighted.

### MERIT CRITERION A - APPLICANT CAPABILITY AND CAPACITY

- 4.2 The capability and capacity of the Applicant, Project partners and key Project personnel to deliver the proposed Project.

#### Overview

- 4.3 Assessment of this criterion may include consideration of the following:

a. Capability:

- Applicant organisation: including technical and research skills, risk management (including Work Health and Safety Management System (WHSMS) skills), project management skills, financial management skills, knowledge management skills, and track record in delivering outcomes in solar research.
- Partner organisation(s): including technical and research skills, risk management (including WHSMS) skills, project management skills, financial management skills, knowledge management skills, and track record in delivering outcomes relevant to the proposed Project.
- Project Personnel: including technical expertise and experience, research skills and experience and track-record in delivering outcomes relevant to the proposed Project.

b. Capacity:

- Applicant organisation: including what and how proposed resources (e.g. research facilities, equipment, technical staff, project managers, contract managers, etc.) will be made available for the duration of the Project to ensure the proposed Project is delivered on time and within budget.
- Partner organisation(s): including what and how proposed resources (e.g. research facilities, equipment, technical staff, project managers, contract managers, etc.) will be made available for the duration of the Project to ensure the proposed Project is delivered on time and within budget.
- Project personnel: including what Full Time Equivalent (FTE) key personnel will be devoting to the proposed Project for its duration and how personnel will be made available to ensure the proposed Project is delivered on time and within budget.

#### Demonstrating merit against the criterion

- 4.4 The Applicant should demonstrate merit in the EOI and full application stage as follows:

##### *Expression of interest*

Statement against the following:

- a. **Capability:** Outline the Project team's track record of research excellence and skills and/or experience that are relevant to the proposed Project including the Applicant organisation, any partner organisations and key personnel. (200 word limit)
- b. **Capacity:** Demonstrate that the Applicant organisation, any partner organisations and key personnel have the resources, skills, expertise and research infrastructure (or that these will be accessible or made available) to achieve the Project outcomes. (200 word limit)

**Attachments:** Nil.

##### *Full application:*

Statement against the following:

a. **Capability** (600 word limit):

- Demonstrate the technical and research expertise and experience of the key personnel, as relevant to the Project, including any awards and peer recognition or other validation of the credentials. This should include examples of other significant Research and Development Projects (and their outcomes) undertaken by the Applicant or the key personnel (in the past five years) in the same or similar field contemplated by the Project.

- Demonstrate the Applicant’s capability to progress the relevant technology through the Technology Readiness Levels and towards Commercial Readiness. Include examples of where the Applicant and/or its key personnel have successfully progressed the outputs of other research projects towards technology maturity and Commercial Readiness, in the same or similar field contemplated by the Project.
- b. **Capacity** (400 word limit):
- Describe the resources (including personnel, physical resources, facilities and organisation capacity) the Applicant will use to deliver the Project, including confirmation that such resources will be available for the duration of the Project.
  - Detail the Full Time Equivalent (FTE) of each of Key Personnel listed.

**Attachments:** CVs of Key Personnel (limit of 2 pages per person).

## MERIT CRITERION B - CONTRIBUTION TO THE ROUND OBJECTIVE AND PRIORITY AREAS

4.5 The extent to which the Project will contribute to the Round objective and specific priorities identified in these Guidelines.

### Overview

- 4.6 This merit criterion focuses on the extent to which the Project contributes to the objectives and priorities for the Round (detailed in items 1.6 and 3.7 of these Guidelines).
- 4.7 References to cost-effectiveness must take into consideration the cost of generation over the lifetime of a solar panel. The International Technology Roadmap for Photovoltaic (ITRPV), tenth edition including maturity report, October 2019,<sup>1</sup> must be used as a benchmark for performance of current mass-market solar PV technologies.

### Demonstrating merit against the criterion

4.8 The Applicant should demonstrate merit in the EOI and full application stages as follows.

### Expression of interest

Statement against the following:

- a. How the Project is aligned with the selected Round Priority. (200 word limit)
- b. The potential impact of the Project within the selected Round Priority by describing the extent to which the work can either:
  - improve the cost-effectiveness of sustainable end-of-life management of solar PV panels, either by reducing downstream processing costs or by increasing the economic value of recovered components and/or materials; or
  - improve on the cost-effectiveness of current mass-market solar panels, with specific references to data in the ITRPV described in item 4.7; or
  - significantly increase the uptake of renewable energy through new, cost-effective deployment opportunities of solar PV. (200 word limit)
- c. How the Project is world class or innovative compared to research already being undertaken in this field (domestic and international). (200 word limit)
- d. Outline the pathway to market uptake for the technology that is the focus of the Project including a timeframe to commercialisation. How does the Project facilitate or accelerate movement along that pathway? What is the potential size of the market for the technology? (300 word limit)
- e. Outline any other contributions the Project is expected to make in the achievement of the Round objective(s) not already mentioned above. (200 word limit)

**Attachments:** One page attachment to support claims against alignment with the ITRPV. This may include graphical representations where relevant.

---

1 International Technology Roadmap for Photovoltaic (ITRPV) <https://itrpv.vdma.org/>

### **Full application:**

Statement against the following:

- a. Expand on how the Project is aligned with the selected Round Priority. (400 word limit)
- b. Expand on the potential impact of the Project within the selected Round Priority by describing the extent to which the work can either;
  - improve the cost-effectiveness of sustainable end-of-life management of solar PV panels, either by reducing downstream processing costs or by increasing the economic value of recovered components and/or materials; or
  - improve on the cost-effectiveness of current mass market solar panels, with specific references to data in the ITRPV described in item 4.7; or
  - increase the uptake of renewable energy through new deployment opportunities of solar PV (400 word limit)
- c. Expand on the innovation in this Project and how the Project research is world-class, including how it complements or builds on existing or emerging areas of research (both domestic and international). (400 words)
- d. Set out how the Project contributes to improving the Commercial Readiness of the technology that is the focus of the Project, including:
  - where the technology currently sits on the TRL index and where it is expected to be at the at the conclusion of the Project, including justification for this assessment (more information on TRL is at Appendix A - Technology Readiness Levels). (200 word limit)
  - the future market and potential size of the market for this technology. (200 word limit)
  - how the proposed Project facilitates or accelerates the technology's pathway to market. (200 word limit)

**Attachments:** One-page attachment to support claims against alignment with ITRPV. This may include graphical representations where relevant.

## **MERIT CRITERION C - PROJECT DESIGN AND METHODOLOGY**

4.9 The strength of the Project design, in terms of meeting the proposed objectives within the timeframe and budget set out in the Application.

### **Overview**

4.10 The purpose of this Merit Criterion is to assess the technical strength of the Project and how well the Applicant has designed and planned the Project, including identifying and managing risks, in order to successfully deliver the Project.

4.11 This Merit Criterion assesses Project risk not identified in the assessment of the other Merit Criteria and the steps the Applicant proposes to take to mitigate those risks. It also assesses Project risk in terms of the likely success of the Project and the achievement of stated outcomes and considers the risk of negotiating and executing a Funding Agreement that is acceptable to ARENA.

4.12 In order to allow time for the assessment process, and finalisation of a Funding Agreement, Projects cannot commence before 1 September 2020. Applicants should also allow for lead-time required to secure resources specific to the Project.

### **Demonstrating merit against the criterion**

4.13 The Applicant should demonstrate merit in the EOI and full application stage as follows.

### *Expression of interest*

A statement against the following (500 word limit):

- a. Outline the technical design or methodology that will be employed to achieve the Project outcomes.
- b. Provide the timeline for the Project, including milestones, stage-gates, dependencies and deliverables associated with the Project.
- c. Outline the main risks to achieving the outcomes of the Project and how these risks will be mitigated. Types of risk could include, but are not limited to: technological, project planning, infrastructure and equipment access, personnel and WHS risks.

**Attachments:** Nil

### *Full application*

A statement against the following:

- a. Expand on the technical design and research methodology of the Project to achieve the Project outcomes. (500 words)
- b. Detail the proposed Project outcomes (i.e. What will the Project aim to achieve). (300 words)
- c. Detail the proposed Project outputs in terms of tangible deliverables. (200 words)

**Attachments:**

- a. Project Plan (10 page limit), which should include:
  - a clear description of the Project;
  - duration of the Project, including start-dates and end-dates (and each phase, if relevant);
  - objectively verifiable milestones and deliverables;
  - Project phases and stage-gates (if relevant), any expected periods where the Project is dormant (for instance, because a key resource is not available);
  - the proportion (if any) of the Project dedicated to postgraduate research;
  - the proportion (if any) of the Project that will take place outside Australia;
  - any dependencies that are outside the control of the Applicant and other participating institution(s) or entity(ies), such as any resources or approvals from third parties that are needed to start the Project (other than funding from ARENA);
  - any other relevant information
- b. Risk Management Plan (using ARENA's template), which should include:
  - consideration of personnel risk and how this will be managed;
  - consideration of technology risk and how this will be managed;
  - any other key project risks; and
  - Work Health and Safety Management System Plan.
- c. Compliance Table (using ARENA's template) stating any general conditions of the draft Funding Agreement template that the Applicant does not accept, accepts in part, or does not consider to be applicable.

4.14 Applicants should be aware that low compliance with the Funding Agreement template may impact on ARENA's assessment of Project risk. Strong compliance with the Funding Agreement will generally increase the merit of a Project.

### **MERIT CRITERION D - FINANCIAL VIABILITY AND CO-FUNDING COMMITMENT**

4.15 The financial viability of the Project, including the level of co-investment and evidence of commitment, both cash and in-kind, to the Project.

## Overview

- 4.16 This merit criterion assesses whether the Applicant and any Project partners have the financial capacity and level of commitment required to deliver the Project successfully.
- 4.17 Applicants may apply for any amount of Project funding within the scope of the Round 5 funding parameters:
- The expected minimum ARENA Grant to a Project is \$400,000.
  - The expected maximum ARENA Grant to a Project is \$4 million.
  - Projects should at least match the ARENA Grant on a 1:1 basis, with a combination of cash and In-Kind Contributions.
- 4.18 ARENA, may, at its discretion consider proposals above or below the minimum and maximum funding amounts specified above up to a total ARENA contribution of \$5 million; however any proposal that exceeds \$4 million will need to demonstrate exceptional merit.
- 4.19 ARENA is seeking to fund Projects that offer high value for the ARENA funding contribution compared to the total Project cost. Applicants should be aware that:
- proposals that seek lower proportions of ARENA funding compared to proposals that seek higher proportions of ARENA funding may be considered to be of higher merit;
  - ARENA expects that Applicants with proposals closer to commercialisation, that is with a higher TRL, will make a larger financial contribution compared with proposals that are in the earlier stages of development;
  - proposals that include a higher cash contribution from the Applicant and its project partners may be considered of higher merit;
  - proposals which include a higher financial contribution, either cash or in-kind or both, from industry partners may be considered of higher merit; and
  - while financial contributions to proposals from state and territory governments are welcome, proposals that have a higher proportion of funding from government sources may be considered of lower merit.
- 4.20 ARENA will also assess whether the amount of ARENA funding sought and the total cost of the Project is appropriate:
- for the stage of research and development of the Renewable Energy Technology; and
  - for the extent to which the Applicant or other partners are providing funding or In-Kind Contributions for the Project.
- 4.21 While there is no separate ARENA funding stream supporting postgraduate research, funding for postgraduate research will be supported as part of a Project. Projects in which postgraduate research comprises the majority component of funding requested may be considered of lower merit.
- 4.22 Applicants should refer to the Eligible Expenditure Guide at Appendix B for information on what the ARENA funding may and may not be used for.
- 4.23 Ineligible expenditure cannot be included in total budget costs in this Round of the Program.

## Demonstrating against the criterion

- 4.24 The Applicant should demonstrate merit in the EOI and full applications stage as follows:

### *Expression of interest*

- A budget table as per the ARENA budget table template. Budget figures provided at the EOI stage are indicative only. ARENA will accept a variance of up to 25 per cent (+ or -) between the figures provided in an EOI and the full application. This variation applies to both the ARENA grant funding requested and the total project budget.
- A written justification for the requested funding for the Project. (300 word limit)

**Attachments:** Nil



### **Full application**

- a. A justification for the requested funding for the Project. (500 word limit)
- b. A Project Budget, which should include the following:
  - a breakdown of expected expenses for the Project, including any overseas expenses;
  - the total cost of the Project;
  - the funding sought from ARENA; and
  - details and amounts of cash and In-Kind Contributions from the Applicant and all other sources.

### **Attachments:**

- a. Evidence/letters of support by the Applicant and any project partners, including their commitment to provide the specified cash and In-Kind Contributions.
- b. Information to confirm the Applicant (and any project partners) has (have) the financial capacity to fund its proposed share of the funding or In-Kind Contributions for the duration of the Project.
- c. A list of any other Research and Development Projects in a similar field for which the Applicant or the key personnel have received funding from Australian Government, state government and local government sources (including from agencies such as ARENA) in the past three years.

## **PART 5. FUNDING AGREEMENTS**

### **FUNDING OFFERS**

- 5.1 All funding offers and any payment of funds under the Program are conditional upon the execution of a Funding Agreement with ARENA.
- 5.2 Applicants must ensure that funding offers are kept confidential until the execution of such a document by both the Applicant and ARENA. All public statements by the Applicant between application lodgement date and execution of the Funding Agreement can only be made with ARENA's consent.
- 5.3 ARENA may withdraw its offer of funding should an Applicant not comply with item 5.2 of these Guidelines.
- 5.4 The funding offer will, if appropriate, include any details of the Funding Agreement negotiation process.

### **FUNDING AGREEMENT**

- 5.5 The Funding Agreement will provide the legal framework for the obligations of each party and payment in relation to the Project.
- 5.6 Details of the process for management and variation of the Funding Agreement will be set out in the agreement.

### **USE OF FUNDING**

- 5.7 Applicants are required to prepare a budget for the Project, which is to be submitted with their EOI and full application.
- 5.8 An approved budget will form part of the Funding Agreement for the Project.
- 5.9 Funding from the Program must be used only for approved expenditure on the Project, as set out in the Eligible Expenditure Guide at Appendix B of these Guidelines.

### **KNOWLEDGE SHARING AND PUBLICATION OF PROJECT INFORMATION**

- 5.10 A condition of funding through the Program is agreement to a Knowledge Sharing Plan to inform industry and the broader community about the Project's development and findings. ARENA will adopt a standardised process for refining knowledge sharing requirements for the Project.
- 5.11 An approved Knowledge Sharing Plan will form part of the Funding Agreement for the Project.
- 5.12 Once a Funding Agreement has been executed for a Project, the knowledge sharing requirements for that Project may be varied from time to time as set out in the Funding Agreement.

## PART 6. FURTHER PROGRAM INFORMATION

### CONFIDENTIALITY AND DISCLOSURE OF INFORMATION

- 6.1 Subject to this item 6.1, information of a confidential nature which is provided by an Applicant as part of or in connection with any application or negotiation process (if any) will be treated as commercial-in-confidence information by ARENA and will only be disclosed with the consent of the Applicant.
- 6.2 Despite 6.1 above, commercial-in-confidence information provided by Applicants may be disclosed by ARENA to the following parties:
- a. the Minister and the Minister's office;
  - b. the Parliament of the Commonwealth of Australia in response to a request by a House or a Committee of the Parliament of the Commonwealth of Australia;
  - c. the Auditor General, Ombudsman, Information Commissioner or Privacy Commissioner;
  - d. the Australian Energy Market Operator (AEMO);
  - e. ARENA staff, Consultants and advisers;
  - f. any Commonwealth agency or body, or any other organisation or individual considered by ARENA to have a need or an entitlement to know that information (including any state or territory agency or body), where that need or entitlement arises out of or in connection with ARENA's assessment, verification or due diligence of any aspect of an application; or
  - g. where authorised or required by law to be disclosed.

### ACKNOWLEDGEMENT AND PUBLICITY

- 6.3 Unless otherwise agreed, ARENA requires that all funding recipients will acknowledge the financial and other support received from ARENA in all publications, promotional and advertising materials, public announcements, events and activities in relation to the Project, or any products, processes or inventions developed as a result of that Project. The form of any such acknowledgement will be set out in the Funding Agreement.

### REVIEW OF DECISIONS AND COMPLAINTS

- 6.4 ARENA has in place a complaints handling policy, which is available on the ARENA website at <https://arena.gov.au>. Any complaints concerning assessments or processes should be discussed with the ARENA official involved in the assessment or process in the first instance. If the Applicant is not satisfied following the discussion with the ARENA official, a formal complaint can be made at [complaints@arena.gov.au](mailto:complaints@arena.gov.au).

### CONFLICTS OF INTEREST

- 6.5 ARENA has in place policies to manage any conflicts of interest that may arise with respect to the ARENA Board, personnel and Advisory Panel members.
- 6.6 Applicants must advise ARENA in writing of any actual or potential conflicts of interest that arise during any part of the Application process. The Applicant must comply with any directions from ARENA as to the management of a material conflict of interest.
- 6.7 ARENA reserves the right to cease consideration of an Application at any stage of the process, where a conflict arises that cannot be appropriately managed.

## NO CONTRACT OR LIABILITY

- 6.8 Despite anything in the Guidelines or in any EOI or full application submission, or any other documentation that forms part of this process (in part or together), by submitting an application, each Applicant:
- a. Acknowledges that neither ARENA nor the Applicant intends to create any contract or other relationship under which ARENA is obliged to conduct the process in relation to the Program in any manner or at all, and that there is in fact no such contract or other relationship in existence.
  - b. Acknowledges that neither the Guidelines nor any submission will create any legal or other obligation upon ARENA to conduct the process in any manner or at all.
  - c. Agrees that ARENA will not be liable whatsoever for any costs incurred by the Applicant in preparing an EOI and/or Application for the purposes of applying for funding under this program.
  - d. Releases ARENA from any claim it might otherwise have been able to make or bring against ARENA, arising out of or in connection with ARENA's conduct of, or failure to conduct, the process in any manner or at all.

## WORK HEALTH AND SAFETY

- 6.9 All organisations have obligations under relevant Work Health and Safety (WHS) Law to ensure the health and safety of workers so far as is reasonably practicable and that the health and safety of other persons is not put at risk from their undertakings. This obligation includes funding Recipients ensuring that safe systems of work are in place for each of their activities. ARENA expects Applicants to be committed to health and safety management in the proposed Project.
- 6.10 ARENA also has a policy of ensuring that it enters into agreements with or provides funding to only those organisations that take a proactive approach to managing work health and safety risks in accordance with the requirements of WHS Law.

## OTHER APPLICABLE REQUIREMENTS

- 6.11 All Applicants must disclose any litigation, arbitration, mediation, conciliation or proceeding or any investigations (Proceedings) that to the best of the Applicant's knowledge, after having made proper enquiry, are taking place, pending or threatened, against them or a Related Body Corporate (as defined in the *Corporations Act 2001 (Cth)*), where such Proceedings have the potential to affect either:
- the Applicant's capacity to undertake the proposed Project, or
  - the Applicant's reputation.
- 6.12 A range of Commonwealth policy and legislative requirements may also affect the conduct of Projects funded through the Program. Applicants should seek their own advice on any relevant legislation that may be applicable under the Funding Agreement.
- 6.13 ARENA will not enter into a Funding Agreement with an organisation on the list of persons and entities designated as terrorists. The list and more information on the anti-terrorism requirements are available at [http://www.dfat.gov.au/icat/UNSC\\_financial\\_sanctions.html](http://www.dfat.gov.au/icat/UNSC_financial_sanctions.html).

## APPENDIX A - TECHNOLOGY READINESS LEVELS

- A.1 The Technology Readiness Level (TRL) index is a globally accepted benchmarking tool for tracking progress and supporting development of a specific technology through the early stages of the innovation chain, from blue sky research (TRL 1) to actual system demonstration over the full range of expected conditions (TRL 9).
- A.2 There are various TRL rating scales that may be applicable to various technologies. For the purposes of this Program, ARENA uses the US Department of Energy Technology Readiness Level scale.
- A.3 It is expected that at the time of application, research and development activities of any specific technology should be between a TRL of 2 and 4 (inclusive) to be funded under the Round, as set out in Item 3.7 of these Guidelines.
- A.4 Applicants should refer to the table below in assessing the TRL of their Project. Applicants may also wish to use the TRL calculator available on the [Program webpage](https://arena.gov.au) at <https://arena.gov.au>. The TRL calculator is a tool developed by the US Air Force Research Laboratory<sup>2</sup> for applying TRLs to technology development programs. In its present form, the calculator is a Microsoft Excel spreadsheet application that allows the user to answer a series of questions about a technology project. Once the questions have been answered, the calculator displays the TRL achieved. Because the same set of questions is answered each time the calculator is used, the calculator provides a standardised, repeatable process for evaluating the maturity of any hardware or software technology under development. In this way, the TRL calculator is one tool that can answer the question of how one can measure TRLs using a standardised method.<sup>3</sup>

Table 1: US Department of Energy Technology Readiness Levels <sup>4</sup>

Relative level of technology development	TRL	TRL definition	Description
Systems operations	TRL 9	Actual system operated over the full range of expected mission conditions	The technology is in its final form and operated under the full range of operating mission conditions. Examples include using the actual system with the full range of wastes in hot operations.
System commissioning	TRL 8	Actual system completed and qualified through test and demonstration	The technology has been proven to work in its final form and under expected conditions. In almost all cases, this TRL represents the end of true system development. Examples include developmental testing and evaluation of the system with actual waste in hot commissioning. Supporting information includes operational procedures that are virtually complete. An Operational Readiness Review (ORR) has been successfully completed prior to the start of hot testing.
	TRL 7	Full-scale, similar (prototypical) system demonstrated in relevant environment	This represents a major step up from TRL 6, requiring demonstration of an actual system prototype in a relevant environment. Examples include testing full-scale prototype in the field with a range of stimulants in cold commissioning <sup>1</sup> . Supporting information includes results from the full-scale testing and analysis of the differences between the test environment, and analysis of what the experimental results mean for the eventual operating system/environment. Final design is virtually complete.

2 Nolte, William L., et al., "Technology Readiness Level Calculator," October 20, 2003, Air Force Research Laboratory (AFRL), presented at the NDIA System Engineering Conference

3 US Department of Energy Technology Readiness Assessment Guide (DOE 413.3-4 10-12-09) <https://www.directives.doe.gov/directives/0413.3-EGuide-04/view>, page 28

4 US Department of Energy Technology Readiness Assessment Guide (DOE 413.3-4 10-12-09) <https://www.directives.doe.gov/directives/0413.3-EGuide-04/view>, page 9 and 10

Relative level of technology development	TRL	TRL definition	Description
Technology demonstration	TRL 6	Engineering/ pilot-scale, similar (prototypical) system validation in relevant environment	Engineering-scale models or prototypes are tested in a relevant environment. This represents a major step up in a technology's demonstrated readiness. Examples include testing an engineering scale prototypical system with a range of simulants. Supporting information includes results from the engineering scale testing and analysis of the differences between the engineering scale, prototypical system/environment, and analysis of what the experimental results mean for the eventual operating system/environment. TRL 6 begins true engineering development of the technology as an operational system. The major difference between TRL 5 and 6 is the step up from laboratory scale to engineering scale and the determination of scaling factors that will enable design of the operating system. The prototype should be capable of performing all the functions that will be required of the operational system. The operating environment for the testing should closely represent the actual operating environment.
	TRL 5	Technology demonstration, Laboratory-scale, similar system validation in relevant environment	The basic technological components are integrated so that the system configuration is similar to (matches) the final application in almost all respects. Examples include testing a high-fidelity, laboratory scale system in a simulated environment with a range of simulants and actual waste <sup>2</sup> . Supporting information includes results from the laboratory scale testing, analysis of the differences between the laboratory and eventual operating system/environment, and analysis of what the experimental results mean for the eventual operating system/environment. The major difference between TRL 4 and 5 is the increase in the fidelity of the system and environment to the actual application. The system tested is almost prototypical.
	TRL 4	Component and/or system validation in laboratory environment	The basic technological components are integrated to establish that the pieces will work together. This is relatively "low fidelity" compared with the eventual system. Examples include integration of ad hoc hardware in a laboratory and testing with a range of stimulants and small scale tests on actual waste. Supporting information includes the results of the integrated experiments and estimates of how the experimental components and experimental test results differ from the expected system performance goals. TRL 4-6 represent the bridge from scientific research to engineering. TRL 4 is the first step in determining whether the individual components will work together as a system. The laboratory system will probably be a mix of on hand equipment and a few special purpose components that may require special handling, calibration, or alignment to get them to function.
Technology development			

Relative level of technology development	TRL	TRL definition	Description
Research to prove feasibility	TRL 3	Analytical and experimental critical function and/or characteristic proof of concept	Active research and development is initiated. This includes analytical studies and laboratory-scale studies to physically validate the analytical predictions of separate elements of the technology. Examples include components that are not yet integrated or representative tested with simulants. Supporting information includes results of laboratory tests performed to measure parameters of interest and comparison to analytical predictions for critical subsystems. At TRL 3 the work has moved beyond the paper phase to experimental work that verifies that the concept works as expected on simulants. Components of the technology are validated, but there is no attempt to integrate the components into a complete system. Modelling and simulation may be used to complement physical experiments.
	TRL 2	Technology concept and/or application formulated	Once basic principles are observed, practical applications can be invented. Applications are speculative, and there may be no proof or detailed analysis to support the assumptions. Examples are still limited to analytic studies. Supporting information includes publications or other references that outline the application being considered and that provide analysis to support the concept. The step up from TRL 1 to TRL 2 moves the ideas from pure to applied research. Most of the work is analytical or paper studies with the emphasis on understanding the science better. Experimental work is designed to corroborate the basic scientific observations made during TRL 1 work.
Basic technology research	TRL 1	Basic principles observed and reported	This is the lowest level of technology readiness. Scientific research begins to be translated into applied research and development. Examples might include paper studies of a technology's basic properties or experimental work that consists mainly of observations of the physical world. Supporting Information includes published research or other references that identify the principles that underlie the technology.

- 1 Simulants should match relevant chemical and physical properties.
- 2 Testing with as wide a range of actual waste as practicable and consistent with waste availability, safety, ALARA (as low as reasonably achievable), cost and project risk is highly desirable.

## COMMERCIAL READINESS INDEX

- A.5 ARENA has developed the Commercial Readiness Index (CRI) for Applicants to use when considering their Projects and developing funding applications for ARENA consideration. The index provides a rigorous structure for evaluating where one or more industry sectors are facing barriers, and enables ARENA to structure its funding support to best reduce risks and barriers at the various stages of the pathway to commercialisation.
- A.6 A pictorial representation of the TRLs and CRIs is shown in Figure 1. The CRI extends to the point at which the technology or application is commercially deployed and has become a bankable asset class. This figure demonstrates how researchers can consider at an early stage how their research will become commercial.
- A.7 More information on the CRI is available on the ARENA website <https://arena.gov.au>.

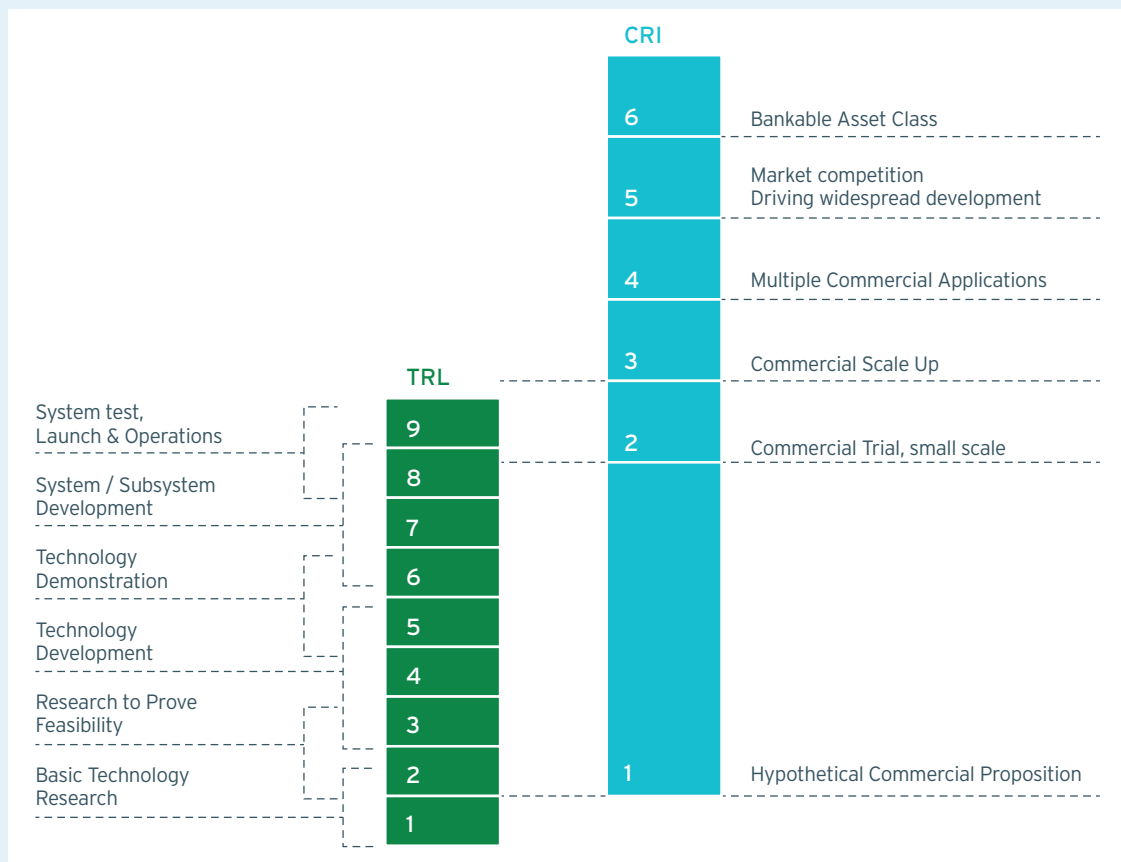


Figure 1: ARENA's TRL and CRI framework



## APPENDIX B - ELIGIBLE EXPENDITURE GUIDE

- B.1 These Eligible Expenditure Guidelines specify the kinds of expenditure that are eligible or ineligible for Projects funded through the Program. The Eligible Expenditure Guidelines are incorporated in the Funding Agreements for the Program, and are to be followed:
- a. in the preparation of the Project budget that is submitted with an EOI or full application for funding under the Program; and
  - b. in the preparation of reports required under the Funding Agreements.
- B.2 Budgets should be realistic and feasible in relation to the nature of the Project and the expected cash flow. As part of a full application, Applicants are required to:
- a. explain any underlying assumptions in the calculation of proposed expenditure;
  - b. indicate where quotes have been received or contracts are already in place; and
  - c. provide relevant document(s) to support expenditure calculations.
- B.3 If a proposal is accepted for funding and a Funding Agreement is executed, ARENA will make payments as per the terms of the Funding Agreement. The amount and timing of funding to be paid will be determined on a case by case basis as part of the process of negotiating the Funding Agreement. Where an Applicant is in any doubt as to the eligibility of proposed expenditure, the Applicant must bring the matter to ARENA for decision. ARENA's determination on the eligibility of expenditure will be final.

### GENERAL PRINCIPLES

- B.4 The following general principles apply in the consideration of Eligible Expenditure:
- a. Eligible Expenditure is expenditure related directly to the undertaking of the Project;
  - b. Eligible Expenditure is calculated net of GST;
  - c. non-cash and In-Kind Contributions may be considered as Eligible Expenditure, provided that the Applicant can demonstrate to the satisfaction of ARENA that the requirements in these Eligible Expenditure Guidelines are satisfied;
  - d. In-Kind Contributions are non-monetary resources used on the Project where no cash has been transferred to the Recipient's account(s) for the Project;
  - e. expenditure that is undertaken prior to the signing of the Funding Agreement may be eligible, if prior written approval has been granted by ARENA;
  - f. expenditure that is incurred after the completion date for the Project specified in the Funding Agreement is generally ineligible;
  - g. Opportunity Costs are not Eligible Expenditure: Opportunity Costs are any benefits or production lost due to the allocation of resources to the Project ahead of any other possible activities by the Recipient;
  - h. where resources are used on a Project and on unrelated activities elsewhere in the Recipient organisation, the cost of those resources should be apportioned to the Project on the basis of the proportion of those resources that were used by the Recipient in undertaking the Project. Where it is not possible to make such a proportionate allocation, the Recipient should allocate the cost of the resources on a reasonable basis and provide information to ARENA to support this allocation of the cost of the resources;
  - i. related party transactions must be treated on an at cost basis, without mark-up, unless the Recipient can demonstrate to the satisfaction of ARENA that the transaction has been calculated on an arm's-length basis; and
  - j. generally accepted accounting principles are to be followed and it must be possible to track expenditure relating to the Project through a Recipient's accounting system to meet the financial reporting and audit requirements in the Funding Agreement.

## SPECIFIC ELIGIBILITY PROVISIONS

### B.5 Eligible Expenditure includes:

- a. expenditure on the preparation of contracts entered into for the purposes of undertaking the activities required for the conduct of the Project, subject to the ineligible expenditure constraints below;
- b. labour expenditure, such as salaries and wages, including reasonable on-costs for personnel employed directly on the Project, which may be calculated as 125 per cent of salaries. Labour on-costs include: workers' compensation insurance, employer contributions to superannuation, recreation and sick leave, long service leave accrual and payroll tax;
- c. administrative expenses, including expenses incurred on communications, accommodation, computing facilities, travel, recruitment, printing and stationery, where such expenses are related directly to the Project;
- d. bench or lab access fees, directly related to the Project;
- e. expenditure on research infrastructure installed for the Project at the full delivered cost of the infrastructure;
- f. expenditure on research infrastructure including hire or lease costs, and running costs directly related to the delivery of the Project;
- g. expenditure activities that directly contribute to or enable knowledge including database development, websites, applications and reports;
- h. expenditure on legal, audit and accounting costs related directly to the Project;
- i. expenditure related to the raising of funds for the Project, or the formation of consortia or joint ventures or other partnering arrangements, where such activities can be related directly to the Project;
- j. expenditure such as relevant licence fees or intellectual property purchase costs, where the Applicant needs to access specific technology to undertake the Project; and
- k. expenditure related directly to obtaining government approvals to undertake the Project.

### B.6 Ineligible expenditure cannot be included in the total Project cost and ARENA funds cannot be used for ineligible expenditure.

### B.7 Ineligible expenditure includes, but is not limited to:

- a. expenditure related to the general operations and administration of the Applicant or Recipient that the Applicant or Recipient could reasonably be expected to undertake in the normal course of business, proportional to the Project;
- b. expenditure on activities that a local, state, territory or Commonwealth government agency has the responsibility to undertake, unless the Applicant or Recipient can demonstrate to the satisfaction of ARENA that the expenditure is related to a co-contribution;
- c. interest on loans for new and pre-existing capital items used for the Project;
- d. expenditure on the acquisition of land for a Project;
- e. sales or promotional activities that do not support directly the successful completion of the Project
- f. membership fees;
- g. donations; and
- h. expenditure that does not directly support the delivery of the Project.

## LABOUR

- B.8 Eligible labour expenditure is the gross amount paid or payable to an employee of the Applicant or Recipient's company or organisation. Eligible salary includes any components of the employee's total remuneration package that are itemised on their Pay As You Go (PAYG) annual payment summaries submitted to the Australian Taxation Office (ATO).
- B.9 Where personnel are already engaged by the recipient prior to the commencement of the Project and have not been engaged specifically to work on the Project, this cost should be classified as In-kind Contributions, as opposed to Cash Contributions. In addition, where an existing member of personnel is transferred to work on the Project (for all or part of the time), then the proportion of time that is spent on the Project shall be classed as an in-kind contribution.
- B.10 Recipients must provide evidence to demonstrate the amount of time that an employee spent on the Project. Evidence to support Eligible Expenditure on labour could include timesheets, job cards or diaries.
- B.11 Labour costs cannot be claimed based on an estimation of the employee's worth to the company, where no cash has changed hands.

## CONTRACT EXPENDITURE

- B.12 Eligible contract expenditure is the cost of any activities to support the Project performed for the Recipient by another organisation. Work to be performed on a Project must be the subject of a written contract, including a letter or purchase order, which specifies the nature of the work to be performed for the Recipient and the applicable fees, charges and other costs payable. The written contract must be executed prior to the commencement of the work undertaken under the contract.
- B.13 It is not a requirement for contracts to be in place at the time an Applicant submits a proposal to ARENA. However, for major items of contract expenditure, such as purchases of major items of hardware to be incorporated in the Project, Applicants will be expected to have some form of documentary evidence, such as written quotes from suppliers, to substantiate the expenditure included in the budget for the Project.
- B.14 Where the contractor and the Applicant or Recipient are not at 'arm's-length', the amount assessed for work performed will be an amount considered to be a reasonable charge for that work and contain no unacceptable overheads and no element of 'in group profit'. Organisations considered not at 'arm's-length' include related companies and companies with common directors or shareholders.

## EXPENDITURE PRIOR TO EXECUTION OF THE FUNDING AGREEMENT

- B.15 ARENA reserves the right to approve expenditure incurred after ARENA has made a funding offer, but before a Funding Agreement has been executed. Requests must be submitted in writing after an offer of funding has been made. Note that any expenditure made before the execution of a Funding Agreement in the absence of ARENA's prior approval is done so at the sole risk of the Applicant.

## OVERSEAS EXPENDITURE

- B.16 As set out in item 3.9 of these Guidelines, any items of expenditure incurred by the Applicant outside of Australia, other than in respect of equipment or materials, must be limited to no more than 10 percent of total ARENA funds, except in exceptional circumstances that must be justified by the Applicant and agreed to by ARENA in writing.
- B.17 Following execution of a Funding Agreement, expenditure on goods and services overseas may be subject to approval by ARENA as specified in the Funding Agreement.

## ACCOUNTING SYSTEMS

- B.18 Recipients and any relevant project partners are required to have suitable accounting systems in place that allow for:
  - a. the separate and accurate identification of contributions and Eligible Expenditure on the Project; and
  - b. a clear audit trail of all Project funding contributions and Eligible Expenditure to be available upon request and as required to meet the requirements in the Funding Agreement.

## GLOSSARY

**Applicant** - an eligible institution as defined in item 3.2 of these Guidelines that has submitted a proposal for funding under the Program.

**Commercial Readiness** - the level of introduction into the market of a new Renewable Energy Technology being investigated by a Project, as mapped on the scale described in Appendix A of these Guidelines.

**Conflict of Interest** - a situation where a person makes a decision or exercises a power in a way that may be, or may be perceived to be, influenced by either material personal interests (financial or non-financial) or material personal associations.

**Consultant** - a Consultant engaged by ARENA pursuant to section 63 of the ARENA Act to provide services to assist ARENA in the performance of its functions.

**Corresponding WHS Law** - as defined in the *Work Health and Safety Act 2011* (Cth), means each of the following:

- the *Work Health and Safety Act 2011* of New South Wales
- the *Occupational Health and Safety Act 2004* of Victoria
- the *Work Health and Safety Act 2011* of Queensland
- the *Occupational Safety and Health Act 1984* of Western Australia
- the *Work Health and Safety Act 2012* of South Australia
- the *Work Health and Safety Act 2012* of Tasmania
- the *Work Health and Safety Act 2011* of the Australian Capital Territory
- the *Work Health and Safety (National Uniform Legislation) Act 2011* of the Northern Territory
- any other law of a State or Territory prescribed by the regulations, as amended from time to time.

**Eligibility Criteria** - the Eligibility Criteria for Projects listed Part 3 of these Guidelines.

**Eligible Expenditure** - expenditure of the kind set out in Appendix B of these Guidelines.

**Full Time Equivalent (FTE)** - the ratio of the total number of paid hours during a period (part time, full time, contracted) by the number of working hours in that period Mondays through Fridays. The ratio units are FTE units or equivalent employees working full-time. In other words, one (1.0) FTE is equivalent to one employee working full-time.

**Funding Agreement** - the agreement between a Recipient and ARENA for funding under the Program. This includes a Head Funding Agreement or an individual Funding Agreement. Both agreements consist of two parts - the General Conditions and the Schedule:

- General Conditions - the predetermined standard contract approved by ARENA
- Schedules - the specific information and conditions that are consistent with the funding offer of one or several Projects.

**General Funding Strategy** - the document made under Subdivision A, Division 2, Part 3 of the ARENA Act.

**Grant** - an amount awarded for a particular Project in return for the completion of specified milestones. A Grant is not to be confused with a gift or a loan. In the case of the Program, the Grant is the amount identified in the Funding Agreement. Grants are subject to normal taxation treatment as income and no special taxation agreements will apply to Grants under the Program.

**Guidelines** - the Research and Development Program Guidelines.

**In-Kind Contribution** - non-monetary resources used on the Project where no cash has been transferred to the Recipient's account(s) for the Project.

**Investment Plan** - the ARENA Investment Plan, a document that ARENA releases annually, outlining ARENA's investment Programs and initiatives.

**Knowledge Sharing Plan** - an agreement entered into between ARENA and the Applicant under a Funding Agreement to share knowledge from the Project.

**Merit Criteria** - the Merit Criteria listed in Part 4 of these Guidelines.

**Opportunity Costs** - any benefits or production lost due to the allocation of resources to the Project ahead of any other possible activities by the Recipient.

**Priority Renewable Energy Technologies (also Round Priorities)** - those Priority Renewable Energy Technologies identified for the Program listed in item 3.8 of these Guidelines.

**Program** - the Research and Development Program.

**Project** - see Research and development Project.

**Recipient** - An entity that has entered into a Funding Agreement with ARENA for funding of a Project.

**Renewable Energy Technology** - includes: (a) hybrid technologies; and (b) technologies (including enabling technologies) that are related to Renewable Energy Technologies.

**Research and Development Project** - research and development activities involving a Renewable Energy Technology that meets the Program's priorities as advised in these Guidelines.

**Technology Readiness Level (TRL)** - the level of development of a Renewable Energy Technology being investigated by a Project, as mapped on the scale described in Appendix A of these Guidelines.

**WHS Law or WHS Legislation** - the *Work Health and Safety Act 2011* (Cth), Corresponding WHS Law or superseded work health and safety or occupational health and safety law in any jurisdiction. The WHS Law includes regulations established under the relevant Acts.

**WHSMS** - work health and safety management system.

**World Class Position** - ability to influence the global competitiveness and/or supply of the Renewable Energy Technology.

Further information is available at  
[arena.gov.au](http://arena.gov.au)

**Australian Renewable Energy Agency**

To discuss potential for funding:  
Phone +61 1800 804 838  
Email [proposals@arena.gov.au](mailto:proposals@arena.gov.au)

*Postal Address*

GPO Box 643  
Canberra ACT 2601

*Location*

2 Phillip Law Street  
New Acton ACT 2601

This work is copyright, the copyright being owned by the Commonwealth of Australia. With the exception of the Commonwealth Coat of Arms, the logo of ARENA and other third-party material protected by intellectual property law, this copyright work is licensed under the Creative Commons Attribution 3.0 Australia Licence.

Wherever a third party holds copyright in material presented in this work, the copyright remains with that party. Their permission may be required to use the material.

ARENA has made all reasonable efforts to:

- clearly label material where the copyright is owned by a third party
- ensure that the copyright owner has consented to this material being presented in this work.

Under this licence you are free to copy, communicate and adapt the work, so long as you attribute the work to the Commonwealth of Australia (Australian Renewable Energy Agency) and abide by the other licence terms. A copy of the licence is available at <http://creativecommons.org/licenses/by/3.0/au/legalcode>

This work should be attributed in the following way:

© Commonwealth of Australia (Australian Renewable Energy Agency) 2018

Requests and enquiries concerning reproduction and rights should be addressed to [arena@arena.gov.au](mailto:arena@arena.gov.au)



**Australian Government**  
**Australian Renewable**  
**Energy Agency**

**ARENA**