



ARENA's R&D Program Round 5: Addressing solar PV end-of-life issues and lowering solar PV cost

Information Session
29 January 2020 and 3 February 2020



Agenda

1. Welcome and introduction
2. Strategic context and Round priorities
3. Application and assessment process
4. Open Q&A



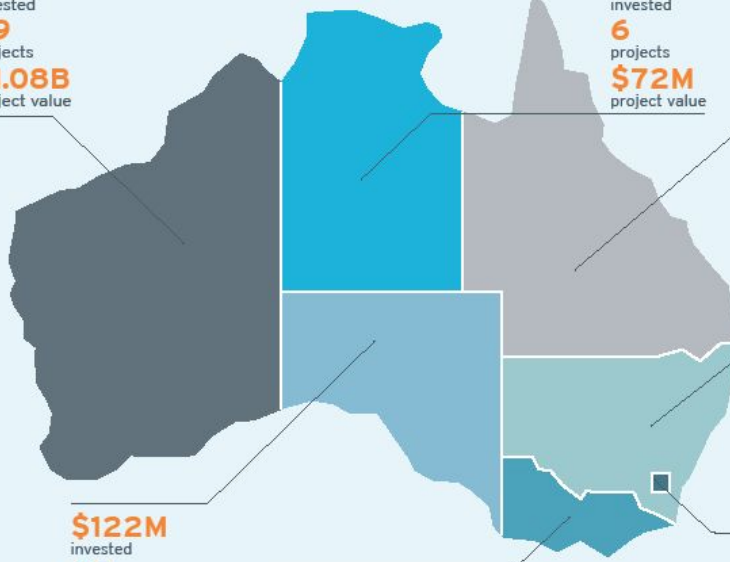
Strategic Context and Round Priorities

ARENA AT A GLANCE

\$1.46B INVESTED **486** PROJECTS **\$5.55B** VALUE **\$4.06B** INVESTMENT LEVERAGE

SOLAR PV \$654M	GRID INTEGRATION \$210M	SOLAR THERMAL \$145M	HYBRID \$109M	BIOENERGY \$105M	STORAGE - BATTERIES/ PHES \$95M	OCEAN \$54M	GEOTHERMAL \$42M	HYDROGEN \$46M
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\$134M
invested
29
projects
\$1.08B
project value



\$37M
invested
6
projects
\$72M
project value

\$199M
invested
50
projects
\$1.19B
project value

\$730M*
invested
198
projects
\$2.18B
project value

\$60M
invested
60
projects
\$166M
project value

\$39M
invested
18
projects
\$95M
project value

\$122M
invested
43
projects
\$427M
project value

\$138M
invested
82
projects
\$341M
project value



\$1:\$2.80
Average investment leverage



Study R&D Demo Deployment
\$1:\$1.56 **\$1:\$1.77** **\$1:\$1.85** **\$1:\$4.95**
 Investment leverage across the innovation chain



Launched new **investment priorities**:

- **integrating** renewables into the electricity system
- accelerating **hydrogen**
- supporting industry to **reduce emissions**



10 projects announced Q3 2019 including:
\$40M SA pumped hydro plant
\$3.8M three hydrogen projects
\$15M ultrafast EV charging network
\$4.5M Lord Howe Island hybrid solution



Held ARENA's project accelerator
A-Lab Incubate 2019

* Includes \$567 million contributed to projects inherited by ARENA in 2012



Investment Priorities

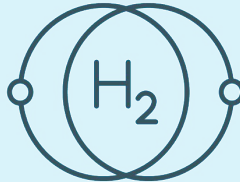
INTEGRATING RENEWABLES INTO THE ELECTRICITY SYSTEM

Delivering technology and business model solutions to enable higher shares of renewables in the electricity sector



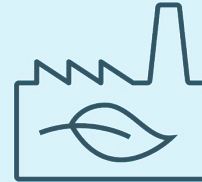
ACCELERATING HYDROGEN

Supporting the growth of Australia's hydrogen industry for domestic applications and export



SUPPORTING INDUSTRY TO REDUCE EMISSIONS

Progressing technologies to reduce costs and reduce emissions



ARENA's Research and Development Program

The Program is delivered under specific, competitive Rounds and has so far awarded over \$87 million in funding. This is Round 5 of the Program.

The objectives of the Program are to provide funding to deliver the following outcomes:



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;



an **increase in skills, capacity and knowledge** relevant to the Round's Priority Renewable Energy Technologies within Australia; and



an **increase in investment** that improves the Technology Readiness and Commercial Readiness of the Round's Priority Renewable Energy Technologies.

Round Objective

ARENA is providing up to \$15 million to support R&D 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.

The Round also has four specific Priority Areas.



Round Priority Areas

- **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.



Application and Assessment Process

Background

- Program 'rules' are outlined in the Guidelines
- Must read the R&D Program Round 5 Guidelines:
<https://arena.gov.au/assets/2019/12/research-development-addressing-solar-pv-end-of-life-issues-and-cost.pdf>
- Must submit applications via ARENANet: <https://arenaomnistar.f1solutions.com.au/>
- Application process is similar to previous Rounds, however Knowledge Sharing is now an eligibility requirement, not a merit criterion.

Funding expectations

- All ARENA funding will be in the form of grants (~ \$15 million in total)
- Projects start and end dates must be between 1 September 2020 and 1 September 2022
- Project length - up to 2 years
- ARENA grants are expected to be between \$400,000 and \$4 million for each project
- No grant can exceed \$5 million
- Projects are expected to match ARENA funding on 1:1 basis. Cash and in-kind contributions count towards matched funding.
- Higher cash contribution = higher merit
- Contributions from industry partners = higher merit
- Higher starting TRL = higher contributions expected

ARENA's assessment process

Two stage process

- Expression of Interest (limited information, less prescriptive/defined)
- Full Application (invitation only)
- Same process for both stages (Full Application more detailed and firm budget).

Eligibility Criteria

- Seven eligibility criteria
- All must be met to proceed to merit assessment

Merit Criteria

- All 4 merit criteria equally weighted
- ARENA Advisory Panel will assess applications against merit criteria.
- Applications numerically scored
- Projects ranked within Round Priorities – top ranked projects progress
- ARENA will allocate funds across Round Priorities as appropriate

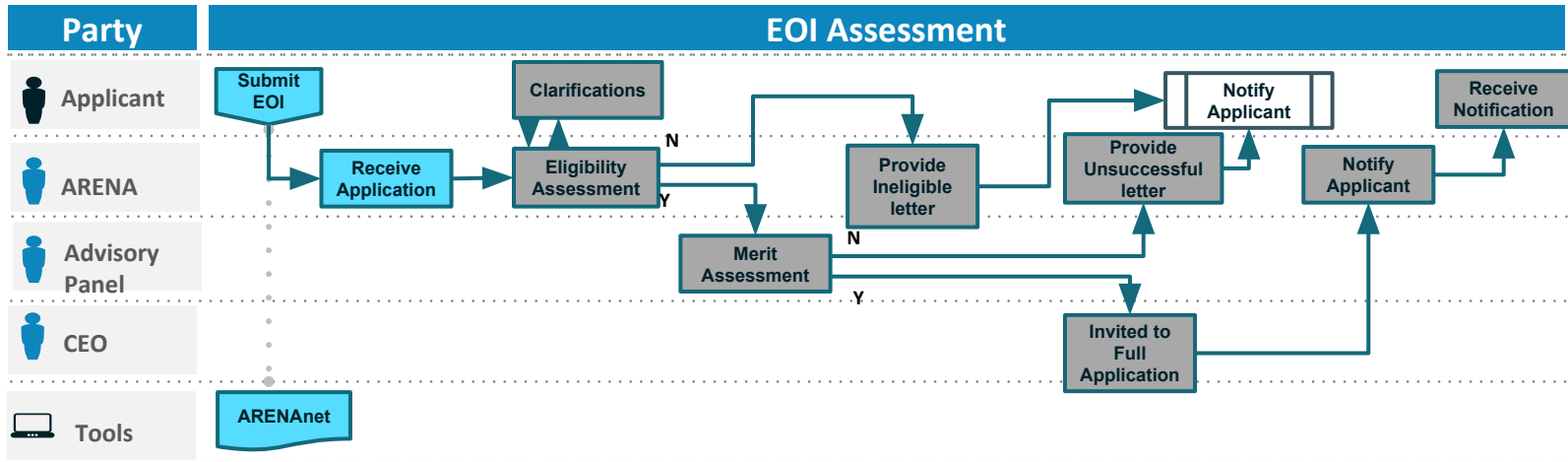
Portfolio Approach

- Considers how a project uniquely contributes to the Program objectives, or as part of a suite of complementary ARENA projects
- May not fund if similar to existing ARENA project or other project under assessment

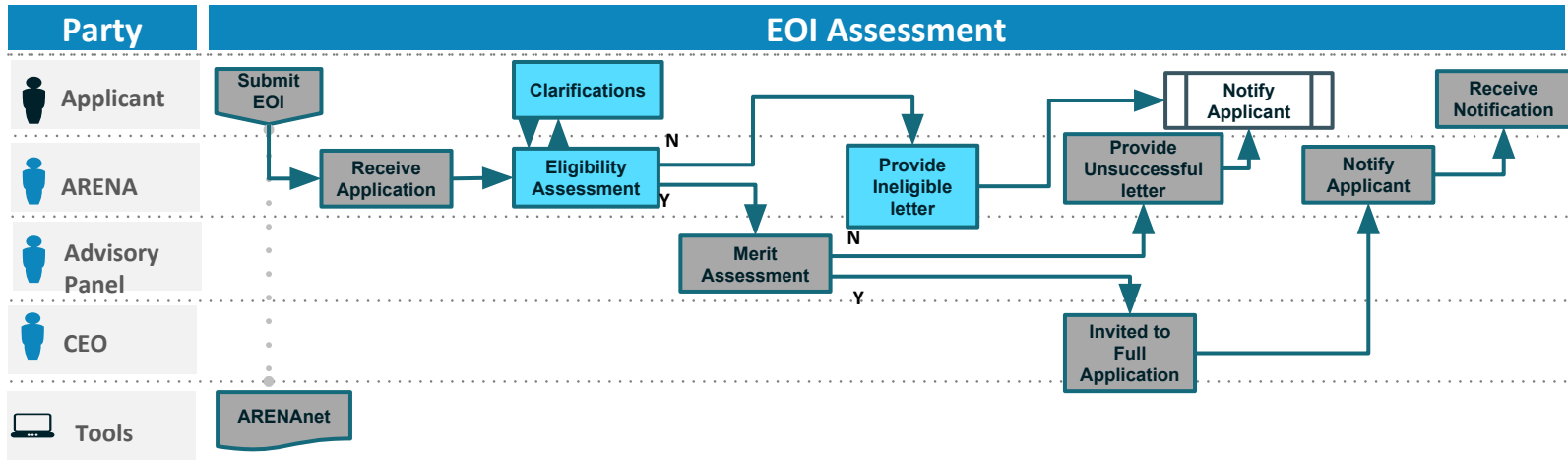
Value for money

- Applications assessed for overall value for money and risk against the merit criteria

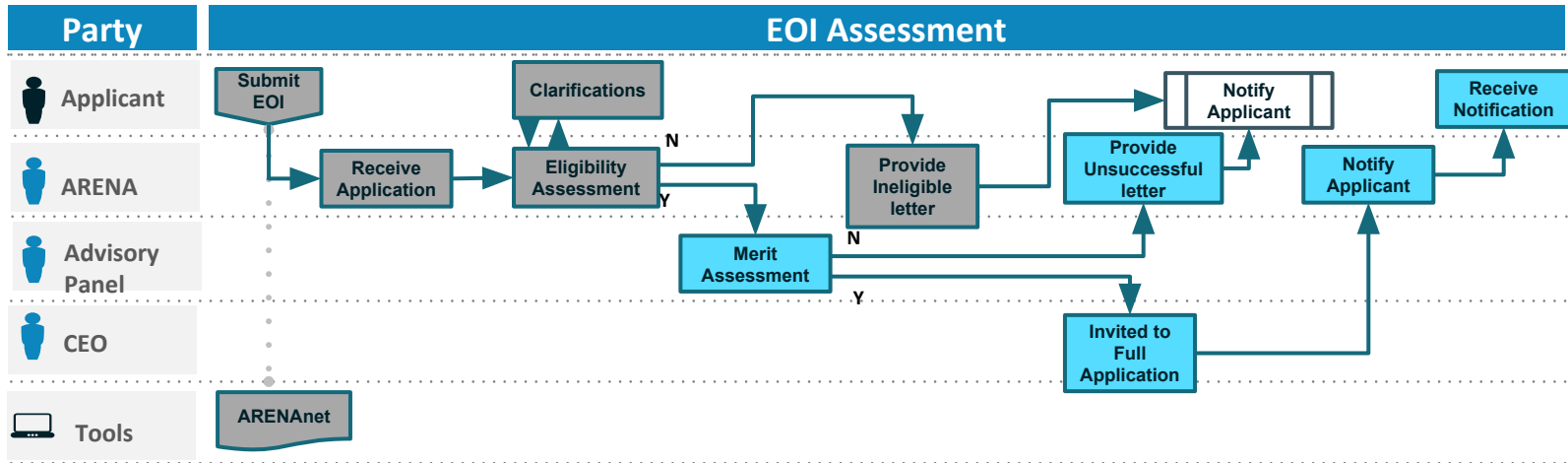
EOI Assessment



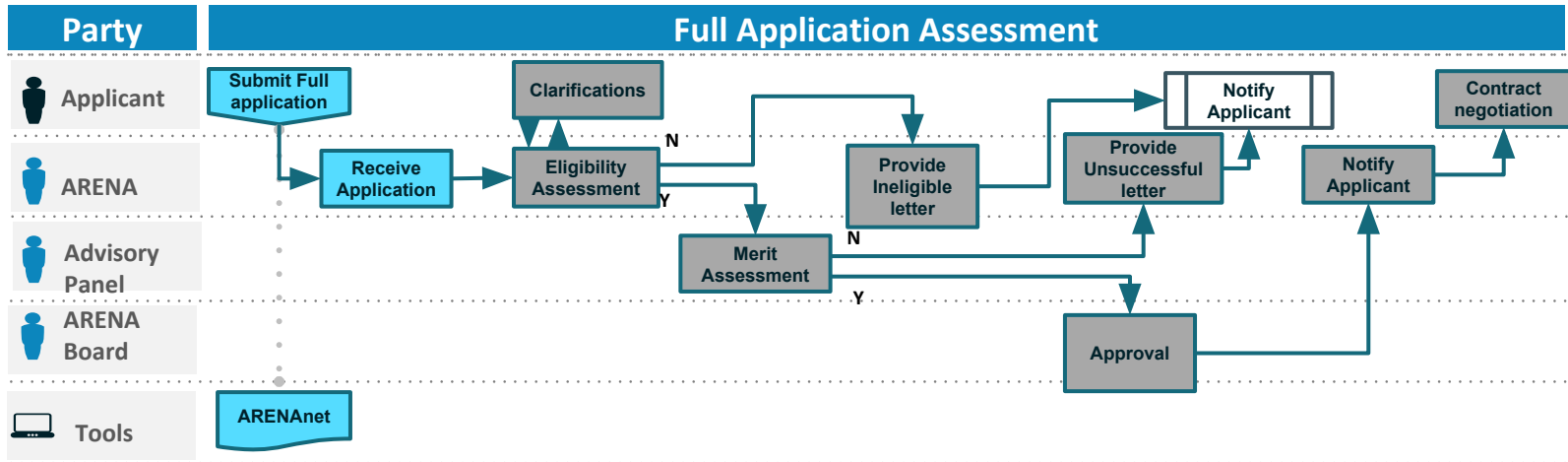
EOI Assessment



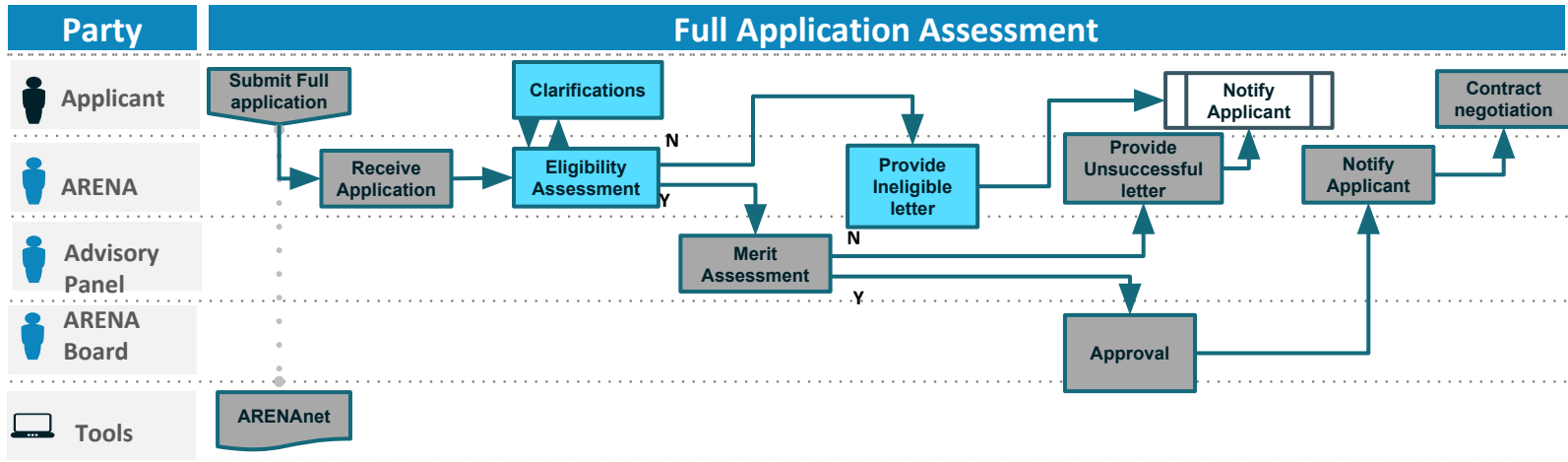
EOI Assessment



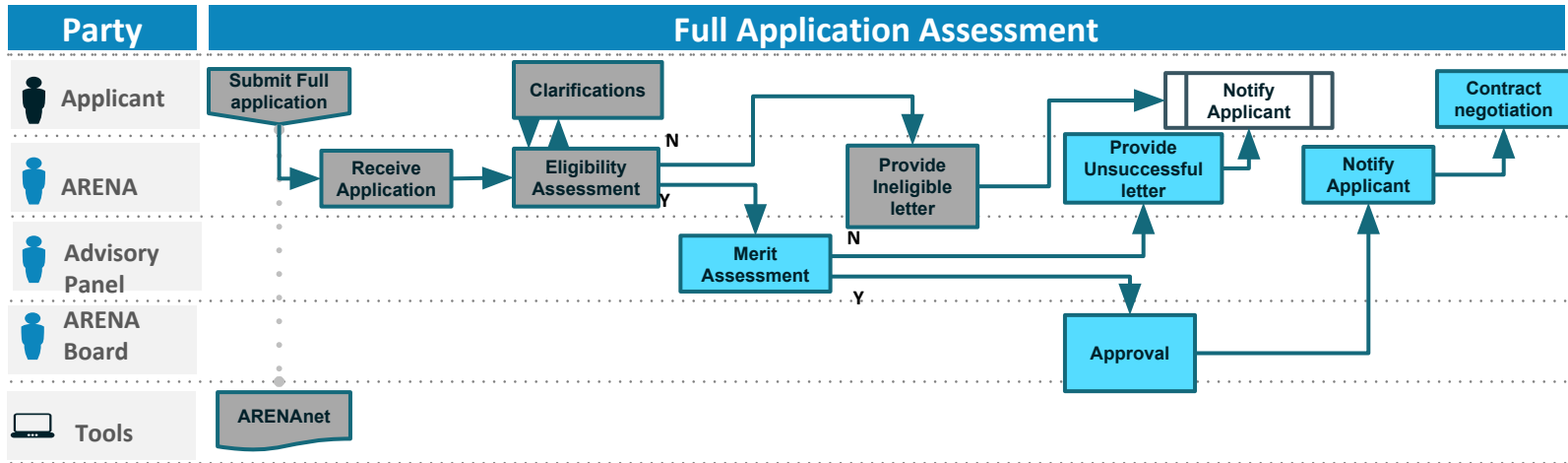
Full Application Assessment



Full Application Assessment



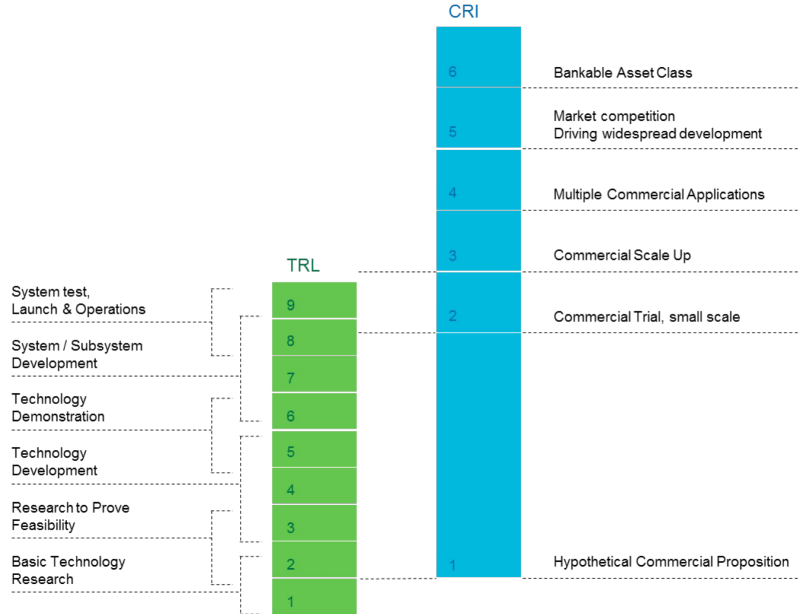
Full Application Assessment



Eligibility Criteria

A - eligible applicant	<ul style="list-style-type: none"> • Must be an Australian research institution <u>OR</u> Australian entity incorporated under the Corporations Act 2001 (Cth)
B - eligible project	<ul style="list-style-type: none"> • Must meet definition of “R&D” and “Renewable Energy Technology” in the Guidelines • Must be between TRL 2-4 (inclusive) at time of application (can move from this during the project) • Must meet one of the round priorities • Must be no more than 2 years
C - take place in Australia	<ul style="list-style-type: none"> • Majority of activities must take place in Australia • No more that 10% of ARENA funds may be spent overseas, with exception of purchase or use of equipment and materials. ARENA will consider requests in increase this cap at EOI stage.
D - intellectual property	<ul style="list-style-type: none"> • Must have ownership or access to any IP necessary to complete the project, and provide evidence to that effect at full application as necessary.
E - workplace gender equality	<ul style="list-style-type: none"> • Applicant must not be named as being non-compliant with the Workplace Gender Equality Act 2012 (Cth)
F - knowledge sharing	<ul style="list-style-type: none"> • Must agree to ARENA's Knowledge Sharing Plan for this Round
G - compliance with other requirements	<ul style="list-style-type: none"> • Completeness and comprehensiveness of application against merit criteria • Disclose any legal proceedings • Accept all requirements in Part 6 of the Guidelines

Technology Readiness Levels (TRLs) 2-4



TRL 1: Basic principles observed and reported

TRL 2: Technology concept and/or application observed and reported.

TRL3: Analytical and experimental critical function and/or characteristic proof of concept.

TRL 4: Component and/or system validation in laboratory environment.

TRL 5: Laboratory-scale, similar system validation in relevant environment.

Further explanation at Appendix A of the Guidelines

Merit criterion A - Applicant capability and capacity (EOI)

Capability

- Project team's (applicant and partners) track record of research excellence and skills as relevant to the proposed Project *(200 words)*

Capacity

- Demonstrate the applicant organisation and any partner organisations and key personnel have the resources, skill, expertise and research infrastructure (or that these will be accessible or made available) to achieve the Project outcomes. *(200 words)*

Merit criterion A - Applicant capability and capacity (EOI)

CVs can be submitted at the Full Application stage

Merit Criterion A - Key Personnel



Insert details of your key personnel (as many as required) who are crucial to the delivery of the Project.

Click the **+** (plus) button below the table to add more personnel.

To delete rows from the table, select the checkbox on the row to be deleted and click the **-** (minus) button below the table to delete the selected row.

Personal Details

Title *

Given Name *

Family name *

Position *

Select this person's organisation

 Main Applicant

Phone Number *

Email *

What is this person's role (eg. Project Manager) and estimated time to be spent (eg. 0.5 FTE) on the project? (50 word limit) *

50 words remaining.

Merit criterion B - Contribution to the Round Objective and Priority Areas (EOI)

Round Priorities	<ul style="list-style-type: none">• How the project is aligned to the selected Round Priority (<i>200 words</i>)
Potential Impact	<ul style="list-style-type: none">• What the potential impact of the Project is within the selected Round Priority, (<i>200 words</i>) on either:<ul style="list-style-type: none">○ improving cost-effectiveness of end-of-life management○ improving on the cost-effectiveness of current mass-market panels (<i>using the ITRPV report as a benchmark</i>)○ increasing the uptake of renewable energy
World Class	<ul style="list-style-type: none">• How the Project is world class or innovative compared to research already being done in this field (domestic and international) (<i>200 words</i>)
Path to Market	<ul style="list-style-type: none">• Outline the pathway to market for the technology including a timeframe to commercialisation. How the Project facilitates or accelerates movement along that pathway and what the potential market size is (<i>300 words</i>)
Other	<ul style="list-style-type: none">• Other contributions the Project will make in the achievement of Round objective(s) not already mentioned (<i>200 words</i>)

Round Objective

The *Program Objectives* are different to the *Round Objective*.

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 lifetimes of a solar panel.

Any comparisons to the performance of current mass-market solar PV technologies must use the ITRPV report as a benchmark.

A one-page attachment may be used to support claims against alignment with the ITRPV. This may include graphical representations where relevant.

Round Priority Areas

The Round Priorities areas are:

- **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.
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Merit Criterion C - Project design and methodology

Project design

- Technical design or methodology that will be employed to achieve the Project outcomes.
- Timeline for the Project, including milestones, stage-gates, dependencies and deliverables associated with the Project.
- Main risks to achieving the outcomes of the Project and how these risks will be mitigated (eg. risk in - technological, project planning, infrastructure and equipment access, personnel and WHS .

(500 words)

Merit Criterion D - Financial viability and co-funding commitment

Budget Table

- Simple budget table in ARENANet
- Budget may vary up to 25% between EOI and Full Application

Written Justification

- Written justification for the requested funding (*300 words*)

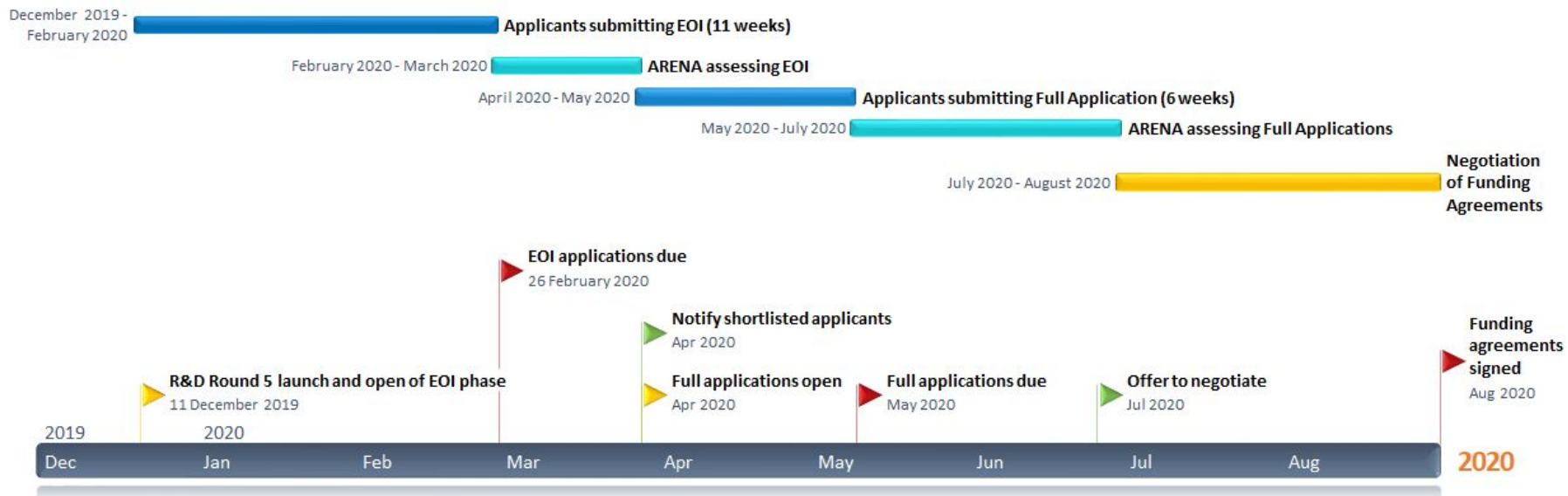
Check against eligible expenditure guidelines in Appendix B of the Guidelines



Other important points

- Part 5 - Funding Agreements
- Part 6 - Further Program Information
- Appendix A - Technology Readiness Levels
- Appendix B - Eligible expenditure

Timeline for application and assessment process



Key links

R&D Round 5 webpage

<https://arena.gov.au/funding/addressing-solar-pv-end-of-life-issues-and-lowering-solar-pv-cost/>

ARENANet

<https://arenaomnistar.f1solutions.com.au/>

Guidelines

<https://arena.gov.au/assets/2019/12/research-development-addressing-solar-pv-end-of-life-issues-and-cost.pdf>

FAQs

<https://arena.gov.au/assets/2019/12/faqs-research-development-addressing-solar-pv-end-of-life-issues-and-cost.pdf>

Further questions?

Email: proposals@arena.gov.au