

ARENA

COMMERCIALISATION OF R&D FUNDING INITIATIVE PILOT – INITIAL EVALUATION

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1.0 PURPOSE AND SCOPE

This evaluation covers the Commercialisation of R&D Funding Initiative Pilot (the Initiative) run in partnership with the CSIRO's ON Prime Program, and an associated workshop ARENA conducted for eligible applicants. This is an initial evaluation, intended to inform a recommendation as to whether ARENA should extend the Initiative into a full program, and any improvements to program design and implementation. The Initiative offered up to \$1 million in kick-start funding grants of \$100K each, for projects of up to one year, to advance the development of a commercially viable product from renewable energy technology developed through R&D. The ARENA website provides further [background on the Initiative](#). The CSIRO website provides further information on the [ON Prime Program](#).

This evaluation assesses achievement of short-term outcomes against the following intended short-term outcomes:

- > Prototypes are developed from research, and commercial analysis
- > Research teams are actively engaged in the commercialisation of their research
- > Research teams have increased their capability and confidence in engaging in commercialisation activities through their project experience.
- > New contacts are made between researchers, and industry and commercial investors.

The evaluation covers effectiveness, efficiency and appropriateness. Evaluation of medium-term outcomes from the funded projects and their expected longer-term impact is planned as a separate exercise when the projects near completion (around November 2020).

2.0 SUMMARY

2.1 KEY FINDINGS

The Commercialisation of R&D Funding Initiative Pilot was very effective in delivering the short-term outcomes that it set out to achieve at a stage of development where impact can be challenging to deliver. The Initiative was not an efficient mechanism, however, when considering the ARENA resources required to run the round against the grant funding that was awarded.

The design of the Initiative was appropriate, although it should be noted the National Innovation and Science Agenda (NISA) funding that supported the ON Prime program that was leveraged for the pilot expired on 30 June 2020. The Initiative would also deliver higher impact and increase efficiency, whilst retaining value for money, if the project grant funding request was increased to \$200,000 and the maximum project length was extended to 1.5 - 2 years.

2.2 EFFECTIVENESS

2.2.1 ACHIEVEMENT OF SHORT-TERM OUTCOMES

Outcome: The early prototyping and commercial analysis of R&D is supported.

KPI: Five early prototypes are supported for development.

Achieved. The Initiative supported five projects, however one involves the development of an industry tool aiming to help commercialise a broader sector of technology, rather than directly commercialising renewable energy R&D.

Outcome: Research teams are actively engaged in the commercialisation of their research.

KPI: Five research teams are actively engaged in the commercialisation of their research.

Achieved. The ARENA funding attracted 10x more renewable energy teams to participate in the ON Prime Program than previous rounds. All 13 of the teams that applied for ARENA funding are engaged in commercialisation, and the 5 projects that received ARENA funding are engaged to a larger extent. Two

of the successful grant recipients said that they would not have taken commercialisation steps if they had not been awarded ARENA funding.

Outcome: Research teams have increased their capability and confidence in engaging in commercialisation activities.

KPI: Research teams feel that they are better equipped to undergo the commercialisation process after participating in the CSIRO's ON Prime Program and attending the ARENA workshop.

Achieved. Participants of the ARENA workshop found the event useful regardless of the funding opportunity. All successful grant recipients reported that the ARENA grant funding was essential to pursuing commercialisation, and that the ON Prime Program was essential or very useful.

Outcome: New contacts are made between researchers, and industry and commercial investors.

KPI: An average of at least 3 new contacts (one-on-one interactions) are made by each research team.

Achieved. Successful grant recipients all reported making more than 3 new contacts, mainly through interviews conducted as part of the ON Prime Program. For two recipients, this was how they found the commercial partner for the funded project and for another two, the contacts helped identify applications for their technology.

2.3 EFFICIENCY

2.3.2 EFFICIENCY OF DELIVERY

The total ARENA resources required to run the Initiative were higher than those typically used to run R&D funding rounds, considering the ratio of resource requirement to total grants awarded.

There are a number of areas however, where efficiency can be increased for any future funding as scoping and design will be minimal and workshop travel funds would not be provided. The expected grant request per project could also be increased to deliver more impact, which would also increase efficiency in relation to grants awarded.

The grant application and assessment process, and funding agreement negotiation were very efficient from an ARENA perspective. The Guidelines were transparent and clear for applicants, but flexible enough for assessors to compare applications across different technologies. The Advisory Panel was also key to the successful assessment process, as they were highly proficient at this particular stage of development and could provide critical analysis regardless of the technology. Changing the knowledge sharing component from a merit criterion to an eligibility criterion (requiring applicants to sign up to a pre-prepared knowledge sharing plan) was particularly successful at this early technology development stage, and has been adopted in the Solar PV R&D Round 5.

The partnership with the CSIRO's ON Prime Program was highly efficient in providing applicants with commercialisation skills and developing commercial contacts, as it required very little ARENA resources. Following the 30 June 2020 expiry of the NISA funding that supported CSIRO's On Prime during the pilot, CSIRO's ON Program is currently adapting the program to pilot tailored and virtual formats, to continue to support researchers create impact with their research.

2.4 APPROPRIATENESS

2.4.3 CONSIDERING ASSUMPTIONS AND EXTERNAL FACTORS

The design of the initiative assumes that the current academic and innovation ecosystem is conducive to achieving the Initiative's outcomes and objectives, however observations indicate that this is only partly the case. Successful grant recipients in the initiative did receive in-kind and some cash support from their institutions, but have had no access to training or commercial development. The broader academic sector does not appear to reward commercialisation attempts and does not actively encourage them. This is not restricted to the renewable energy R&D sector, but may be more apparent in Australia than other countries such as the US.

The initiative demonstrated that there is enough interest in commercialisation from the R&D sector to justify running the process, however the number of ideas with a reasonable commercial potential is not as high as expected. The initiative would be unlikely to be able to extend beyond 5 projects in a round.

The CSIRO ON Prime Program was highly appropriate as an incubator to support the funding initiative, providing skills and contacts for teams in preparation for submitting an application to the ARENA funding initiative. A key component is the 100 interviews, which provided teams with contacts and also resulted in commercial partners for two of the successful grant recipients.

The maximum grant request of \$100k and project length of 1 year were slightly too restrictive, and could be increased to \$200k grants over 1.5-2 years to allow for additional activities and achieve greater impact in terms of commercial development.

The initiative does fill an important gap in ARENA's existing grant funding programs, fulfilling outcomes for the translation of R&D that are not otherwise targeted. No other national grants programs fulfill this funding gap, and commercial investment is not forthcoming at this technology development stage. Neither has there been any new investment policies or investment incentives that would decrease the grant funding need for the commercialisation of R&D.

2.5 IMPLICATIONS FOR FUTURE FUNDING ROUNDS

If a national accelerator program remained available and ARENA was seeking an investment area to achieve impact with less grant funding, the initiative could be considered for expansion into a program with repeated rounds.

Most of the expenditure and the biggest hurdle that recipients reported were around salary and committing FTEs. The initiative could be run as a Fellowship program for early career researchers, which would be simpler to administer, and would be likely to translate better to the academic sector in terms of what the objectives are and what the eligible activities are. A Fellowship program could also be made available to international researchers to help attract more personnel with the motivation to pursue commercialisation, and those with better commercial expertise, into Australian research institutions. Scoping work would need to be done to understand the potential IP transfer issues.

Once projects funded under the initiative have completed, there is a risk that even successful technology developments are not yet at a stage where they can attract further investment, either from private sources or from ARENA through the Advancing Renewables Program. The funded project activities focus on prototyping and testing, and the next logical phase of development would involve scaling up for deployment and creating a revenue stream. ARENA could consider including support for these activities in the original grant funding, potentially as stage-gated funds, or providing follow-on support for example through invitation to A-Lab events or networking opportunities.

3.0 EVALUATION

3.1 EFFECTIVENESS

Extent to which the intended short-term outcomes were achieved.

Outcome: The early prototyping and commercial analysis of R&D is supported.

KPI: Five early prototypes are supported for development.

Achieved. The Initiative supported five projects, however one involves the development of an industry tool aiming to help commercialise a broader sector of technology, rather than directly commercialising renewable energy R&D.

The M&E Plan targeted supporting five early prototypes as a successful KPI. A target of five projects was chosen as this represents an increase from the typical number of renewable energy projects received by CSIRO's ON Prime, it is an acceptable success rate compared to the anticipated level of

resources required to implement the Initiative, and translates into a 20% success rate if medium-term outcomes are to be achieved (i.e. if one project successfully attracts further commercial investment).

Five projects were deemed to be of high merit and were successful in receiving funding (Table 1). The successful projects involve a range of activities for prototype development and commercial development, however one project (2019/CRD001) focussed on the development of a tool for industry rather than a specific technology. Although the tool aims to facilitate the commercialisation of Building-integrated photovoltaics (BIPV) technology, if successful, it is not directly commercialising R&D. A future program might consider excluding tools of this kind, as it is difficult to assign a TRL to, does not necessarily leverage existing R&D and was difficult for assessors to compare directly with other technology developments. This would not apply to software development that provides a direct solution for renewables.

TABLE 1: FIVE PROJECTS WERE CONTRACTED UNDER THE INITIATIVE

Project	Recipient	TRL	ARENA grant	Total project cost*
2019/CRD001 - Building-integrated photovoltaics (BIPV) enabler	RMIT	5	\$100,614	\$320,941
Commercial development of a tool that aims to unlock deployment opportunities for BIPV. Although the tool itself will be developed and prototyped in the project, it is not a renewable energy technology in and of itself.				
2019/CRD002 - Pilot project to trial Solar F2D2 at University of Queensland Gatton Solar Farm	UQ	5	\$95,912	\$293,754
Field testing of a solar PV reliability tool, developed at UQ including real-world trial and techno-economic assessment.				
2019/CRD003 - Prototyping a photoluminescence imaging tool for testing of fielded solar modules	UNSW	4	\$100,000	\$462,558
Building and testing of solar PV module imaging instruments, and software development for users.				
2019/CRD004 - Displacement of gas by thermal energy storage	Uni SA	4	\$103,500	\$229,720
Development of a thermal energy storage system prototype.				
2019/CRD005 - Launch of a photothermal absorption spectrometer for cost reduction in PV materials	UNSW	6	\$100,000	\$364,375
Building of a production-ready prototype of a PV material optical absorption measurement device, establishment of a service model for customers and initiation of a launch plan.				

*total project cost is ARENA grant plus any co-contributions. Does not include any ON Prime awards or the travel grants for the workshop.

Outcome: Research teams are actively engaged in the commercialisation of their research.

KPI: Five research teams are actively engaged in the commercialisation of their research.

Achieved. The ARENA funding attracted 10x more renewable energy teams to participate in CSIRO's ON Prime Program than in previous cohorts. All 13 of the teams that applied for ARENA funding are engaged in commercialisation, and the 5 projects that received funding are engaged to a larger extent.

The ARENA funding program, conducted in conjunction with the ON Prime6 cohort, generated a 10x increase in the number of renewable energy teams participating in the ON Prime Program compared to previous cohorts (Table 2). The ON Prime7 cohort also saw a significant increase in total teams, but did not see the same level of renewable energy teams. This increase in ON Prime participation is very likely to translate into an increase in engagement in commercialisation activities.

A survey was sent to the ON Prime6 applicants¹ to test how the ARENA funding changed motivations to apply to ON Prime (Figure 1). The results show that about a third of ON Prime applicants would have applied anyway, a third were prompted to apply in this specific cohort and a third only applied because of the funding opportunity.

¹ 69% response rate

Of the successful ARENA grant recipients, two said that they would not have taken commercialisation steps if they had not been awarded funding and two said that their plans have been fast-tracked.

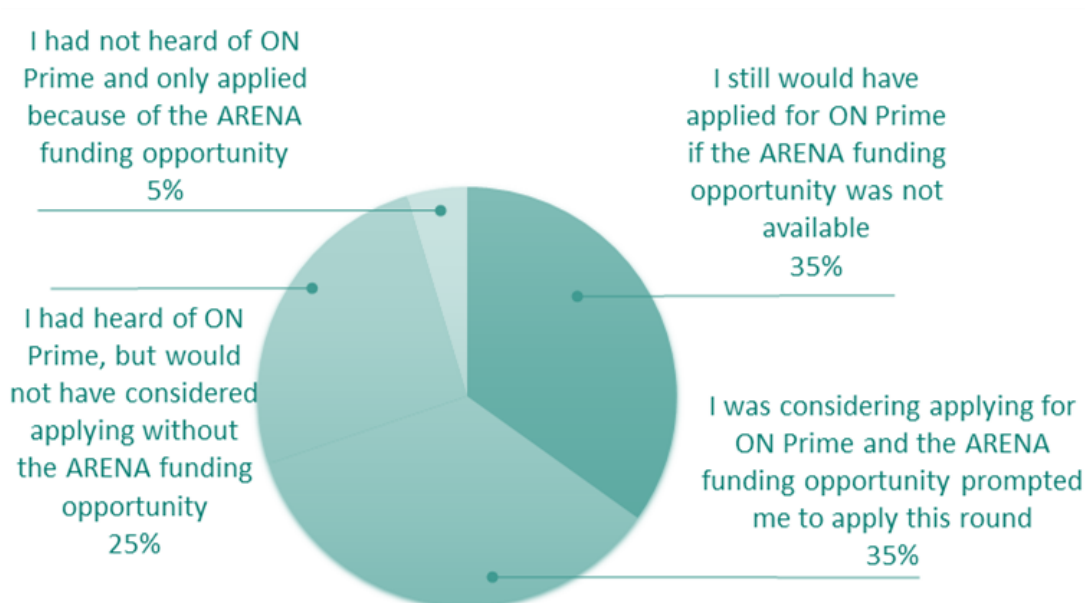
In addition to providing motivation to apply to ON Prime with the funding opportunity, ARENA also heavily advertised the Initiative and the ON Prime Program through face-to-face and a webinar information session, which may have helped boost engagement.

TABLE 2: NUMBER OF TEAMS PARTICIPATING IN EACH PRIME COHORT ²
 BLUE = SUPPORTED THROUGH ARENA R&D PROGRAM

CISRO's ON Prime cohort	Total teams	Renewable energy teams	Renewable energy technologies
ON Prime7 - 2019	100	6 (6%)	Solar cooling, storage, solar farm data analysis, redox batteries, waste to energy x2
ON Prime6 - 2019 (ARENA Program)	75	30 (40%)	Demand response, storage x5, solar PV x11, forecasting x2, ocean, bioenergy, hydrogen x4, CST, energy management x3, wind
ON Prime5 - 2018	36	1 (3%)	Battery
ON Prime4 - 2018	48	3 (6%)	Appliance energy monitoring, membrane technology, hydrogen
ON Prime3 - 2017	64	6 (9%)	Batteries x2, tidal, wind, smart batteries, thermal storage
ON Prime2 - 2017	67	1 (2%)	Solar PV
ON Prime1 - 2016	38	0	-

FIGURE 1: SURVEY RESULTS FROM ON PRIME6 APPLICANTS, AS TO HOW THE ARENA FUNDING CHANGED THEIR MOTIVATIONS TO APPLYING TO THE ON PRIME PROGRAM

² The hydrogen team in ON Prime4 also went through ON Prime6. Teams developing energy efficiency technologies are not included in the count of renewable energy teams.



A measure of how engaged individuals are in commercialisation activities, is to consider the number of key personnel and salary costs in each funded project (Table 3). As expected, the majority of project costs are for personnel. In each case there is a project lead gaining experience, with contribution from other group leaders (Chief Investigators, CI), and some researchers involved in commercialisation. One project also includes Ph.D. students, however their time commitment is small.

As most of the project funds are being used for salaries, and one of the key outcomes for the initiative was to increase the engagement of researchers in commercialisation activities, a consideration for future funding would be to run it as a fellowship scheme for post-doc or early career researchers

TABLE 3: KEY PERSONNEL AND SALARIES IN SUCCESSFUL PROJECTS

Project	Key Research Personnel	Salaries (in-kind and cash)
2019/CRD001 - Building-integrated photovoltaics (BIPV) enabler	1x Project lead, 1x CI, 5x Ph.D. students, 2x research assistants, 1x software technician	\$271,089
2019/CRD002 - Pilot project to trial Solar F2D2 at University of Queensland Gatton Solar Farm	1x Project lead, 1x CI, 1x post-doc researcher	\$147,754
2019/CRD003 - Prototyping a photoluminescence imaging tool for testing of fielded solar modules	1x Project lead, 3x CIs	\$264,990
2019/CRD004 - Displacement of gas by thermal energy storage	1x Project lead, 2x CIs, 2x researchers	\$151,220
2019/CRD005 - Launch of a photothermal absorption spectrometer for cost reduction in PV materials	1x Project lead, 1x researcher	\$303,875

Outcome: Research teams have increased their capability and confidence in engaging in commercialisation activities.

KPI: Research teams feel that they are better equipped to undergo the commercialisation process after participating in the CSIRO's ON Prime Program and attending the ARENA workshop.

Achieved. Participants to the ARENA workshop found the event useful regardless of the funding opportunity. All successful grant recipients reported that the ARENA grant funding was essential to pursuing commercialisation, and that the ON Prime Program was essential or very useful.

Successful projects are likely to have increased their capability and confidence in engaging in commercialisation, after going through their 1 year project, however there have also been shorter term outcomes from the ARENA workshop and participating in ON Prime.

Responses to the ARENA workshop feedback survey³, showed that almost all participants (95%) found the ARENA workshop useful, regardless of the funding opportunity, and only 1 respondent said it did not add to the ON Prime Program. Most participants said that this added value was because the workshop was specific to the renewable energy sector, whereas ON Prime covers all early stage technologies. Participants could get feedback from the panel as experts in this field, and also learnt about the commercialisation process specifically in renewables.

Successful grant recipients had a mixed view on ARENA's workshop, indicating that perhaps the workshop assisted less well developed projects more than those with high merit applications.

A stand-alone workshop, even without the opportunity for grant funding, would be of value to the renewable energy R&D community however this may not necessarily translate into project development until much further down the track.

Feedback from ARENA staff, ThinkPlace facilitators and invited panel speakers on the ARENA workshop has suggested a range of improvements to the design of the event. These are:

- reducing the panel talks and increasing panel Q&A and time for the poster pitch session
- use a facilitator for the panel Q&A who is in the sector
- providing participants with a template for the poster pitch beforehand
- tweaking the poster pitch format by:
 - including a customer section
 - including a technology description/categorisation (although this goes against the ON Prime pitch strategy)
 - including a 'point of difference' section
 - including space for a diagram
- ask participants to use post-it notes on the poster pitch for more adaptive pitching
- decreasing the number of panel speakers (best speakers were those who had commercialised R&D previously - Lachlan Blackhall, Entrepreneurial Fellow and Head, Battery Storage and Grid Integration Program, Australian National University; Paul Barrett, Head of Physical Sciences at IP Group Australia; and Darren Miller, ARENA's CEO), but including them in the full day of activities
- keeping an ARENA representative on the Panel to answer application questions
- including some reflection time in the pitch session
- investigating a better way to facilitate making connections (e.g. through a 'speed dating' session and setting up the expectation of making connections when engaging expert participants)
- improving the AV set-up of the venue
- using Slido4 more interactively e.g. getting participants to read out their questions.

Applications to the ARENA grant funding scored from 35-55 (out of 60) in the merit assessment⁵, which is generally good compared to first stage EOI R&D applications. This indicates that following ON Prime and the ARENA workshop, applicants were able to respond well to merit criteria which were designed to test their commercialisation plan and project plan.

Successful grant recipients gave very positive feedback on overall initiative, stating that 'it was an extremely useful program', an 'innovative and inspiring program'. The ON Prime Program was noted to be 'very useful for the commercialisation pathway', including facilitators and the mentor and that it 'pushed [the team] to the limit at time but helped a lot in the end'. Recipients also reported that they 'greatly benefited personally' and that the focus on real world impact aligned well with their career goals.

Outcome: New contacts are made between researchers, and industry and commercial investors. KPI: An average of at least 3 new contacts (one-on-one interactions) are made by each research team at the ARENA Workshop.

³ 43 responses were received from the ARENA workshop feedback (out of 50 participants).

⁴ Product for audience participation at events <https://www.sli.do/>

⁵ Four merit criteria each scored from 1-5, with moderated scores from 3 assessors totalled

Achieved. Successful grant recipients all reported making more than 3 new contacts, mainly through interviews conducted as part of CSIRO’s ON Prime Program. For two recipients, this was how they found the commercial partner for the funded project and for the other two the contacts helped identify applications for their technology.

A KPI of 3 contacts was selected as this allows for a 33% rate of conversion of contacts into relationships, to achieve medium-term outcomes.

The most important way of making contacts was through ON Prime interviews. Successful grant recipients all reported making more than 3 new contacts, and for two of these projects this was how they established their first commercial partner. This is a critical component of forming high merit commercialisation projects, and should therefore be a key aspect of any incubator program that the ARENA funding initiative partners with.

The workshop was not designed specifically to facilitate contacts, as it was not deemed appropriate to ask Panel members to provide this, and it was more important to provide the opportunity for expert feedback.

Some workshop participant feedback indicated that more networking time, and more opportunity for contacts would be welcome, however this expectation would need to be communicated to invited Panel members and speakers. There would also be a balance between having the right experts in the room, and having those who are prepared to fulfill this kind of role. Some feedback also indicated that the workshop added insights to the customer interviews conducted as part of the Prime program, and therefore any contacts made might be more useful if the Workshop was held earlier.

The role of mentors in the ON Prime Program also contributed to this outcome, and for many teams this contact developed into a relationship. This aspect of the initiative structure could be replicated in a future program.

3.2 EFFICIENCY

ANALYSIS OF THE ARENA RESOURCES REQUIRED TO IMPLEMENT THE INITIATIVE, THE ROLE OF CSIRO’S ON PRIME PROGRAM PARTNERSHIP AND EFFICIENCY FROM THE APPLICANT’S PERSPECTIVE.

The total ARENA resources required to run the Initiative were much higher than those typically used to run R&D funding rounds, when considered as a ratio to the total grants awarded. There are a number of areas however, where efficiency can be increased for any future funding: scoping and design will be minimal, workshop travel funds would not be provided, and project grant funding could be improved. The expected grant request per project could also be increased to deliver more impact, which would also increase efficiency when measured as a ratio to total grants awarded.

The partnership with the CSIRO’s ON Prime Program was highly efficient in providing applicants with commercialisation skills and developing commercial contacts, as it required very little ARENA resources.

The total ARENA resources to run the Initiative was 0.1 Analyst FTE, 0.2 Manager FTE and 0.1 Director FTE and \$11,000 in workshop facilitation costs, with a total of \$514,682 awarded in grants (Table 4). If the funding was to be repeated, it is expected that efficiency improvements could reduce this resource requirement. Total grants awarded could also be increased by increasing the expected grant request per project.

TABLE 4: AN OVERVIEW OF THE ARENA RESOURCES REQUIRED AT EACH STAGE OF THE ROUND

	Number of projects	Grants awarded	ARENA resources for pilot initiative	Expected resources for future funding
Scoping and design	-	-	~ 3 months 0.5 Manager 0.05 Director/GM	Reduced - can draw on existing design and lessons learnt.
ON Prime Program	75	-	~ 8 weeks 0.05 Manager	Increased – expiry of NISA funding for ON Prime Program

	Number of projects	Grants awarded	ARENA resources for pilot initiative	Expected resources for future funding
			0.05 Director/GM	
ON Prime Program participants to be considered by ARENA	62	-	~ 1 week 0.1 Manager 0.1 Director/GM	Reduced - raise the application requirements to reduce number of eligible projects.
Eligible for ARENA funding	30	-		
ARENA workshop	15	-	~ 4 weeks 0.2 Analyst 0.2 Manager 0.1 Director/GM \$11,000 facilitation	Reduced - increase the TRL cut-off for the workshop and make spots competitive to allow final numbers to be established earlier, improve workshop design and consider internal facilitation.
Travel grants for attending workshop	6	\$14,586	~ 4 weeks 0.1 Manager	None - remove from funding program.
Applications to ARENA grant funding	13	-	~ 6 weeks 0.2 Analyst 0.2 Manager 0.1 Director/GM	Similar - process was efficient.
Funding agreement negotiation	5	\$500,096	~ 4 weeks 0.2 Analyst 0.2 Manager 0.05 Director/GM	Similar - process was efficient.
Evaluation	5	-	~ 8 weeks 0.1 Manager	Increased - the medium and long-term outcomes of the projects themselves need to be evaluated.
Total		\$514,682	0.2 Manager FTE 0.1 Analyst FTE 0.1 Director/GM FTE	

Scoping and design

The translation of R&D to commercial outcomes is a complex development stage that required extensive scoping, and careful design. Although this was relatively resource intensive, this work can be leveraged for future rounds and the learnings may also be useful for other Government funding areas. ARENA liaised with the Department of Defence during the funding scheme to share ideas and insights, and findings may also be of interest to the Department of Industry.

CSIRO's ON Prime Program

Leveraging the CSIRO's ON Prime Program for this funding Initiative required minimal administrative resources from ARENA to implement and as such, represented good value for money. The program had an existing application portal, assessment process (to allow teams onto the program), facilitator feedback portal and monitoring process which were also leveraged. ARENA also received good support from the CSIRO's ON Prime Program staff, they were flexible and communicative and the two programs had good alignment in terms of objectives.

Although the ON Prime Program supported ARENA's commercialisation funding Initiative, some lessons have been identified that would have increased efficiency:

- > ON Prime applicants should be asked to justify why their project involves a renewable energy technology, as a simple tick box resulted in a large amount of ineligible projects asking to be considered.
- > The questions in the ON Prime application form would need to be revised, as in many cases it was difficult to understand what the specific technology was and therefore make a decision on eligibility.

- > Tools, services and studies that do not include technology development should be made ineligible as these are not the intended focus of the ARENA Commercialisation of R&D funding but were eligible under the ON Prime Program.

The NISA funding that supported the ON Prime program that was leveraged for the pilot expired on 30 June 2020. CSIRO's ON Program is currently adapting the program to pilot tailored and virtual formats, to continue to support researchers create impact with their research. With a suitable national accelerator program, it may be possible for ARENA to run a similar program in the future.

Another option would be to go back to market and seek another incubator program that may be suitable. Energy Lab for example was not chosen for the Initiative as participation is not free (equity is usually taken in return for start-up funds), and the program is not specifically targeted towards researchers and the development of technology, however it could be reconsidered for future funding.

Direct delivery by ARENA would be less suitable because it would only be available to parties pursuing renewable energy technologies. This may result in a small number of teams participating, and would lose the benefit of interacting with researchers in different sectors (an advantage that has been identified by ON Prime participants).

ARENA workshop

The workshop design and facilitation was outsourced to ThinkPlace. ARENA approached a number of experts in the area of technology development to participate in a discussion panel alongside the ARENA CEO. Although these panel members were offered travel reimbursement, none claimed any expenses and were not paid for their time. If a future round was run, the same generosity could not be expected although there is likely to be an interest in participating.

ARENA also engaged Advisory Panel members to participate in a feedback session with teams. These Panel members were paid for their time, however the workshop was scheduled to be held the day prior to a regular ARENA Advisory Panel meeting, therefore there were no additional travel costs.

Some learnings that would increase efficiency in running the workshop are:

- > A minimum TRL of 4 should be included in the eligibility requirements for attending the workshop, as the volume of early stage projects was too high to invite all applicants. Although projects that are earlier than TRL 4 may benefit from workshop participation, supporting these does not contribute to the outcomes of the program which aims to develop technology at the prototype stage. The workshop guidelines were amended during the program to reflect this.
- > Invitation to the workshop should be merit based as the volume of applicants exceeded expectations, and the overall quality of projects was lower than expected.
- > Travel grants should not be awarded as the low number of reimbursement requests indicates that this is not a funding gap and that research institutions can support participation. This does mean however, that attendance to the workshop cannot be made an eligibility requirement of the associated grant funding.
- > Workshop guidelines could be revised to improve administration; some of the eligibility criteria would be better set out as conditions of grant payment, and a maximum grant payment should be included.

Grant funding

The low grant ask and low risk profile of the projects enabled a simplified negotiation process and will translate into commensurate resource requirements in contract management. The resources required for the application processes however, is similar to that in R&D rounds, although there is some reduction in having a one-stage process. Using participation in the ON Prime program as an eligibility requirement also worked effectively as a filter, reducing the number of low merit or irrelevant applications (e.g. focussed on R&D rather than commercialisation outcomes) that may have applied otherwise, and reducing the ARENA resource requirement.

The assessment process was very efficient. It was very transparent for applicants yet it also provided the assessors with sufficient flexibility to give a true assessment and recommendation for the projects. The key here may have been ensuring that the assessment criteria was not too prescriptive.

All successful grant recipients rated the Guidelines as 5/5 in terms of clarity. Recipients also said the length of time given to prepare applications was adequate, as was the length of time required to prepare the application and the timeframe to receive the outcome of the application.

Only 5 of the 12 applications submitted were assessed as high merit and awarded funding despite ARENA having sufficient funds to fund up to 10 of the submitted projects. Future funding rounds should consider reducing the total funding envelope, increasing the expected grant request per project, tightening the Guidelines to focus on higher TRL projects and/or ensuring teams have appropriate partnerships to help commercialisation prospects

Projects were not successful for the following reasons:

- > Despite the extensive market research required as part of ON Prime, proponents still lacked key market knowledge, i.e. they often proposed a solution looking for a problem.
- > Project teams were either insufficiently resourced or lacked experience. Many teams had students doing most of the work which led to doubts that the outcomes would be achieved. A fellowship funding round with specific eligibility criteria would mitigate this.
- > Projects with tangible and authentic commercial partners performed better. Many applications listed partners which didn't appear to be contributing meaningfully to the project.

Some lessons learnt that would increase efficiency in the grant application stage are:

- > The small grant may have restricted activities.
 - > A larger grant (around \$200k) could have increased the contributions of senior personnel
 - > Few researchers seemed willing to take time out of their "day jobs" to commit to the project. A fellowship round that specifically supports a researcher may help mitigate this.
 - > Increasing the project length to 1.5-2 years would increase the scope of activities and also allow for delays in engaging personnel.
 - > The Initiative was quite late in being publicly announced. This led to delays in being able to advertise for personnel and has already resulted in some of the projects being extended.
- > The merit criterion 'Commercial potential of the Renewable Energy Technology and how the Project will help realise that potential' needs to be revised to make the intention clearer to applicants, and generate clearer responses that are easier to assess.
- > The Initiative does not require an in-depth technical assessment of applications, however assessors need to have expertise specifically in the commercialisation of early stage technology. More experience in the translation of technology to commercial ventures and market understanding was needed.
- > Knowledge sharing as an eligibility requirement rather than a merit criterion worked well as it enabled a consistent knowledge sharing approach to be undertaken across the project portfolio. This approach has been taken forward into the Solar PV R&D Round 5.
- > IP going to overseas partners was raised as a concern with a number of applications. Future initiatives focused on commercialisation should request applicants going into more detail surrounding how IP will be controlled and protected to ensure benefits continue to flow to Australia.

3.3 APPROPRIATENESS

TESTING THE ASSUMPTIONS AND LOOKING AT CHANGES IN EXTERNAL FACTORS (TO THE EXTENT RELEVANT TO THIS SHORT-TERM EVALUATION) AS IDENTIFIED DURING THE DESIGN OF THE INITIATIVE, AND ANALYSIS OF ANY ALTERNATIVE APPROACHES.

Assumptions

CSIRO's ON Program is a suitable incubator for ARENA to leverage for this Funding Initiative.

The ON Prime Program was an essential component of translating research ideas into a potentially commercial technology, particularly at this early stage. ARENA's observations was that all teams that leaned into the process went through at least one significant pivot in their commercial approach, with many more minor changes. These are learnings that would have been unlikely to occur without the ON Prime Program, within the university environment.

Under the NISA funding model the ON Prime Program was nationally available, there was no barrier to entry other than merit of the ON Prime application (i.e. no financial requirements), and the program was specifically designed to target R&D rather than start-ups more generally.

An expected grant request of \$100k is enough to support prototype development, but keeps commercial applications focussed.

The low funding amount was enough to attract participants to the ON Prime program, and applications for funding. Two eligible projects did not apply, with feedback from one of these teams being that this was because of changes in the workshop eligibility criteria.⁶ This indicates that having a low expected grant request is effective in keeping applications focussed, and those that might have submitted a more general R&D application or were not committed to commercialisation, were discouraged from applying. Notwithstanding, a slightly larger 'small grant' (e.g. up to \$200,000) could be considered in future to both ensure the correct motivation to apply for commercialisation activities, as opposed to continued R&D, yet allow a slightly wider scope of activities to be undertaken.

Feedback from successful projects was that an increase in funds would have allowed for further activities such as increasing testing in the field, testing with potential customers, increasing the functions in software development and increasing FTEs of key personnel.

A 1 year project is long enough to develop a prototype, but short enough to keep commercial development fast.

Some projects have already requested extensions as they have suffered delays in advertising for personnel, as public announcement of the Initiative was delayed. ARENA processes post assessment should be made as streamlined as possible as any delays can have a significant impact on projects with such a short timeframe. This may include allowing additional time in the negotiation phase (especially when nearing the end of calendar year deadlines) or settling the announcement schedule early.

The project plans received comprehensively covered the expected next steps in commercialisation, without appearing to cut out activities because of time constraints, or plan activities that were too far down the track.

Feedback from successful grant recipients was that an increase in project length would have been more practical for engagement of personnel and would have allowed more time for additional activities if the maximum grant request had been larger.

There are enough researchers who have ideas with commercial potential, who want to commercialise their work, to justify running the Funding Initiative.

⁶ The team was not initially selected for invitation to the ARENA workshop as there were 15 other teams that were deemed to have participated more fully in the Prime program and had made more progress in developing their commercial plan. One of these 15 teams subsequently dropped out of the program, and a spot at the workshop was offered to this team with only a week's notice. As attendance at the workshop was an eligibility requirement of applying for ARENA funding, this also changed their eligibility status.

The number of applicants to the ON Prime program indicates that there are enough researchers who want to commercialise their work, to justify running the Funding Initiative. The quality and early stage of development of many participants' projects however, indicates that the commercial potential of these ideas is perhaps not enough to justify running the Initiative.

ARENA could consider extending the scope of the funding to aim to bring good research ideas and commercialisation capability from overseas into Australian universities, which might be achieved by funding fellowships. The management of IP between research institutions would need to be carefully considered, however.

ARENA's support for early-stage companies via the Advancing Renewables Program (ARP) generally focuses at a later commercial development stage and does not overlap with the outcomes of this Funding Initiative.

Since the Funding Initiative was run, there has been no change to ARENA programs and support for this specific development stage remains a gap in ARENA's funding mechanisms.

The Solar PV R&D Round was launched in Dec 2019, however the projects funded under this Initiative would not have been eligible to apply to the R&D program as the activities focus on commercial development rather than technology development. Some of the technology supported through the initiative is also outside of the priority areas for the Solar PV R&D Round.

External factors

The commercialisation of R&D innovation stage is not well supported through public funds on a national scale, and available grant funds are not specific to renewable energy technologies.

The ARC Linkage Projects program 2019 did award funding to 3 renewable energy projects in hydrogen storage (\$584,731), cathodes for lithium ion batteries (\$422,881), and phase change materials for thermal energy storage (\$415,882). Although the program aims to develop connections between research and industry, it funds early technology development rather than commercialisation activities. It is expected that commercial development will be conducted by the project partners, if the project itself is successful enough.

The commercialisation of renewable energy R&D therefore remains under-supported through other Government programs.

Commercial investment is not forthcoming at this very early stage of technology development.

There has been no change to the early stage investment landscape since the funding Initiative was run. The recent ARENA Renewable Energy Venture Capital Fund evaluation also noted a lack of support for renewable energy technologies at this development stage, likely contributing to the small pipeline of potential projects for investment.

Investment from industry and current policies (e.g. R&D tax incentive) are not enough to stimulate early technology development to capture the full potential of renewable energy R&D.

There has been no change to industry investment incentives or other policies since running the Initiative, and no new schemes that enable the translation of renewable energy R&D into commercially available technologies.

The current academic and innovation ecosystem is conducive to achieving the program outcomes and objectives.

There has been no change to the academic and innovation ecosystem since running the Initiative. Observations of teams participating in the ON Prime program (in all technologies) suggests that researchers are not being well prepared by their research institutions to embark on commercialisation activities, although in general they are being supported (non-financially) in their decision to do so.

Successful grant applicants to the initiative did receive in-kind support, and some cash support (ranging from \$0-20k).

Further information is available at
arena.gov.au

Australian Renewable Energy Agency

Postal Address

GPO Box 643
Canberra ACT 2601

Location

2 Phillip Law Street
New Acton ACT 2601

Engage with us

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