

RESEARCH PROPOSAL TEMPLATE

For IGMS application: Please limit to 25 pages, excluding technical attachments and references, which can be in the Annex.

Please use Arial Font size 12. All submissions shall be in English.

1. Overview

Funding Programme	Closing the Resource Loop Funding Initiative
Funding Initiative	Closing the Resource Loop Funding Initiative
Funding Tranche	RIE2025
Funding Agency	National Environment Agency
Title of Research Project	Click or tap here to enter text.
Host Institution	Click or tap here to enter text.
Project duration (months)	Choose duration
Keywords	[to be filled on IGMS]
Main Research Area	[to be filled on IGMS]
Research Objectives	[to be filled on IGMS]
Potential Application/ Exploitation of Research	[to be filled on IGMS]
Primary MSE domain	[A] Closing the Resource Loop
Secondary MSE domain	[A1] Resource Recovery

2. Scientific Abstract (not more than 300 words)

[To be filled on IGMS]

3. Lay Abstract (not more than 300 words)

[To be filled on IGMS]

4. Research Proposal

This section shall include the existing problems, scientific challenges and the proposed methodology/approach to solving the challenges.

- Problem statement: Clearly state the problem statements(s) to be addressed and highlight the importance of addressing them.
Click or tap here to enter text.

- **Research objectives:** Articulate the research objectives and how it could solve the problem statement(s) mentioned.
Click or tap here to enter text.
- **Alignment to national policies(s):** Describe how the project would create new knowledge and advances in technology or solution to address national problem(s). State the specific target of national policies (e.g. Singapore Green Plan 2030, Singapore's Zero Waste Master Plan) that is being addressed.
Click or tap here to enter text.
- **Strategic advantage:** Highlight the international competitiveness of the project being proposed and its contribution to Singapore's interests in terms of technology, capability development, economic benefits etc. Explain in the terms of how it helps national security or resiliency and/or to maintain/develop Singapore's position as a global leader and list the stakeholders involved.
Click or tap here to enter text.
- **Landscape scan and innovativeness:** Explain how the project exemplifies technological excellence, by providing information on
 - Best available Technology/state-of-the-art through a landscape scan
Click or tap here to enter text.
 - Innovative content and how this project attempts to exceed the Best Available Technology
Click or tap here to enter text.
- **Proposed approach and methodology:** Provide details of the proposed approach and methodology. Highlight the novelty of the research and the potential of producing breakthrough work.
Click or tap here to enter text.
- **R&D to capability/commercialisation/operational pathway:**
 - State how the results from the project will be translated (e.g. through the commercialisation of new products, solutions and create spinoffs/Intellectual Property (IP)/ licensing, etc.).
Click or tap here to enter text.
 - Analyse the relevance, importance, and feasibility of the project if implemented in the larger market/ecosystem, where relevant.
Click or tap here to enter text.
 - Identify industry collaboration partners for piloting, test-bedding, adopting/licensing or commercialising the solution/project outcomes/technologies. Collaborators identified should also cover other aspects of the whole value chain such as feedstock generator (upstream), product demands, and market off-takes (downstream).
Click or tap here to enter text.
- **Potential IP generation:** List any expected Intellectual Property or Patents to be created from this project.
Click or tap here to enter text.

- Quantitative impact of the solution/project outcomes/technology if implemented, following the success of the project:
 - [For proposals commencing at TRL 6 and beyond] Calculate the project's projected Return On Investment taking into account avoided cost (e.g. landfilling), revenue generated (e.g. sales of product recovered), or quantification of tangible benefits (e.g. health benefits). The table below could be used as reference for computing the project's projected Return On Investment. To provide the necessary information below and attach a detailed Excel calculation within the Annexes.

Annual Return On Investment (ROI):			
$\frac{\text{Total Cost Savings [A + C] + Total Revenue Generated[B] - Total Project Cost [X}_0\text{]}}{\text{Total Project Cost [X}_0\text{]}} \times 100\%$			
X₀ = Total Project Cost (CAPEX + OPEX)			
Description	Quantity (per annual)	Assumptions	Spending (per annual)
CAPEX	-	Click or tap here to enter text.	\$X,XXX,XXX per project
Land cost	Quantity unit	\$X,XXX,XXX per unit	\$X,XXX,XXX
OPEX-Energy	Quantity unit	\$X,XXX,XXX per unit	\$X,XXX,XXX
OPEX-Chemical/Material	Quantity unit	\$X,XXX,XXX per unit	\$X,XXX,XXX
OPEX-Maintenance	Quantity unit	\$X,XXX,XXX per unit	\$X,XXX,XXX
OPEX-Manpower (Executive)	Quantity unit	\$X,XXX,XXX per unit	\$X,XXX,XXX
OPEX-Manpower (Non-Executive)	Quantity unit	\$X,XXX,XXX per unit	\$X,XXX,XXX
Total spending project period (-) \$ X,XXX,XXX			
Cost Avoidance (A)			
Description	Quantity (per annual)	Assumptions	Earnings (per annual)
Cost saving from avoiding landfilling	Quantity unit	\$X,XXX,XXX per unit	\$X,XXX,XXX
Waste Disposal	Quantity unit	\$X,XXX,XXX per unit	\$X,XXX,XXX
Others	Quantity unit	\$X,XXX,XXX per unit	\$X,XXX,XXX
Revenue Generated (B)			
Description	Quantity (per annual)	Assumptions	Earnings (per annual)
Sales revenue from resource recovered	Quantity unit	\$X,XXX,XXX per unit	\$X,XXX,XXX
Sales of product/services	Quantity unit	\$X,XXX,XXX per unit	\$X,XXX,XXX
Others	Quantity unit	\$X,XXX,XXX per unit	\$X,XXX,XXX
Total earning project period \$ X,XXX,XXX			
Other Tangible Benefits (C)			
Description	Quantity (per annual)	Assumptions	Earnings (per annual)
Health benefits	-	Click or tap here to enter text.	\$X,XXX,XXX

Others	-	Click or tap here to enter text.	\$X,XXX,XXX	
Return On Investment (ROI)				Choose an item. %
Time period in years (t)				Choose an item. years

- [For proposals commencing at TRL 6 and beyond] Construct the Net Present Value using the earning and spending assumptions provided above for the appropriate duration for a commercial scale project. It is important to factor in additional considerations such as debt services (bank loan) and corporate taxes. The table below could be used as a reference for the project's projected Net Present Value. Kindly provide the necessary information below and attach a detailed Excel calculation within the Annexes.

Net Present Value: $\sum_{t=0}^n \frac{R_t}{(1+i)^t}$	
R_t = Net cash inflow (earnings) – outflow (spending) during a single time period (t)	Year -5: \$X,XXX,XXX
	Year -4: \$X,XXX,XXX
	Year -3: \$X,XXX,XXX
	Year -2: \$X,XXX,XXX
	Year -1: \$X,XXX,XXX
	Year 1: \$X,XXX,XXX
	Year 2: \$X,XXX,XXX
	Year 3: \$X,XXX,XXX
	Year 4: \$X,XXX,XXX
	Year 5: \$X,XXX,XXX
	Year 6: \$X,XXX,XXX
	Year 7: \$X,XXX,XXX
	Year 8: \$X,XXX,XXX
	Year 9: \$X,XXX,XXX
	Year 10: \$X,XXX,XXX
	Year 11: \$X,XXX,XXX
	Year 12: \$X,XXX,XXX
	Year 13: \$X,XXX,XXX
	Year 14: \$X,XXX,XXX
	Year 15: \$X,XXX,XXX
	Year 16: \$X,XXX,XXX
	Year 17: \$X,XXX,XXX
	Year 18: \$X,XXX,XXX
	Year 19: \$X,XXX,XXX
	Year 20: \$X,XXX,XXX
	Year 21: \$X,XXX,XXX
	Year 22: \$X,XXX,XXX
	Year 23: \$X,XXX,XXX
	Year 24: \$X,XXX,XXX
	Year 25: \$X,XXX,XXX
i = Require return or discount rate / discount rate or return that could be earned in a alternative investment	Choose an item. %
Net Present Value (NPV)	\$ (+/-) X,XXX,XXX

- Qualitative impact: Where impact of solution/project outcomes/technology when impact cannot be quantified, please provide qualitative impact (intangible outcomes, new capabilities / competencies) which will be developed. Qualitative impact may include transfer of technical expertise to Singapore if an overseas

institute is involved, contribution to industry and society, building up research infrastructure.

Click or tap here to enter text.

- Environmental impact and carbon mitigation:
 - Highlight the environmental footprint (e.g. CO₂ emissions, net energy consumption, residual waste generation, recyclability of plastics) and potential cost benefit of the solution, benchmark them against competing technologies (e.g. X% improvement from competing technologies).

Click or tap here to enter text.

- Provide net carbon emission impact and highlight whether the project mitigates/contributes to carbon emissions. Emissions can be calculated either using activity data or material balance. Kindly provide the necessary information below and attach a detailed Excel calculation within the Annexes.

Click or tap here to enter text.

- Organisation expertise: Provide details of your organisation's expertise and experience including the track records and details of current and/or successful implementation of relevant or similar technologies.

Click or tap here to enter text.

- Collaborations: Highlight the involvement of local and/or international collaborators and articulate the value such collaborations bring to the project. Include resources committed in “Section 5: Research Team” and “Section 10: Other Sources of Support”. Attach the respective Letter of Support or Agreements signed as supporting documents

Click or tap here to enter text.

Others:

- Social behavioural sciences elements: Highlight if there are any social-behavioural science elements (i.e. incorporation of human factors into technology design to maximise adoption outcomes) in the project – where applicable.

Click or tap here to enter text.

- Data Requirements (if applicable): Please note that data to be collected in the project could be shared unless they are commercial data or bounded by NDAs. This applies to all NRF-funded projects and is meant to maximise synergies across projects requiring similar data and minimise duplicative work.
 - Specify and describe datasets¹ required from Public Sector Agencies, and highlight possible alternatives if the data requested is not available for sharing. Note requests for data are subjected to agencies' approval. Refer to Annex A on the Potentially Useful Datasets from Urban Solutions and Sustainability (USS) Domain Metadata Catalogue and the document "Part 2 -General Instructions-Instructions and Templates for Applicants" on the data request procedure.

Name of Dataset	What will the data be used for? <i>Please describe all intended usages of the data requested</i>	What are the specifications/requirements of the data items? <i>Please be specific and provide as much details as possible (e.g. aggregated or individual records, relevant period of data, resolution, data need frequency (one-time/ad-hoc or regular e.g. quarterly, monthly)).</i>	File Format <i>If applicable</i>
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Choose an item.
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Choose an item.
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Choose an item.
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Choose an item.

¹ NEA is not obliged to secure the list of data within the proposal from data owner. PIs and Host Institutions to undertake mitigation measures to ensure successful completion of projects if awarded.

- Highlight all the datasets to be measured/collected within this project. Include details on data parameters to be measured, data collection plans, potential challenges, and mitigation measures.

Parameters to be measured	Data Collection Plan	Potential challenges & mitigation measures
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

5. Research Team

The Applicant shall include a detailed CV with updated information of all team members [Lead PI, Team PI(s) and/or Co-Principal-Investigator(s)] and collaborator(s) including academic qualification, professional experience and accomplishment within the provided template.

Name	Email	Institution	Institution UEN ²	Role in Project	% Time Within Total Work Commitment	% Time Within This Project ³	SSIC ⁴ (for industry collaborator)
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Choose an item.	Choose an item.%	Choose an item.%	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Choose an item.	Choose an item.%	Choose an item.%	Click or tap here to enter text.

² Unique Entity Number

³ “% time within this project” by team members [Lead PI, Team PI(s) and/or Co-Investigator(s)] and collaborator(s)] must add up to 100%

⁴ Singapore Standard Industrial Classification

[illegible]

6. Research Milestones

The Applicant shall propose research milestones to be achieved for the project in this section. Research milestones refers to the detailed activity milestones to be undertaken in this project.

Description	Start Month ⁵	Duration (months)	Month																			
			3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60
<Please colour the corresponding months for each milestones in yellow, to graphically show the duration of each milestones>																						
Enter research Milestones	Choose an item.	Choose an item.																				
Enter research Milestones	Choose an item.	Choose an item.																				
Enter research Milestones	Choose an item.	Choose an item.																				
Enter research Milestones	Choose an item.	Choose an item.																				
Enter research Milestones	Choose an item.	Choose an item.																				
Enter research Milestones	Choose an item.	Choose an item.																				
Enter research Milestones	Choose an item.	Choose an item.																				
Enter research Milestones	Choose an item.	Choose an item.																				
Enter research Milestones	Choose an item.	Choose an item.																				

⁵ “Start Month” refers to the month from the month of the commencement of the project. “Duration” refers to the number of months to complete the milestone. For example: If the project commenced in March, and the proposed task starts in the June for a month long, then the “Start Month” shall be set as 3, with “Duration” set as 1.

7. Technical Milestones

The Applicant shall propose technical milestones in relation to the research milestones to be achieved for the project at both mid-term mark and project completion mark. Technical milestones refer to key technical deliverables that can be expected from the successful execution of the project. Deliverables should be quantitative, e.g. % of improvement in efficiency or cost-saving, or target to achieve certain international standards.

[To be filled on IGMS]

8. Performance Indicators

The applicant shall provide the details of the following indicators for this project:

Performance Indicators	Target
Research Excellence	
<p>1. Proportion of publications in the top 10% most highly cited worldwide</p> <p><i>This refers to the % of Singapore's publications in top 10% citation percentiles (worldwide, field weighted), excluding self-citations, in year of publications</i></p>	<p>Please select KPI target.%</p>
<p>2. No. of publications in top 10% journals</p> <p><i>This measures the number of publications in the top 10% of S&T journals in the field as tracked in the Thomson Reuters Joint Citation Report</i></p>	<p>Please select KPI target.</p>
Manpower	
<p>3. No. of industry R&D jobs created</p> <p><i>This measures the number of innovation positions induced in the ecosystem by public R&D investments. This includes all persons employed for R&D and R&D related activities, such as researchers, project managers, product designers, technicians and other supporting staff. To be tracked based on RSE and non RSE</i></p>	<p>Please select KPI target.</p> <p>Please provide description, if any.</p>
I&E	
<p>4. No. of industry projects</p> <p><i>Number of R&D projects (in the form of research collaboration agreements or contract research agreements) undertaken with industry.</i></p> <p><i>This should be tracked by the following parameters:</i></p> <ul style="list-style-type: none"> i) Public sector performer (A*STAR / IHL) ii) Enterprise type (MNC/LLE/SME/public agencies/VWOs) iii) Engagement type (New or renewal, depending on whether it is a new engagement or a follow-on engagement with additional funding) iv) 	<p>Please select KPI target.</p> <p>Please provide description, if any.</p>
<p>5. No. of Technologies Deployed including licenses</p> <p><i>This measures the number of research findings or technologies developed that are deployed (e.g. through a license or at least at pilot scale) that will contribute to at least one of the following outcomes: (i) Introduction of new product in the market; (ii) Introduction of new service in the market; (iii) product or process improvement. This should be tracked by type of company (MNCs, LLEs, SMEs, start-ups and public sector/VWOs)</i></p>	<p>Please select KPI target.</p> <p>Please provide description, if any.</p>

<p>6. No. of successful start-ups</p> <p><i>Successful Start-ups defined as</i></p> <ul style="list-style-type: none"> • Received subsequent 3rd party financing, equal or greater than Gov investment or • Increased enterprise valuation by at least 20 or • Crossed S 250 k annual revenue 	<p>Please select KPI target.</p> <p>Please provide description, if any.</p>
<p>7. Industry R&D Spending</p> <p><i>This refers to the R&D investment that a company commits to spend in Singapore as a result of collaborations with a public research performer. The R&D investment can comprise cash and/or in-kind.</i></p> <p><i>The investment by the company, whether in cash or in qualifying in-kind contributions should, where possible, be reflected in the agreements signed between the company and the relevant performer(s).</i></p> <p><i>This should be tracked by:</i></p> <ul style="list-style-type: none"> i) Public sector performer (A*STAR / IHL / Hospital) ii) Enterprise type (MNC/LLE/SME) iii) Engagement type (New or renewal, depending on whether it is a new engagement or a follow-on engagement with additional funding) 	<p>\$X,XXX,XXX.XX</p> <p>Please provide description, if any.</p>
<p>8. Industry R&D Funding</p> <p><i>This refers to cash funding received from private sector industry sources. This should be tracked by:</i></p> <ul style="list-style-type: none"> i) Public sector performer (A*STAR / IHL / Hospital) ii) Enterprise type (MNC/LLE/SME) iii) Engagement type (New or renewal, depending on whether it is a new engagement or a follow-on engagement with additional funding). 	<p>\$X,XXX,XXX.XX</p> <p>Please provide description, if any.</p>
<p>9. No. of instances of policy influence</p> <p><i>A policy influence refers to an instance whereby</i></p> <ul style="list-style-type: none"> • Outputs of a funded project (e.g. research findings or published technology roadmap) informed policy, regardless of the outcomes of the eventual policy e.g. changes in guidelines, informing of target setting, informing of strategy/ops planning etc., or • Expertise developed through funded activities (e.g. technical experts hosted by a core-funded entity) participated in policymaking or were consulted by policymakers in their expert capacity 	<p>Please select KPI target.</p> <p>Please provide description, if any.</p>

<p>10.No. of instances of standard industry practice influences</p> <p><i>A standard industry practice influence refers to an instance whereby</i></p> <ul style="list-style-type: none"> <i>• outputs of a funded project (e.g. research findings) informed industry decision making or practice beyond the level of single companies (e.g. contributing to setting of industry managed standards)</i> <i>• expertise developed through funded activities (e.g. technical experts hosted by a core funded entity) participated in decision making by industry bodies or were consulted by industry bodies in their expert capacity</i> 	<p>Please select KPI target.</p> <p>Please provide description, if any.</p>
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Technology Readiness Level	Year 1 (Start TRL)	Year 2	Year 3 (Target TRL)
Progress of Technology Readiness Level (TRL).	Choose TRL	Choose TRL	Choose TRL

TRLs	Description
TRL 1	Basic principles observed and reported
TRL 2	Technology concept and/or application formulated
TRL 3	Analytical and experimental critical function and/or characteristic proof of concept
TRL 4	Component and/or breadboard validation in laboratory environment
TRL 5	Component and/or breadboard validation in relevant environment
TRL 6	System/subsystem model or prototype demonstration in a relevant environment
TRL 7	System prototype demonstration in an operational environment
TRL 8	Actual system completed and qualified through test and demonstration
TRL 9	Actual system proven through successful mission operations

9. Total Project Budget

[To be filled on IGMS]

10. Other Funding Support

10.1 Grants

[To be filled on IGMS]

10.2 Other sources of support

All funding in cash, in-kind services, and tangible contributions by the Applicant, industry collaborators or any other partners towards the proposed project. In-kind services include labour, materials, and other services such as loan of facilities and space.

Institution	Type of support	Role in project	Type of resources/ support (able to select 1 or more choices)	Description of item support	Contribution (\$\$)	Start of support	End of support
Click or tap here to enter text.	Choose an item.	Choose an item.	<input type="checkbox"/> Manpower <input type="checkbox"/> Equipment / Software/ <input type="checkbox"/> Consumables <input type="checkbox"/> Factory space /access to facilities <input type="checkbox"/> Raw material / samples (e.g. waste)	Click or tap here to enter text.	\$X,XXX,XXX	Click or tap to enter a date.	Click or tap to enter a date.
Click or tap here to enter text.	Choose an item.	Choose an item.	<input type="checkbox"/> Manpower <input type="checkbox"/> Equipment / Software/ <input type="checkbox"/> Consumables <input type="checkbox"/> Factory space /access to facilities <input type="checkbox"/> Raw material / samples (e.g. waste)	Click or tap here to enter text.	\$X,XXX,XXX	Click or tap to enter a date.	Click or tap to enter a date.

Click or tap here to enter text.	Choose an item.	Choose an item.	<input type="checkbox"/> Manpower <input type="checkbox"/> Equipment / Software/ <input type="checkbox"/> Consumables <input type="checkbox"/> Factory space /access to facilities <input type="checkbox"/> Raw material / samples (e.g. waste)	Click or tap here to enter text.	\$X,XXX,XXX	Click or tap to enter a date.	Click or tap to enter a date.
Click or tap here to enter text.	Choose an item.	Choose an item.	<input type="checkbox"/> Manpower <input type="checkbox"/> Equipment / Software/ <input type="checkbox"/> Consumables <input type="checkbox"/> Factory space /access to facilities <input type="checkbox"/> Raw material / samples (e.g. waste)	Click or tap here to enter text.	\$X,XXX,XXX	Click or tap to enter a date.	Click or tap to enter a date.
Click or tap here to enter text.	Choose an item.	Choose an item.	<input type="checkbox"/> Manpower <input type="checkbox"/> Equipment / Software/ <input type="checkbox"/> Consumables <input type="checkbox"/> Factory space /access to facilities <input type="checkbox"/> Raw material / samples (e.g. waste)	Click or tap here to enter text.	\$X,XXX,XXX	Click or tap to enter a date.	Click or tap to enter a date.
Click or tap here to enter text.	Choose an item.	Choose an item.	<input type="checkbox"/> Manpower <input type="checkbox"/> Equipment / Software/ <input type="checkbox"/> Consumables <input type="checkbox"/> Factory space /access to facilities <input type="checkbox"/> Raw material / samples (e.g. waste)	Click or tap here to enter text.	\$X,XXX,XXX	Click or tap to enter a date.	Click or tap to enter a date.
Click or tap here to enter text.	Choose an item.	Choose an item.	<input type="checkbox"/> Manpower <input type="checkbox"/> Equipment / Software/ <input type="checkbox"/> Consumables <input type="checkbox"/> Factory space /access to facilities <input type="checkbox"/> Raw material / samples (e.g. waste)	Click or tap here to enter text.	\$X,XXX,XXX	Click or tap to enter a date.	Click or tap to enter a date.

11. Suggested Reviewers

[To be filled on IGMS]

12. Declaration**12.1 Declaration of involvement in panel/committees appointed by NEA**

The applicant shall provide the details in the table should team members (i.e. Lead PI, Team PI(s) and/or Co-Investigator(s)), collaborators and/or advisers be involved in panels or committees (e.g. expert or technical panel, scientific committee, advisory role, etc.) appointed by NEA.

Name	Panel/Committee (s)	Role	Point of Contact in NEA
Click or tap here to enter text.	Click or tap here to enter text.	Choose an item.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.	Choose an item.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.	Choose an item.	Click or tap here to enter text.

12.2 Declaration of Ethics Approval

[To be filled on IGMS]

12.3 Undertaking by Lead Principal Investigator (PI)

[To be filled on IGMS]

12.4 Undertaking by Office of Research (ORE)

[To be filled on IGMS]

12.5 Undertaking by the Director of Research (DOR)

[To be filled on IGMS]

<<Title of Annexes>>

This section could contain technical attachments as suggested below but not limited to the following:

- Schematics diagram of the process
- Photographs
- Technical brochures
- Laboratory test results