Exploiting Distributed GEneration (EDGE) Programme
Request for Proposal (RFP)

Research Areas	**EXPLOITING DISTRIBUTED GENERATION RFP 2** 1. Request for proposals to develop innovative solutions that facilitate interconnection and management of distributed energy resources (DERs) with utility grid to provide non-homogeneous power quality. 2. Request for proposals to develop innovative asset management with computational intelligence based predictive maintenance that can manage large number of DERs including vehicle-to-grid (V2G) technology.
RFP Number	EDGE RFP 2
Category	Directed Call
Open Date for Proposal	**15 Jul 2022, 1200 hrs (noon) (UTC +08:00)**
Close Date for Proposal	**15 Oct 2022, 1200 hrs (noon) (UTC +08:00)** Softcopy submission Proposals and all accompanying attachments **MUST** be submitted to EDGE@SingaporeTech.edu.sg by the stipulated date and time**.**
Other Instructions	For more information, please refer to: www.singaporetech.edu.sg/EDGE. If you have any queries, please send them to the EDGE Programme Office at EDGE@SingaporeTech.edu.sg.

EXPLOITING DISTRIBUTED GENERATION REQUEST FOR PROPOSAL 2

Background

1. With the proliferation of distributed energy resources (DERs) (e.g. solar, energy storage systems (ESS), electric vehicles (EVs) and increasing grid costs), Singapore's grid would need to evolve to be more nimble, flexible and intelligent to optimise various energy sources, reduce grid costs while ensuring reliability and stability. To advance applied research, development and demonstration (RD&D) in industry-relevant areas, which would enhance the adoption and exploitation of distributed power generation in Singapore, there is a need to:

   a. Enhance Singapore's power engineering capabilities, focusing on micro-grids and DERs through open grant calls to support collaborative research between Institutes of Higher Learning (IHLs) and the industry. Areas include micro-grid energy management systems, control and optimization; interconnected micro-grids design and probabilistic grid planning; and heterogeneous power quality.

   b. Build up capabilities to operate and manage the Singapore Institute of Technology (SIT)'s micro-grid testbed at Punggol. The Campus Micro-grid, when ready in 2024, will be a national infrastructure, open to the industry and academics for research, development and demonstration (RD&D) – allowing technologies developed in Singapore to be validated in real-world conditions, bridging the chasm between RD&D and commercialisation. The full-featured micro-grid at Punggol will be one which can cooperate and interoperate with the utility grid with seamless and controlled transitions between utility-connected mode and islanded mode.

Scope of Grant Call

2. The EDGE Programme Office in SIT invites submission of proposals for RD&D projects that will strengthen and develop new capabilities in the areas of distributed generation to prepare Singapore for a decentralised energy system, through electrical power engineering. Proposals can also include social sciences, such as design thinking, psychology and human behavior, as these domains are playing increasingly pivotal roles in the deployment of energy sector innovations.

3. Through extensive consultation of industry players, IHLs and Research Institutes (RIs), we identified two domain areas for this grant call as elaborated below:

a. **Interconnection and Management of Distributed Energy Resources (DERs) with Utility Grid to Provide Non-Homogeneous Power Quality.** Developing the optimal architecture and strategies for interconnection of DERs with utility grid and for management of these DERs to provide differentiated levels of power delivery service to different categories of end-use loads, with the objective of reducing the overall costs of energy delivery in the electricity supply chain. Proposals should minimally address the following questions:

   i. How to evolve the power system to meet future requirements for high quality electricity service that modern digital economies demand, without increasing the cost of upstream power delivery by tapping on downstream availability of DERs.

   ii. How to seed the evolution of grid planning for a dispersed paradigm by exploiting the extremely heterogeneous requirements of end-use loads, with considerations of the future high penetration of DERs and of the potential cooperation of thermal and electrical networks in the end-use premises.

b. **Asset Management with Computational Intelligence Based Predictive Maintenance that can manage Large Number of DERs including Vehicle-to-Grid (V2G) Technologies.** Developing technologies and methodologies to efficiently and economically manage and maintain the projected increased number of DERs (including V2G applications) in the future power network with the objective of optimising the total life-cycle costs. Proposals should minimally address the following questions:

   i. How to implement and demonstrate smart circular-economy solutions for digital asset management which is based on data-driven and risk-informed decisions considering the expanding number of assets and the increasing complexity of the assets.

   ii. How to digitalise the operation, maintenance, and condition assessment of DERs to enable them to operate at the highest level of efficiency and increased asset availability.

Eligibility, Funding Support and Other Important Information

4. This RFP is open to research consortia comprising IHLs, RIs, public sector agencies, not-for-profit organisations, and private sector companies. In line with EDGE's focus on near-to-market and industry focused innovations, **proposals shall be led by a Host**

Institution. "Host Institution" refers to a **company which is incorporated under the Companies Act** and is in the energy and power related industries. To encourage stronger partnership with Singapore's research community, consortia comprising multiple IHLs and RIs are strongly encouraged.

5. Proposals shall not be funded or be currently considered for funding by other agencies.

6. Funding awarded cannot be used to support overseas research activities. All funding awarded must be used to carry out the **research activities in Singapore**.

7. Proposals will be funded up to 50% of the approved qualifying costs in cash. Companies that are involved in the proposals shall contribute at least **30% of qualifying costs as cash and/or in-kind contribution**. SIT will also provide additional in-kind contribution (at least 20% of the approved qualifying costs).

8. Only IHLs, RIs and not-for profit organisations would be allowed support for indirect costs, which include up to 30% of qualifying costs as overheads.

9. Budget for the entire project shall be broken down into the following broad categories, mainly: (a) expenditure on manpower (EOM); (b) equipment; (c) other operating expenses (OOE); (d) overseas travel, and (e) research scholarship. Please refer to **Annex A** for the list of non-fundable costs when proposing the project budget.

10. The project may include research collaborations with local or overseas organisations. However, contracting out the whole or substantial part of the research work is not permitted.

11. Collaborators are not permitted to receive, directly or indirectly, any part of the funding, whether in cash or in the form of assets acquired using the funding or otherwise. All assets acquired using the funding must be located in Singapore and maintained within the control of the grantees.

12. The project duration, including completion of the final report and all miscellaneous project activities, shall not exceed **three (3) years**. The proposed project schedule must be realistic, allowing sufficient time for the preparation of final report and for the review of project results.

13. All rights, title to or interest in all intellectual property arising from the project (Foreground IP) shall vest in the Host Institution and project team in a manner that

is mutually agreed among the Host Institution and the project team and as documented in the Research Collaboration Agreement, which shall be entered into by the Host Institution and the project team before the research commences.

14. The Host Institution and the project team shall provide the Singapore Government and public sector agencies with a non-exclusive, non-transferable, perpetual, irrevocable, worldwide, royalty-free right and licence to use, modify, reproduce and distribute the Foreground IP for non-commercial, RD&D and/or educational purposes only. The Host Institution shall promptly inform the EDGE Programme Office in writing of any applications filed for the registration of Foreground IP.

15. Projects must include a test-bedding phase or at a location site that is jointly agreed by Principal Investigator (PI) and SIT, and eventually facilitate capability development and translated to SIT's Punggol Campus micro-grid, a national infrastructure open to industry and academic partners for test-bedding and validation of solutions. Projects should involve SIT's Faculties as Co-Investigators (Co-Is) / Collaborators.

Assessment Criteria

16. Proposals will also be evaluated against the following criteria:

a. High-technical-merit research and innovation that is novel, internationally competitive, directly addresses the identified challenge(s), and can lead to breakthrough results;

b. Economic benefits to Singapore in terms of capabilities and manpower development, as well as commercialisation spin-offs;

c. Strong and clear demonstration of potential commercial viability and economic advantage of the proposed solution over existing technologies and practices;

d. Excellent execution by an experienced research team with a good track record and whose members have the relevant and complementary expertise.

Application and Evaluation Process

17. This RFP is a single stage process.

18. The PI should fill up the proposal's details in accordance with the stipulated application template as provided in **Annex B** .

19. The proposal and all accompanying documents (all attachments MUST be submitted in PDF format, except for the budget details which must be submitted in Excel

format) MUST be sent to the EDGE Programme Office at **EDGE@SingaporeTech.edu.sg**.

20. All endorsed proposals eligible for funding will be invited for a selection for award by a Project Evaluation Panel (PEP). The EDGE Programme Office reserves the rights to award in parts.

Submission

21. Proposal must be endorsed by the Chief Executive Officer / Chief Technology Officer (or equivalent) of the Host Institution by the deadline for online submission on **15 Oct 2022, 1200 hrs (noon), UTC +08:00.**

22. Proposals are only considered as complete after the proposal with the relevant attachments, with the endorsement from the Chief Executive Officer / Chief Technology Officer (or equivalent) of the Host Institution, are submitted by the specified deadline. **EDGE Programme Office will not entertain any submissions after the specified RFP deadline or any requests to extend the endorsement deadline.**

Result

23. Notifications for the acceptance and approval of successful and complete proposals can be expected by **FY2023Q1**. Awarded projects will commence thereafter.

~ End ~

Annex A

LIST OF NON-FUNDABLE DIRECT COSTS

Type of Expenses	Description
Salaries of PI / Investigators / Visiting Professors & researchers/ Collaborators/ general administrative support staff	Not allowable.
Teaching buy outs	Not allowable for the hiring of substitutes to perform the Investigators' teaching duties.
Stipend top-up for existing post-graduate scholarship holders	Not allowable.
Undergraduate stipend and tuition support	Not allowable.
Costs related to general administration and management	Not allowable. This includes common office equipment, such as furniture and fittings, office software, photocopiers, scanners and office supplies.
Costs of office or laboratory space	Not allowable. This includes renovation/outfitting costs, rent, depreciation of buildings and equipment, and related expenditures such as water, electricity, general waste disposal and building/facilities maintenance charges.
Personal productivity tools & communication expenses	Not allowable, unless the use of mobile phones and other form of smart devices were indicated in the methodology for the project.
Audit fees (Internal and external audit) and Legal fees	Not allowable.
Entertainment	Not allowable.
Refreshment	Not allowable.
Fines and Penalties	Not allowable, unless this is related to a hosted conference or workshop for the project.
Patent Application	Not allowable.
Professional Membership Fees	Not allowable.
Staff retreat and team-building activities	Not allowable.