

# ELECTRIFYING SOCIETY: TOWARDS RESILIENT DECARBONIZED COMMUNITIES

**CALL FOR PROPOSALS – Seed Grants 2023 [Deadline: September 6th, 2023]**

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Duration	Two years
Value	Maximum \$125,000 per year
Deadline	September 6th
How to apply	Application must be submitted through the ERDC portal (under development).
For more information	Contact <a href="mailto:erdc@concordia.ca">erdc@concordia.ca</a>

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**Preamble.** Concordia University and its partners secured the Canada First Research Excellence Fund (CFREF) grant entitled Electrifying Society: Towards Resilient Decarbonized Communities (ERDC) effective March 1, 2023. Its aim is to accelerate and optimize the transition to decarbonized resilient communities – entailing design and integration of proven or new technologies for smart carbon-neutral buildings, smart and secured grids, energy storage, energy management, integration of distributed renewable energy resources, and electrification of transportation, while emphasizing innovation, affordability, equity, and the well-being of society. ERDC is a transformative and integrated program that centers its action on the impact on communities, with electrification as a key element. It recognizes the Indigenous partner communities as key stakeholders, valuing their expertise, needs, and strengths. Through co-development, the program fully includes the Indigenous partners, ensuring their active participation in shaping and implementing impactful pathways for sustainable development.

As approved by the ERDC Advisory board, the preliminary program’s research, and innovation strategy would include, among other initiatives, three main calls for projects (2023, 2024, 2026).

- **Seed Grants:** The goal of the first call is to leverage the proposed research in the ERDC proposal (available) to achieve both early impact and support preparation of large-scale initiatives to be funded in the Impact Grant (1) call one year from now.
- **Impact Grant (1):** The goal of the 2024 call for proposals would be to support large-scale initiatives which will become the backbone of the ultimate impact of ERDC and building its legacy. We will be looking for multidisciplinary projects involving a broad variety of partners, public and private, addressing the full array of implications and contingencies attending the electrification of society, including social acceptability and economic viability, to demonstrate real and significant impact.
- **Impact Grant (2):** The 2026 call will be further defined with the development of the projects. It would aim to maximize the impact of previously funded research and leverage new opportunities that arise from that research and the evolution of the market and technology.

This initial call for **Seed Grant** proposals (2023) is based on the plan as set out in the ERDC proposal, specifically its three Themes and three Platforms (Figure 1). Following the selection of the initial projects, a full retreat of researchers, funded or not, will be convened to reflect on the funding strategy and adapt it to the rapidly evolving landscape. The aim is to ensure that the funding strategy incorporates equity, diversity, and inclusion principles at all levels.

	THEMES	
A. Electrification	THEME 1: Smart, sustainable and healthy built environment	B. Digitalization, IoT
	THEME 2: Resilient community energy and transportation systems based on renewables	
	THEME 3: Planning and governance for social equity and citizen engagement	
	C. Living lab and knowledge mobilization	

**Figure 1: Themes (T1, T2, T3) and connecting Platforms (PA, PB, PC)**

Theme 1: Smart, sustainable, and healthy built environment

Focuses on the design, development, and operation of the built environment and placemaking, encompassing urban centers as well as rural and remote communities, with the goal of reaching carbon neutrality. Examples of projects include but are not limited to:

1. Multi-functional, prefabricated energy-positive building envelope systems with integrated solar panels.
2. Methodologies for creating a resilient and healthy microclimate in and around buildings with integration of natural and hybrid ventilation for energy efficiency.
3. Methodologies for occupant-centric control of energy-efficient, fully accessible buildings.
4. Building archetype development for a virtual Canadian building stock model for decarbonization scenarios.

Theme 2: Resilient community energy and transportation systems based on renewables

Focuses on innovative theories, designs and system concepts for electrified, smart, and connected communities in diverse environments and inclusive of underrepresented groups. Examples of projects include but are not limited to:

1. Community-centered energy networks for efficient grid response in electrified, resilient and decarbonized communities.
2. Digital twin technologies to model and manage data of community energy projects with efficient built environment and electrified transportation including renewables and storage.
3. Cross-sector electricity co-management and optimization, demand-side management, and dynamic pricing to support highly flexible and efficient consumption of electricity of buildings and transportation.

Theme 3: Planning and governance for social equity and citizen engagement

Focusing on the quality of both processes and outcomes, this theme develops strategies for informed planning and approaches for engaging communities, in order to improve the lived experiences of electrification and decarbonization scenarios and sites. Examples of projects include but are not limited to:

1. Community Engaged Design: Co-developing strategies, processes, tools, and scenarios for identifying, engaging with, and expanding electrification infrastructure and sites for and with communities.

2. Indigenous Communities: Co-developing approaches for fully inclusive Indigenous participation and collaboration in clean energy projects designed to benefit Indigenous communities and draw from their knowledges and strengths.
3. Building Criteria, Urban Metrics, and Key Indicators: Identifying and developing criteria, metrics, and indicators for assessing building qualities, urban morphology, and transportation system effectiveness, in an integrated manner.
4. Data for Policy/Procurement Shifts: Developing methods for assessing fair and ambitious climate targets across Canadian cities and communities.
5. Financial Risk Assessment: Micro-macro finance modeling for assessing climate change risks.

#### Platform A: Electrification

The electrification platform connects the three themes at the technological level and facilitates integration of technologies. Examples for using the platform include but are not limited to:

1. Improving safety, security and resilience of smart grids and electric vehicles and the integration of Electric Vehicles (EV) with buildings and the grid, including nanogrids and microgrids and associated energy management systems
2. Transportation electrification, including design, monitoring, control, optimization and fault detection
3. Development of metal ion and solid-state batteries and beyond.
4. Transformations of critical minerals from cell to recycling (circular economy)
5. MBS, BMU, Energy Management Systems, EV platforms, auxiliaries, Vehicle-to-Grid (V2G)

#### 6. Platform B: Internet-of-Things (IoT) and Digitalization

A systematic framework for efficient, cybersecure, and resilient energy management must be established to fully integrate distributed generation and electrified loads in the future Internet-of-Energy. A digitalized IoT framework with multi-level energy management strategies to provide reliable, flexible, secure, and sustainable solutions for smart systems ranging from smart buildings to smart EVs, smart grids, and smart cities. Examples for using the platform include but not limited to:

1. Development of transfer learning approaches and federated learning approaches with secure communication technologies to train models locally before securely sharing only trained models to the cloud for an aggregated model.
2. Development of explainable unsupervised learning models to avoid the difficulty of data labelling while allowing interaction with the end-user to refine the resulting models.
3. Development of secure computing.
4. IoT solutions for smart buildings and vehicle-to-grid concepts

#### Platform C: Living Lab and Knowledge Mobilization

The following potential Living Labs have already been identified. Potential new Living Lab sites will also be considered:

1. Concordia Campus as a Living Lab
2. City of Montreal
3. City of Varennes
4. West 5 (London Ontario)
5. First Nations, Inuit, and Métis communities collaborating with Indigenous Clean Energy

6. International projects, for example hydrogen/syngas production in Columbia (two pilot sites in Bogota and Amazon region)

**Eligibility.** This call, for **Seed Grants**, is open to Concordia researchers and researchers from our three institutional partner institutions on the CFREF project (University of Calgary, Toronto Metropolitan University and Dalhousie University). The Principal Investigator (PI) must be affiliated with one of the above-mentioned institutions. Co-Principal Investigators can be affiliated with Concordia University, one of the three partnering institutions, or one of our collaborating institutions (Carleton University; University of Windsor; École de Technologie Supérieure; École Polytechnique de Montréal and Université de Montréal). **Applications must include collaboration between at least three researchers.** The inclusion of at least one ECR in the team is strongly encouraged. A researcher is limited to submitting one application as a principal investigator (PI) and participating in a maximum of three applications as a co-PI.

The participation of non-academic partners (private, governmental, non-for-profits, etc.) is compulsory. Applicants are strongly encouraged to explore new partnerships (for the the list of non-academic partners supporting the ERDC, please visit the following [website](#). Partners can support the application by cash and/or in-kind contributions. Collaboration between partner institutions (Concordia University, TMU, University of Calgary and Dalhousie) is also encouraged, to build as early as possible the essential partnerships to deliver on the program objectives.

### Evaluation Criteria

1. Alignment with the scope of the call (Pass/Fail)
  - a. Does the project fit in one or more of the ERDC themes or platforms?
  - b. Does the project have the potential to lead to large multidisciplinary projects involving a broad variety of partners, public and private, addressing the full array of implications and contingencies attending the electrification of society, including social acceptability and economic viability, to demonstrate real and significant impact.

2. Credible EDI strategy (pass/fail)

Achieving fully inclusive equity within its research ecosystem is a priority of Concordia in all its endeavors. Concordia recognizes the importance of intersectionality and acknowledges that representation and inclusion must consider the unique experiences and challenges faced by individuals from various intersecting identities. While we emphasize the full inclusion of members of the four federally designated groups, namely women, Indigenous Peoples, racialized minorities, and persons with disabilities, we recognize that diversity extends beyond these categories. With Indigenous Peoples, we acknowledge that it is essential to foster a nation-to-nation relationship, respecting their distinct rights, cultures, and knowledge systems. The inclusion of a strong cohort of early-career researchers (ECRs) is likewise a priority. Concordia's own commitments to expansive equity, diversity and inclusion additionally encompass, but are not limited to, ethnic, linguistic, and religious diversity and inclusion, and a particular focus on Black inclusion and thriving in keeping with its commitment to fulfill all recommendations in the Final Report of the President's Task Force on Anti-Black Racism.

In keeping with Concordia's and its partners EDI priorities, and the CFREF Program's mandate to significantly increase the equity of the Canadian research ecosystem, applicants are expected to increase the inclusion and advancement of underrepresented groups in their fields, as one means to enhance excellence in research and training.

[https://www.nserc-crsng.gc.ca/NSERC-CRSNG/Politiques-Politiques/EDI\\_guidance-Conseils\\_EDI\\_eng.asp](https://www.nserc-crsng.gc.ca/NSERC-CRSNG/Politiques-Politiques/EDI_guidance-Conseils_EDI_eng.asp)

All proposals must meet the following criteria. Applicants to a Stage 2 to fund Impact Grants (1) in a later call would be expected to report on fulfillment of commitments made in the current Seed Grant proposals:

- a. Identification of field-specific equity challenges, where existent. This is not expected to be exhaustive, and should focus on elements that the proposal is capable of addressing to a degree.
- b. Avenues of equitable recruitment identified for HQP and, as necessary, faculty and community recruitment for research team. (e.g. commitment to advertising all job postings on under-represented group-specific student groups or centres' websites).
- c. Where faculty recruitment is planned, or a larger team already in place, prominent inclusion of ECRs concretely provided for.
- d. Commitment to evaluate job and team candidates accounting for leaves (official and otherwise), interruptions, slow-downs, disability-related progress differentials, and non-traditional career paths. This commitment should be prominently advertised in all recruitment efforts.
- e. Equitable mentorship plan for HQP and (where applicable) ECRs clearly delineated.
- f. Gender-based Analysis+ (equity, diversity and inclusion in the research *design*) elaborated in proposal.

Though it will not be adjudicated in Seed Grant proposals, research teams should begin planning equitable outreach activities as soon as possible. For information on equitable, diverse and inclusive research and training environments, recruitment, and research design, see New Frontiers in Research Fund's (NFRF's) Best practices in equity, Best practices in equity, diversity and inclusion in research and NSERC's guide on integrating equity, diversity and inclusion considerations in research. The OOR will offer workshops on EDI in the research team (faculty, community members, HQP, staff, etc.) and in the research design (GBA+ analysis), well ahead of application deadline.

3. Scientific quality of the proposed project

- a. Are the objectives of the project toward decarbonized resilient societies clearly stated and feasible within the timeframe of this call?
- b. Is the state-of-the art clearly described?
- c. Is the solution proposed clearly explained, innovative and multidisciplinary in nature?
- d. Are the key technical performance targets defined, quantitatively, to achieve decarbonized resilient societies?

4. Quality of the team and partnerships

- a. Does the project involve partners, private and institutional, to achieve impact?
- b. Is the contribution of partners if any, clearly explained and synergized toward achieving impact?
- c. Do all key participants involved have the required expertise and experience?
- d. Is there an effective mechanism to ensure interaction among the participants?

5. Impact

- a. Has the improvement toward decarbonized resilient communities been clearly described?
- b. Has a way forward for eventual implementation or removal of barriers been clearly described?
- c. Is the project significantly contributing to training students or personnel?
- d. Is the project contributing to developing an ERDC ecosystem across Canada?
- e. Is there a plan to disseminate the results for the benefit of ERDC partners, contributors, and communities implicated in the research?
- f. Is the foreground IP (patents, know-how, trade secrets, etc.) to be developed or other issues such as building codes and standards identified (whenever applicable).

**Proposal Evaluation Process.** ERDC will set up a fair, rigorous, and transparent way of allocating funding. As part of its governance, the Scientific Committee is responsible for overseeing the project selection process. Each of the six ERDC themes/platforms will have a Theme/Platform Project Evaluation Committee. As a first step, each proposal will be reviewed by two independent external reviewers. The results of the reviews will be forwarded to their respective Theme Evaluation Committee for reviewing the projects and the independent evaluations and rank the proposals based on the evaluation criteria. The theme/platform committees will forward their results to the Scientific Committee which will establish the overall list of projects and their recommendation to the Advisory Board for final approval. Projects overlapping more than one theme/platform will be assessed by the theme/platform to which the largest part of the funding is allocated.

**Budget.** The total budget allocated for this first call is approximately \$6.75M. The allocated budget is distributed amongst the partnering institutions as follows: Concordia University: up to \$4.5M; University of Calgary: up to \$750k; Dalhousie University: up to \$750k; TMU: up to \$750k. The maximum ERDC contribution per project is \$250K over two years. Overall, for the first call, this would represent approximately a total of 27 projects distributed, if possible, equally between the 6 themes and platforms. If ERDC funding is requested for a collaborating institution, the funding will be accounted for within the PI's partner institution's overall share. The funds allocated to each partner university will be accounted for against their allocation defined in the proposal.

**ERDC Funding Decision Appeals.** The ERDC strives for equitable treatment of applications and provides an appeal process for challenging funding decisions based on procedural errors. Appeals must demonstrate a procedural error, without reassessing the application itself. Errors may include undisclosed conflicts of interest or failure to provide required information. Appeals cannot be made on peer review assessments, eligibility decisions, failure to follow application instructions, or other non-procedural matters. Appeals must be submitted in writing within one month of receiving the decision. It should be concise and limited to two pages. Non-compliant appeals will not be considered.

### **Timeline**

Issue first call:	<b>June 29, 2023</b>
Deadline to receive proposals:	<b>September 6, 2023</b>
Results:	<b>Fall 2023</b>