Volt-Age
CONCORDIA

ASCENT

Call for Proposals

Application Guide

Supported by Canada First Research Excellence Fund

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Glossary

Term	Scope	Description
CFP	This call	**Call for Proposal**, or CFP, is a request for submissions for the ASCENT Volt-Age grant.
Applicant	This call	An Applicant is typically a faculty member who leads or is a part of a research team in a university setting. The Applicant is the primary point of contact for the ASCENT CFP.
Co-Applicant	This call	A Co-Applicant is typically a faculty member who leads or is a part of a research team in a university setting.
Volt-Age Partner Institutions	This call	Volt-Age Partner Institutions consist of University of Calgary, Dalhousie University, and Toronto Metropolitan University.
Partner	This call	A Partner is typically an organization outside of the post-secondary education sector. This includes private industry, government agencies, non-profit organizations, etc.
Core team	This call	The group consisting of the Applicant and Co-Applicant(s) included in an ASCENT application.
Community organisation	General	In Canada, a community organization, frequently referred to as a Community-Based Organization (CBO) or an *organisme communautaire* in Quebec, is a non-profit, independent entity operated by and for local citizens to address specific social, cultural, economic, or environmental needs.
NRC	General	**National Research Council of Canada**, the Government of Canada's largest federal science and technology research and development organization.

ISED	General	**Innovation, Science and Economic Development Canada**, a department of the Government of Canada.
CAF	General	**Canadian Armed Forces**, the unified military force of Canada, encompassing the Navy, Army, Air Force, and Special Forces.
DND	General	**Department of National Defence**, the civilian government department responsible for supporting CAF in defending Canada's national interests domestically and internationally.
DRDC	General	**Defence Research and Development Canada**, the science, technology and innovation branch of the DND.
IP	General	**Intellectual property**, or IP refers to creations of the mind developed through individual intellectual effort and applied in practice. This includes scientific discoveries, artistic works such as music and literature, designs, symbols and names or images used in commerce.
IPR	General	**Intellectual Property Rights**, or IPR, provides legal protection to Intellectual Property. These rights include patents, copyrights, trademarks, and industrial designs.
EDI	EDI	**Equity, Diversity, and Inclusion**, or EDI, refers to the intentional practices and policies used to ensure that research environments are fair, representative, and welcoming to all individuals, particularly those from underrepresented groups.
GBA+	EDI	**Gender-based Analysis Plus** is an intersectional analysis that goes beyond biological (sex) and socio-cultural (gender) differences to consider other factors, such as age, disability, education, ethnicity, economic status, geography (including rurality), language, race, religion, and sexual orientation.

TRL	General	**Technology readiness levels** describe the different stages of pre-commercial development.
Data assets	TRL	A database repository, data service, or other data resource.
Scientific research	TRL	Research aimed at expanding the base of theoretical scientific knowledge and predictions that have universal applicability.
Applied research	TRL	The application of scientific knowledge to solve specific practical problems or answer certain questions.
Research and development	TRL	Systemic work designed to produce new products, techniques or processes or improve existing products, techniques or processes.
Proof of concept	TRL	Analytical and experimental demonstration of hardware/software concepts.
Model	TRL	A reduced scale, functional form of a system, near or at operational specification.
Prototype	TRL	The first early representation of the system which offers the expected functionality and performance expected of the final implementation.
Laboratory environment	TRL	A fully controlled test environment where a limited number of functions and variables are tested. Tests in a laboratory environment are solely for the purpose of demonstrating the underlying principles of technical performance (functions), without respect to the impact of environment.

Simulated environment	TRL	A relevant working environment with controlled realistic conditions, generally outside of the lab. If the technology will be used in various environments (e.g., the Arctic and Southern Canada), the technology must be developed and tested in each operational environment.
Operational environment	TRL	A “real-world” environment with conditions associated with typical use of the product and or process. If the technology will be used in various environments (e.g., the Arctic and Southern Canada), the technology must be developed and tested in each operational environment.

Key Information

- Funding: up to a maximum of CAD 2 million per project
- Project duration: 2 years
- Team composition (minimum requirements):
  - One (1) Applicant
  - One (1) Co-Applicant
  - One (1) Partner
- Application deadline: **31 August (Monday) 2026 13:00hrs**

- Applicants should ensure that they receive Application Guide (this document) and Core Team Member Form for the ASCENT CFP

- Documents or materials required to be submitted by the Applicants are indicated by the symbol '❖'

1. Background

The world is entering a transformed political environment marked by heightened geopolitical tensions, a more fragile international security landscape, rising protectionism, and accelerating technological rivalry. These shifts are pushing countries, including Canada, to reinforce national sovereignty and strengthen security across strategic sectors. Universities possess unique capabilities to support this national effort and contribute directly to the well-being of citizens. In particular, the development of dual-use technologies offers a powerful opportunity to enhance both economic competitiveness and national resilience. Alongside these technological contributions, academic research can advance social and behavioural concepts that help society adapt to a more contested world. By aligning scientific and social innovation with national priorities, universities can play a decisive role in strengthening Canada's sovereignty and long-term stability.

Canada is investing significantly to achieve its objectives. Defence and security spending targets are expected to increase from under two per cent of GDP today to five per cent over the next 10 years. The 2025 Federal Budget committed CAD 81.8 billion in new defence spending, including CAD 6.6 billion over five years for Defence Industrial Strategy intended to expand Canadian supply chains, domestic capability, and sovereign control over key technologies. Through this strategy, the National Research Council of Canada (NRC) is investing over CAD 900 million to advance long-term national prosperity and strengthen a resilient domestic defence economy. Transport Canada has launched a call for proposal to support the development of critical dual-use transportation infrastructure in the Arctic, funded through the Arctic Infrastructure Fund (AIF), which will provide CAD 1 billion over four years. With CAD 656.9 million over five years, starting

2025-26, ISED is invested developing and commercialising dual civilian-military technologies in a range of industries including aerospace, automotive, marine, cybersecurity, artificial intelligence, biodefence, and life sciences. ISED, along with Natural Resources Canada, will also support the development of innovative critical minerals processing technologies, support joint investments with Allies in Canadian critical minerals projects, and develop a critical mineral stockpiling mechanism to strengthen Canadian and Allied national security.

These developments also present a huge opportunity for Canada to drive innovation, growth, and productivity while addressing strategic objectives. Research and development funding targeted towards dual-use projects can expand capacity in priority areas for defence acquisition of advanced technologies while also developing technologies with wide civilian applicability across society.

Focusing a call for proposals on such technologies aligns academic output with national security, economic resilience, and international commitments. Connecting research and development efforts on dual-use technologies will also help build relationships between Canadian innovators and the defence community. At the same time, the development of an intellectual property strategy to strengthen technological sovereignty will help bolster Canada’s readiness to compete in a knowledge-driven and innovation-led economy.

2. Purpose

Volt-Age's mission is to accelerate the equitable energy transition in Canada and around the world towards decarbonized and energy-resilient communities, a goal that is intrinsically dual-use in nature.

Canada’s universities possess strong research and development capacity. However, researchers often face barriers in engaging, co-developing, and advancing critical and sensitive technologies with defence industry and related organizations.

With the ASCENT Call for Proposal (‘ASCENT CFP’ or ‘CFP’), Volt-Age intends to address these challenges in the university-led dual-use research innovation and technology development. ASCENT will provide an opportunity to demonstrate and showcase the latest applied research and technology that support both civilian and security applications through partnerships between academic stakeholders and industry, government, and community organizations.

This focus necessitates profound interdisciplinary collaborations. Through the ASCENT CFP, research at Volt-Age will prioritize experimentation, testing, rapid-prototyping, validation, maturation, and security of dual-use applied research, alongside the exploration of equity and accessibility, public policy and governance, and knowledge mobilization to ensure these technologies are developed and implemented responsibly and effectively.

Volt-Age expects that ASCENT will reduce barriers to researchers by enabling structured, secure, and mission-focused collaboration between various stakeholders in the defence and security sectors.

2.1 Expected outcomes

Under this CFP, the projects invited for application are expected to contribute to a fair transition and have a real impact by:

- Advancing the development and responsible deployment of clean energy and decarbonization solutions with dual-use applications, ensuring benefits across civilian applications and broader strategic national contexts.
- Translating research to commercialization through creation of intellectual property and nurturing entrepreneurial ventures
- Incorporating and building a community of diverse perspectives, experiences, and knowledge systems
- Supporting societal acceptability and social integration of new technology throughout the research process
- Seeking to make lasting change beyond the scope of the project

Applications must exhibit the potential for significant, sustained, scalable, and replicable impacts, aligning with Canada’s sovereign and decarbonization goals and setting a benchmark for future initiatives. A broad range of academic, public, community and private partners must be involved in the projects to demonstrate real and significant impacts focusing on innovation, economic viability, equity, and the security and well-being of society, through the responsible advancement of dual-use technologies.

3. Research challenges

The purpose of including the following challenges is to familiarize the Applicants with the nature of problem statements and the expected solutions for some of the ongoing and/or outstanding research topics that are highly relevant to the Canadian Armed Forces (CAF), Department of National Defence (DND), Defence Research and Development Canada (DRDC), and other organizations, while being equally important for civilian applications.

The list provided here is not exhaustive, neither in the of number of topics included nor in their description. Although these topics are provided under different sections, overlap between sections is expected. In fact, Applicants are encouraged to identify these overlaps when preparing their Application for this CFP.

3.1 Background: Extreme arctic/north climatic conditions

Canada's far North and Arctic region is characterized by seasonally frozen ground, deep snow, rugged terrain, permafrost, and extreme temperatures that can reach -60º C in the High Arctic. These conditions are further compounded by frequent high winds, often reaching 10-120 km/h across both the high Arctic and Subarctic regions. Climate change is causing additional challenges for the structural design of arctic infrastructure foundations. Permafrost that has persisted for thousands of years is thawing and refreezing each season, causing existing buildings/foundations to sink, shift, and crack. Many Arctic communities are located in isolated regions with limited or no road access and must be reached by alternative means of transportation, such as barges or heavy-life aircraft. The roads that do exist tend to be built on ice in the winter months and have weight limits.

3.2 Energy sovereignty

3.2.1 Wind

Typical wind turbines are massive in size, which significantly limits their potential use in remote and isolated northern locations, given significant barriers related to transportation and installation. A typical unit has size dimensions that exceed 120 meters in height and has blades that are 80-90 meters long, which requires hundreds of tons of concrete for the base. The blades and shafts are typically made of composite materials in order to limit their overall weight as well as reduce the logistical burden of lifting them during installation. A unit of that size is not as practical and is designed to supply much more power than is necessary for most northern installations. Wind turbines of smaller capacities are logistically manageable.

Many DND/CAF locations exist in isolated locations or within small, arctic communities that have limited or no road access and must be reached by other means of transportation such as barges or heavy-lift aircraft. The roads that do exist tend to be built on ice in the winter months with weight limitations. Consequently, designs must be modular to simplify transport by air, ship or ice road. Ideally, designs should also make use of readily available parts or easily manufactured parts in order to simplify the installation, maintenance and repair. Designs should also be easy to assemble by non-technicians using commonly available tools. New materials are needed that will similarly limit the burdens of installation, address durability concerns, and might further include radar absorbing materials (RAM) to mitigate interference with communications systems.

3.2.2 Batteries and Hydrogen

The demand for electrical power and space heating in the Canadian Subarctic and High Arctic is fulfilled almost exclusively with diesel-fired generators. There is a critical requirement to reduce petroleum-generated electrical energy consumption in the North in order to minimize operational, logistical, and environmental burdens.

DND is tasked with procuring battery or hydrogen-powered green vehicles and developing decarbonization plans for operational fleets. Transitioning commercial fleets to zero-emission platforms is underway, but replacing fossil fuels presents significant challenges, such as the complex transition process from legacy energy sources to renewable sources, the limitations of energy density in renewable sources, their environmental impact, and the heavy infrastructure required. Battery and hydrogen-powered vehicles for military use face additional hurdles: batteries need extensive charging infrastructure, which is scarce in strategic locations and vulnerable to attacks or natural disasters; conventional hydrogen storage requires high-pressure compression (350-700 bar) or cooling to -253°C, both of which are challenging for ships, planes and armored vehicles in hostile environments. Alternative fuels like ammonia, methanol, ethanol, and biofuels are being explored, but face adoption issues related to safety, cost, and infrastructure.

3.3 Vehicle-to-Grid (V2G), Vehicle-to-Home (V2H) technologies

While V2G and V2H technologies are being successfully demonstrated in southern urban centers of Canada, their application for Forward Operating Locations (FOLs) or remote radar sites faces unique technical and environmental hurdles. The civilian applications of V2G focus on grid load balancing and peak shaving with a particular emphasis on circling the energy back to the power grid in times of emergency. However, defence and security applications require that priority be given to survivability and microgrid stabilization. This is especially important for remote monitoring sites which are typically off-grid, or isolated microgrids powered by diesel generators. The challenge in such circumstances is to integrate electric vehicle (EV) batteries as a high-speed buffer to prevent diesel generator shutdowns during sudden spikes in demand.

In addition to these, defence mandates require that remote sites be able to 'black-start', i.e. restart from total failure, in extreme cold without relying on external assistance. V2G systems must be designed to hold a 'cold-start reserve' that cannot be utilized for normal base operations, adding a complex layer of software and physical logic to the vehicle's power management system. Beyond pilot demonstrations, research is being explored in the field of Integrated Thermal Energy Management, that use the waste heat from EV charging and discharging cycles to maintain the internal temperature of battery housings, thereby preserving vehicle range in extreme cold. Attention is also focused on the need for a unified military standard for bidirectional charging that allows full interoperability between different EV platforms such as snowmobiles, all-terrain tracked vehicles, and light transport trucks, as bases in extreme climates cannot easily swap power across different vehicle types.

3.4 Mobility and transportation

Transport Canada, working together with DND, is exploring dual-use transportation infrastructure that supports defence and community/civilian requirements in the Arctic. This will strengthen Canada's sovereignty and defence readiness, support economic growth and help make communities better able to handle challenges. The objectives for such initiatives include enhancing and developing connections to key transportation corridors, domestically and abroad, to support regional economic development, efficient trade flows and access to resource-rich and industrial opportunities, improving connectivity for human security to provide communities in the Northern and Arctic regions with access to essential goods and services, logistics hubs and related facilities required for dependable regional mobility and emergency response capabilities, and advancing Indigenous reconciliation, including recognizing that First Nations, Inuit and Metis are best placed to identify their community needs. Key solutions should incorporate features that improve infrastructure resilience against climate change through new designs, technologies, or materials that reduce the risks and impacts of climate change (like thawing permafrost, extreme temperatures or flooding). Transportation infrastructure may include airport infrastructure, developing or expanding a port, expanding, moving or improving a sealift area, ferry terminals, all-season roads, highways or inter-community roads, access roads to ports, airports, sealift areas, rail infrastructure, digital infrastructure, and intermodal hubs.

3.5 Sustainable infrastructure

Currently, 60 percent of the energy requirements in DND facilities is for space heating, of which 90 per cent is generated from the burning of fossil fuels. Given that DND has more than 10,000 buildings in its portfolio, the need to address the GHG emissions of these buildings is essential. The challenge is in finding ways to convert these buildings to low carbon heating without requiring a major building retrofit, which would be cost prohibitive.

It is recognized that in addition to how energy is generated/transferred, reducing GHG emissions can also be affected by improving the energy efficiency of a building with such technologies as improved windows or better insulation.

As CAF enhances its mobility, reach and footprint in Canada's North to support operations and exercises, and its ability to project force in the region, it will require pursuing innovative solutions to ensure that sovereign fixed ground-based assets are optimized for use in the Arctic environment, including the ability to monitor and secure such critical assets and supporting infrastructure.

Multiple sites in isolated locations across the Canadian Arctic shelter remotely operated strategic and sensitive assets (e.g. sensors, instruments, etc.) that are exposed to extreme weather conditions and could be susceptible to interference or physical disruption. Ensuring continuity of operations in the region for the defence of North America has many aspects including but not limited to physical protection of the assets against various intruders and extreme weather, 24/7 monitoring for perimeter or power impacts, and/or real-time alerts of disruption or tampering of the assets.

3.6 Critical minerals and rare earth elements

The Canadian Critical Minerals Strategy addresses five core objectives: (1) supporting economic growth, competitiveness, and job creation; (2) promoting climate action and environmental protection; (3) advancing reconciliation with Indigenous peoples; (4) fostering diverse and inclusive workforces and communities; and (5) enhancing global security and partnerships with allies. These objectives will be achieved by focusing on six areas: (1) driving research, innovation and exploration; (2) accelerating project development; (3) building sustainable infrastructure; (4) advancing reconciliation with Indigenous peoples; (5) growing a diverse workforce and prosperous communities; and (6) strengthening global leadership and security.

Off-grid mining operations are heavily dependent on GHG emitting energy sources for power, such as diesel, largely due to the lack of access to energy grids in Canada's northern and remote regions. Solutions are solicited for developing green energy infrastructure that would improve the environmental performance and sustainability of critical mineral development, by integrating renewable and alternative energy solutions throughout the mineral value chain. These initiatives would drive the industry's competitiveness by reducing energy costs, while advancing climate action by reducing the carbon footprint of industrial activities in environmentally sensitive regions. They would also support improved quality of life and energy security for primarily Indigenous communities in isolated and remote regions.

In regions with high critical mineral potential, there is a need to address gaps in enabling energy infrastructure. Addressing these gaps could be achieved through leveraging, and expanding existing energy network capacity such as hydroelectricity generation and transmission lines, or by enabling innovative technologies to decarbonize mineral development activities such as wind, hydrogen, small modular reactors, etc. Given their lack of grid connectivity, northern and remote mining operations are ideal for the integration of renewable and alternative energy sources to support the electrification of mines, including wind, solar, hydrogen, and energy storage solutions. In addition, some jurisdictions are looking into the potential of small modular reactor (SMRs) technologies to fill energy supply needs of mine sites and communities, in addition to carbon capture, utilization, and storage (CCUS) technology to reduce carbon emissions from existing energy systems.

The Canadian Critical Minerals Strategy

3.7 Cybersecurity and telecommunications

In Canada's Arctic, satellite coverage at extreme northern latitudes and the nature of the polar ionosphere creates unique issues and limitations for sensor and communications capabilities. Additionally, the remoteness of these assets' locations and the lack of infrastructure in the Arctic poses a significant challenge for supplying power, supplies, and components. As such, maintaining the operational capabilities of these assets and the site surrounding them could be facilitated by maintaining independence of systems such that the operations (or failure) of one system do not adversely affect other systems.

V2G infrastructure needs to ensure that they are resistant to electronic interference and cyber-attacks. As V2H or V2G technologies rely on software to manage energy flow, it creates a new digital attack surface that could potentially cripple an entire northern base's power supply if compromised.

4. Eligibility

This CFP is open to Applications submitted by eligible Applicants, in collaboration with Co-Applicants and other eligible Partner Organization(s).

4.1 Applicant

Eligible Applicants must be affiliated with Concordia University. The maximum number of applications that an individual can be an Applicant on is one (1). An Applicant cannot be a Co-Applicant on another ASCENT application.

The Applicant shall assume overall responsibility for the CFP. The Applicant is also accountable for the overall completion and submission of the application.

❖ The Applicant must complete all required fields in the ASCENT Application Form, the Core Team Member Form, Budget Template and the Risk Assessment Form (RAF), and submit them for application.

4.2 Co-Applicant(s)

Eligible Co-Applicants must be individuals is affiliated with Concordia University or a Volt-Age Partner Institution or other post-secondary institutions chartered in Canada. Volt-Age Partner Institutions consist of:

- University of Calgary,
- Dalhousie University, and
- Toronto Metropolitan University.

An application must have a minimum of one (1) Co-Applicant and may have up to five (5) Co-Applicants. The maximum number of applications that an individual can be a Co-Applicant on is two (2).

- ❖ The Applicant and the Co-Applicant(s) must submit their CVs in the format prescribed by the Tri-Agency. No other format will be accepted. Please refer to the Tri-Agency CV instructions for details.

- ❖ The Applicant and the Co-Applicant(s) must complete the self-identification survey.

The Applicant must ensure that all Core Team members of the project meet the eligibility requirements and complete the self-identification survey.

4.3 Partner(s)

An application must have a minimum of one (1) Partner. Eligible Partner(s) must be either of the following types:

- Canadian incorporated for-profit organizations
- Canadian incorporated not-for-profit organizations
- Canadian provincial, territorial and municipal government organizations
- Indigenous organizations
- Crown corporations

Examples of Partner(s) are

- Small and medium enterprises (SME),
- Private enterprises,
- Multinational corporations,
- Innovation networks,
- Financial institutions,
- Centers of excellence,
- Community organizations,
- Industrial and/or manufacturing associations,
- Collaborative programs for research and development of dual-use technologies,
- Incubators and/or accelerators
- Indigenous governments or nations
- Entities owned and led by First Nations, Inuit, and Métis peoples

Annex 1 provides a list of potential Partners that Applicants may consider for inclusion as part of this CFP. The list provided is not exhaustive and is intended for reference purposes only. It is provided exclusively to support prospective Applicants for this CFP.

Applicants are encouraged to explore the listed organizations and their involvement across different projects or any other organization that may serve as suitable partners for this CFP.

4.3.1 Types of contributions

Partners may contribute to the project to be submitted for this CFP in the following two ways:

- Cash contributions: Financial support provided to cover eligible project costs.
- In-kind contributions: Non-monetary support provided to a project such as goods, services, or resources, which would normally incur a cost but are offered free of charge. Examples include access to facilities, data, equipment, and technical expertise relevant to the project.

Only the funds transferred to the project's account at the university will be considered cash contributions. All other forms of support for the project will be considered in-kind.

❖ The Applicant must complete the contributions sections for each Partner in the Budget Template (separate document).

4.3.2 Letters of support

❖ The Applicant must submit a letter of support for each Partner who will be involved in their project.

Letters of support must include the following items:

- signed by authorized personnel of the Partner organization,
- Partner's letterhead,
- the name, title and the signature of Partner's representative who will directly participate in the project,
- include the project title and the name of the Applicant or Co-Applicant with whom the Partner's representative will be working on the project,
- outline the commitments and contributions (as mentioned in section 4.3.1) by the Partner to the project.

4.3.3 Indigenous partnerships

The Applicant is highly encouraged to involve entities owned and/or led by Indigenous communities as Partners. Research involving Indigenous Peoples must adhere to the relevant concepts, principles and protocols. For guidance and resources, please refer to NSERC Guide for Research involving Indigenous Peoples and communities.

4.4 Research trainees

Volt-Age funded projects are centered around a cohort of research trainees. Providing opportunities for the next generation of research trainees to build their skills and receive valuable training and mentorship must be a key component of applications submitted for this CFP.

Concordia University research trainees funded through ASCENT will receive the following amounts from Volt-Age: Masters: CAD 22,000 per year; PhD: CAD 35,000 per year; post-doctoral fellow: CAD 50,000 per year.

The minimum number of research trainees must be equal to the number of Core Team members. As long as this minimum requirement is respected, the distribution of research trainees under each core team member can vary.

For example, if there are 5 Core Team members (1 Applicant and 4 Co-Applicants), the minimum number of research trainees is 5. However, the total number of research trainees can be more than the minimum and can be distributed in any combination (e.g. 2 under the Applicant's supervision, 3 under one Co-Applicant's supervision, etc.).

New research trainees must constitute a minimum of eighty percent (80%) of the total research trainees as part of the project.

If existing research trainees are to be transferred,

- they must not have completed more than one year of their program, and their existing project must have ended, or
- they were already recruited through Volt-Age projects funded in the past.

❖ The Applicant must provide the details for existing research trainees in the ASCENT Application Form.

5. Governance and project management

Applicants must clearly describe how the Volt-Age project will be governed and managed to ensure effective delivery of project objectives. Applicants must outline the project's governance and decision-making structure, including key roles, responsibilities, and accountabilities across the project team. Applicants must also describe their program management approach, including how progress will be monitored, key milestones tracked, and resources coordinated to support successful execution. Where relevant, applicants may also highlight how collaborators or external stakeholders will contribute to project execution and the translation of research outcomes into practical applications.

6. Research plan

Applicants must describe the research plan for their project as an integrated whole. This should include how the major technical objectives of the project, the experiments, and the research activities fit into a coherent CFP. The plan must demonstrate the originality and significance of the project by situating it within the current state of knowledge, highlighting existing gaps and challenges, and articulating its contribution to the broader field. The plan must also include specific problems or challenges (see section 3 on Research Challenges) being addressed and explain how the solution proposed in the project will support electrification and decarbonization efforts in civilian, defence, security and strategic initiatives in Canada.

Applicants should also identify the communities and the industries that stand to benefit from the research. In addition, applicants are expected to identify the potential for IP generation as well as the replicability and scalability of the proposed solutions beyond the end of the funding.

6.1 Timelines and milestones

The Applicant must submit details on the timeline and key milestones planned during the project in section 8 of the ASCENT Application Form.

6.2 Research security plan

❖ The Applicant must provide a Research Security Plan that describes any research security risks associated with the proposed project and the measures that will be implemented to mitigate those risks. This Plan should include a risk assessment and mitigation measures in relation to each of the Partner included in this CFP. The Applicant must use the National Security Guidelines for Research Partnerships' Risk Assessment Form (RAF) for the Plan.

The Plan should also address the following, where applicable:

- risks related to research data, materials, technology, infrastructure, intellectual property (IP), or research findings,
- cybersecurity considerations, protection and management of data, knowledge, and research outputs,
- mitigation measures, implementation timelines and responsibilities, and
- monitoring of mitigation measures.

Where institutional policies or safeguards are referenced, applicants must briefly explain how they will apply to the proposed project. Applicants are strongly recommended to review

- Guidance for Research Organizations and Funders on Developing a Research Security Plan
- National Security Guidelines for Research Partnerships (Annex B – Partner risks),
- Conducting Open-Source Due Diligence for Safeguarding Research Partnerships,
- Sensitive Technology Research and Affiliations of Concern,
- Assessing Your Risk Profile,
- Mitigating Your Research Security Risks,

In order to identify and apply measures that could help minimize any potential or identified national security risks to safeguard their research and its outcomes when selecting a relevant Partner for this CFP.

6.3 Work package(s)

The Applicant may include up to four (4) work packages under a single project. For each work package, the Applicant must identify the technology area(s) on which research will be conducted under that work package. Refer to Annex 2: Sensitive Technology Research Areas for a list of the technology area(s) relevant to this CFP.

The Applicant should evaluate the Technology Readiness Level (TRL) for each identified technology area. Refer to Annex 3: Technology Readiness Level (TRL) on how to perform this evaluation.

For each work package, the Applicant must:

- identify the relevant technology area(s),
- indicate the TRL their research on the technology area has achieved, at the start of the project, and
- indicate the TRL their research on the technology area will be working to achieve, by the end of the project.

7. Resilience and impact beyond the funding duration

Applications must clearly demonstrate how the proposed research capabilities, infrastructure developed, or functions will be sustained and continue to generate value beyond the funding duration. This includes outlining plans for

- long-term operation
- maintenance
- resourcing
- identifying potential funding streams or partnerships to support ongoing activities
- describing how initiative will evolve, scale, or be integrated into existing systems or institutions.

Applications should articulate the anticipated lasting impacts (such as continued research outputs, knowledge mobilization, talent development, or commercialization pathways) and explain how these will remain viable and relevant over time.

8. Intellectual Property (IP)

Volt-Age encourages researchers to proactively identify, protect, and pursue the commercialization of intellectual property (IP) arising from funded projects in order to maximize research impact and support the translation of innovations into real-world applications. Such activities may include invention disclosure, patent protection, licensing, spin-off/start-up creation, industry partnerships, and other pathways that enable technologies and discoveries to reach the market and broader society.

In this CFP, ownership of IP rights (IPR) developed through the funded project will be determined strictly in accordance with substantive inventive contribution and applicable institutional IP policies. Partners, on account of their contributary role, will not automatically own project results or resulting IP outright.

The protection, management, and commercialization of IP will be governed by Volt-Age's standard Terms and Conditions and associated research agreements administered through Concordia University.

9. Equity, Diversity, and Inclusion

When designing and conducting research, it is critical to prioritize Equity, Diversity, and Inclusion (EDI) to ensure that research actively addresses systemic barriers and promotes fair treatment. The Canada Research Coordinating Committee provides more details on systemic barriers in academia and the research ecosystem. Researchers should strive to design processes that consider unequal starting points (equity), encourage participation from underrepresented voices (diversity), and create an environment where everyone feels valued and can contribute meaningfully (inclusion). This includes investing time into building meaningful partnerships, providing access to a variety of training and learning opportunities, and fostering inclusive research environments. By integrating EDI principles into every stage of the research process—design, data collection, analysis, and dissemination—researchers can ensure that their work is relevant, impactful, and reflective of diverse perspectives. Applicants should reflect on specific EDI strategies to promote a fair, inclusive, and supportive research process.

Partnerships should also reflect Volt-Age's commitment to EDI, both in how research is conducted and, in the outcomes, they seek to achieve. For further guidance, applicants are encouraged to consult the SSHRC Guide to Addressing EDI, the SSHRC Best Practices Guide, specifically regarding systemic barriers, and the NSERC Guide on Integrating EDI Considerations in Research.

10. Budget

Applicants must present a clear and well-justified budget that aligns with the program guidelines. Each project may request up to CAD 2 million to support eligible expenses such as knowledge dissemination activities, and other project specific costs, while the remainder of the funds should be dedicated to supporting graduate students and post-doctoral fellows. All proposed expenditures must comply with the Tri-agency Guide on Financial Administration, which outlines eligible direct costs of research and the proper use of grant funds.

Applicants are required to provide a detailed budget breakdown of:

- Budget summary,
- Research trainees,
- Research funds, and
- Partner(s) contributions

11. Funding

11.1 Funding amount

Funding for this CFP is provided by Volt-Age through the Canada First Research Excellence Fund (CFREF). Each project submitted for this CFP will be eligible to be awarded up to a maximum of CAD 2 million.

Only Applicants from Concordia University are eligible to receive funding. Only Co-Applicants from Concordia University and partner institutions (University of Calgary, Dalhousie University, and Toronto Metropolitan University) are eligible to receive funding. Other post-secondary institutions chartered in Canada can be included as Co-Applicants but are not eligible to receive funding. Organizations can be included as Partners but are not eligible to receive funding.

No funds will be transferred outside of Canada.

11.2 Funding duration

Funding will be provided over a two (2)-year period.

11.3 Eligible costs

Eligible costs within the funding provided to awardees include

- Compensation: salaries and benefits. Sixty percent (60%) of the costs should go towards compensation.
- Equipment: Supplies, user fees, and consumables
- Computers and electronic communications
- Travel and subsistence: field work, conferences, and research collaborations-related travel
- Dissemination of results and networking: hosting workshops and seminars, publishing fees, and translation costs
- Services and other expenses (must be specified)

12. Evaluation criteria

Applications for this CFP will be evaluated using two distinct sets of criteria: Mandatory Criteria (MC) and Points-Rated Criteria (PRC). Applications must meet all Mandatory Criteria to be considered eligible. Applications will then be assessed and evaluated using the Points-Rated Criteria. Refer Annex 4 for detailed information on MC and PRC.

13. Submission process

13.1 Timeline

The ASCENT CFP is launched on Monday, 29 June 2026.

The deadline to submit the ASCENT Application Form and all the requested documents is <u>Monday, 31 August 2026 at 13:00hrs (EDT)</u>.

- ❖ The Applicant must submit a filled Core Team Member Form.

A Core Team consists of the Applicant and the Co-Applicant(s). The Applicant must verify that the ASCENT Application package includes this Form. Each Core Team member listed in the Core Team Member Form will receive a link to a self-identification survey.

- ❖ The Applicant and the Co-Applicant(s) must complete the self-identification survey.

The Applicant will receive the ASCENT Application Form <u>only upon completion of both the above-mentioned requirements</u>. The Applicant is responsible for ensuring that all Core Team members of the project have completed the self-identification survey.

13.2 Administrative review

Volt-Age will perform an administrative review of all received documents. This review will perform compliance checks, such as observing the eligibility elements, team size and makeup, and budget formatting. This review is not evaluative.

Based on this review, documents will be returned to the Applicants along with a Volt-Age administrative review report. Applicants will be requested to perform revisions to the application documents based only on the requests made in their respective administrative review reports. No other additions or changes can be made. The Applicant must resubmit their revised documents by the re-application deadline to be reviewed and evaluated.

Legend:

Steps to be performed by the Applicant and the Co-Applicant(s)	Steps to be performed by Volt-Age

Flow of activities:

Step 1: Applicant receives and verifies the ASCENT Application package consisting of the following documents:

- ASCENT Application Guide
- Core Team Member Form

▼

Step 2: Applicant submits a Core Team Form to Volt-Age

▼

Volt-Age sends Applicant a link for a self-identification survey

▼

Step 3: Applicant and Core Team members complete the self-identification survey

▼

Volt-Age sends Applicant the following documents to fill:

- ASCENT Application Form
- Budget Template
- Risk Assessment Form

▼

Step 4: Applicant submits the following filled documents for ASCENT CFP:

- Application Package (includes Application Form, CVs, and Letter(s) of Support)
- Budget
- Risk Assessment Form

Application deadline: **31 August (Monday), 2026 13:00hrs (EDT)**

▼

Volt-Age performs administrative review of applications

Review includes compliance checks (team size, budget format, eligibility, etc.) and is not evaluative

▼

Volt-Age returns reviewed documents to Applicants along with administrative review report to request resubmission

▼

Step 5: Applicant resubmits the revised documents

Only requested changes in the administrative review report are permitted

Re-Application deadline: September 11 (Friday), 2026 13:00hrs (EDT)

▼

The application undergo evaluation by Master Reviewers and Adjudication Jury

▼

Volt-Age announces the results in November 2026

13.3 Document format and submission rules

13.3.1 Application Package

The following filled and completed documents must be compiled into a single file in .pdf format and in the following order:

- ASCENT Application Form
- CVs of Applicant and Co-Applicant(s)
- Letter(s) of Support from each Partner

This file must be named as 'Application_Package_Lastname.pdf', where Lastname refers to the Applicant's last name.

13.3.2 Risk Assessment Form

The Risk Assessment Form must be completed for each Partner. All the Risk Assessment Forms must be compiled into a single file in .pdf format. The order of the forms within this document is left to the discretion of the Applicant.

This file must be named as per the format 'Risk_Assessment_Form_Lastname.pdf', where Lastname refers to the Applicant's last name.

13.3.3 Budget

All sheets in the Budget Template document (in excel format) must be filled completely. All the sheets must be compiled into a single file in .pdf format.

This file must be named as per the format 'Budget_Lastname.pdf' where Lastname refers to the Applicant's last name.

13.3.4 Submission and correspondence

All submissions for the ASCENT CFP must be sent via email to volt-age@concordia.ca. The following documents (in .pdf format only) must be added to the email as attachments.

- Application Package
- Risk Assessment Form
- Budget

When sending the email, the subject line must begin with '[ASCENT]'. Emails with subject lines that do not begin with '[ASCENT]' may not be identified as correspondence related to this CFP and may not be reviewed.

13.4 Late submission

No application documents will be accepted or reviewed after the re-application deadline, i.e. September 11, 2026.

The Applicant must ensure that all application documents are completed, revised (as per the requests made in the administrative review report only) and submitted before the re-application deadline.

13.5 After submission

All received re-application documents will proceed to a two-step evaluation process involving Master Reviewers and a separate Adjudication Jury.

After the evaluation process is complete, the funding decisions will be announced in November 2026.

14. Application checklist

Applicant	Co-Applicant(s)	Partner(s)
☐ Confirmed that the ASCENT Application Guide [pdf] and the Core Team Member Form [word] have been received		
☐ Core Team Member Form completed and sent to volt-age@concordia.ca		
	☐ Completed self-identification survey	
☐ Ensured that all Core Team Members have completed the self-identification survey		
☐ Received the ASCENT Application Form [word], Budget Template [excel] and Risk Assessment Form [editable pdf]		
		☐ Provided Letter(s) of Support to the Applicant
☐ Provided CV in the Tri-Agency format	☐ Provided CV in the Tri-Agency format to the Applicant	
☐ Prepared the list of references	☐ Provided a list of references to the Applicant	

☐ Completed section 14 (Relevant References) of the ASCENT Application Form		
☐ Completed all sections of the ASCENT Application Form		
☐ Compiled the filled ASCENT Application Form, the CVs of Applicant and Co-Applicant(s), and the Letter(s) of Support from Partner(s) into a single file in .pdf format, and named the file as per submission rules		
☐ Completed the Budget Template document and compiled the filled sheets into a single file in .pdf format, and named the file as per submission rules		
☐ Completed the Risk Assessment Form (RAF) for each Partner and compiled all such documents into a single file in .pdf format, and named the file as per submission rules		
☐ Submitted the required documents as attachments to an email to volt-age@concordia.ca		

15. Annex 1: List of potential Partners

Each section in this Annex consists of a list of organizations (of no particular type) and projects that are relevant to the objectives and challenges of the ASCENT CFP and align with the Themes and Platforms of the Volt-Age research program.

The list provided is not exhaustive and is intended for reference purposes only. It is provided exclusively to prospective Applicants for the ASCENT CFP to aid their applications. Applicants are encouraged to explore the listed organizations and their involvement in different projects or any other organizations that may serve as suitable Partners for this CFP.

Volt-Age has collected and consolidated the information in this document from sources available in the public domain. While every effort has been made to ensure accuracy at the time of compilation, Volt-Age cannot guarantee that all information will remain up to date. Applicants are advised to perform their due diligence while reviewing the listed information and when identifying and selecting a relevant Partner for this CFP.

Applicants are strongly recommended to review,

- Guidance for Research Organizations and Funders on Developing a Research Security Plan
- National Security Guidelines for Research Partnerships (see Annex B – Partner risks),
- Conducting Open-Source Due Diligence for Safeguarding Research Partnerships,
- Sensitive Technology Research and Affiliations of Concern,
- Assessing Your Risk Profile,
- Mitigating Your Research Security Risks,

in order to identify and apply measures that could help minimize any potential or identified national security risks to safeguard their research and its outcomes when selecting a relevant Partner for this CFP.

Greening Government Fund

The Greening Government Fund, created in 2019, is a component of The Greening Government Strategy which outlines the plan to reduce GHG emissions and broader scope greening actions for federal operations. The fund is finances through departments and agencies that generate more than 1 kilotonne of GHGs per year from air travel or those who choose to contribute voluntarily

Projects vary greatly but include adopting clean technologies – such as developing smart building competencies or enhancing aircraft aerodynamics, increasing green procurement tools, and implementing renewable electricity initiatives.

As of September 2025, the Greening Government Fund has approved approximately CAD 80 million in funding for projects that reduce GHGs in government operations.

For more information, please visit here.

The list (in no particular order) of the fund receiving organizations and details of the activities on each of their projects is provided below.

No.	Organization(s)	Title	Project activities
1	Environment and Climate Change Canada	Northern Zero Emission Vehicle (ZEV) Deployment Pilot Project	Test the use of a zero-emission vehicle (ZEV) powered by renewable energy at the Eureka High-Arctic Weather Station. The project is expected to be the northern-most implementation of regular, day-to-day electric vehicle use in the world and will provide a valuable test-case for ZEV operation in harsh arctic environments for the Government of Canada (GoC) and other interested parties.
2	Royal Canadian Mounted Police	Battery Energy Storage Solutions (BESS) for Electric Vehicle (EV) Charging for Temporary and Remote Locations	Test battery energy storage systems (BESS) to provide electric vehicle charging in remote and temporary locations (events, specialized operations, and emergencies) to create a standardized approach for using BESS with renewable energy and ultimately to help federal operations deploy reliable, sustainable, and scalable EV charging solutions across Canada.
3	Fisheries and Oceans Canada	Remote Communications Sites - Future Energy Solutions	Conduct a pilot project to evaluate emergent renewable and hybrid Power, Energy and Control (PE&C) systems at remote Marine Communications and Traffic Services sites operated by the Canadian Coast Guard.
4	Natural Resources Canada & Department of National Defence	Ground Source Heat Pumps for Space Heating in Arctic and Sub-Arctic Buildings	Install and test a ground source heat pump (GSHP) system in a federal building situated in the Arctic. The demonstration project and accompanying feasibility studies will be used to develop a design guide and pre-feasibility assessment tool for estimating energy savings under different climatic conditions.

5	Department of National Defence	Advanced Microgrids towards Arctic Zero Emissions (AMAZE)	Target GHG reductions at remote northern and arctic federal facilities through an innovative integrated systems approach that includes variable speed generators, thermal energy management, renewable energy systems and advanced microgrid controls.
6	Environment and Climate Change Canada	Portable Level 3 Modular Electric Vehicle (EV) Chargers	Procure and pilot portable level 3 modular (stackable) EV charging units that can be easily transported to remote and underserved locations, enabling EVs to partially recharge and extend their operational range.
7	Department of National Defence	Naval Electric Ship Technologies (NEST)	Assess the feasibility of hybrid and/or all-electric solutions for Royal Canadian Navy (RCN) ships to reduce GHG emissions stemming from ship platforms and operations.
8	Natural Resources Canada	Combined Heat Pumps and Latent Thermal Energy Storage Systems for Building Electrification	Test the use of heat pumps combined with thermal energy storage to enable more efficient and cost-effective heating for federal buildings by deploying a combined system in a federal facility and providing guidelines to support other departments in adopting this clean technology.
9	Department of National Defence	Distributed Electric Micro Grid	Deploy an on-base microgrid with integrated battery storage and solar photovoltaic (PV) at Canadian Forces Base Greenwood.
10	Employment and Social Development Canada	Northwest Territories Shared Electric Vehicle Pilot Project	Test a battery electric vehicle and the feasibility of a solar-powered charging station in a harsh sub-Arctic climate. This project will also develop a shared booking tool to facilitate sharing common assets interdepartmentally.

11	Environment and Climate Change Canada	Pilot Using Vegetation to Clean Federal Contaminated Sites	Test using plants to clean up hydrocarbon contaminated soil at the Eureka High Arctic Weather Station. This project will assess the feasibility of using green solutions as a viable remediation approach for northern federal contaminated sites instead of using heavy machinery and their associated GHG emissions.
12	National Research Council Canada & Defense Research and Development Canada	Canadian Low Emission Aircraft Platforms (LEAP)	Assess the feasibility of applying hybrid and/or hydrogen electric propulsion and energy technologies to the Royal Canadian Air Force National Safety and Security air fleet and the Transport Canada administrative air fleet.
13	National Research Council Canada	LEAP AHEAD: Low Emission Aviation Platforms – Advancing Hydrogen & Electrified propulsion Aircraft Development	Advance the exploration of hybrid and hydrogen electric propulsion technologies to support greener operations of the Royal Canadian Air Force air fleet. These technologies will help overcome the challenges associated with extreme (Arctic) environments, reduce GHG emissions while guiding the design of low-carbon options for decarbonizing national safety and security air fleets.
14	Royal Canadian Mounted Police	Feasibility Study for Solar Canopies in Parking Lots	Explore the technical feasibility and cost effectiveness of installing solar canopies in a large parking lot in Ottawa. This project will also identify key considerations and design parameters for implementing solar canopies at other RCMP sites.
15	Department of National Defence	Implementation and Evaluation of Fuel Cell Technology for Canadian Armed Forces (CAF) Operations	Investigate direct methanol fuel cells (DMFCs) as a cleaner alternative to diesel and jet fuel to reduce the carbon footprint of CAF ground operations, particularly at Canada's northernmost station, CFS Alert. This project will investigate how well DMFCs work to deliver a deployable low-emission solution that supports Canada's climate goals and ensures reliable power for military operations at home and abroad.

16	Department of National Defence	Light Armored Vehicle (LAV) Hydrogen Hybrid Feasibility Study	Conduct a digital feasibility study to determine if a Light Armored Vehicle can be designed to operate using solid-state hydrogen storage instead of diesel in an operational environment to enable the CAF to better understand the advantages and limitations of using hydrogen as an operational fuel.
17	Department of National Defence	Navy Ship Platform Exploitation of Energy Data (SPEED)	Optimize energy efficiency and reduce GHG emissions for naval platform by developing an understanding of baseline energy use, developing, and validating ship energy models, and enabling energy-efficient operations by applying data analytics to ship platform power and energy data.
18	Department of National Defence	Biogas for Clean Energy Production at 4 Wing Cold Lake	Generate clean energy by capturing biogas from wastewater treatment and using it to power fuel cells for heating and electricity production. This will minimize methane emissions and reduce the carbon footprint at CFB Cold Lake.
19	Department of National Defence	Level 3 Charging Station Powered by Liquid Organic Hydrogen Carrier (LOHC)	Install and test a hydrogen-powered EV charging station that works without relying on the local power grid to offer fast, environment-friendly, and cost-effective charging, with flexible deployment options for remote, off grid or overseas locations.
20	Department of National Defence	CFB 9 Wing Gander Electrical Distribution Capacity and Planning Assessment	Complete an engineering study to determine Canadian Forces Base 9 Wing Gander's electrical capacity and identify upgrades required to replace the base's heating fuel oil with electricity.
21	Department of National Defence	Ship Platform Exploitation of Energy Datasets 2.0 (SPEED 2.0)	Optimize energy efficiency and reduce GHG emissions for naval ship platforms through the development of ship energy machine learning and physics-based models and exploration of a ship energy digital twin for reduced fuel use.

22	Department of National Defence	Canadian Armed Forces (CAF) Uniform Green Disposal	Find a sustainable approach to disposing of Canadian Armed Forces uniforms while ensuring uniforms remain durable and high performing by investigating recycling in an effort to divert textiles from landfill.
23	Department of National Defence	Sustainable Naval Operations: Low Carbon Fuel (LCF) Integration	Evaluate and assess how the integration of low-carbon fuels in various Canadian naval ships will affect fuel systems and equipment to reduce GHG emissions from marine operations and build the knowledge needed for the Navy to safely use cleaner fuels in the future.
24	Department of National Defence	Feasibility Study on Forest Residue Gasification	Conduct a feasibility study and life-cycle cost analysis (LCCA) to assess forest residue gasification scenarios at Canadian Forces Base Valcartier. The results of this project would support a low carbon energy production solution to meet peak demand. The project also includes the development of calculation and analysis tools to enable other departments and provinces to conduct similar feasibility studies.
25	Fisheries and Oceans Canada	Low Carbon Fuel (LCF) Accelerator: Vessel Compatibility and Transition Supports	Implement targeted retrofits and piloting alternative fuel technologies on four vessels to help the Canadian Coast Guard transition to low carbon fuels. This reduces pollution from marine operations and builds the technical and organizational knowledge required to support a 40% fleetwide adoption of low carbon fuels by 2030.
26	Fisheries and Oceans Canada	Hydrogen Utilization for Canadian Coast Guard Vessels	Provide Canadian Coast Guard with data on the technological feasibility of hydrogen (and select hydrogen carriers) as a fuel to deliver fleet emission reductions. The study will analyze hydrogen-based technology solutions as well as other factors to understand whether it is feasible, efficient and safe to incorporate hydrogen technology into Canadian Coast Guard operations.

27	Fisheries and Oceans Canada	Technology Demonstration Plan for Hydrogen-Based Power and Propulsion Systems for Canadian Coast Guard Vessels	Develop a demonstration plan to test hydrogen-based power and propulsion systems to reduce GHG emissions in the National Safety and Security Fleet (NSSF) vessels to support informed decisions on fleet decarbonization and provide a model that can be replicated across other federal marine operations.
28	Innovation, Science and Economic Development Canada	Measurement Canada Heavy-Duty Truck Fleet Replacement	Transition Measurement Canada's existing fleet of six diesel fueled heavy-duty trucks to 100% electric powered vehicles by 2025.
29	National Research Council Canada & Defense Research and Development Canada	Green Aviation INnovative Surfaces (GAINS)	Develop and deploy micro-structured surface coating technologies to enhance aircraft aerodynamics and reduce aircraft drag in National Safety and Security air fleets.
30	Natural Resources Canada	Payment Options for Off-Site Electric Vehicle Charging for Government of Canada fleets	Research, pilot and assess payment solution(s) that permit Government of Canada fleet operators to access and pay for charging at off-site charging stations.
31	National Research Council Canada	Life Cycle Assessment of Medium and Heavy-Duty Trucks used in Relocation Services	Conduct a life cycle assessment of medium and heavy-duty trucks used in Government of Canada relocation services focusing on both vehicle production and usage life cycle stages.
32	National Research Council Canada	Operational Data Analytics: A Demonstration of Benefits to Greening Government Marine Fleets	Develop a baseline of the current performance and operating conditions of select Canadian Coast Guard (CCG) vessels and develop a proof-of-concept fuel consumption prediction tool to allow for greener marine operations and decision making within the CCG fleet.

33	Natural Resources Canada	Electrification Readiness Assessment Tool (ERAT)	Develop a tool to help federal real property portfolio managers identify and overcome roadblocks to electrification, thereby accelerating the transition to low-carbon operations and optimizing resource allocation across the federal government.
34	Natural Resources Canada	Deploying Zero-Emission National Safety & Security Vehicles	Identify, procure, deploy, and evaluate zero-emission vehicles for the light-duty National Safety and Security fleet segment.
35	Natural Resources Canada	Combined Heat Pumps and Latent Thermal Energy Storage Systems for Building Electrification	Test the use of heat pumps combined with thermal energy storage to enable more efficient and cost-effective heating for federal buildings by deploying a combined system in a federal facility and providing guidelines to support other departments in adopting this clean technology.
36	Parks Canada Agency	Towards a Carbon Neutral Transportation Experience at Point Pelee National Park	Evaluate zero-emission transportation options to replace the existing compressed natural gas (CNG) and gasoline-powered shuttle system in Point Pelee National Park. A carbon neutral alternative can have four season capabilities that would facilitate increased year-round park visitation.
37	Parks Canada Agency	Greening Grounds Maintenance Equipment in PEI Parks	Eliminate fossil fuels from all ground maintenance activities by replacing gas and diesel-powered grounds maintenance equipment with zero-emission mowers and electric hand tools. The projects results will effectively reduce GHG emissions from PEIs ground maintenance activities, reduce noise and operational cost and will facilitate similar transitions for other Parks Canada administered locations.
38	Parks Canada Agency	Install Heat Pumps at Kejimkujik National Park & National Historic Site	Use the clean electricity produced by the onsite photovoltaic solar array to replace four existing oil-based heating systems with electric heat pumps. This will further reduce GHG emissions at Kejimkujik National Park and National Historic Site.

39	Parks Canada Agency	Sable Island Sustainable Micro-Grid	Construct an innovative micro-grid power generation system consisting of PV solar array and efficient variable speed gensets at the Sable Island National Park Reserve, to reduce fuel consumption and GHG emissions.
40	Parks Canada Agency	Greening Northern Houses	Design and build an energy efficient residential unit, to serve as a demonstration project for future net-zero staff housing in remote northern communities.
41	Crown-Indigenous Relations & Northern Affairs Canada	Mount Nansen Solar Project	Install two solar array systems, one with a storage battery, at the Mount Nansen Mine Site, an off-grid abandoned mine under remediation in Central Yukon.
42	Public Services and Procurement Canada	Enabling the Production of Environmental Product Declarations for Combat Vehicles	Reduce GHG emissions from the Government of Canada's procurement activities by creating product category rules to standardize environmental product declarations (EPDs) for combat vehicles. These EPDs will help the government include environmental factors in future contracts for combat vehicles.
43	Public Services and Procurement Canada	The Circular Economy in Support of the Decarbonization of Supplies Within Construction, Major Renovation, and Interior Design Projects	Develop an action plan for including circular economy measures in all stages of Government of Canada construction projects, major renovations and interior design projects. The plan should aim to reduce carbon emissions in procurement and be easily applied to federal construction and renovation projects across Canada.
44	Public Services and Procurement Canada	Hyper-Intelligent Building Program for Optimizing Energy Efficiency	Apply advanced technology to digitize existing buildings and identify areas for significant reductions in greenhouse gas emissions and energy consumption. By creating 3D models and continuously monitoring energy usage, the project seeks to optimize energy efficiency and reduce the carbon footprint of federal buildings.

45	Treasury Board of Canada Secretariat	National Safety and Security Fleet Decarbonization Project	Accelerate the decarbonization of National Safety and Security Fleet (NSSF) and other federal air and marine operations by conducting future pathways analysis, technical studies, market analysis, industry engagement, and by developing requirements for low-carbon fuel procurements and operations.
46	Royal Canadian Mounted Police	Interdepartmental Marine Fleet Low/Zero-Emission Initiative	In partnership with DND, DFO, and Parks Canada, evaluate the performance of low/zero-emission engines in small government vessels (boats less than 15 meters in length) and identify vessel categories best suited for conversion to low/zero-emission alternatives.
47	Department of National Defence	Net-Zero Central Heating Plant	Develop a design to switch the fuel used in CFB Goose Bay's central heating plant from number 6 heating oil to electricity. Switching to renewable energy at this site provides significant benefits as the oil-based facility generated 4% of DND's total greenhouse gas emissions.
48	Transport Canada	A Plan to Reduce Operational Carbon Emissions at Transport Canada Owned and Operated Airports	Replace existing diesel-powered heavy equipment used in airport operations with low-carbon equivalents and evaluate their performance in harsh climatic conditions.
49	Public Services and Procurement Canada	Case Study of Wood vs. Concrete Building for the Canada Revenue Agency Building in Shawinigan, Quebec	Conduct a case study and life cycle assessment of the Canada Revenue Building in Shawinigan, Quebec to compare the climate impacts of wood construction with traditional concrete design and construction. The project will define the regional reference carbon footprint for wood construction products and consider solutions for increasing its use in large building projects.

50	Natural Resources Canada & Canadian Space Agency	Advanced Control Strategies for CSA's Space Centre	Optimize heating, ventilation, and air-conditioning (HVAC) control systems in CSA's Space Centre in St-Hubert, Quebec to reduce energy consumption and costs, peak electrical loads, natural gas usage and GHG emissions.

Regional Defence Investment Initiative

The Government of Canada announced a total of over CAD 33 million in funding under the Regional Defence Investment Initiative (RDII) for Quebec in February 2026.

For more information, please visit here.

The funds are provided by Canada Economic Development for the Quebec Regions (CED) to enable the recipients to develop new technologies, adapt their products and services to meet the needs of the Canadian Armed Forces, increase their capacity to produce and innovate, improve their productivity and competitiveness, explore new markets or consolidate existing ones, and meet the certification standards and qualifications required in defence. In addition, these projects will lead to the creation and maintenance of 250 well-paid jobs within these businesses and organizations.

The list (in no particular order) of recipients and details of the activities on each of the 28 projects receiving support under the RDII are provided below.

No.	Organization(s)	Fund purpose	Project activities
1	Héroux-Devtek	Equipment acquisition	To increase productivity at a business that designs and manufactures landing gear for the defence sector.
2	CM Labs Simulations	Marketing strategy	To increase sales at an innovative business specializing in virtual training simulators.
3	Kinova	Equipment acquisition	To improve productivity at a business that develops advanced robotics solutions.
4	Alphacasting	Equipment acquisition	To improve productivity at a business specializing in the manufacture of aerostructure parts and sub-assemblies in titanium, aluminum, and steel for the aerospace and defence industries.

5	Université de Sherbrooke	Equipment acquisition	To foster innovation and technology transfer at a high-tech interdisciplinary institute.
6	Quebec Metallurgy Center (CMQ)	Equipment, accreditation acquisition	To strengthen the capacity for innovation and technology transfer of a research and development center specializing in metallurgy.
7	MiQro Innovation Collaborative Centre (C2MI)	Equipment acquisition	To strengthen the capacity for innovation and technology transfer of a research and development center specializing in microelectronics.
8	Terminal & Cable GP	Equipment acquisition, facility refurbishment	To increase production capacity at an Indigenous business specializing in assembling cables and electrical harnesses for the defence industry.
9	C3RiOS Systems	Marketing strategy, equipment acquisition	To support the growth, within the defence sector, of an aerospace business specializing in the design of avionics systems
10	Novika Solutions	Equipment acquisition	To strengthen an organization's capability to assist with the development of innovative products and processes in support of the defence and manufacturing sectors.
11	Chantier Naval Forillon	Facility upgrade	To improve productivity at a shipyard specializing in the manufacture of vessels.
12	Centre de technologies avancées BRP-Université de Sherbrooke (CTA)	Equipment acquisition	To foster technology transfer at a non-profit organization working on innovation for the specialized vehicle market.
13	Les Industries Desjardins (9156-1795 Québec Inc.)	Equipment acquisition	To increase production capacity and productivity at a business specializing in the design and manufacture of reservoirs.
14	Anyon Systems	Marketing strategy	To increase sales at a business that designs superconducting quantum computer solutions and advanced detection technologies for the defence sector

15	INFLO Technique	Equipment acquisition	To increase productivity at a business specializing in the design and manufacture of custom valves for the nuclear and national defence sectors
16	Composites Development Center of Quebec (Cégep de Saint-Jérôme)	Equipment acquisition	To strengthen the capabilities of an organization that provides guidance to businesses on innovation and technology transfer.
17	Carcajou Tactical	Equipment acquisition, leasehold improvements	To increase production capacity and sales at a business specializing in the manufacture of tactical accessories.
18	Beslogic	Marketing strategy	To increase sales at a business specializing in the development of an artificial intelligence platform for the aeronautics and defence industries.
19	Tyto Robotics	Marketing strategy	To increase sales at a business that manufactures test systems for drone components.
20	Ferreol	Marketing strategy	To increase sales at a business specializing in the design and marketing of alpine skis.
21	Canadian Technology Systems (4364546 Canada Inc.)	Equipment acquisition, marketing strategy	To improve productivity and increase sales at a business specializing in the development of technology to neutralize explosive devices.
22	TestX Lab (9538-5332 Québec inc.)	Equipment acquisition	To launch a value-added services business.
23	SimActive	Marketing strategy	To increase sales at a business that has developed mapping software.
24	ApexO	Marketing strategy, innovation activities	To increase sales at a business specializing in the design of precision ballistics software.
25	Levando Technologies	Business launch	To launch a business specializing in the development of energy storage solutions.

26	Usinage Préci-Max	Facility upgrade	To increase productivity and production capacity at a business specializing in the machining of custom components
27	Ferreol Technologies (948 0-3798 Québec Inc.)	Innovation activities, marketing strategy	To increase sales and the innovation potential at a business specializing in the development of innovative materials.
28	Usinage Préciaxes	Equipment acquisition	To increase production capacity at a business specializing in the machining of high-precision components

National Defence Programs

A list of programs (in no particular order) provided by the Department of National Defence and the Canadian Armed Forces that may be relevant to ASCENT CFP is given below.

For more information, please visit here.

No.	Program
1	Bureau of Research, Engineering and Advanced Leadership in Innovation and Science (BOREALIS)
2	Indigenous Reconciliation Program
3	Innovation for Defence Excellence and Security (IDEaS)
4	Mobilizing Insights in Defence and Security (MINDS)
5	Northern Operational Support Hubs (NOSH)
6	Women, Peace and Security in Defence

Strategic Response Fund (SRF)

Building on the success of the former Strategic Innovation Fund (SIF), the SRF not only continues existing commitments but also expands support for industries affected by trade disruptions and tariff challenges.

The SRF's innovation investments make large-scale innovation less risky, bridge market gaps and support competitiveness and growth across Canadian industries. These investments strengthen Canada's long-term competitiveness and create jobs across all sectors of the economy.

Industries prioritized by SRF for innovation investment include Critical Minerals, Aerospace and Defence, Biomanufacturing and Life Science, Clean Technologies (including Batteries and Zero-emission Vehicles (ZEV)), Natural Resources, Semiconductors, Agri-food, etc.

For more information, please visit here.

No.	Organization(s)	Fund purpose	Project activities
1	HTEC	Hydrogen technologies and sustainable practices	Construction of a Hydrogen Liquefier facility to decarbonize commercial trucking
2	Heidelberg Materials	Cement industry decarbonization	North America's first commercial full-scale carbon capture, utilization and storage system in the cement sector
3	Linamar Corp	Green technologies in Automotive sector	Manufacturing of the next generation of EV and battery technology parts
4	Foran Mining Corp	Critical minerals production	Adoption and integration of clean innovative technologies in critical minerals production
5	Pratt & Whitney Canada	Supporting innovation in Canada's aerospace industry	Next-generation thermal engine technologies for more efficient performance and reduced emissions for future aircraft propulsion systems

6	Kepler Communications	Satellite Communications capabilities	Development of an in-orbit high-speed connectivity network
7	Goodyear Canada	Production of EV and all-terrain tires	Expansion and modernization of facility to improve manufacturing process and production capacity for EV and all-terrain tires
8	Hitachi Energy Canada	Securing Canada's Electrical Grid	A new state-of-the-art transformer test laboratory and high-voltage direct current simulation and collaboration centre
9	E-One Moli Energy (Canada)	Battery manufacturing	Construction of Canada's largest factory for high performance lithium-ion battery cells
10	Volta Energy Solutions Canada	Canadian Electric Vehicle supply chain	Battery copper foil manufacturing facility
11	General Dynamics Mission Systems – Canada	Aerospace sector	Remotely Piloted Aircraft Systems (RPAS) Center of Excellence (COE)
12	AVL Fuel Cell Canada	Hydrogen Fuel Cell technologies	Establishing a world-class fuel cell R&D center for transportation in Canada
13	INSAT	National Sustainable Aviation Innovation Network	Pan-Canadian, industry-led aerospace network focused on funding collaborative research and development projects aimed at accelerating the green industrial transformation of the aerospace industry
14	Braya Renewable Fuels	Renewable fuels	Renewable fuel production facility
15	Ranovus	Canada's Semiconductor industry	Development of power efficient connectivity technologies for next-generation artificial intelligence
16	E3 Lithium	EV Battery production	Lithium from Alberta oilfield: Canada's first direct lithium extraction project
17	Rio Tinto Fer and Titane	Clean economy	Critical minerals supply chain
18	BHP	Minerals	World's most sustainable potash mine

19	Westinghouse Electric Canada http://www.tytorobotics.com/	Net Zero with Clean Energy	eVINCI(TM) micro reactor development project
20	ArcelorMittal Canada	Reducing Emissions in Steel industry	AM Dofasco primary transformation to low emissions advanced high-quality steelmaking through innovative technology adoption
21	CAE	Quebec's Aerospace sector	Project Resilience
22	Pratt & Whitney Canada	Quebec's Aerospace sector	Hybrid-electric Flight Demonstrator
23	LM Wind Power Blades (Canada)	Clean future through Renewable Energy	Expansion project for facility in Gaspé, Quebec
24	Centre of Excellence in Mining Innovation	Canada's Mining industry	Mining Innovation Commercialization Accelerator (MICA)
25	Algoma Steel	Reducing Emissions in Steel industry	Electric Arc Furnace transformation
26	Air Products	Alberta's Clean Hydrogen sector	New Edmonton Blue Hydrogen Project
27	Moltex Energy Canada	Non-emitting Energy	Stable salt reactor
28	Terrestrial Energy	Small Modular Reactor technology	Development of an Integral Molten Salt Reactor
29	Rockport Networks	Data storage in Network technologies	Networking at the edge (NATE)
30	Telesat Canada	Connectivity in Rural Communities	Telesat Low Earth Orbit (LEO) Constellation

31	Woodbridge Foam Corp	Innovation in Automotive sector	Project Source North
32	Carbon Engineering	Technology to combat Climate Change	‘Closing the Carbon cycle: Air-to-fuels validation’ project
33	Blackberry QNX Software Systems	Vehicle safety	‘Connected Autonomous Platform Software (CAPS)’ project
34	Bluedrop Performance Learning	Training for Aerospace and Defence sectors	Next Generation Virtual Reality and Augmented Reality Structured Training
35	Creative Destruction Lab	AI Innovation	Develop an AI Model to predict the likelihood of success of technical start-up companies
36	Siemens Canada	Clean Energy	Smart grid Atlantic: Empowering consumers in the energy revolution
37	JP Bowman	Automotive sector	Advanced Material for Enhanced Passenger Vehicle Lightweighting
38	Synergyx Technologies	Automotive sector	Non-contact metrology system for curvature measurement of automotive glass
39	General Dynamics	Light Armored Vehicles (LAVs), Electric LAVs	Next generation LAVs and next generation electric LAV

16. Annex 2: Sensitive Technology Research Areas

Government of Canada maintains a list of advanced and emerging that are important to Canadian research and development, on its website.

The list may be updated periodically in accordance with the evolution of technologies, the strategic and intelligence applications of technology, and national security imperatives.

The table below provides detailed information on the relevant STRA. There are 10 major areas (numbered in each section) for which descriptions are provided. These major areas are further classified into areas, each having their own description, along with some examples.

The table provided is intended for reference purposes only. It is provided exclusively to prospective Applicants for the ASCENT CFP to aide their applications. Applicants are encouraged to explore the details in the table and highlight all the technologies that their project would be performing research and development in their ASCENT Application Form. Such STRA information will be considered in the assessment and evaluation of the application for this CFP.

Volt-Age has collected and consolidate the information in this document from sources available in the public domain. While every effort has been made to ensure accuracy at the time of compilation, Volt-Age cannot guarantee that all information will remain up to date. Applicants are advised to perform their due diligence while reviewing the listed information, before filing out relevant sections of the ASCENT Application Form for this CFP.

No.	Area
1	Advanced Digital Infrastructure Technology
2	Advanced Energy Technology
3	Advanced Materials and Manufacturing
4	Advanced Sensing and Surveillance
5	Aerospace, Space and Satellite Technology
6	Artificial Intelligence and Big Data Technology
7	Human-Machine Integration
8	Life Science Technology
9	Quantum Science and Technology
10	Robotics and Autonomous Systems

Advanced Digital Infrastructure Technology

Advanced digital infrastructure technology refers to the devices, systems and technologies which compute, process, store, transmit and secure a growing amount of information and data that support an increasingly digital and data-driven world.

Area	*Description*	*Examples*
Advanced Communications	Technologies that enable fast, secure and reliable wireless communication to facilitate growing demand for connectivity and faster processing and transmission of data and information. These technologies could also enable communications in remote environments or adverse conditions where conventional methods are ineffective, or in spectrum-congested areas.	• Adaptive/cognitive/intelligent radios, • Massive multiple input/multiple output (MIMO), • Millimeter-wave spectrum, • Open/Virtualized Radio Access Networks, • Optical/Photonic Communications, • Wideband High Frequency Communications
Advanced Computing	Computing systems with high computational power that enable the processing of complex calculations that are data- or compute-intensive.	• Context-aware Computing, • Edge Computing, • High Performance Computing, • Neuromorphic Computing
Cryptography	Methods and technologies that enable secure communications by transforming, transmitting or storing data in a secure format that can only be deciphered by the intended recipient.	• Biometric Encryption, • DNA-based Encryption, • Post-Quantum Cryptography, • Homomorphic Encryption, • Optical Stealth Encryption
Cyber Security	Technologies that protect the integrity, confidentiality, and availability of internet-connected systems, including their hardware, software, as well as data from unauthorized access or malicious activities.	• Cyber Defence Tools, • Cross Domain Solutions, • Moving Target Defence Technology
Data Storage	The methods, tools, platforms, and infrastructure for storing data or information securely in a digital format.	• Five-dimensional (5D) Optical Storage, • DNA Storage, • Single-molecule Magnets

Distributed Ledger	Digital ledgers or databases that track assets or records transactions in multiple locations at the same time, with no centralized or single point of control or storage.	• Blockchain, • Cryptocurrencies, • Digital Currencies, • Non-Fungible Tokens (NFTs)
Microelectronics	Microelectronics encompasses the development and manufacturing of very small electronic designs on a substrate. It incorporates semiconductors as well as more conventional components such as surface mount technology with the goal of producing smaller and faster products. As microelectronics reach the limit for integration, photonic components are making their way into this field.	• Memory-centric Logic, • Multi-chip Module, • Systems-on-Chip (SoC), • Stacked Memory on Chip
Next-generation Networks	Fifth and future generations of communications networks use high frequency spectrums to enable significantly faster processing and transmission speeds for larger amounts of data. Advancements in networking could allow for integrated communication across air, land, space, and sea using terrestrial and non-terrestrial networks, as well as increased data speed and capacity for network traffic. It could also pave the way for new AI- and big data-driven applications and services, and its massive data processing capabilities could enable the Internet of Everything.	

Advanced Energy Technology

Advanced energy technology refers to technologies and processes that enable improved generation, storage and transmission of energy, as well as operating in remote or adverse environments where power sources may not be readily available but are required to support permanent or temporary infrastructure and power vehicles, equipment and devices.

Area	*Description*	*Examples*
Advanced Energy Storage	Technologies that store energy, such as batteries, with new or enhanced properties, including improved energy density, compact size and low weight to enable portability, survivability in harsh conditions and the ability to recharge quickly.	• Fuel cells, • Novel Batteries (Biodegradable batteries, graphene aluminium-ion batteries, lithium-air batteries, room-temperature all-liquid-metal batteries, solid-state batteries, structural batteries), • Supercapacitors (or ultracapacitors)
Advanced Nuclear Generation	New reactors and technologies that are smaller in size than conventional nuclear reactors and are developed to be less capital-intensive, therefore minimizing risks faced during construction.	• Nuclear Fusion, • Small Modular Reactors (SMRs)
Wireless Power Transfer	Enables the transmission of electricity without using wire over extended distances that vary greatly and could be up to several kilometres.	• Recharging zones for electric vehicles, • Recharging space-based objects such as satellites

Advanced Materials and Manufacturing Technology

Advanced Materials

Advanced materials technology refers to high-value products, components or materials with new or enhanced structural or functional properties. They may rely on advanced manufacturing processes or novel approaches for their production.

Area	*Description*	*Examples*
Augmented Conventional Materials	Conventional materials such as high strength steel or aluminum and magnesium alloys – products that are already widely used – which are augmented to have unconventional or extraordinary properties.	• Improved durability or high temperature strength, • Corrosion resistance, • Flexibility, • Weldability, • Reduced weight
Auxetic Materials	Materials that have a negative Poisson's ratio, meaning that when stretched horizontally, they thicken or expand vertically (rather than thinning as most materials do when stretched), and do the opposite when compressed horizontally.	Unique properties, such as • Energy-absorption, • High rigidity, • Improved energy/impact absorption, • Resistance to fracture
High-Entropy Materials	Special materials, including high-entropy alloys, high-entropy oxides or other high-entropy compounds, comprised of several elements or components. Depending on their composition, high-entropy materials can enhance fracture toughness, strength, conductivity, corrosion resistance, hardness and other desired properties. Due to the breadth of the theoretically available combinations and their respective properties, these materials can be used in several industries, including aerospace. Additionally, high-entropy oxides are being considered for applications in energy production and storage, as well as thermal barrier coatings.	

Metamaterials	Structured materials that are not found or easily obtained in nature. Metamaterials often have unique interactions with electromagnetic radiation (i.e., light or microwaves) or sound waves.	
Multifunctional/ Smart Materials	Materials that can transform in response to external stimuli (e.g., heat, water, light, etc.) within a given amount of time.	Examples include: • Magnetorheological fluid, • Shape memory alloys, • Shape memory polymers • Self-assembled materials
Nanomaterials	Nanomaterial materials have dimensions of less than 100 nanometers and exhibit certain properties or unique characteristics such as increased durability or self-repair. A subset of nanomaterials, nano-energetic materials are energetic materials synthesized and fabricated at the nano-level that have a small particle size and high surface area between particles, which enable faster or more efficient reaction pathways when exposed to other substances.	
Powder Materials for Additive Manufacturing	Powders that typically consist of metal, polymer, ceramic and composite materials. These powders enable additive manufacturing processes, also referred to as 3D printing. Research into novel powder materials can lead to manufactured parts with enhanced mechanical properties and other desired characteristics.	
Superconducting Materials	Materials that can transmit electricity with no resistance, ultimately eliminating power losses associated with electrical resistivity that normally occurs in conductors. Manufacturing of superconducting electronic circuits is one of the most promising approaches to implementing quantum computers.	

Two-dimensional (2D) Materials	Materials with a thickness of roughly one atomic layer. One of the most well-known 2D materials, for which there are currently production/fabrication technologies, is graphene. Other examples of 2D materials include: silicene, germanene, stantene, metal chalcogenides and others, which are currently being researched with potential applications in sensors, miniaturized electronic devices, semiconductors and more.	

Advanced Manufacturing

Advanced manufacturing technology refers to enhanced or novel technologies, tools and processes used to develop and manufacture advanced materials or components. This could include using specialized software, artificial intelligence, sensors and high-performance tools, among others, to facilitate process automation or closed-loop automated machining and create new materials or components.

Area	*Description*	*Examples*
Additive Manufacturing (3D Printing)	Various processes in which solid three-dimensional objects are constructed using computer-aided-design (CAD) software to build an object, ranging from simple geometric shapes to parts for commercial airplanes. 3D printing could be used to accelerate the development through rapid prototyping of customized equipment, spare tools or novel shapes or objects that are stronger and lighter. Approaches are also being developed for multi-material additive manufacturing and volumetric additive manufacturing, as well as additive manufacturing for repair and restoration.	• Improved durability or high temperature strength, • Corrosion resistance, • Flexibility, • Weldability, • Reduced weight

Semiconductor Manufacturing	Methods, materials and processes related to the manufacturing of semiconductor devices. Recent technological advancements include developments in Extreme Ultraviolet (EUV) lithography, which is an advanced method for fabricating intricate patterns on a substrate to produce a semiconductor device with extremely small features.	Advancements in • Deposition, • Coating, • Lithography, • Ionization/doping, • Thermal management techniques
Critical Materials Manufacturing	Up and midstream technologies necessary to extract, process, upgrade, and recycle/recover critical materials (e.g. rare earth elements, scandium, lithium, etc.) and establish and maintain secure domestic and allied supply chains. More information about critical minerals can be found in Canada's Critical Minerals List.	
Four-dimensional (4D) Printing	Production and manufacture of 3D products using multifunctional or "smart" materials that are programmed to transform in response to external stimuli (e.g. heat, water, light, etc.) within a given amount of time. Recent developments have also been made in creating reversible 4D printed objects, which can return to their original shape without human involvement.	
Nano-manufacturing	Production and manufacture of nanoscale materials, structures, devices and systems in a scaled-up, reliable and cost-effective manner.	
Two-dimensional (2D) Materials Manufacturing	Standardized, scalable and cost-effective large-scale production of 2D materials.	

Advanced Sensing and Surveillance

Advanced sensing and surveillance refer to a large array of advanced technologies that detect, measure or monitor physical, chemical, biological or environmental conditions and generate data or information about them. Advanced surveillance technologies, in particular, are used to monitor and observe the activities and communications of specific individuals or groups for national security or law enforcement purposes but have also been used for mass surveillance with increased accuracy and scale.

Area	*Description*	*Examples*
Advanced Biometric Recognition	Technologies that identify individuals based on their distinctive physical identifiers (e.g. face, fingerprint or DNA) or behavioural identifiers (e.g. gait, keystroke pattern and voice). These technologies are becoming more advanced due to improving sensing capabilities, as well as integrating artificial intelligence to identify/verify an individual more quickly and accurately.	
Advanced Radar	Radar is a system that uses radio waves to detect moving objects and measure their distance, speed and direction. Advancements in radar technology could enable improved detection and surveillance in different environments and over greater distances.	• Active Electronically-scanned Arrays, • Cognitive Radars, • High Frequency Skywave Radar (or over-the-horizon radar), • Passive Radar, • Synthetic Aperture Radar
Atomic Interferometer Sensors	Sensors that perform sensitive interferometric measurements using the wave character of atomic particles and quantum gases. These sensors can detect small changes in inertial forces and can be used in gravimetry. They can also improve accuracy in navigation and provide position information in environments where the Global Positioning System (GPS) is unavailable.	

Cross-cueing Sensors	Systems that enable multiple sensors to cue one another. Cross cueing can be used in satellites for data validation, objection tracking, enhanced reliability (i.e., in the event of a sensor failure) and earth observations.
Electric Field Sensors	Sensors that detect variations in electric fields and use low amounts of power. They are useful for detecting power lines or lightning, as well as locating power grids or damaged components in the aftermath of a natural disaster.
Imaging and Optical Devices and Sensors	Devices and sensors that provide a visual depiction of the physical structure of an object beyond the typical capabilities of consumer grade imaging techniques such as cameras, cellphones, and visible light-imaging. Such technologies typically make use of electromagnetic radiation beyond the visible spectrum, or use advanced techniques and materials to improve optical capabilities, such as enabling more precise imaging from a greater distance. This sensitive research area also includes sensitive infrared sensors.
Magnetic Field Sensors (or Magnetometers)	Sensors that are used to detect or measure changes in a magnetic field, or its intensity or direction.
Micro Electro-Mechanical Systems (MEMS) or Nano Electro-Mechanical Systems (NEMS)	Miniaturized, lightweight electro-mechanical devices that integrate mechanical and electrical functionality at the microscopic or nano level. A potential use of MEMS or NEMS could be as ‘smart dust’, or a group of MEMS or NEMS, made up of various components, including sensors, circuits, communications technology, and a power supply, that function as a single digital entity. Smart dust could be light enough to float in the air and detect vibrations, light, pressure, and temperature, among other things, to capture a great deal of information about a particular environment.

Position, Navigation and Timing (PNT)	Systems, platforms, or capabilities that enable accurate and timely calculation of positioning, navigation and timing. These technologies are critical to a wide-range of applications, most notably for enabling the Global Navigation Satellite System (GNSS), one of which is the widely-used Global Positioning System (GPS), but also for enabling navigation in areas where GPS or GNSS do not work.	• Chip-scale advanced atomic clocks, • Gravity-aided inertial navigation system, • Long-range underwater navigation system, • Magnetic anomaly navigation, • Precision inertial navigation system
Side Scan Sonar	An active sonar system that uses a transducer array to send and receive acoustic pulses in swaths laterally from the tow-body or vessel, enabling it to quickly scan a large area in a body of water to produce an image of the sea floor beneath the tow-body or vessel.	
Synthetic Aperture Sonar (SAS)	An active sonar system that produces high resolution images of the sea floor along the track of the vessel or tow body. SAS can send continuous sonar signals to capture images underwater at 30 times the resolution of traditional sonar systems, as well as up to 10 times the range and area coverage.	
Underwater (Wireless) Sensor Network	Network of sensors and autonomous/uncrewed underwater vehicles that use acoustic waves to communicate with each other, or with underwater sinks that collect and transmit data from deep ocean sensors, to enable remote sensing, surveillance and ocean exploration, observation and monitoring.	

Aerospace, Space and Satellite Technology

Aerospace technology refers to the technology that enables the design, production, testing, operation and maintenance of aircraft, spacecraft and their respective components, as well as other aeronautics.

Space and satellite technology refers to technologies that enable travel, research and exploration in space, as well as weather-tracking, advanced PNT, communications, remote sensing and other capabilities using satellites and other space-based assets.

Area	*Description*	*Examples*
Advanced Wind Tunnels	Technological advancements in systems related to wind tunnel infrastructure. Existing facilities are used to simulate various flight conditions and speeds ranging from subsonic, transonic, supersonic and hypersonic.	
On-orbit Servicing, Assembly and Manufacturing Systems	Systems and equipment that are used for space-based servicing, assembly and manufacturing. On-orbit servicing, assembly and manufacturing systems can be used to optimize space logistics, increase efficiencies, mitigate debris threats and to modernize space asset capabilities.	
Payloads	Lower cost satellite payloads with increased performance that can meet the needs of various markets. This will require several technology improvements, such as light weight apertures, antennas, panels, transceivers, control actuators, optical/infrared sensor and multi-spectral imagers, to meet the growing demand and ever-increasing technical requirements.	

Propulsion Technologies	Components and systems that produce a powerful thrust to push an object forward, which is essential to launching aircraft, spacecraft, rockets or missiles. Innovations could range from new designs or advanced materials to enable improved performance, speed, energy-efficiency, and other enhanced properties, as well as reduced aircraft production times and emissions.	• Electrified aircraft propulsion, • Solar electric propulsion, • Pulse detonation engines, • Nuclear thermal propulsion systems, • Nuclear pulse propulsion systems, • Nuclear electric propulsion systems
Satellites	Artificial or human-made, including (semi-)autonomous, objects placed into orbit. Depending on their specific function, satellites typically consist of an antenna, radio communications system, a power source, and a computer, but their exact composition may vary. Continued developments have led to smaller satellites that are less costly to manufacture and deploy compared to large satellites, resulting in faster development times and increased accessibility to space.	• Remote Sensing satellites, • Communications satellites
Space-based Positioning, Navigation and Timing (PNT)	Space-based facility that can act as an orbital outpost while having the ability to support extended human operations. Space stations can be used as a hub to support other space-based activities including assembly, manufacturing, research, experimentations, training, space vehicle docking and storage.	Examples of innovations in space stations could include the ability to extend further into space or enhanced life support systems that can be used to prolong human missions.
Zero-Emission/Fuel Aircraft	Aircraft powered by energy sources that do not emit polluting emissions that disrupt the environment or do not require fuel to fly. While still in early stages, these advances in powering aircraft could support cleaner air travel, as well as enable flight over greater distances and to remote areas without the need for refueling (for zero-fuel aircraft).	

Artificial Intelligence and Big Data Technology

Artificial intelligence (AI) refers to the broad field encompassing the science of making computers behave in a manner that simulates human behavior/intelligence using data and algorithms.

Big data refers to information and data that is large and complex in volume, velocity and variety, and as such requires specialized tools, techniques and technologies to process, analyze and visualize it. AI and big data technology may be considered cross-cutting given how important they are in enabling developments in other technology areas, including biotechnology, advanced materials and manufacturing, robotics and autonomous systems and others.

Area	*Description*	*Examples*
AI Chipsets	Custom-designed chips meant to process large amounts of data and information that enable algorithms to perform calculations more efficiently, simultaneously and using less energy than general-purpose chips. AI chips have unique design features specialized for AI, which may make them more cost-effective to use for AI development.	
Computer Vision	Field of AI that allows computers to see and extract meaning from the content of digital images such as photos and videos.	• Image classification, • Object detection, • Depth perception
Data Science and Big Data	Enables the autonomous or semi-autonomous analysis of data, namely large and/or complex sets of data when it comes to big data technology. It also includes the extraction or generation of deeper insights, predictions or recommendations to inform decision-making.	• AI-enabled Data Analytics, • Big Data Technology (Data Warehouse, Data Mining, Data Correlation), • Predictive Analytics

Digital Twins	Virtual representations of physical objects or systems that combine real-time sensor data, big data processing and artificial intelligence (namely machine learning) to create an interactive model and predict the object or system's future behaviour or performance. Advancements in digital twin technology could enable the growth and integration of an immersive digital experience (e.g. the metaverse) into daily life.	
Machine Learning	Branch of AI where computer programs are trained using algorithms and data to improve their decisions when introduced to a new set of data without necessarily being programmed to do so.	• Deep Learning, • Evolutionary Computation • Neural Networks
Natural Language Processing	An area of AI that allows computers to process and make sense of, or 'translate', natural human language using speech and audio recognition to identify, analyze and interpret human voices and other types of audio.	• Syntactic and Semantic Analysis, • Tokenization, • Text Classification

Human-Machine Integration

Human-machine integration refers to the pairing of operators with technology to enhance or optimize human capability. The nature of the integration can vary widely, with an important dimension being the invasive nature of the pairing.

Area	*Description*	*Examples*
Brain-Computer Interfaces	Interfaces that allow a human to interact with a computer directly via input from the brain through a device that senses brain activity, allowing for research, mapping, assistance or augmentation of human brain functions that could enable improved cognitive performance or communication with digital devices.	
Exoskeletons	External devices or 'wearable robots' that can assist or augment the physical and physiological performance/capabilities of an individual or a group.	
Neuroprosthetic/ Cybernetic Devices	Implanted and worn devices that interact with the nervous system to enhance or restore motor, sensory, cognitive, visual, auditory or communicative functions, often resulting from brain injury. This includes cybernetic limbs or devices that go beyond medical use to contribute to human performance enhancement.	
Virtual/ Augmented/ Mixed Reality	Immersive technologies that combine elements of the virtual world with the real world to create an interactive virtual experience. An application of these technologies that several companies are developing is the 'metaverse' which is an immersive digital experience that integrates the physical world with the digital one and allows users to interact and perform a variety of activities like shopping and gaming, seamlessly in one virtual ecosystem. While still being explored, this could potentially translate into a digital economy with its own currency, property and other goods.	

Wearable Neurotechnology	Brain-computer interfaces that are wearable and non-invasive (i.e. do not need to be implanted). These wearable brain devices can be used for medical uses, such as tracking brain health and sending data to a doctor to inform treatment, as well as for non-medical applications related to human optimization, augmentation or enhancement, such as user-drowsiness, cognitive load monitoring or early reaction detection, among others.	

Life Science Technology

Life science technology refers to the term that encompasses a wide array of technologies that enhance living organisms, such as biotechnology and medical and healthcare technologies.

Biotechnology

Biotechnology uses living systems, processes and organisms, or parts of them, to develop new or improved products, processes or services. It often integrates other areas of technology, such as nanotechnology, artificial intelligence, computing and others, to create novel solutions to problems, including in the area of human performance enhancement.

Area	*Description*	*Examples*
Biomanufacturing	Methods and processes that enable the industrial production of biological products and materials through the modification of biological organisms or systems. Advances in biomanufacturing, such as automation and sensor-based production, has led to commercial-scale production of new biological products, such as biomaterials and biosensors.	
Genomic Sequencing and Genetic Engineering	Technologies that enable whole genome sequencing, the direct manipulation of an organism's genome using DNA, or genetic engineering to produce new or modified organisms.	Examples include: • Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR), • Next Generation Sequencing (NGS)
Proteomics	Large-scale and experimental analysis of protein, proteomes and proteome informatics. Proteomic applications can be used for the identification of unknown bacterial species and strains, as well as species level identifications of tissues, body fluids, and bones of unknown origin.	

Synthetic Biology	Combination of biology and engineering to create new biological entities, such as cells or enzymes, or redesign existing biological systems, with new functions like sensing or producing a specific substance. Synthetic biology is expected to enable advancements in many areas, such as antibiotic, drug and vaccine development, biocomputers, biofuel, novel drug delivery platforms, novel chemicals, synthetic food, and synthetic life.	

<u>Medical and Healthcare Technology</u>

Medical and healthcare technology refer to tools, processes or services that support good health and prevent, or attempt to prevent, disease. Advances in biotechnology, nanotechnology and advanced materials are enabling new methods of delivering medicine or treating injuries, diseases or exposure to toxic substances.

Area	*Description*	*Examples*
Chemical, Biological, Radiological and Nuclear (CBRN) Medical Countermeasures	Various medical assets used to prevent, identify or treat injuries or illnesses caused by chemical, biological, radiological or nuclear (CBRN) threats, whether naturally-occurring or engineered. CBRN medical countermeasures include therapeutics to treat injuries and illnesses, such as biologic products or drugs, as well diagnostics to identify the threats.	
Gene Therapy	Use of gene manipulation or modification in humans to prevent, treat or cure disease, either by replacing or disabling disease-causing genes or inserting new or modified genes.	

Nanomedicine	Use of nanomaterials to diagnose, monitor, prevent and/or treat disease.	Examples of nanomedicine include nanoparticles for targeted drug delivery, smart imaging using nanomaterials, as well as nano-engineered implants to support tissue engineering and regenerative medicine.
Tissue Engineering and Regenerative Medicine	Methods of regenerating or rebuilding cells, tissues or organs to allow normal, biological functions to be restored. Regenerative medicine includes self-healing, where the body is able to use its own tools or other biological materials to regrow tissues or cells, whereas tissue engineering largely focuses on the use of synthetic and biological materials, such as stem cells, to build function constructs or supports that help heal or restore damaged tissues or organs.	

Quantum Science and Technology

Quantum science and technology refer to a new generation of devices that use quantum effects to significantly enhance the performance over those of existing, ‘classical’, technologies. This technology is expected to deliver sensing and imaging, communications, and computing capabilities that far exceed those of conventional technologies in certain cases, well as new materials with extraordinary properties and many useful applications. Quantum science and technology may be considered cross-cutting, given that quantum-enhanced technologies are expected to enable advancements or improvements in most other technology areas, including biotechnology, advanced materials, robotics and autonomous systems, aerospace, space and satellite technology and others.

Area	*Description*	*Examples*
Quantum Communications	Use of quantum physics to enable secure communications and protect data using quantum cryptography, also know as quantum key distribution.	
Quantum Computing	Use of quantum bits, also known as qubits, to process information by capitalizing on quantum mechanical effects that allow for a large amount of information, such as calculations, to be processed at the same time. A quantum computer that can harness qubits in a controlled quantum state may be able to compute and solve certain problems significantly faster than the most powerful supercomputers.	
Quantum Materials	Materials with unusual magnetic and electrical properties. While many of these materials are still being explored and studied, they are promising contenders that could enable energy-efficient electrical systems, better batteries and the development of new types of electronic devices.	• Superconductors, • Graphene, • Topological Insulators, • Weyl Semimetals, • Metal Chalcogenides

Quantum Sensing	Broad of range of devices, at various stages of technological readiness, that use quantum systems, properties, or phenomena to measure a physical quantity with increased precision, stability and accuracy. Recent developments in applications of quantum physics identified the possibility of exploiting quantum phenomena as means to develop quantum radar technology.	
Quantum Software	Software and algorithms that run on quantum computers, enable the efficient operation and design of quantum computers, or software that enables the development and optimization of quantum computing applications.	

Robotics and Autonomous Systems

Robotics and autonomous systems refer to machines or systems with a certain degree of autonomy (ranging from semi- to fully autonomous) that are able to carry out certain activities with little to no human control or intervention by gathering insights from their surroundings and making decisions based on them, including improving their overall task performance.

Area	*Description*	*Examples*
Molecular (or Nano) Robotics	Development of robots at the molecular or nano-scale level by programming molecules to carry out a particular task.	
(Semi-) Autonomous/ Uncrewed Aerial/ Ground/ Marine Vehicles	Vehicles that function without any onboard human intervention, and instead, are either controlled remotely by a human operator, or operate semi-autonomously or autonomously. Uncrewed vehicles rely on software, sensors and artificial intelligence technology to collect and analyze information about their environment, plan and alter their route (if semi- or fully autonomous), and interact with other vehicles (or human operator, if remotely-controlled).	
Service Robots	Robots that carry out tasks useful to humans that may be tedious, time-consuming, repetitive, dangerous or complement human behaviour when resources are not available, e.g. supporting elderly people. They are semi- or fully-autonomous, able to make decisions with some or no human interaction/intervention (depending on the degree of autonomy) and can be manually overridden by a human.	
Space Robotics	Devices, or ‘space robots’, that are able to perform various functions in orbit, such as assembling or servicing, to support astronauts, or replace human explorers in the exploration of remote planets.	

17. Annex 3: Technology Readiness Level (TRL)

The transition of academic research into tangible socioeconomic or industrial impact requires a shared language to describe the maturity of an innovation. In Canada, Innovation, Science and Economic Development (ISED) utilizes the Technology Readiness Level (TRL) scale as the primary framework for assessing the progress of a technology as it moves from the laboratory toward commercial or operational environments.

ASCENT CFP will utilize the structured methodology of the TRL framework to assist Applicants in communicating the maturity of their research in relation to work package(s) within the project and their relevance to its objectives and challenges and their alignment to the Themes and Platforms of the Volt-Age research program. Applicants are encouraged to familiarise themselves with the contents of this section and complete section 8.4 of the ASCENT Application Form accordingly.

17.1 Introduction

The TRL scale consists of 9 (nine) distinct levels (numbered 1 to 9, in the ascending order of technology maturation), categorized into 4 (four) broader technology development stages as mentioned below:

Label	Technology Development Stage	Levels
A	Fundamental Research	1, 2
B	Research and Development	3, 4, 5
C	Pilot and Demonstration	6, 7, 8
D	Early Adoption	9

The following principles are based on the Technology Readiness Level (TRL) Assessment Tool developed by ISED, available here.

17.2 Guiding principles

The following principles should be applied when determining the TRL of a technology:

Technology development stage

When determining a TRL, it is best to start with the general development stage (A to D) of the technology before assessing the specific TRL (1 to 9).

Conservative TRL

If there are uncertainties as to whether a technology is at a certain TRL, the lower TRL should be assigned.

Operating environment

A key aspect of the various TRLs is the testing environment of a technology. It is important to be clear in understanding the real-world conditions expected and if and how the testing environment (e.g., laboratory, simulated or operational) represents these conditions.

TRL validity

If a developed technology is to be deployed in an operational environment that was different than the one it was tested for, the technology would no longer be considered fully developed and would need to be tested and refined for the new operational environment to be considered at the same TRL.

Note:

A technology is said to have achieved a specific TRL if it has met all the requirements for that level and all prior levels. A technology is said to be at a certain TRL if the research team is currently working to achieve the requirements specific to that level.

For the purposes of this CFP, applicants must use the TRL measurement scale to describe the TRL the research team is currently working to achieve (i.e. the TRL the technology is currently at).

17.3 Descriptions of TRLs

The following table provides the definition and description for each TRL. Hyperlinked word(s) lead to the Glossary that includes definitions and/or descriptions.

TRL	Definition	Description
1	Basic principles observed and reported	Scientific research begins with properties of a potential technology observed in the physical world. These basic properties are being reported in the literature.
2	Technology and/or application concept formulated	Applied research begins with identification of practical applications of basic scientific principles. There is an emphasis on understanding the science better and corroborating the basic scientific observations made during TRL 1 work. Analysis of the feasibility of speculative applications is being conducted and reported in scientific studies.
3	Experimental proof of concept	Active research and development begin. The applications are being moved beyond the paper stage to experimental work. Feasibility of separate technology components are being validated through analytical and laboratory studies. There is not yet an attempt to integrate components into a complete system.
4	Validation of component(s) in a laboratory environment	Basic technological components are integrated "ad-hoc" to establish that they will work together in a laboratory environment. The "ad-hoc" system would likely be a mix of on hand equipment and a few special purpose components that may require special handling, calibration, or alignment in order to function.
5	Validation of semi-integrated component(s) in a simulated environment	The integrated basic technological components are performing for the intended applications in a simulated environment. Configurations are being developed but can undergo fundamental changes. The technology and environment at TRL 5 are more similar to the final application than TRL 4.
6	System and/or process prototype demonstrated in a simulated environment	A model or prototype, that represents a near desired configuration, is being developed at a pilot scale, generally smaller than full scale. Testing of the model or prototype is being conducted in a simulated environment.
7	Prototype system ready (form, fit and function) demonstrated in an appropriate operational environment	A full-scale prototype is being demonstrated in an operational environment but under limited conditions (i.e., field tests). At this stage, the final design is very close to completion.

8	Actual technology completed and qualified through tests and demonstrations	Technology is being proven to work in its final form and under expected conditions. This stage commonly represents the end of technology development. At this stage, operations are well understood, operational procedures are being developed, and final adjustments are being made.
9	Actual technology proven through successful deployment in an operational environment	Actual application of the technology in its final form is being conducted under a full range of operational conditions. Sometimes referred to as "system operations". This stage is where technology is further refined and adopted.

17.4 TRL evaluation checklist

The Applicants must evaluate each of their Technology Research Areas according to the checklist provided below.

Step 1

Refer Annex 2 to select up to two (2) key Technology Research Areas that a work package within your project will include.

Step 2

For each Area, starting from the top of the table and proceeding to the bottom, check each item in the last column ('Check') and tick if your research has already achieved the respective activity (under column 'Activities'). If you check <u>all</u> the activities for a given level, the <u>TRL achieved by your research for that Area</u> will be the level mentioned in the first column ('TRL').

Step 3

If you do NOT check all but a few of the activities for a given level, the <u>TRL your research is currently at for that Area</u> will be the level mentioned in the first column ('TRL').

The Applicant(s) must mention the TRL obtained in step 3 in the required sections of the ASCENT Application Form.

TRL	Definition	Activities	Check
1	Basic principles observed and reported	Have you conducted basic research activities and defined basic principles?	☐
		Have the principles and findings been published in the literature? (e.g., research articles, peer-reviewed papers, white papers)	☐
2	Technology and/or application concept formulated	Have applications of basic principles been identified?	☐
		Have applications and supporting analysis been published in the literature? (e.g., analytical studies, small code units for software, papers comparing technologies)	☐
3	Experimental proof of concept	Have proof of concept and/or analytical and experimental critical function been developed?	☐
		Have separate components been validated in a laboratory environment?	☐
4	Validation of component(s) in a laboratory environment	Have “Ad-hoc” components, sub systems and/or processes been integrated in a laboratory environment?	☐
		Is it understood how “ad-hoc” integration and test results differ from the expected system goals?	☐
5	Validation of semi-integrated component(s) in a simulated environment	Have semi-integrated component(s)/subsystems or processes been validated in a simulated environment?	☐
		Is it understood how the simulated environment differs from the expected operational environment and how the test results compare with the expectations?	☐
6	System and/or process prototype demonstrated in a simulated environment	Has a pilot scale model or prototype been developed?	☐
		Is the pilot scale model or prototype system near the desired configuration in performance, and volume but generally smaller than full scale?	☐
		Has the pilot scale model or prototype system been demonstrated in a simulated environment?	☐
		Do you understand how the simulated environment differs from the operational environment, and how results differed from expectations?	☐

7	Prototype system ready (form, fit and function) demonstrated in an appropriate operational environment	Is the full-scale prototype with ready form, fit and function developed?	☐
		Has the full-scale prototype been demonstrated in an operational environment but under limited conditions?	☐
8	Actual technology completed and qualified through tests and demonstrations	Has the final configuration of technology been developed?	☐
		Has the final configuration been successfully tested in an operational environment?	☐
		Has the technology's ability to meet its operational requirements been assessed and problems documented (plans, options, or actions to resolve problems been determined)?	☐
9	Actual technology proven through successful deployment in an operational environment	Has the technology been successfully deployed and proven under a full range of operational conditions?	☐
		Have operational tests and evaluation reports been completed?	☐

18. Annex 4 - Evaluation Criteria

Applications for the ASCENT CFP will be evaluated using two distinct sets of criteria: Mandatory Criteria and Points-Rated Criteria. Applications must meet all Mandatory Criteria to be considered eligible, after which they will be assessed and evaluated based on the PRC. Details of the criteria are outlined below.

18.1 Mandatory Criteria (MC)

The following table provides a list of the Mandatory Criteria applicable to this CFP. Each MC has two (2) levels of evaluation: Pass and Fail.

To be eligible for assessment and evaluation of their Application and eventually for funding under this CFP, <u>the Applicant must answer and meet all the six (6) Mandatory Criteria (MC) described below.</u>

Criteria	Evaluation
MC 1 Applicant eligibility	Pass – The Applicant is affiliated with Concordia University.
	Fail – The Applicant is not affiliated with Concordia University, or this criterion is not answered.
MC 2 Project Summary	Pass – The Application provides a clear, high-level, and non-confidential summary of the project, including the problem being addressed, the core research, development and/or experimentation approach, and the expected outcomes and impact.
	Fail – The Application does not satisfactorily provide a high-level, or the summary is incomplete, unclear, or it includes confidential/sensitive information, or this criterion is unanswered.
MC 3 Alignment with Volt-Age Themes and Platforms	Pass – The Application clearly aligns with at least one (1) Volt-Age Theme and up to two (2) Platforms of the Volt-Age research program.
	Fail – The Application does not clearly identify or demonstrate alignment with any Themes or Platforms of the Volt-Age research program, or the alignment is vague, implicit, or not substantiated, or this criterion is unanswered.

MC 4 Co-Applicant eligibility	Pass – The Application includes at least one (1) eligible Co-Applicant. Co-applicants must be affiliated with a Canadian university or other post-secondary institution chartered in Canada.
	Fail – The Application does not include at least one eligible co-applicant, or the Application includes Co-Applicant(s) that do not meet the eligibility requirement of being affiliated to a Canadian university or other post-secondary institution chartered in Canada, or this criterion is unanswered.
MC 5 Partner eligibility	Pass – The Application includes at least one (1) eligible Partner. Eligible partners must be either a Canadian incorporated for-profit organization, or a Canadian incorporated not-for-profit organization, or a Canadian provincial, territorial, or municipal government organization, or an Indigenous organization, or a Crown corporation.
	Fail – The Application does not include at least one (1) eligible Partner or includes Partners that do not meet the above-specified eligible types of organizations, or this criterion is unanswered.
MC 6 Research Security Plan	Pass – The Application includes a Research Security Plan, or the Risk Assessment Form (RAF) that addresses all applicable research security requirements and demonstrates consideration of potential risks related to the project, Partners, data, personnel, and research outcomes. The Research Security Plan is complete and appropriate to the scope of this CFP.
	Fail – The Application does not include a Research Security Plan, or the Risk Assessment Form (RAF), or the submitted Research Security Plan is incomplete and does not adequately address the required research security considerations, or this criterion is unanswered.

18.2 Points-Rated Criteria (PRC)

The following table provides a list of the Points-Rated Criteria applicable to this CFP. Each PRC has five (5) scores of evaluations: 4 (the highest), 3, 2, 1, and 0 (the lowest).

Though not mandatory, the PRC has considerable weightage in the evaluation under this CFP. These PRC may strengthen the overall application. Applicants are encouraged to fill relevant information requested in the ASCENT Application Form.

PRC 1: Project Summary

Score	*Description - The Application …*
4	provides a clear, compelling, and well-structured project title, summary, and keywords. The summary fully addresses **all required elements** • Identifying/addressing the problem/gap, • Stating the limitations of existing solutions, • Proposing a new and/or improved solution, • Aligning with the research challenges of this CFP, • Describing the R&D and/or experimentation approach, • Summarising the expected dual-use outcomes and impacts, and • Mentioning the relevance to beneficiaries. The value proposition, innovation, alignment, and potential impact on Canada and Canadians are **exceptionally clear, convincing, and comprehensive.**
3	provides a clear and informative project title, summary, and keywords. The summary addresses **all or nearly all required elements** with good detail and demonstrates a strong understanding of the problem, proposed solution, research approach, and expected impacts. **Minor gaps, omissions, or areas requiring clarification may be present**, but they do not significantly affect understanding.
2	provides a project title, summary, and keywords that address the **basic requirements**. The summary addresses **some but not all** required elements in sufficient detail and provides only a general description of the project and its objectives. Alignment with the CFP research challenges, expected impacts, beneficiaries, or research approach is present but **lacks clarity, specificity**, or **supporting detail**.

1	provides an **incomplete, unclear, or poorly developed** project title, summary, or keywords. Several required elements are **missing, insufficiently described**, or **difficult to understand.** The project's objectives, relevance, alignment with the CFP research challenges, research approach, or expected impacts are inadequately explained, preventing a meaningful assessment of the project's value or suitability.
0	does not provide any information on this PRC.

PRC 2: Alignment with Volt-Age Themes and Platforms

Score	*Description - The Application …*
4	demonstrates **strong and clear alignment** with one or more Volt-Age Themes and clearly integrates one or more Platforms **in a meaningful and innovative way**. The project shows a **deep understanding** of Volt-Age priorities. Integration across the Themes and Platforms is **clear, cohesive, and central** to the project design and impact.
3	**aligns well** with the Volt-Age Themes and Platforms and incorporates at least one of them in a **clear and relevant** way. The connection to Volt-Age priorities is well-articulated with **demonstrated relevance**. Integration across Themes and Platforms is present and **supports the project objectives**.
2	shows **general alignment** with Volt-Age Themes and/or Platforms, but connections may be high-level, partially developed, or not fully integrated into the project design. Relevance to Volt-Age priorities is evident but **lacks depth or clarity**.
1	**does not clearly align** with Volt-Age Themes or Platforms, or the connection is weak, unclear, or missing. The Application **does not demonstrate relevance** to Volt-Age priorities.
0	does not provide any information on this PRC.

PRC 3: Relevance to dual-use research

Score	*Description - The Application …*
4	**demonstrates strong and explicit relevance** to dual-use research **with up to two (2)** research challenges, either from the list provided below (with details described in section 3 of the Application Guide), or with their own defined challenge. • Energy Sovereignty: Wind • Energy Sovereignty: Batteries and Hydrogen • Vehicle-to-Grid (V2G), Vehicle-to-Home (V2H) technologies • Mobility and transportation • Sustainable infrastructure • Critical minerals and rare earth elements • Cybersecurity and telecommunications
3	**demonstrates relevance** to dual-use research **with at least one** research challenge, either from the list provided above, or with their own defined challenge, with a clear and relevant connection to the project objectives. The relevance supports the overall research direction and demonstrates good understanding of the research challenge(s).
2	shows **general or partial relevance** to dual-use research with the research challenge list provided above, or with their own defined challenge, but the connection may be high-level, **indirect, or not fully integrated** into the project design.
1	**does not demonstrate relevance** to dual-use research with any of the research challenges mentioned, or with their own defined challenge, or the connection is unclear, weak, or not substantiated.
0	does not provide any information on this PRC.

PRC 4: Technology Readiness Level (TRL)

Note: This PRC will be evaluated on each Technology Research Area mentioned under each Work Package separately.

Score	*Description - The Application …*
4	evaluates and assigns a **clear, well-defined, and realistic** achieved TRL, current TRL, and the TRL to be achieved, to its research for this Technology Research Area. It provides a pathway to advance from current TRL to TRL to be achieved that is **technically sound, with strong justification, defined milestones, and appropriate validation activities**.
3	evaluates and assigns a **reasonable and realistic** achieved TRL, current TRL, and the TRL to be achieved, to its research for this Technology Research Area. The **pathway** provided to advance from current TRL to TRL to be achieved is somewhat **feasible and reasonable**, though some elements such as milestones or validation steps **may lack full detail.**
2	evaluates and assigns a **less realistic** achieved TRL, current TRL, and the TRL to be achieved, to its research for this Technology Research Area. The Application **has an intent to advance** from the current TRL and the TRL to be achieved, however the **pathway** is **somewhat overambitious, lacks detail, or has limited clarity** on how the advancement will be achieved.
1	**evaluates and assigns an unrealistic** achieved TRL, current TRL, and the TRL to be achieved, to its research for this Technology Research Area. The Application d**oes not present a credible or clear pathway t**o advance from the current TRL to the TRL to be achieved or the information provided is **unsupported or missing**.
0	does not provide any information on this PRC.

PRC 5: Resilience and Impact Beyond the Funding Duration

Score	*Description - The Application …*
4	demonstrates **strong value** beyond the ASCENT funding period, with a **detailed, feasible, and well-justified plan** for sustaining or transitioning capabilities.
3	shows **good potential** for value beyond the funding period with a **credible and reasonably detailed plan** for sustaining or transitioning capabilities.
2	indicates **some value** beyond the funding period, with a **basic or partially developed plan** for sustaining or transitioning capabilities.
1	**does not demonstrate value** beyond the funding period, lacks credible plan for sustaining or transitioning capabilities.
0	does not provide any information on this PRC.

PRC 6: Co-Applicant Relevance and Competency(ies)

Note: This PRC shall be evaluated on each Co-Applicant separately.

Score	*Description - The Application …*
4	lists Co-Applicant(s) that is/are **highly relevant** to the project, bringing complementary and clearly defined expertise that is critical to success. Their role(s) is/are **well-justified, tightly aligned** with project objectives, and demonstrate strong synergy. Evidence shows a p**roven track record of effective collaboration** and **significant contributions** to similar complex initiatives.
3	lists Co-Applicant(s) that is/are **relevant** and bring important expertise that shall support project success. Roles and responsibilities are **clearly defined** and **aligned** with project needs. There are **good evidence of relevant experience** and **some indication of effective collaboration**.

2	includes Co-Applicant(s) that is/are **generally relevant** but may have **overlapping, loosely defined, or partially justified roles**. Their **contributions** support the project at a **basic** level, though alignment with objectives or demonstrated **collaboration experience may be limited**.
1	mentions Co-Applicant(s) that is/are **not relevant** or **do not provide clear value** to the project. Roles are **unclear, poorly justified, or misaligned** with project objectives. There is **little to no evidence of relevant expertise** or effective collaboration.
0	does not provide any information on this PRC.

PRC 7: Partner Relevance

Note: This PRC shall be evaluated on each Partner separately.

Score	*Description - The Application …*
4	lists Partner(s) that is/are **highly relevant** and **strategically selected** with **clearly defined, complementary roles** essential to project success. Contributions are **well-documented** and **directly support** project objectives. **Strong alignment** is demonstrated between Partner capabilities and project goals with a clear added value from each Partner.
3	lists Partner(s) that is/are **relevant**, with **clearly defined roles** that support project objectives. Contributions are **meaningful** and **generally well-described**. There is **good alignment** between **Partner expertise** and **project needs**, with clear benefit to project delivery.
2	includes Partner(s) that is/are **generally relevant**, but **roles may be somewhat unclear, overlapping, or not fully justified**. Contributions are present but **may lack detail or clear linkage** to project activities. Alignment with project objectives is **adequate but not strongly demonstrated**.
1	mentions Partner(s) that is/are **not relevant**; their **roles are poorly defined or misaligned** with project objectives. Contributions are **unclear or not adequately described**. **Limited or no added value** to the project demonstrated.
0	does not provide any information on this PRC.

PRC 8: Partner Contribution(s)

Note: This PRC shall be evaluated on each Partner separately.

Score	*Description - The Application …*
4	lists Partner that demonstrates **strong commitment** to the project through significant contributions. Partner provides **substantial cash** contribution. In-kind contributions are also **meaningful**, **well-documented**, and **directly support** project objectives.
3	list Partner that demonstrates **meaningful commitment** to the project through cash and/or in-kind contributions. Partner provides **notable cash** contribution. Contributions are generally **well-described** and **aligned** with project activities, with clear benefit to project delivery.
2	includes Partner whose commitments through contributions may be **moderate or inconsistently demonstrated**. Cash and/or in-kind contributions are present but may **lack detail, scale, or clear linkage** to project activities.
1	mentions Partner that demonstrate **limited commitment** as contributions are **minimal, unclear, or poorly described,** with insufficient evidence of meaningful cash support.
0	does not provide any information on this PRC.

PRC 9: Intellectual Property (IP)

Score	*Description - The Application …*
4	**clearly identifies** existing and/or potential IP and provides a well-defines strategy for its use, development, and protection. There is a **strong, explicit commitment to pursue IP** opportunities in collaboration with Volt-Age. The approach demonstrates a clear understanding of IP management, ownership, and commercialization pathways, with high potential for impact.

3	**identifies** existing and/or potential IP and outlines a credible approach for its use or development. There is a **clear interest in pursuing IP** with Volt-Age, and the strategy shows good understanding of IP considerations and potential applications.
2	**references** IP but provides limited detail on its use, development, or management. **Interest** in pursuing IP with Volt-Age is indicated but **not well-developed**. The IP approach is basic and lacks clarity or depth.
1	**does not address IP**, or the information provided is **unclear** or **insufficient**. There is no demonstrated plan to use, develop, or pursue IP, and **no indication of interest** in engaging with Volt-Age on IP-related activities.
0	does not provide any information on this PRC.

PRC 10: Governance and Project Management

Score	*Description - The Application …*
4	presents a **comprehensive, well-structured, and highly credible** governance and management approach. Decision-making structures, roles, responsibilities, and accountabilities are clearly defined and optimized across the team. The program management approach includes **detailed and systematic plans for monitoring** progress, tracking milestones, and coordinating resources.
3	outlines a **strong and credible** governance and management approach. Roles, responsibilities, and decision-making structures are clearly described. The program management approach includes **solid plans** for **progress monitoring,** milestone tracking, and resource coordination.
2	provides an **adequate** governance and management approach, though **some elements lack detail or clarity**. Roles and decision-making structures are present but not fully developed. The program management **approach** is **basic** but plausible.
1	does not demonstrate a **credible** governance or management approach. Roles, responsibilities, and decision-making **structures are unclear or missing**. The program management approach is **insufficient or poorly defined**.
0	does not provide any information on this PRC.

PRC 11: Research Security Plan

Score	*Description - The Application …*
4	provides a **comprehensive** Plan that thoroughly identifies research security risks (schedule, operational, delivery) associated with the project and project partners The Plan **clearly addresses risks** related to research data, materials, technology, infrastructure, intellectual property, research findings, and cybersecurity. **Detailed mitigation measures**, implementation timelines, assigned responsibilities, and **monitoring mechanisms** are **clearly defined** and **highly credible.** Any referenced **institutional policies or safeguards** are **clearly explained** in the context of the proposed project.
3	provides a **well-developed** Plan that identifies the major research risks associated with the project and partners. **Risk** related to data, technology, IP, research outputs, and cybersecurity are **addressed** where applicable. **Mitigation measures**, responsibilities, timelines, and monitoring mechanisms are provided but **may lack some detail** or **specificity. Institutional safeguards** are referenced and **generally explained**.
2	provides a Plan that identifies **some relevant research security risks,** but the assessment is **incomplete** or **lacks sufficient partner-specific consideration**. Mitigation measures are described at a high level, and timelines, responsibilities, or **monitoring mechanisms** are **only partially addressed**. Some applicable risk areas may be insufficiently considered.
1	provides a **limited** or **inadequate** Plan. Research security **risks** are **poorly identified**, **partner risks** are **not adequately assessed**, and **mitigation measures** are **vague**, **incomplete**, or **not credible.** Timelines, responsibilities, monitoring mechanisms, or cybersecurity considerations are largely absent.
0	does not provide any information on this PRC.

PRC 12: Equity, Diversity and Inclusion (EDI)

Score	*Description - The Application …*
4	demonstrates a **comprehensive and well-integrated approach** to EDI across both the research design and trainee opportunities. EDI **principles are embedded throughout** the research process, with clear, actionable strategies and innovative practices that meaningfully support inclusion, equity, and diversity. Training and enrichment opportunities for research trainees strongly **reflect and advance EDI values**.
3	presents a **strong and clearly articulated approach** to incorporating EDI in both the research design and trainee opportunities**. EDI principles are well considered**, with solid strategies and practices that support inclusive research and meaningful trainee engagement.
2	**includes consideration** of EDI principles in the research design and trainee opportunities, but the approach may be basic, lacking detail, or not fully integrated. **Plans are present** but may not be strongly developed or innovative.
1	**does not adequately demonstrate** how EDI principles and values are incorporated into the research design or trainee opportunities. Plans are unclear, insufficient, or absent.
0	does not provide any information on this PRC.

End of document