CIMA+

Engineering
for **people**

EXPERTISE IN MICROGRIDS

cima.ca

A LEADER IN CONSULTING ENGINEERING

With more than 30 years of industry experience, CIMA+ is the consulting engineering firm of choice across Canada. Our interdisciplinary team works hand-in-hand with clients to deliver exceptional results on projects large and small.

EMPLOYEE-OWNED AND CLIENT FOCUSED

We are proud to be employee-owned and rated one of Canada's best employers. This unique business model supports our strong culture of excellence, entrepreneurial spirit, and accountability. Clients love working with our talented roster of professionals and we take pride in delivering successful projects that set the stage for long-lasting, partnerships.

40+
offices across Canada

30+
years of industry experience

3,600+
employees

> **"We wish to make a difference with our employees, clients, and business partners to shape an inclusive, fair and carbon neutral world. We must work towards this ideal that is not contrary but rather complementary to the sustained growth we are aiming to achieve."**
>
> **Denis Thivierge,** P. Eng.
> President and Chief Executive Officer

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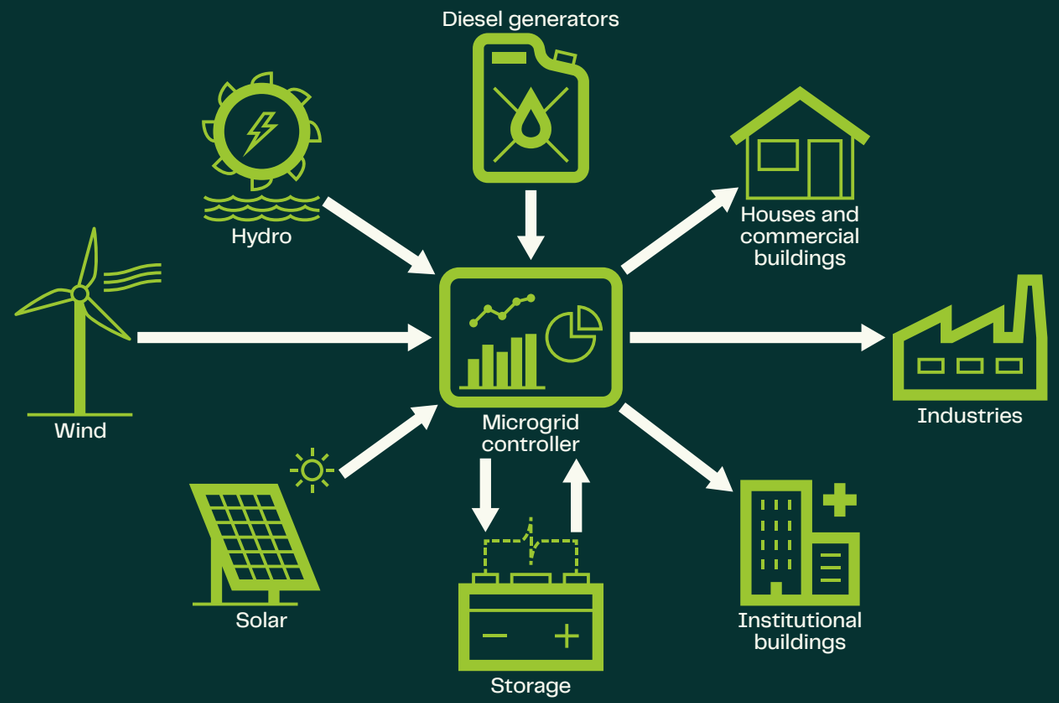
WHY IMPLEMENT A MICROGRID?

In grid connected systems, microgrids are used to manage and reduce energy demands and can be implemented in existing systems for various reasons.

One of the main reasons to implement a microgrid is to incorporate renewable energies into a community's energy mix and reduce reliance on other energy sources. For example, communities with isolated power systems are served by an islanded grid which is typically fed by a diesel plant with multiple generators. Implementing a microgrid allows these systems to integrate one or more sources of renewable energy, such as wind, solar, hydropower, etc., as well as energy storage. Therefore, microgrids allow remote communities to increase their use of self-supplied energy generation and reduce their reliance on diesel generated power.

Another important reason to implement a microgrid is to reduce long-term costs. Microgrids can include energy storage for peak demand management, which can help reduce energy costs. Furthermore, for communities that rely on diesel, reducing fuel consumption and associated transportation reduces greenhouse gas emissions which results in end user and utility company savings. The challenge in implementing a microgrid is finding the most cost-effective and efficient way to develop and manage the electricity distribution network. This is accomplished by increasing the importance of renewable energy in meeting the communities' present and future energy needs.



CIMA+ CAN HELP YOU IMPLEMENT YOUR MICROGRID FROM START TO FINISH

A successful microgrid deployment requires proper integration of multiple systems.

A typical microgrid project will include adding a combination of the following to the existing facilities:

- Centralized energy sources
- Energy storage
- Distributed energy resources
- Building management systems
- Microgrid controllers

CIMA+ keeps abreast of the most cutting-edge technologies in distributed energies and building management systems and integrates them in our client's project to increase the efficiency of the overall microgrid. Furthermore, CIMA+ can help our clients transition from a microgrid to a smart city, including electric mobility and transportation.

CIMA+ provides the following services for microgrid integration:

- Technical and financial feasibility studies
- Environmental and interconnection impact assessments
- Preliminary engineering including optimization of:
  - Renewable energy sources
  - Battery storage
  - Building management system integration
- EPC Projects
  - Complete detailed engineering
  - Testing and commissioning
  - Training and O&M assistance
- Owner's engineer
  - Develop performance specifications
  - Review EPC document and provide comments and recommendations
  - Factory Acceptance Test (FAT) and Site Acceptance Test (SAT)
  - Site supervision
  - Training and O&M assistance
- Cybersecurity
- Microgrid integration with existing infrastructure assets

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EXPERTISE REQUIRED TO IMPLEMENT A MICROGRID

CIMA+ is your one-stop shop for the successful implementation of a microgrid, offering all required expertise. This includes knowledge on how to integrate different types of energy sources, building energy management, energy storage and controllers, as well as often overlooked cybersecurity requirements.

Furthermore, our team has the knowledge and skills required to integrate several energy sources simultaneously, which can then be managed in real time. In the next pages you will find more information on CIMA+'s various areas of expertise that set us apart as a leader in the development and implementation of microgrids across Canada.

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EXPERTISE REQUIRED TO IMPLEMENT A MICROGRID

INTEGRATION OF ENERGY SOURCES (CENTRALIZED AND DISTRIBUTED)

Solar

CIMA+'s professionals have been involved in the solar energy sector since 2007, and are knowledgeable in the areas of standards, processes, technological developments and design conventions for this renewable energy technology. We work closely with our clients at every phase of a solar project – from defining design requirements to commissioning and interconnection with the utility network. This allows for reduced delays and seamless integration to the existing networks. CIMA+ has experience with a wide variety of solar installations, from smaller 7.5 kW roof top projects to larger ground mount ones with a generating capacity of over 200 MW. The range of services we offer reduces the need for coordination with many stakeholders, and facilitates project management, implementation and completion.

Wind

CIMA+ has the expertise to support our clients through the various development stages of wind energy projects. We have participated in all phases leading to the installation of wind turbines in the framework of the first wind farm projects in Québec. Our team has been involved in the development of wind farms across Canada with capacities ranging from 15 MW to 350 MW, and interconnection to distribution and transmission systems.

Hydropower and tidal systems

CIMA+ has been providing hydropower plant rehabilitation and development services for over 30 years. Our experts carry out projects locally and abroad, and have provided professional services to deliver more than 250 projects of various sizes for both private and public sector clients. Our team handles each phase of hydroelectric projects, including the design, preliminary and detailed engineering, project management, and cost estimates, as well as procedures, contract documents, construction site support services, monitoring and commissioning. In collaboration with specialized partners, CIMA+ also provides services for hydrokinetic and tidal systems.

Diesel / thermal

CIMA+ has gained recognition in the power generation sector, thanks to our unique approach focusing on constructability, operations and maintenance. Our team delivers highly specialized services aimed at providing effective, cost-efficient solutions that are tailored to our clients' needs and compatible with the latest technological and environmental requirements.

Energy storage

Supported by a team of seasoned professionals, CIMA+ provides clients with customized, proven and reliable energy storage solutions for the generation, transmission or distribution applications related to the integration of renewable energy, peak shaving, load displacement, reliability and stability, Volt/VAR support, etc. The recommended solutions consider utility requirements and available renewable energy, especially in terms of power quality, reliability and cost-efficient energy management. Our experts have in-depth knowledge of, and experience with, the most recent innovations in energy storage systems, including flywheel and compressed air.

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Building energy management

CIMA+ has an in-depth expertise regarding the integration of building management systems, including energy efficiency and energy management. Our team has comprehensive and in-depth knowledge of the latest technological advances, which we incorporate into our designs and projects, whether for existing buildings, additions or new constructions. The energy efficient concepts and innovative sequences developed by CIMA+ allow our clients to minimize their energy consumption without compromising the comfort of their building.

Hydrogen and liquefied natural gas

Hydrogen and liquefied natural gas (LNG) can be used to produce electricity in microgrids in order to reduce greenhouse gas (GHG) emissions. CIMA+ has developed its expertise with hydrogen and LNG systems from past projects where we performed the engineering for electrical systems, as well as gas collection and storage systems. CIMA+ can help our clients from the prefeasibility phase to the different engineering stages of hydrogen and LNG projects..

Microgrid controllers

CIMA+'s expertise in the design of simple microgrid controllers is based on hands-on experience acquired with a wide range of control platforms, from individual loop controllers to fully integrated Distributed Control Systems (DCS) and implementing Supervisory Control And Data Acquisition (SCADA) systems, used to monitor and control a large selection of distributed processes. These can apply to various infrastructure assets, from municipal water and wastewater facilities, pipelines, cathodic protection systems, compressor and pumping stations, transmission and distribution systems, and renewable energy.

Communications and protocol standards are an important element of any implementation, since SCADA systems enable communications with remote and widely distributed devices. Most SCADA systems include archiving capabilities through integrated process historian software, which not only provide a repository for the collected process data but allow for off-line access for the preparation of various production and troubleshooting reports to improve operational effectiveness, reliability, asset aging and replacement planning.

Our knowledge in terms of configuration and integration for a variety of OPC Servers helps bridge the transfer of information across disparate systems. CIMA+ also securely integrates historians into your business system, including configuration of associated reports and event capture snapshots of critical systems. In addition to the SCADA capabilities of the HMI systems previously described, our team has worked on a wide range of RTU/MTU platforms, which allows our interfaces to be very user-friendly.

CIMA+ also partners with specialized companies to provide custom solutions for microgrid controllers that require advanced features such as load and energy forecasting.

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Cybersecurity

The increased use of digital networks and microprocessors at all levels of the control system combined with the migration to open system infrastructure such as Ethernet and IP-based networks, means that control systems are now exposed to the same vulnerabilities as information technology systems. However, the impact and methods used to manage utility and industrial networks, though similar, are not the same as for the desktop and office environments.

CIMA+ provides the complete range of services, from audits to determine the integrity of your existing installation, through to the design and installation of an industrial hardened system compliant with the latest IEC 62443 and other industry standards such as NERC CIP. However, industrial cybersecurity is not limited to the equipment, it also includes people, policies, and procedures to ensure the installed system is maintained to stay ahead of the continually evolving cyberspace threats. As a full EPCM organization, CIMA+ can also provide all of the cyberspace required beyond the control system, including requirements for physical security, integration with information technologies, as well as patch management and system upgrades. Control systems and the supporting infrastructure are certainly part of an organization's mission critical facilities. Our team gives you access to a one-stop shop for engineering services in buildings, communications systems, and IT systems such as servers, storage systems, networks (SAN, WAN, LAN), remote access and TIA TIER certification.

HIGHLIGHTED PROJECTS

BATTERY-BASED ENERGY STORAGE SYSTEM IN COLVILLE LAKE, NORTHWEST TERRITORIES

The community of Colville Lake, located 50 km from the Arctic Circle, relied on diesel fuel to generate electricity. Looking for ways to reduce its greenhouse gas (GHG) emissions, this community of fewer than 200 people began supplementing its diesel-powered generating station with renewable energy sources and a battery-based energy storage system. After conducting a performance analysis of the existing system, CIMA+ issued recommendations for improving the efficiency of the Colville Lake solar power farm and its battery-based energy storage system, which will make it possible to further minimize GHG emissions and extend equipment life expectancy.

CIMA+ also prepared specifications for the design of future power station upgrade projects, with the objective that the addition of renewable energy sources to diesel-powered generating stations will become standard practice. In addition, thanks to the experience acquired during the course of this project, the community now can count on a qualified local workforce.

IGIUGIG

Located in Southwest Alaska, Igiugig is an Indigenous community of 69 people. The Kvichak River, which runs through the village to the nearby lake, provides the community with salmon and, since 2014, electricity. CIMA+'s partner, ORPC, provided a hydrokinetic turbine which helped reduce the community's diesel consumption with a long-term vision of being 100% sufficient using only renewable energy.

CIMA+ is involved in the second phase of this project, which is supported by the American Department of Energy (DoE) and scheduled to be completed in 2021. This second phase consists of adding a second hydrokinetic system, a battery storage system and a microgrid controller in order to efficiently control the system and optimize the use of renewable energies.

HIGHLIGHTED PROJECTS

LAC-MÉGANTIC MICROGRID

After the 2013 rail disaster, the City of Lac-Mégantic saw an opportunity to rebuild the downtown area while integrating renewable energy sources and smart grid technologies to serve the community. At that time, the city retained CIMA+ to prepare a pre-feasibility study which provided recommendations and defined the steps required to complete such an ambitious project. In 2018, Hydro-Québec invested in the project and proceeded with the pre-engineering phase. It was decided that the project would consist of a complete microgrid system with islanding capacity. The Lac-Mégantic microgrid project will serve approximately 30 buildings from nearly 2,000 electricity-generating solar panels, and batteries able to store up to 1 MWh of energy. In the fall of 2019, with its local partners STACE and Transelec Common Inc., CIMA+ was awarded the EPC contract for detailed engineering, procurement, construction and commissioning of the microgrid. The project is scheduled to be completed in late 2020.

Photos : © Hydro-Québec

FOR MORE INFORMATION, CONTACT US:

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WE HAVE A LOCAL PRESENCE FROM COAST TO COAST, ALL ACROSS CANADA.

Baie-Comeau Beauce Bécancour Barrie Bowmanville Burlington Calgary – Airport Calgary – Downtown
Clarenville Edmonton – Downtown Edmonton – West Gatineau Granby Guelph Halifax Kelowna Kitchener
Labrador City Laval Lévis London Longueuil Mississauga Montréal Oakville Ottawa Québec City Red Lake
Regina Rimouski Rivière-du-Loup Rouyn-Noranda Saguenay Saint John, NB Saskatoon Sept-Îles Sherbrooke
Sorel-Tracy St John's, NL Sudbury Terrace Terrebonne Thunder Bay Toronto Vancouver Victoria West Kootenays

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