CIMA+ Engineering for **people**

WHEN RENEWABLE ENERGY AND PROFITABILITY GO HAND IN HAND

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.

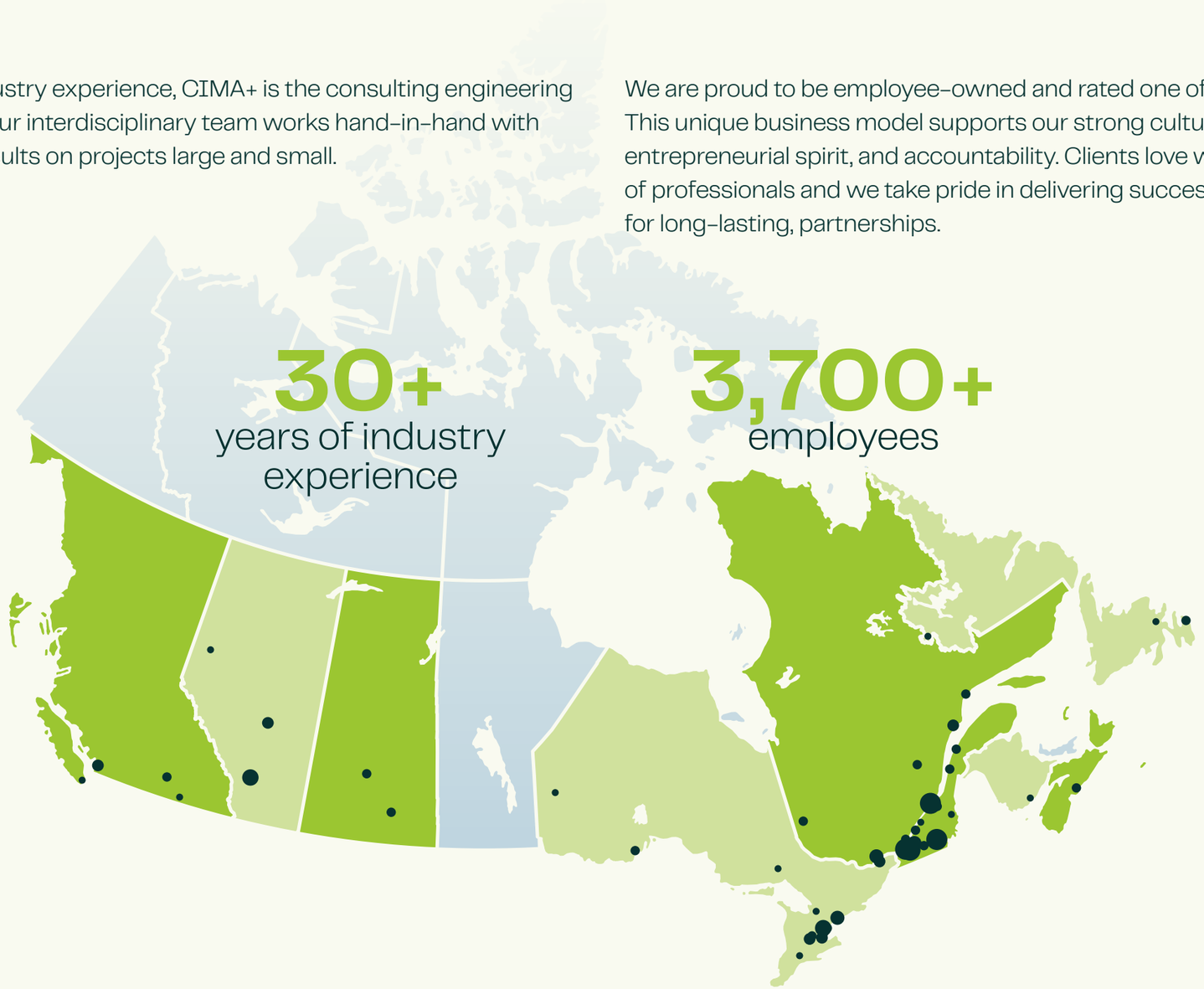
EMPLOYEE-OWNED AND CLIENT FOCUSED

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.

45+
offices across Canada

30+
years of industry experience

3,700+
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

CIMA+

KINCENTRIC
Best Employer
CANADA 2023

BEING PART OF THE SOLUTION TO TACKLE CLIMATE CHALLENGES

A growing number of industries are turning to renewable energy sources to reduce their dependence on fossil fuels and their greenhouse gas emissions. This energy transition is essential to counter climate change: the future of our planet depends on it.

Our approach is to offer our help to clients rather than simply telling them what to do. We have specialists in every field, whether it is civil, structural, mechanical or electrical engineering. This really allows us to address all of a client's needs at once.

CIMA+'s leadership in renewable energy has earned us awards of excellence from leading engineering associations across the country. For many years, we have been helping our clients achieve their energy transition in a cost-efficient manner, through optimal use of natural resources and the latest technologies.

Our specialists share the same goal: finding solutions adapted to each client to protect the environment without neglecting productivity.

THE SECRET OF A SUCCESSFUL ENERGY TRANSITION

For a plant operator, a municipality or an electricity provider, it can be a daunting task to determine the best installations for making an energy transition. A wide variety of solar panels, wind turbines and battery systems exist on the market, and each meets specific needs related to a variety of energy and power production methods. CIMA+ helps its clients ask the right questions, so that they can choose the technology that best meets their needs.

Keeping profitability in mind

Cost is an important issue: the transition to renewable energy sources must not be done at the expense of profitability. We make sure that we implement new technologies at the right time, in compliance with all applicable standards and in sync with public power grids across the country.

An impressive technical know-how

For over 40 years, our specialists have worked closely with clients in both the private and public sectors, building up extensive expertise in renewable energy. We offer turnkey engineering services, from needs assessment to commissioning and interconnection to the public grid across Canada, for all types of projects.

Adapting to each client and their regional reality

Too many firms impose their own ways of doing things on their clients. We do the opposite, adopting the standards of each of our clients to the point of becoming an extension of their in-house team. The result is a much longer-lasting partnership.

Our 400 specialists are located in over 30 offices from coast to coast, from Halifax to Vancouver. A local team supports our clients, wherever they are in the country. This team masters the standards of public and private networks in its region, in addition to having access to the niche expertise of our vast pool of specialists, as well as to all the support required for large-scale, multidisciplinary projects.

ONE-STOP SHOP: A SINGLE TEAM FOR EVERY STAGE OF YOUR PROJECTS

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PROJET

1 Prefeasibility

- Interconnection study
  - For private electricity producers working with public utilities
  - Analysis of the impact on public networks
- Evaluation of a new location
- Environmental studies
- Geotechnical services

2 Feasibility

- Technical and economic study
- Owner's engineering
- Site optimization
- Engineering for tenders
- Constructability
- Network studies
- Energy efficiency studies
- Field surveys

3 Detailed engineering

- Owner's engineering
- Complete design for all engineering disciplines and operational solutions for new or existing structures
- Network studies
- Traditional delivery methods, design-build, design-bid-build, etc.

4 Construction and commissioning

- Owner's engineering
- Management of the interconnection process with public utilities
- Assistance, site management and supervision
- Factory Acceptance Tests (FAT) and Site Acceptance Tests (SAT)
- Pre-operational checks, testing and commissioning

5 Operation and maintenancde

- Training of operations and maintenance staff
- Operational support
- Optimization of maintenance
- Asset management program
- In-plant health and safety
- Specialized studies: short-circuit, arc flash, harmonics.

A NATIONAL TEAM WITH A LOCAL PRESENCE ACROSS CANADA

Our teams of experts have completed major projects in every Canadian province and territory, from Prince Edward Island to the Yukon, Nunavut and Nunavik. Whether you are in a remote region or a metropolis, we can provide you with optimal renewable energy solutions.

POWER PLANTS AND DAMS

- 500 projects delivered on +200 hydropower sites
- From 100 kW to 5000+ MW
- +30 years of experience
- +100 engineers and technicians involved in projects
- +2 Grands Prix du génie-conseil québécois awards

SOLAR FARMS AND ROOFTOP SOLAR SYSTEMS

- Design of the largest solar farms in Canada
- +2 GW total installed capacity
- From 7.5 kW to 200 MW
- +16 years of experience

ENERGY STORAGE SYSTEMS

- +24,000 kW installed
- +$1.5M worth of projects delivered
- 2 Grands Prix du génie-conseil québécois awards since 2021

WIND FARMS

- From 15 to 350 MW
- Pioneers in the field: design of Quebec's first wind farm
- Finalist for the Grands Prix du génie-conseil québécois

SMART AND AUTONOMOUS POWER GRIDS

- +20 smart grid specialists
- 7 provinces and territories, Designed smart grids
- 1st solar microgrid in Québec (Lac-Mégantic)
- 2, 2021 and 2022 Grand Prix du génie-conseil québécois

TRANSMISSION LINES, DISTRIBUTION AND SUBSTATIONS LOW VOLTAGE UP TO 735 KV

OVERHEAD AND UNDERGROUND TRANSMISSION LINES

- +145 clients
- + 1350 projects
- +32 M$ in fees per years
- +150 specialiste

WIND ENERGY

Wind energy infrastructure and systems have become increasingly complex over the years. Increasingly powerful wind turbines are connected to wind farms located far from transmission lines. Not to mention public grids that have tightened their interconnection standards in an increasingly competitive market.

CIMA+ is working closely with existing site operators to:

- increase plant reliability
- limit downtime, and
- facilitate operational supervision and equipment maintenance.

CIMA+ offers innovative solutions to meet its clients' specific needs and constraints. For example, our specialists designed a de-icing system for wind turbine blades to eliminate frequent stoppages due to ice formation, ensuring that the wind farm remained operational throughout the winter.

WIND POWER EXPERTISE

- Site study
- Environmental assessment
- Social acceptability solution
- Grid interconnection
- Harmonic emission studies
- Turbine and tower foundations
- Overhead or underground collector networks
- Complete SCADA/HMI/RTU solutions
- Telecommunications network design
- NERC compliance

PUTTING WIND POWER TO WORK FOR LOCAL COMMUNITIES

MORE PRODUCTIVE WIND TURBINES IN WINTER

Finalist for the Grands Prix du génie-conseil québécois.

Our specialists created two wind turbine prototypes equipped with a de-icing system and tested them at the Lac-Alfred wind farm in the Lower St. Lawrence region. From the very first test, it took just a few minutes to defrost the blades paralyzed by ice, enabling them to produce energy once again.

The system, which can be activated remotely when the turbine is running or stopped, induces a current of over 100 A to melt the ice.

Other versions have been developed to optimize costs or adapt the system to other types of turbines.

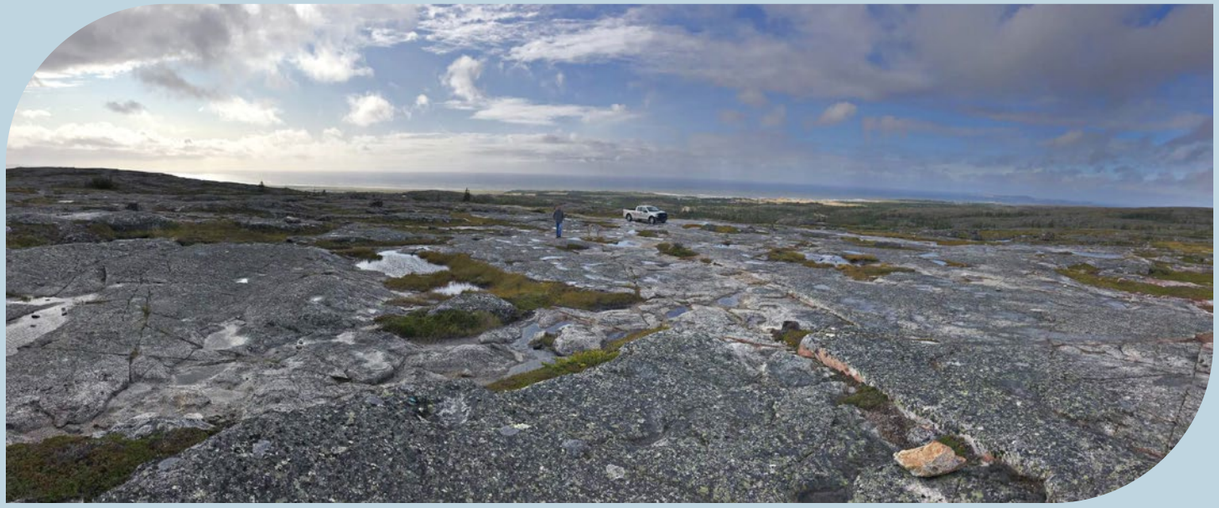
This de-icing system is installed by local companies, helping to increase the economic spin-offs for their region.

ENERGY TRANSITION FOR A NUNAVIK COMMUNITY

The Nunavik communities of Whapmagoostui and Kuujjuarapik wanted to install two wind turbines to reduce their dependence on diesel power and help combat climate change.

CIMA+ carried out the detailed engineering for the collector system and substation, as well as the studies required for interconnection to the Hydro-Québec grid.

Our team also took charge of project management and the on-site installation of the wind turbines, as well as the implementation of a telecommunications system to ensure effective monitoring and maintenance of the system.



CIMA+

SOLAR ENERGY

Over the past 15 years, CIMA+ has designed some of Canada's largest solar farms. We have worked on projects as large as the 465 MW Travers Park in Alberta, or as small as 7.5 kW solar panels installed on a building rooftop. The total installed capacity of the projects we have delivered exceeds 1.5 GW, enough to power over 150 million LED bulbs.

Our multidisciplinary specialists have solid experience when it comes to different voltage levels and interconnection methods. These skills enable them to design creative solutions and ensure seamless connections to existing networks, thereby reducing production times and costs.

Our experts also rely on the modelling of each design element. This ensures efficient workflows and proper planning of the equipment required for the installations.

The models developed by our team accurately calculate the voltage transmitted to the ground, thus enhancing safety on the site – a particularly important factor in the vicinity of residential areas.

SOLAR ENERGY EXPERTISE

- Solar photovoltaic technology: modelling, optimization and integration.
- Foundations: solar panel mounting systems and inverter buildings
- Public network and collector network studies
- Substations and power lines
- Telemetry
- Complete SCADA/HMI/RTU solutions
- Telecommunications network design

"Our well-honed team has proven time and again that it can deliver all the elements of a solar park project, whatever the size."

Jean-Hugues Lapointe, Eng.
Leader, Renewable energy

CIMA+'S ACHIEVEMENTS

Claresholm – 132 MW

- 477,000 solar panels
- Solar farm and collector network design
- Grid interconnection

Travers – 465 MW

- Largest solar farm in North America
- Substation design

Hillcrest – 200 MW

- 600,000 solar modules
- Electrical design for the photovoltaic power plant
- Grid studies
- Grounding
- Construction supervision

Kingston – 100 MW

- Supplies 17,000 homes
- 464,000 solar panels
- Complete electrical design

HARNESSING THE POWER OF THE SUN ON A MAJOR SCALE

CANADA'S LARGEST SOLAR FARM

In 2022, some 1.3 million solar panels were added to Travers Park in Alberta. The goal was to generate 465 MW of electricity for 35 years, enough to power more than 150,000 homes and offset more than 620,000 tonnes of greenhouse gases per year.

CIMA+ designed and supervised the construction of the high-voltage substation, comprising three 240 kV–34.5 kV transformers. This substation connects the park to the province's power grid, doubling its solar energy output.

This impressive array of solar panels was installed on over 13 km² of farmland – the equivalent of 1,887 soccer fields.

CIMA+ contributed its expertise in several disciplines, from the evaluation of geotechnical data to the commissioning of the substation.

A CLEAN, SUSTAINABLE SOURCE OF ELECTRICITY FOR OHIO

Covering an area of around 6 km², the Hillcrest Solar Park in Ohio has a capacity of 200 MW and supplies clean, sustainable electricity to tens of thousands of homes.

It consists of more than 600,000 solar modules mounted on single-axis trackers and an interconnection substation that ties it into the 138 kV Duke Energy local transmission grid. These trackers are installed on five main sites and interconnected to 55 inverters, which are connected at 34.5 kV to the power plant substation.

ENERGY STORAGE

Energy storage plays a major role in the energy transition, as it enables real-time energy management and improved production reliability. When used properly, this technology reduces production costs and helps combat climate change.

However, this technology is evolving rapidly, and there are many systems on the market.

For storage to be cost-effective, several factors need to be considered, such as the location of systems, the duration of charges and their application. For example, solutions for a residential project differ from those for a solar park.

Our specialists are here to advise you on the most up-to-date systems best suited to your needs. They keep abreast of the latest technological advances, including flywheel and compressed-air energy storage. They have also won two Grands prix du génie-conseil québécois, two years running. They have the skills required to integrate these solutions into existing installations, taking into account current standards.

EXPERTISE IN ENERGY STORAGE

- Choice of appropriate technology
- Peak load shaving
- Load transfer
- Grid reliability and stability
- Volt/VAR systems

“It is very important to choose a technology that can adapt to your installations’ evolution and that will help you save a lot of money in the long term. At CIMA+, we have been fortunate enough to work on both very small residential systems of a few kilowatts and large grid-connected projects.”

Éric Cantin, Tech.
Leader, Energy storage

STORING ENERGY TO MEET NEEDS AT LOWER COSTS

GREATER ENERGY EFFICIENCY FOR A MAJOR AUTOMOTIVE PLANT

The Ford Essex plant in Windsor, Ontario, has significantly reduced its electricity bill thanks to a new battery storage system. The company participates in the Industrial Conservation Initiative (ICI) program, which rewards off-peak electricity consumption.

By relying on eight new battery systems, the plant can store energy when rates are low, and then use it during peak periods, significantly reducing its operating costs.

CIMA+ participated in the civil engineering of the site and carried out network studies, as well as ensuring the system's interconnection to the plant's 13.8 kV distribution network. In total, the storage system can inject or store up to 4 MW/8 MWh, equivalent to the energy consumed by around 2,000 homes annually.

BATTERIES THAT GO A LONG WAY

It will soon be possible to cross the city of Toronto from east to west up to 60% faster, thanks to the new Eglinton Crosstown light rail line. This section will serve 25 stations over 19 km.

Service reliability will be ensured by a 10 MW/30 MWh storage system, which will also power the line in the event of a Toronto Hydro grid failure. Lithium batteries will store energy generated at night and during less busy periods. This energy will be used the following day during peak periods, to reduce operating costs and polluting emissions.

Our team provided most of the engineering required to integrate this storage system into the facilities, as well as ensuring coordination between the various project stakeholders.

HYDROPOWER AND DAMS

Hydroelectricity is the most important source of energy in the country.

CIMA+ is one of only a handful of firms to have qualified to work with Canada's major utilities in hydroelectric power generation and electricity transmission and distribution.

We offer an integrated engineering service that meets the various legal requirements. We help each client assess whether it is more advantageous to invest in new hydroelectric structures or upgrade existing facilities, based on technical and economic feasibility. We also take on project management, providing adequate documentation and ensuring that work progresses safely, on time and on budget, and with deliverables that meet the highest industry standards.

Over the years, CIMA+ has worked on more than hundreds of hydroelectric sites in Canada and abroad, with capacities ranging from 100 kW to over 5000 MW. Whether for new installations, rehabilitation, redevelopment or expansion of existing infrastructures, the solutions proposed by our multidisciplinary technical teams are optimized according to the reality of the hydroelectric industry.

Our skills and understanding of the specific needs of utility providers and private developers and owners enable us to design and deliver solutions tailored to the needs of each client. Our clients rely on CIMA+ for turnkey solutions. In addition, we are proud to be the largest supplier of engineering services to Hydro-Québec.

EXPERTISE IN HYDROPOWER AND DAMS

- Application for environmental permits and authorizations
- Dam safety and bringing structures up to standard
- Complete lifecycle, including feasibility studies, optimization, engineering, construction supervision and commissioning
- Increase in generating capacity
- Hydrological and hydraulic studies
- Geology and geotechnics
- Mechanical auxiliary systems and electrical switchgear
- Control, protection and automation engineering

"Thanks to the size of our teams, our work organization and the diversity of our expertise, we can meet the multidisciplinary needs of our clients. Our flexibility in adjusting our processes and ways of doing things to the client's needs sets us apart. The value of engineering lies in optimizing projects, reducing costs and schedules, and ultimately developing a product that will perform to expectations or beyond."

Mathieu Lemay, Eng.
Leader, Hydropower and dams

TACKLING ENVIRONMENTAL CHALLENGES

A HYDROPOWER PLANT THAT BLENDS INTO THE LANDSCAPE

Grand Prix
du génie-conseil québécois

Building a hydropower plant embedded in a cliff without compromising the beauty of a prized natural site: that's the challenge CIMA+ took up with the Hydro-Canyon Saint-Joachim project.

Erected on the edge of the 74 m-high Sainte-Anne Falls, these facilities harness 23.2 MW of power to supply the equivalent of 4,800 homes.

The project involved the construction of a 405 m^2 spillway, a 440 m tunnel and, above all, a 4,000 m^2 wall built into the canyon rock to support a road leading to the power plant. This concrete wall, held in place by 1,700 nails, reaches 20 m in places, making it the tallest structure of its kind in Canada.

Due to the presence of a geological fault, some modifications were necessary during construction. The water intake was hidden in the river meander so as not to be visible from the trails. As for the dam, it is camouflaged under riprap to give the impression of a natural waterfall.

A HYDROPOWER PLANT BUILT ON PERMAFROST IN AN EARTHQUAKE ZONE

Thanks to Innavik's new run-of-river power plant, the 1,800 residents of Inukjuak, Nunavut's second-largest community, can say goodbye to their diesel-powered generators.

CIMA+ drew on its geotechnical expertise to carry out the detailed engineering for the structures built on permafrost in an area known for its high seismicity. Weather conditions also complicated the work supervised by our team, particularly the excavation and stabilization of rock faces, as snow affected visibility.

The hydropower plant, which includes a 440 m tunnel and an 18 m high retaining wall, supplies the community of Inukjuak with 7.5 MW of clean energy. It also helps improve air quality, which was polluted by diesel generators, and prevent the risk of fuel spills into the river, the source of drinking water for this northern village.

SMART GRIDS

More and more companies are turning to smart microgrids to optimize their energy management. And with good reason! Microgrids automatically manage equipment energy consumption according to precise production targets. Their more sophisticated functionalities increase profitability compared with conventional systems. All this, powered by solar or wind energy.

Key benefit: savings

Smart microgrids make it easier to manage demand during peak periods, when public grids are operating at full capacity and the cost of electricity rises. They enable energy to be stored at preferential rates without interrupting operations. Remote communities that rely on diesel generators can also benefit from these systems to reduce fuel consumption and greenhouse gas emissions.

CIMA+ has implemented dozens of microgrids over the past few years. Our team is at the forefront of technological advances and has all the knowledge needed to integrate these systems into existing facilities or networks, taking into account the most stringent cybersecurity standards. Our specialists can help you identify the most efficient renewable energy sources and storage solutions for you.

EXPERTISE IN SMART MICROGRIDS

- Choice of appropriate technologies
- Environmental impact and public grid interconnection studies
- Cybersecurity
- Integration of microgrids into existing infrastructure assets

1 Photo: Jean-Michel Naud

FIRST SELF-SUFFICIENT COMMUNITIES

HYDRO-QUÉBEC'S FIRST MICROGRID

Grand Prix
du génie-conseil québécois

The municipality of Lac-Mégantic, which was partly destroyed by a rail tragedy in 2013, wanted to rebuild its downtown area with a focus on clean energy. It was therefore the ideal candidate to host Hydro-Québec's very first microgrid.

The state-owned company retained the services of CIMA+ and WSP to equip downtown Lac Mégantic with a system featuring some 2,200 photovoltaic solar panels and batteries capable of storing roughly 700 kWh of energy. The whole installation is automatically controlled by a power management system.

This microgrid can temporarily take over from the public grid in the event of a power failure, supplying thirty or so commercial and residential buildings. It also makes it possible to forecast the amount of energy consumed according to weather conditions, and to optimize the contribution of solar panels and batteries.

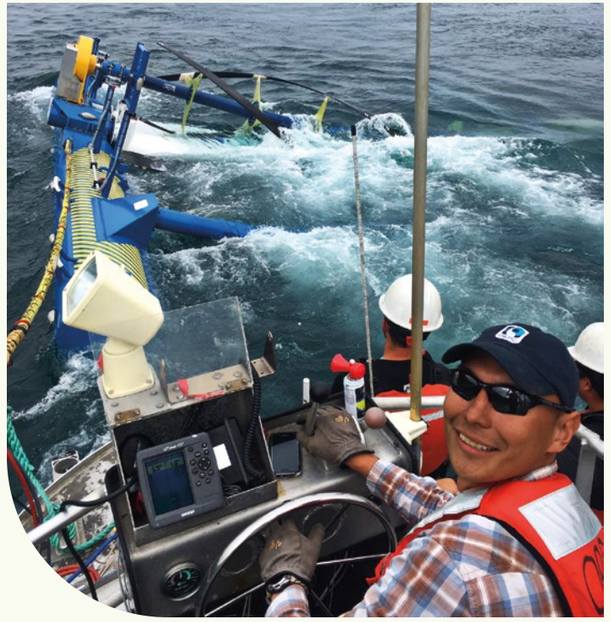
Thanks to the Lac-Mégantic microgrid, Hydro-Québec has developed expertise that can be applied in remote regions where the majority of stand-alone grids are still powered by fossil fuels.

AN ENERGY SELF-SUFFICIENT COMMUNITY

Grands Prix
du génie-conseil québécois

Like most of the neighbouring villages, the Indigenous community of Igiugig in Southwest Alaska relied on diesel generators to produce its electricity. Thanks to its new microgrid and two marine turbines powered by the current of the Kvichak River, the community expects to reduce its annual fuel consumption by 90%. For this community of just over 80 inhabitants, this represents annual savings of $170,000 and a reduction of 230 tonnes in greenhouse gas emissions.

CIMA+ contributed to the second phase of the project, which involved creating a smart microgrid by adding a second marine turbine and a battery storage system. Our team analyzed several storage scenarios ranging from 100 kWh to 250 kWh to identify the most efficient one, considering diesel savings and investment costs. We were also involved in commissioning the microgrid and implementing the control system.



BIOGAS, BIOFUELS AND BIOMASS

CIMA+ has been involved in several cogeneration and combined-cycle power plant projects in recent years. These projects involved steam turbines fuelled by biomass or wood waste, or gas turbines activated by biogas, landfill gas and synthetic gas.

Our expertise covers all fuel types, including:

- Biomass (bark, sawdust, etc.)
- Lumber waste
- Used tires/tire derived fuel (TDF)
- Municipal solid waste
- Landfill gas, syngas, biogas

EXPERTISE IN BIOFUELS

- Cogeneration plants
- Combined-cycle power plants
- Combustion engines
- Gas and steam turbines
- Steam boilers
- Waste heat recovery
- Combustion, gasification, pyrolysis, biomethanization
- Organic Rankine Cycle (ORC)
- Feedwater treatment

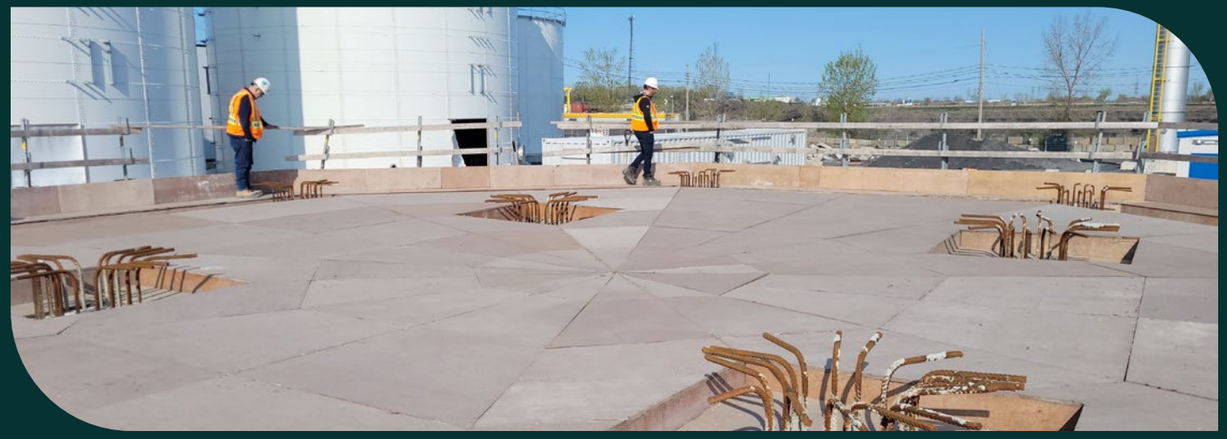
RECLAIMING RESIDUAL MATERIALS TO PRODUCE ENERGY

TRANSFORMING ORGANIC WASTE INTO NATURAL GAS IN THE HEART OF MONTRÉAL

A new $167 million plant will soon transform organic waste into renewable natural gas (RNG) in the eastern part of Montréal. The plant will process 60,000 tonnes of organic waste per year and produce enough RNG to supply nearly 3,600 homes.

CIMA+ engineered the main mechanical and piping components as part of the building design, which had to meet all environmental standards and code requirements while reducing the overall impact on the client's budget.

Equipment layout was problematic due to the limited space available. The 3D modelling performed by CIMA+ facilitated the construction and future maintenance of the equipment, while freeing up suitable floor space for operators.



TRANSFORMING NON-RECYCLABLE URBAN WASTE INTO RENEWABLE BIOFUEL

Over the past 15 years, CIMA+ has completed more than 40 multidisciplinary projects representing over 24,000 engineering hours for three new municipal waste treatment plants owned by Enerkem.

Located in Edmonton, Westbury and Varennes, the three plants transform waste into fuels and chemicals, including transportation fuels such as methanol and ethanol.

Currently in operation, the Edmonton plant will produce and sell around 38 million litres of renewable biofuels and chemicals annually. Some 100,000 metric tons of waste will be recycled each year.

CIMA+ was involved in the Edmonton and Varennes plant projects from start to finish, from preliminary studies to construction site supervision.

Currently under construction, the $825 million Varennes plant will recycle carbon and hydrogen contained in non-recyclable waste and wood waste currently landfilled or burned. It will shortly begin producing 125 million litres of biofuels and renewable chemicals annually. CIMA+ provided the engineering services required for connecting the plant to Hydro-Québec's power grid and designing the site's primary 230 kV substation.

CIMA+

OUR KNOW-HOW IN ENERGY AND RESOURCES

CIMA+ is one of Canada's largest private consulting engineering firms, and excellence and innovation are part of our DNA. From Vancouver to Saint John's, we offer a complete range of services, thanks to over 3,700 employees deployed in more than 45 Canadian cities. Our Energy and Resources division benefits from the know-how of 600 experts, engineers and technicians, making it one of the largest and most experienced in the country.

Our business partners see us as an industry leader, and they trust us with their projects, knowing the importance we attach to quality, on-budget and on-time delivery, not to mention our flawless management and reliability. Since the mid-1990s, we have been working with many Canadian private and public electricity providers, including Hydro-Québec, BC Hydro and SaskPower.

Over the past five years, our teams specializing in power transmission and distribution, control and protection systems, substations and telecommunications have delivered an average of 1,000 projects a year for private and public clients across all Canadian provinces and territories.

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 Grande Prairie 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 Terrebonne Thunder Bay Toronto Vancouver Victoria West Kootenays

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