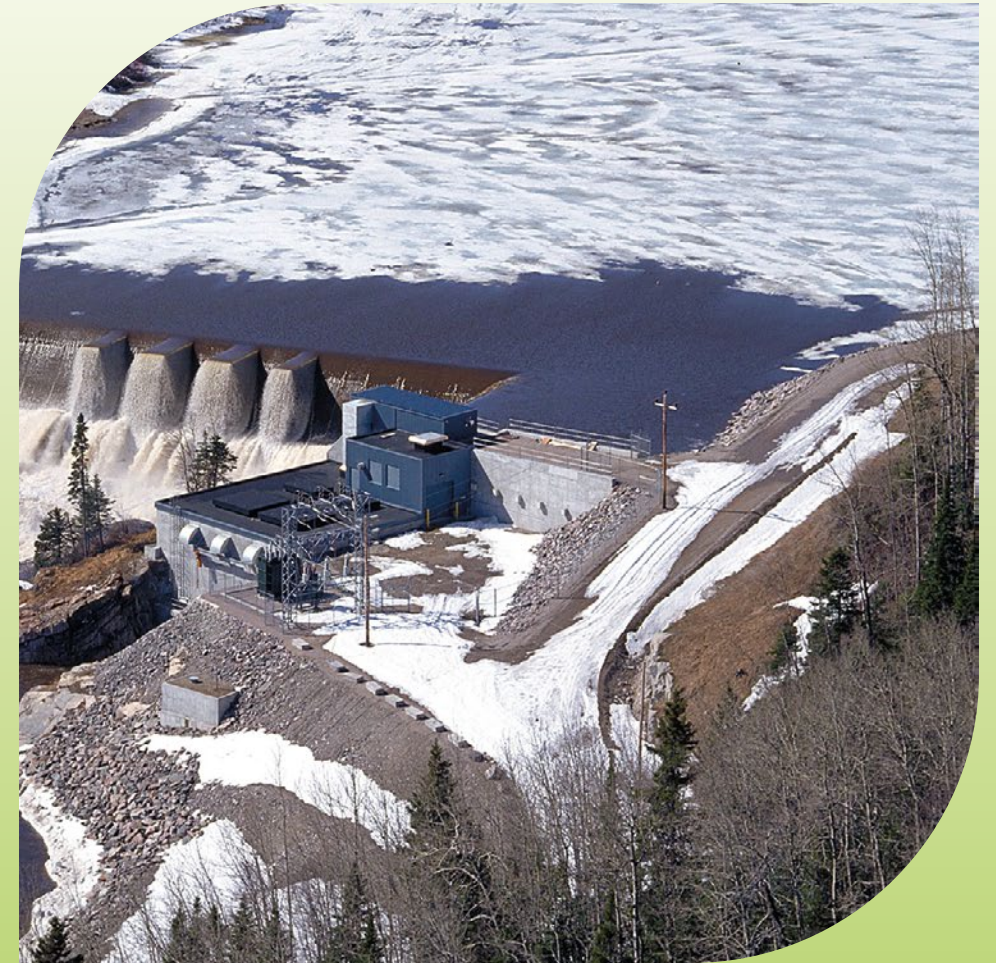
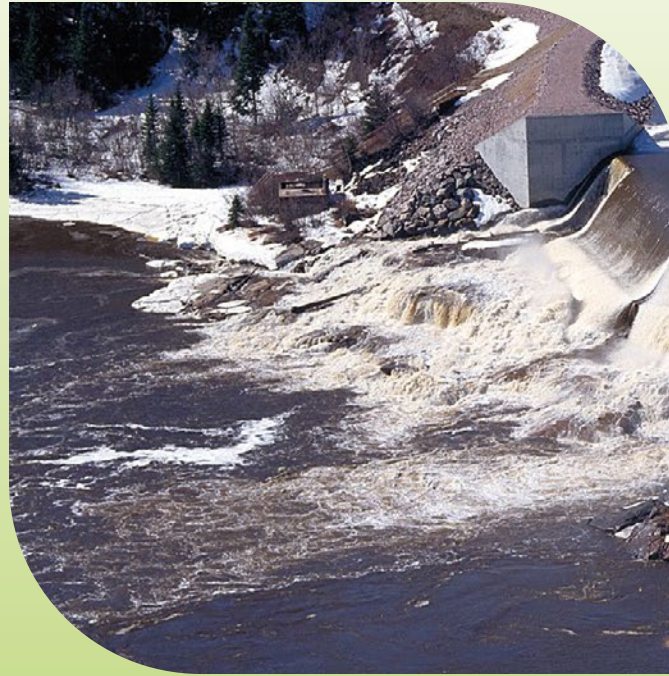




Engineering
for people

OUR EXPERTISE IN HYDROPOWER AND DAMS



cima.ca



A LEADER IN CONSULTING ENGINEERING



EMPLOYEE-OWNED AND CLIENT FOCUSED

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.

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

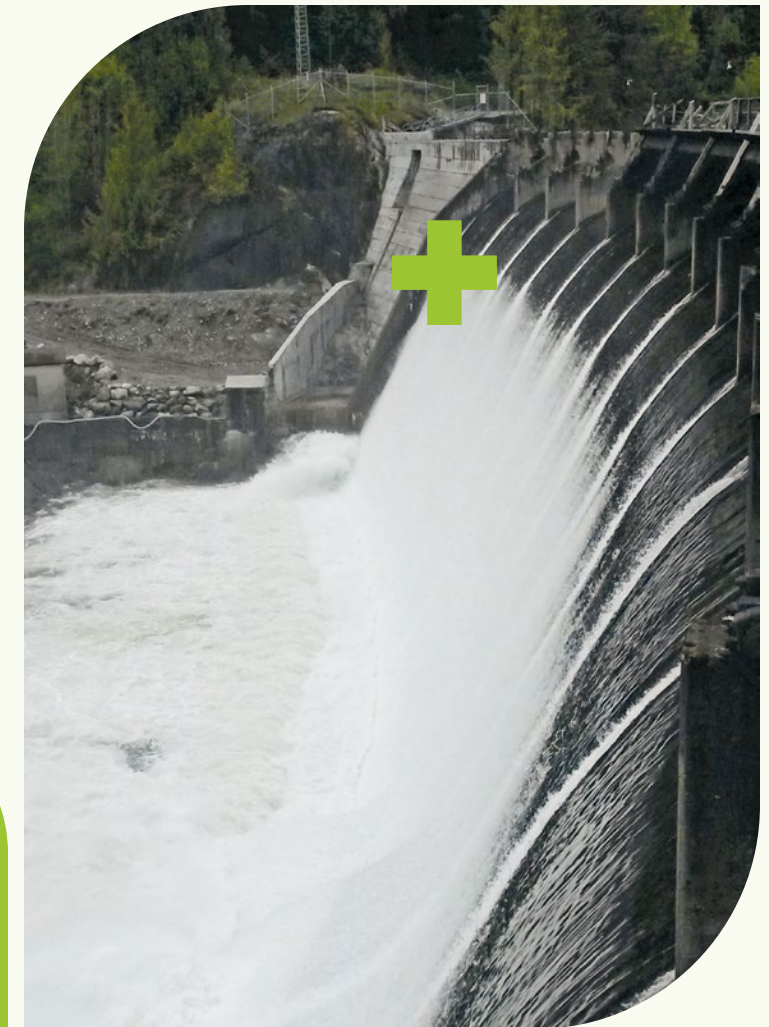


HARNESSING THE RENEWABLE POWER OF WATER FOR A SUSTAINABLE ENERGY FUTURE

Hydropower, a clean, renewable energy source, has not only been the most important source of electricity for over a century, but also the most important source of energy in the country. It contributes to increase independence from fossil fuels and helps balance intermittent renewable energy sources.

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
- Complete turbine-generator mechanical services, including equipment selection, optimization, design and operating support
- Heavy mechanical engineering: valves, grooves, lifting systems





AN INTEGRATED TEAM WITH LEADING EDGE EXPERTISE

Our team has developed expertise in the fields of renewable energy, hydroelectricity, wind and solar power, as well as transmission and distribution networks, working closely with North American and international clients in both the private and public sectors. 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, which demonstrates our commitment to providing our clients with services that meet the highest standards of quality.

“Thanks to the size of our teams, the organization of our work 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 client 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
Senior Director, Hydropower and Dams



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 and technical advice. In addition, we are proud to be the largest supplier of engineering services to Hydro-Québec, and to carry out projects for some of Canada's largest utilities.





OUR KNOW-HOW

- Conceptual and feasibility studies
- Hydrological, hydraulic and energy analyses
- Environmental assessments
- Detailed engineering
- Permit and authorization applications
- Technical specifications and tender documents
- Construction management and contract administration
- Site supervision and services during construction
- Commissioning
- Operations support



ENGINEERING

- Hydrology, hydraulics and hydrotechnics
- Heavy and auxiliary mechanics
- Civil and structural engineering
- Geology and geotechnics
- Turbines and alternators
- Power transmission and distribution
- Network, grounding and arc flash studies
- Electricity and switchgear
- Automation, instrumentation, protection and controls
- Geomatics
- Transportation – Bridges and roads
- Telecommunications and cybersecurity
- Earth and environment
- Buildings



CIMA+ and its employees are active members of the following associations:

- Waterpower Canada
- Clean Energy BC
- Ontario Waterpower association
- Association québécoise de la production d'énergie renouvelable (AQPER)
- Canadian Dam Association

120+
dedicated
professionals

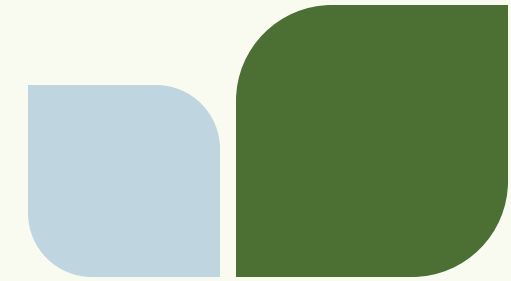
500+
delivered
projects

30+
years of
experience

5000+
MW power



INTEGRATED TEAM – THROUGHOUT THE LIFECYCLE



DESIGN AND STUDIES

We work in partnership with our clients right from the design stage and throughout the lifecycle of their infrastructure assets, offering innovative, practical and cost-effective solutions thanks to our extensive hydropower expertise and proprietary technological tools. Our professionals, involved in the operation of power generation facilities, master and anticipate the challenges associated with hydrology, modeling and energy production.

PROJECT MANAGEMENT, PROCUREMENT AND CONSTRUCTION

CIMA+ supports numerous clients in project and construction management, providing adequate documentation and high-quality deliverables, ensuring projects progress safely, on time and on budget, while upholding the highest standards of excellence. Our specialists also help select the best equipment and long-lead items, and manage tenders. Our professionals integrate seamlessly with the client's team to direct or supervise work through to completion, participate in testing and commissioning of all equipment, while maintaining smooth coordination with all stakeholders.

DAM CONDITION AND SAFETY ASSESSMENTS

Our experts have the technical know-how to advise our clients on how to ensure the durability and safety of their structures, while complying with the legal and regulatory framework. Our team can also carry out any environmental studies required, including the impact of climate change on infrastructure assets. Our skills in assessing the condition and safety of dams are backed up by diverse, hands-on experience.

- Dam safety review
- Inspection and condition assessment of all types of structures
- Stability and dam break analysis
- Evaluation of public safety in the vicinity of dams
- Operation, maintenance and surveillance (OMS) manual
 - Emergency preparedness plan (EPP)
 - Topographic and bathymetric surveys
 - Hydrotechnical, geotechnical and structural analyses
 - Water management plan
 - Flood zone mapping
 - Materials assessments
 - Environmental assessments



INTEGRATED TEAM – THROUGHOUT THE LIFE CYCLE

CUTTING-EDGE TECHNOLOGIES FOR SUCCESSFUL PROJECTS

At the cutting edge of innovation, our professionals have developed technologies, engineering procedures and methodological approaches that validate the technical and economic feasibility of projects of all sizes. Our personalized approach has enabled the success of projects once considered economically unviable using traditional methods.

Our technological tools provide visual assistance, illustrate our designs concretely, facilitate the integration of safety by design and the development of site-appropriate work methods. Thanks to these tools, it is possible to visualize, plan and implement safety measures from the earliest stages of the project, ensuring better risk anticipation and optimization of work processes.

Proprietary tools for hydroelectric power

- Hydro Production Appraisal –HPA | Evaluation of hydropower production and losses
- HydroHelp | Preliminary analysis of hydroelectric turbines, cost estimates and preliminary layout based on inputs (flow, water volume, elevation)
- Tools for measuring performance and optimizing hydroelectric plant management

Geotechnical and geographic information system (GIS)

- Integrated 3D scanning techniques, including drones and LiDAR
- Global Mapper, QGIS and ArcGIS | Handling of spatial data sets
- Autodesk Civil 3D and Midas | Computer-aided design in civil engineering
- FLAC | 2D finite-difference modeling for mechanical engineering calculations
- RS2 | 2D finite element modeling in soil and rock engineering
- GEO-SLOPE/SEEP, Split-FX, Settle 3D, Shake 2000, Geotec | Computer-aided modeling and design in geotechnical engineering

Hydraulics and hydrology

- Full range of free-surface hydraulic software | 1D, 2D, 3D-CFD, water hammer, including GENER, Swan, TOMAWAC, ARTEMIS, FLOW 3D, HEC RAS, Geo HEC RAS, RiverFLO-2D, a finite element model and a hydrodynamic and finite element model for floodplain hydraulics
- TELEMAC-2D | Two-dimensional free-surface flow simulation on a horizontal plane

Structure

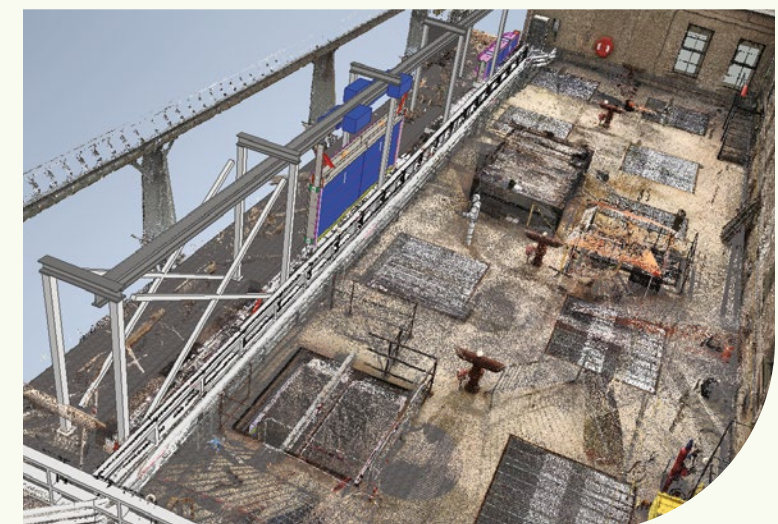
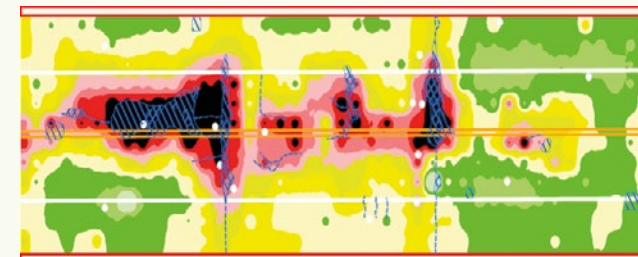
- SolidWorks, AutoCAD, REVIT and CATIA | tridimensional modeling
- ADINA, SAFI, SAP, etc. | Finite element analysis
- AutoPIPE | Penstock design and pipe stress analysis

Heavy mechanics

- Inventor and SolidWorks | 3D design of gate opening systems, embedded parts, beams, lifting systems, gantry cranes, penstocks and other specialized equipment
- Nastran and Ansys | Advanced linear and non-linear finite element analysis
- Specialized equipment for on-site precision measurements | Residual thicknesses, wear, hardness, vibration, flatness, alignment, material characterization

Electricity

- AutoCAD, REVIT, E3, Elecdes | 2D and 3D design, control and protection diagrams, integration into multidisciplinary models
- EasyPower, ETAP, SKM, CYMCAP, PSS/E, EMTP, CDEGS | Short-circuit studies, coordination, arc flash exposure, power flow, cable sizing, harmonics, grounding, insulation coordination, transient analyses



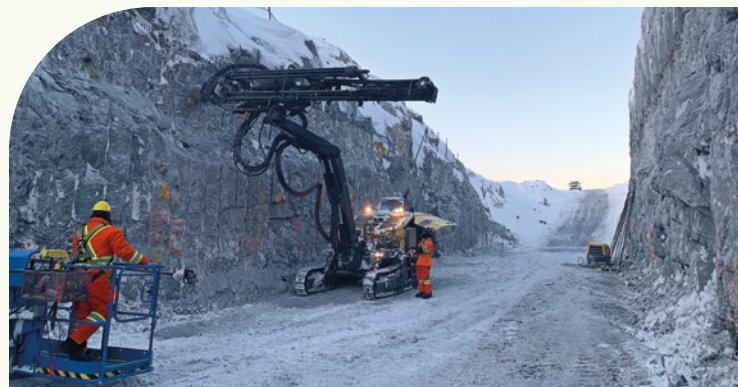


HYDROPOWER PROJECTS

HYDRO INNAVIK

For this Design Built type project, CRT Construction mandated CIMA+ to act as the Design Build Contractor's Engineer for the construction of the new 7.5 MW Innalik hydroelectric project located near the village of Inukjuak in Nunavik, northern Quebec. The Innalik Hydro Project is in partnership with the Inuit owned Pituvik Landholding Corporation who chose Innergex Renewable Energy Inc. to develop the project. Since December 2023, this innovative project provides customers of Inukjuak's off-grid system with clean and renewable energy, replacing diesel for their basic electricity and heating needs. CIMA+'s scope of work included geotechnical surveys, excavation and rock consolidation, as well as detailed design of civil structures, electrical and mechanical systems for the rockfill dam, concrete spillway, diversion structures, powerhouse and 11 km of transmission line.

Client: CRT Construction inc., Nunavik, QC.



MODERNIZATION OF THE CHAUDIÈRE RING DAM

Portage Power retained CIMA+ to act as their Lead Owner's Engineer, Designer and Construction Manager to undertake the upgrade of 5 sluiceways of the Chaudière Ring Dam spillway structure situated on the Ottawa River. Built in the years 1908 to 1909, the Chaudière Ring Dam is composed of 50 stoplog controlled sluices, and is used as the main water control structure for seven generating stations located on this section of the Ottawa River.

CIMA+'s scope of work included the condition assessment of the Ring Dam including concrete coring and lab testing, initial design concepts including risk identification and mitigation in collaboration with Portage Power and a major supplier to ensure end users requirements were met. Detailed design and Tender ready documents were produced for the refurbishment of all 5 sluiceways including concrete resurfacing, installation of new stoplog and gate gains in order to install automated gates. CIMA+ also produced performance specifications for the procurement of the lifting mechanism, PLC and SCADA and electrical engineering required for the operation of the gates. Site supervision was also provided by CIMA+.

Client: Portage Power (Energy Ottawa), ON





HYDROPOWER PROJECTS

REPLACEMENT OF THE ABÉNAQUIS GS PENSTOCK AND GUARD GATE

The Abénaquis hydropower plant, located on the Magog River in the heart of the city of Sherbrooke, was built in 1910. The plant, equipped with three (3) generating units for a total of 3.0 MW when the three units are in operation, is supplied by a 200 m long, 2.9 m diameter steel penstock. CIMA+ was mandated to undertake the condition assessment, the conceptual and detailed design and civil works supervision of the intake pipe's manifold and guard gates rehabilitation. The design of the new manifold was optimised to minimise head losses using a 3D hydrodynamic model (CFD).

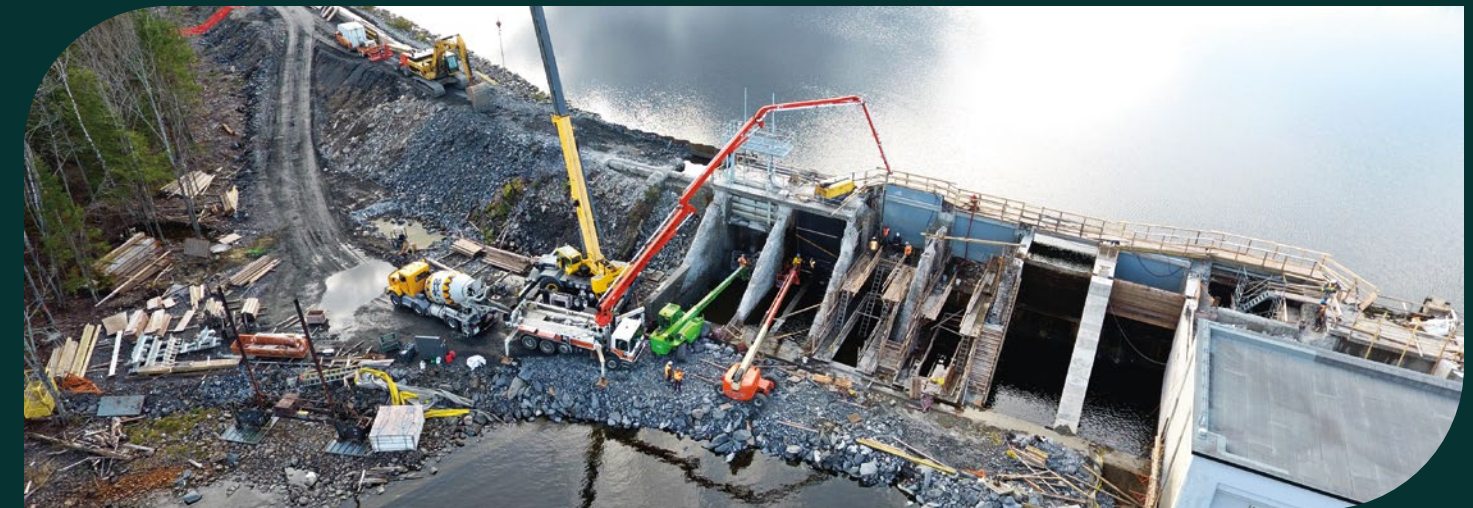
Client: City of Sherbrooke, Sherbrooke, QC



REHABILITATION OF THE GRANDE-DAME GENERATING STATION AND DAM

The Grande-Dame hydropower facility is located on the Magog River and was originally built in 1911. The generating station is 65 m long and consists of three sluices at the intake, six spillway sluices, and two sluices that are completely blocked by a concrete wall. CIMA+ was responsible for the complete rehabilitation of the Grande-Dame spillway as well as the intake sluices. Reconstruction work included installing a steel caisson cofferdam with divers, refurbishing the spillway and intake piers, rebuilding the deck with prefabricated slabs, and stabilizing the embankment dams on both abutments. The work also included polyurethane and epoxy injection on concrete pillars, injection grouting, replacement of two spillway gates, and installation of new sills and grooves for wooden stop logs.

Client: City of Magog, QC





HYDROPOWER PROJECTS



SAFETY STUDIES ON EVOLUGEN'S DAMS

Evolugen (Brookfield Renewable Energy) mandated CIMA+ to conduct comprehensive DSRs according to both internal dam safety procedures and the Québec Dam Safety Law assessments of a total of 18 dams on the Noire, Coulonge and Lièvre rivers. Including formal engineering inspections of all dams.

Client: Evolugen, Pontiac, QC and Ottawa, ON Regions

ENERDU GS

This project increased the site's production capacity 3-fold by constructing a new, larger powerhouse adjacent to the old one. The new 1.1 MW power plant houses two horizontal 2.0 m Kaplan turbines. The installation's five concrete weirs (originally constructed in the late 1800's) were completely rehabilitated and fitted with inflatable gates, and the old powerhouse footprint was converted to a high-flow by-pass channel, to increase the site's discharge capacity. CIMA+ conducted all aspects of the Environmental Assessment with special attention to the migrating eel population and protection of existing privately-owned heritage buildings and railway

bridge in very close proximity to the project site. Our engineers prepared the dam safety assessment as well as the hydraulic, structural and hydro mechanical engineering for the rehabilitation of the existing structures and the construction of the new components. CIMA+ issued the detailed engineering reports, drawings and specifications that were required for permitting and construction, then followed-up with on-site technical support throughout the construction work as Owner's Engineer. This project was awarded the Ontario Waterpower Association's Stewardship Award in 2019.

Client: Enerdu Power Systems, Almonte, ON.

REHABILITATION OF NORTHERN AREA DAMS – SIX MILE LAKE REGION

CIMA+ was mandated by Public Services and Procurement Canada (PSPC) to perform the engineering required for the rehabilitation of seven dams and associated structures, on five different sites of the Trent-Severn Waterway and Six Mile Lake: Whites Portage, Six Mile Lake, Hungry Bay, Crooked Bay and Pretty Channel. The dams were built in the early 1900's and are considered as an integral part of the region's cultural heritage. All five concrete spillways and two embankment dams are in poor condition and require structural rehabilitation or replacement.

Client: Public Services and Procurement Canada,
Six Mile Lake, ON





HYDROPOWER PROJECTS

SAFETY ASSESSMENT OF THE OCEAN FALLS GS DAM

Boralex mandated CIMA+ to provide a comprehensive Dam Safety Review including a flood flow determination, classification and risk assessment of the Ocean Falls dam and hydropower project located in Cousins Inlet, on the Central Coast, BC. The concrete arch dam is 45 metres in height and was built in 1912. The study included a hydrology study, inflow design flood determination and also 2D hydraulic modeling of the dam and dam failure. LiDAR data was used to model the local topography and the town of Ocean Falls, located in the flooded area.

Client: Boralex, Ocean Falls, BC



REHABILITATION OF THE HULL-2 GS

This project was already underway when CIMA+ was asked to take over the project by Energy Ottawa to act as their Owner's Engineer, Construction Manager and Commissioning coordinator to complete rehabilitation of the Hull-2 Generating Station. Although this project primarily involved the rehabilitation of power generation equipment and their auxiliaries, work was also required to replace the electrical and mechanical systems of the auxiliary services. CIMA+ acted as the owner engineer during the major portion of the upstream civil works, electrical & hydro-mechanical construction in addition to completing the engineering, providing construction management and site supervision services, and performing and coordinating electrical testing for commissioning.

Client: Energy Ottawa, Gatineau, QC.





HYDROPOWER PROJECTS

REHABILITATION OF THE HULL-1 GS

Energy Ottawa engaged CIMA+ to act as their Owner's Engineer, Lead Designer and Construction Manager to undertake the complete rehabilitation of the Hull-1 Generating Station, built in the early 1900's with no major upgrades since the original construction. CIMA+'s scope of work included the refurbishment of the generating station, intake canal, forebay and tailrace structures, upstream gates, lifting mechanism and other related hydraulic structures. The design also required the removal and replacement of three existing quadruple Francis camelback turbines, speed

and voltage regulators, 480 V switchgear with 600 V switchgear, switchgear cabinet and transformers, installation of control and protection equipment, and rehabilitation of the powerhouse structure and overhead crane. Our engineers also designed the upstream riprap cofferdam with sheet pile core and the downstream secant pile cofferdam, as well as providing resident engineer services during construction, and carrying out and coordinating commissioning of the power plant and electrical and mechanical equipment.

Client: Energy Ottawa, Gatineau, QC.

REPLACEMENT OF FIVE GUARD GATES AT THE BERSIMIS-2 RUN-OF-RIVER POWER PLANT

The Bersimis-2 power plant, a pioneering Hydro-Québec facility commissioned in 1959, is equipped with five turbine-generator units generating a total output of 869 MW. As part of the plant's future-proofing work, CIMA+ was retained to carry out the engineering required for the preparatory work to replace the guard gates, and for the renovation of the mechanical and electrical auxiliary systems, as well as

the control and protection systems for the entire plant. The project mobilized expertise in control and protection, electrical switchgear, heavy and auxiliary mechanics, and civil engineering. Our team also developed the work methods and supervised construction.

Client : Hydro-Québec, North Shore, QC





HYDROPOWER PROJECTS

REPLACEMENT OF AUXILIARY SERVICES AT THE BEAUMONT RUN-OF-RIVER POWER PLANT

Located on the Saint-Maurice River, the Beaumont power plant has six Francis-type turbine-generator units, with a total installed capacity of 270 MW. In the past, our team has been involved in the rehabilitation of spillway and regulating gates, enhancing reliability and extending the service life of the gates' lifting mechanisms. In recent years, our professionals have gone on to carry out detailed engineering for the rehabilitation of AC auxiliary services, drawing on their expertise in electrical switchgear, control and protection, as well as civil and structural engineering. In addition, our team supported the client during the procurement process and construction work.

Client: Hydro-Québec, La Tuque, QC



DESIGN OF THE NASSAU SECTOR GATES PROTECTING THE CITY OF PETERBOROUGH

CIMA+ was retained by Public Services and Procurement Canada (PSPC) to design and supervise the construction of the Nassau sector gates at the entrance to the Trent Canal. These gates protect the Trent Canal from flooding caused by the Otonabee River. This critical infrastructure protects the city of Peterborough, as well as the historic Peterborough lock. CIMA+ was involved in all stages of the project, from

feasibility study, options analysis, selection of the preferred option, detailed design, preparation of tender and construction documents, to construction supervision and commissioning.

The 386 km Trent-Severn Waterway crosses the Trent and Severn river basins. Water levels and flows are regulated by 143 dams.

Client: Public Services and Procurement Canada (PSPC), Peterborough, ON



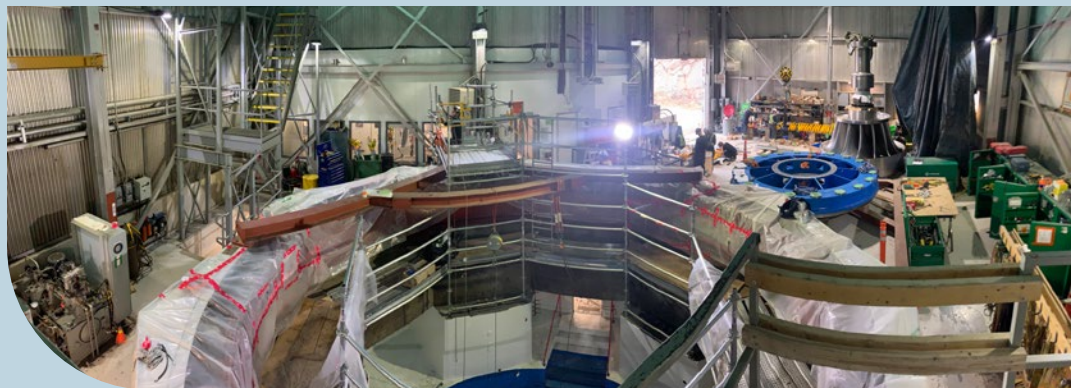


HYDROPOWER PROJECTS

CAPACITY INCREASE AND UPGRADE OF THE TALTSON POWER PLANT

The Taltson hydroelectric power plant, originally built in the 1960s for the mining industry, had a single 18 MW turbine-generator unit. The plant is accessible only by air or winter roads, and is the primary source of renewable energy in the region south of Great Slave Lake in the Northwest Territories. Having initially carried out an assessment of the plant's condition and a pre-feasibility study for its upgrade, CIMA+ then acted as the owner's engineer for the review of documentation and coordination of deliverables with the client and suppliers for the plant's capacity increase to 22 MW. We also carried out detailed electrical engineering for the integration of various systems, as well as the protection study, assisted with factory and site acceptance tests (FAT and SAT), drew up and implemented the commissioning plan, and supported our client throughout the project.

Client: Northwest Territories Power Corporation, near Fort Smith, NT



SAFETY ASSESSMENT OF THE LAFORGE-2 HYDROELECTRIC FACILITY

The Laforge-2 hydroelectric facility, located northeast of the La Grande complex, comprises 38 earthfill and two concrete structures. It consists of five sections: closing dike, North and South dams, spillway and water intake at the back of the power plant. CIMA+ carried out the regulatory inspection of the structures, condition analysis, overflight of the area and downstream reconnaissance. We analyzed auscultation data, reviewed previous documentation and carried out

a hydraulic analysis and failure study of the structures. We assessed the stability of the structures, their liquefaction potential and resistance to internal erosion, and formulated recommendations for safety, maintenance and monitoring. The project was complex due to the management of over 7,000 documents, inspections in remote locations accessible only by helicopter, and the size of the structures.

Client : Hydro-Québec, Nord-du-Québec, QC





FOR MORE INFORMATION, CONTACT US:

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T 514 337-2462

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

Baie-Comeau Beauce Bécancour Barrie Bowmanville Burlington Calgary – Airport Calgary – Downtown
Clareville 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

KINCENTRIC
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CANADA 2023



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for **people**

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