

ENERGY SERVICES ACQUISITION PROGRAM (ESAP)/  
ENERGY SERVICE MODERNIZATION (ESM) PROJECT

# Modernizing Energy Services for Canada's National Capital Region



THE CANADIAN COUNCIL FOR PUBLIC-PRIVATE PARTNERSHIPS  
2020 NATIONAL AWARDS CASE STUDY

The Canadian Council for  
Public-Private Partnerships



Le Conseil Canadien pour  
les Partenariats Public-Privé



## The Canadian Council for Public-Private Partnerships 2020 National Award Case Studies

National Award Case Studies Gold Award for Project  
Development: Energy Services Acquisition Program (ESAP)/  
Energy Service Modernization (ESM) Project

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## Introduction

For nearly 30 years, The Canadian Council for Public-Private Partnerships and its members from the public and private sectors have played a strong role in refining the P3 model and promoting new approaches to infrastructure development and service delivery.

Governments across Canada are using the public-private partnership (P3) model to build, maintain and operate much-needed infrastructure, from schools and hospitals to bridges and highways. In 2021, there are close to 300 active P3 projects in operation or under construction valued at more than \$139.4 billion.

Along the way, the 'made-in-Canada' P3 model has become globally renowned but, as the winners of the 2020 National Awards for Innovation and Excellence in Public-Private Partnerships demonstrate, it has never stopped evolving.

This year, CCPPP is publishing three case studies on these exemplary projects, joining the more than 80 that have been published to date. Designed to inspire others to consider innovative and efficient models for procuring infrastructure, the studies highlight many of the lessons learned about P3s. Each case provides a close look at how a successful P3 has worked, including how the partnership was established, its structure and operation and its resulting benefits.

It is important to learn from these complex projects as we move forward. After all, investment in infrastructure is critical for the future of our communities and country because it creates jobs, drives growth, stimulates productivity, and builds a legacy for us to thrive.

Canadians want — and expect — critical infrastructure to be built quickly and with the best value for taxpayers. Using public-private partnerships is an advantage given their fixed price, on-time private sector delivery commitment, risk allocation and improved life cycle maintenance and operations.

In 1998, CCPPP established the National Awards for Innovation and Excellence in Public-Private Partnerships to honour governments and/or public institutions and their private sector partners who have demonstrated excellence and innovation in P3s. Gold, silver and bronze Awards of Merit are given in the areas of project development, financing, infrastructure, service delivery or other notable attributes to projects from across the country and at all levels of government.

Winning projects are chosen on the basis of the following criteria:

- Innovative features;
- Relevance or significance as a national and/or international model;
- Economic benefit (job creation, enhanced economic value, export potential, etc.);
- Measurable enhancement of quality and excellence of service or project;
- Appropriate allocation of risks, responsibilities and returns between partners; and
- Effective use of financing and/or use of non-traditional sources of revenue.

## 2020 Award Winners



### Waterloo LRT ION Stage 1 — Gold Award for Service Delivery

This 19-kilometre LRT system, which opened in 2019, has already transformed travel in one of Canada's key high-tech startup scenes. The ION corridor in Ontario's Kitchener-Waterloo area passes through two historic downtowns, a university campus and business parks and is fully integrated into the region's bus network, cycling and pedestrian routes. Using the P3 model achieved estimated cost savings of 12 per cent compared with traditional procurement. The awards committee noted that for the first year and a half of service GrandLinq and the OM&R provider Keolis improved system performance and met operating and maintenance targets, despite the challenges of the COVID-19 pandemic. The project is also helping limit urban sprawl and protect farmland by intensifying development in existing urban areas.



**Energy Services Acquisition Program (ESAP)/Energy Service Modernization (ESM) Project — Gold Award for Project Development**

This ambitious \$1.8-billion initiative is modernizing energy centres in five locations — some of which date back almost a century — to provide heating and/or cooling for 80 buildings in the nation’s capital, including Parliament. The upgrades will lower operating costs for taxpayers and help reduce the Canadian government’s energy consumption and greenhouse gas emissions. This design-build-finance-operate P3 is set to reach substantial completion in 2025, followed by 30 years of operations and maintenance. The awards committee noted the project is complex because it involves the private sector mitigating risks from federal and interprovincial brownfield construction, six years of interim operations during construction, as well as factoring in protections for heritage assets. It also has built in flexibility to potentially expand the modernized district energy system to other public and private buildings in the region.



**Regina Bypass — Gold Award for Infrastructure**

Opened in 2019 after four years of construction, the Regina Bypass is the largest transportation infrastructure project in Saskatchewan history and its single largest job creator. Improving traffic safety and mobility were the key drivers for the project, the awards committee noted. Previously, residents and visitors to the communities east of Regina had to cross the Trans-Canada Highway on non-signalized at-grade intersections, potentially in inclement weather with poor visibility. Since the bypass was completed, there has been a marked reduction in collisions. The \$1.88-billion project involved building 12 interchanges, 60 kilometres of four-lane highway, 55 kilometres of

new service roads, twinning on Highway 6, as well as the province’s first highway roundabouts.



**Corner Brook Acute Care Hospital — Silver Award for Project Development**

The project involves the development of a new 164 bed acute care regional hospital to serve the people of western Newfoundland. The project is the largest capital project ever contemplated in Newfoundland and Labrador and faces the challenge of being constructed in a lightly populated area. Using the P3 model for the project is estimated to have resulted in cost savings of \$90 million compared with traditional procurement. The awards committee noted the project is using technology to find innovative design, operational and environmental solutions to help in the delivery of care, as well as in reducing long-term operational costs and the site’s carbon footprint.



**Highway 104 Sutherlands River to Antigonish Twinning Project — Silver Award for Project Development**

The twinning of this stretch of Nova Scotian highway, from the boundary with New Brunswick to Antigonish, has been a significant community concern for years to help reduce fatal collisions. It is also the first highway P3 project in the province in more than 20 years and was one of the first P3 projects to reach financial close last spring in the midst of highly volatile financial market conditions caused by the pandemic. Among other things, the awards committee noted that considerable cooperation and flexibility were required by all parties including government, bank lenders and bond underwriters/purchasers to close the project — and with no impact on overall project duration.

## Acknowledgements

CCPPP has a team of dedicated Award selection committee volunteers who review the applications, select the winners and provide feedback on the case studies. Using their extensive P3 knowledge and experience, they select the winners from a pool of very qualified applications and then ensure the case studies provide a learning tool for seasoned practitioners, as well as those new to the P3 model. The following panelists comprised the 2020 selection committee:

- Cliff Inskip, Chair of the Awards Selection Committee and President, Polar Star Advisory Services Inc.
- Shariq Alvi, Managing Director, Infrastructure and Project Finance, CIBC
- Rupesh Amin, Founder and CEO, Conquora Capital Partners Inc.
- Peter Hepburn, Managing Director and Head, Infrastructure and Project Finance, National Bank Financial Markets
- Alain Massicotte, Partner, Blake Cassels and Graydon LLP
- Johanne Mullen, Partner, National Capital Projects and Infrastructure Leader, PwC Canada
- Dr. Alan Russell, Professor Emeritus & Chair, Computer Integrated Design & Construction, Department of Civil Engineering, University of British Columbia
- Brad Nicpon, Partner, Real Property & Planning Group, McCarthy Tétrault LLP
- Lindsay Wright, Senior Manager, Global Infrastructure, KPMG

Deborah Reid and Jennifer Robinson authored the 2020 Award Case Studies, which were developed with significant input and review from the project partners and procurement agencies as well as the diligent work of the researchers. CCCPP would like to thank them for their contributions as well as Infrastructure Canada for its research support for the case studies.



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## About CCCPP

Established in 1993, CCCPP is a national not-for-profit non-partisan, member-based organization with broad representation from across the public and private sectors. Our mission is to collaborate with all levels of government, Indigenous communities and the private sector to enable smart, innovative and sustainable approaches to developing and maintaining infrastructure that achieve the best outcomes for Canadians.

Our reports, case studies, guidance and surveys are available on CCCPP's online bookstore at

[www.pppcouncil.ca/web/bookstore](http://www.pppcouncil.ca/web/bookstore).

Additional resources include: P3 Spectrum

([www.P3spectrum.ca](http://www.P3spectrum.ca)), Canada's premier source for up-to-date P3 project info.

## Quick Facts – Energy Services Acquisition Program (ESAP)/Energy Service Modernization (ESM) Project<sup>1</sup>

### Project type

Design-Build-finance-Operate-Maintain (DBfOM)<sup>2</sup>

### Asset/Service

35-year performance and availability agreement to design, build, finance, operate and maintain North America's first conversion of a large district energy system from steam to electric for cooling and low-temperature hot water for heating.

This project will transform how the Government of Canada heats 80 buildings and cools 67 buildings in the National Capital Region.

Signature elements of the project include:

- Reducing greenhouse gas emissions by more than 90 per cent;
- Cutting costs and improving safety by moving to low temperature hot water heating and fully electric chilling;
- Transforming two energy centres into architectural landmarks complete with visitor education; and
- Recognizing Algonquin First Nations history, heritage and culture in site design.

Construction operations and maintenance period:

- March 31, 2020 to October 31, 2025

Modernized operations and maintenance period:

- October 31, 2025 to October 31, 2055

### Status

Construction phase and operations and maintenance of existing facilities<sup>3</sup>

### Partners

#### Public Sector

- Public Services and Procurement Canada (Government of Canada)

#### Private Sector

- Innovate Energy comprised of:
  - PCL Investments Inc.,
  - ENGIE Services Inc., and
  - Black & McDonald Capital Limited

### Other participants

#### Public Sector

- PSPC and PPP Canada- Procurement Advisors
- FVB Energy Inc., Stantec, Evergreen, Robertson Martin Architects, Turner and Townsend and Markham District Energy - Owner's Technical Advisors
- PricewaterhouseCoopers LLP - Financial Advisor
- E&Y – Business consulting and change management
- HKA Global (Canada), Inc. - Fairness Advisor
- Norton Rose Fulbright - Legal Advisor
- Project Management Advisors - Tiree Colliers
- Ausenco - Independent Engineer

#### Private Sector

- PCL Constructors Canada Inc. and Black & McDonald Limited – Design Build Joint Venture
- ENGIE Canada – OM Provider
- Bbb architects – Architects
- WSP – Designers
- TD Securities Inc. – Financial Advisor
- Davies Ward Phillips & Vineberg LLP – Legal Advisor
- Fasken Martineau LLP – Lenders' Legal Advisor
- BTY Group – Lenders' Technical Advisor

<sup>1</sup> Background and facts in this case study rely on the information contained in the award application submitted jointly by the project partners in September 2020 to The Canadian Council for Public-Private Partnerships. Information from the submission has been supplemented and updated with information from the procurement documents, the project agreement, the project report, other sources as noted and personal interviews with project partner representatives.

<sup>2</sup> The 'f' in finance is lowercase because the project involves short-term financing only.

<sup>3</sup> Construction phase started in April 2020 and is expected to reach substantial completion in October 2025.

## Project cost, financing and Value for Money (VfM)

### Total project cost (present value dollars)

- \$1.84 billion NPV<sup>4</sup> (including total capital costs of \$1.03 billion)

The nominal value of the contract is \$2.6 billion and is broken down into two parts.

- The first, valued at \$1.1 billion, is for the design and construction of the new system, to be completed by 2025;
- The second portion is for the operation and maintenance, which includes energy and fuel costs, of the new system over a 35-year period, valued at \$1.5 billion.<sup>5</sup>

### Financing (nominal dollars)

- \$560 million: Revolving credit facility with six Canadian and international bank P3 lenders. The revolving bank facility is coupled with an interest rate swap to fix the cost of financing throughout the construction period.
- No long-term capital payments are required given the uniqueness of a DBfOM transaction not requiring long-term financing.
- Equity: There was technically no equity requirement aside from nominal amounts to document ownership.

### Payments (nominal dollars)

- Two interim completion payments (earned value-based payments) during construction:
  - \$232,289,575.14 paid when 45 per cent of total capital costs have been completed;
  - \$232,289,575.14 paid when 75 per cent of total capital costs have been completed.
- Payment of \$567,818,961.46 upon reaching substantial completion to fully repay the construction period revolving credit facility.
- Interim operations and maintenance (O&M) payments and post-substantial completion O&M payments are fixed and include the cost of operating and maintaining the facilities, as well as life cycle costs.
  - Interim O&M payments total \$180 million NPV
  - Post-substantial completion payments will total \$740 million NPV over 30 years

### Value for money (present value dollars)

- A VfM analysis conducted in 2019 following financial close showed using the DBfOM model achieved savings of 12.2 per cent compared to the costs of delivering the project using a traditional public sector procurement approach.

## Project highlights and innovative features

- Operations during construction and long-term operations phase;
- Construction of a district energy system that does not follow the utility model;
- Interprovincial brownfield linear project;
- Brownfield and linear project;
- Significant contractual flexibility to expand the system and introduce greening initiatives;
- A long construction period of 70+ months, requiring increased due diligence from lenders and increased scrutiny into the capabilities of Innovate Energy to deliver the project;
- The construction revolving facility is outstanding and is the only form of financing (there is no long-term financing component); and
- Highly technical integration and risk management between three industry leaders because the project is not a typical greenfield P3 project. This requires a number of additional risks to be considered and borne by the consortium.

## Project websites

<https://www.tpsgc-pwgsc.gc.ca/biens-property/gestion-management/ecologisation-greener/esap-pase-eng.html>

<http://nationalcapitaldistrictenergy.ca/>

<sup>4</sup> Net present value (NPV) calculated in 2019.

<sup>5</sup> <https://www.tpsgc-pwgsc.gc.ca/trans/pq-qp/qp15-eng.html>





## Overview

A pressing need to upgrade aging critical infrastructure and a desire to build back with a vastly improved system that lowers greenhouse gas emissions has led the Government of Canada to embark on North America’s first conversion of a large district energy system from steam to electric for cooling and low-temperature hot water for heating.

In 2009, the Energy Services Acquisition Program (ESAP) was established to explore potential new business models for the provision of energy services in the National Capital Region, home to Parliament and a vast network of government offices. In total, the region covers approximately 4,715 km<sup>2</sup> and spans municipalities on both sides of the Ontario-Quebec provincial boundary, including the City of Ottawa and the Ville de Gatineau.

Eighty buildings in the region currently rely on five federally owned central heating and cooling plants and their associated distribution systems, collectively referred to as the existing district energy system. These plants deliver heating (generated by using natural gas and fuel oil) and cooling (chilled water) to the buildings through service tunnels, buried piping and bridge crossings.

Built between 50 and more than 100 years ago, the district energy system services 80 buildings with heat and 67 with cooling where more than 50,000 public servants work. Although the Cliff Plant was cutting-edge when originally built in 1918<sup>6</sup>, the five plants use outdated technology that is inefficient and expensive to maintain.

District energy systems are rare in Canada compared to Europe and the United States, which is estimated to have at least 700<sup>7</sup>. In Canada such systems can be found on hospital and post-secondary campuses and in downtown Toronto (Enwave), Vancouver and Markham, ON.

ESAP, when it is fully implemented, will use carbon neutral heating and cooling for baseload operations and lower government greenhouse gas emissions from the system by at least 90 per cent, the equivalent of taking more than 21,000 cars off the road.<sup>8</sup>

The program is part of a \$2.1-billion commitment over five years announced in Budget 2016 to reduce emissions and improve the greening of government operations. These investments will reduce costs, address climate change and reduce air pollution.

In 2017, the government estimated the majority of its greenhouse gas emissions came from energy required for buildings (89 per cent).<sup>9</sup>

*“The rehabilitation of the Government of Canada’s heating and cooling plants in the National Capital Region presents an incredible opportunity to invest in and benefit from green technology. By modernizing our plants, we are showing our commitment to being leaders in protecting the environment and strengthening our economy.”*

~ Steven MacKinnon

*Parliamentary Secretary to the Minister of Public Services and Procurement<sup>10</sup>*



<sup>6</sup> Dewalt, Bryan. n.d. The Cliff Street Heating Plant, Ottawa, National Museum of Science and Technology. <https://journals.lib.unb.ca/index.php/MCR/article/view/17618/22349> (Accessed June 23, 2021)

<sup>7</sup> Environmental and Energy Study Institute, September 2011. Fact Sheet: What is District Energy? [https://www.eesi.org/files/district\\_energy\\_factsheet\\_092311.pdf](https://www.eesi.org/files/district_energy_factsheet_092311.pdf) (Accessed June 23, 2021)

<sup>8</sup> Interview with PSPC in June 2021.

<sup>9</sup> Government of Canada backgrounder, “Government of Canada greenhouse gas emissions inventory,” July 17, 2017. [https://www.canada.ca/en/treasury-board-secretariat/news/2017/07/government\\_of\\_canadagreenhousegasemissionsinventory.html](https://www.canada.ca/en/treasury-board-secretariat/news/2017/07/government_of_canadagreenhousegasemissionsinventory.html) (Accessed on March 19, 2021)

<sup>10</sup> Government of Canada news release, “Government of Canada committed to modernizing heating and cooling plants in National Capital Region,” July 18, 2017 (Accessed on March 19, 2021).

The ESAP project involves the conversion of the current district energy system to use low-temperature hot water for heating and to electric chillers for cooling. These systems are more efficient and versatile when applying alternative energy sources — for example, this would allow PSPC to capture waste heat from a data centre. They are also safer to operate.<sup>11</sup>

Fun fact: The Ottawa River also helps to chill the process water used to cool buildings connected to the network. The river water intakes at Tunney's Pasture and Cliff will be joined by a new River Pump Station, part of the ESAP P3 agreement, on the Gatineau shoreline of the river, immediately south of the Macdonald Cartier Interprovincial Bridge. The Ottawa River helps the CHCP chillers by transferring its cold thermal energy to the process water.<sup>12</sup>

The government investment in ESAP's modern technology will result in an estimated cost savings of approximately \$400 million over the life of the contract, however, these estimates will be revised once the modernized system has been operating for two years and all necessary adjustments have been made.<sup>13</sup>

In addition to the modernization of the five plants<sup>14</sup>, ESAP will convert all connected user buildings from either high-pressure steam or high-temperature hot water heating to technology that can accept low-temperature hot water by September 2024 to ensure that all buildings are ready for connection to the modernized district energy system.<sup>15</sup>

As the federal authority for real property, Public Services and Procurement Canada (PSPC) is responsible for providing the heating and cooling services and is the government authority in charge of procuring and overseeing the delivery of the ESAP project.

After an analysis of different procurement models, PSPC decided in 2017 to deliver the project using a DBfOM model. In 2018, after a robust public procurement process, it selected the Innovate Energy consortium to replace the current infrastructure and to operate and maintain the system over a 35-year period. The government will retain ownership of all assets involved throughout the term of the contract.

In a twist on usual P3 agreements, the government stipulated the project use short-term financing only, requiring PCL Investments to structure the project in a way not done before in the Canadian P3 market. This decision enhanced contractual flexibility during the operations and maintenance phase to enable significant expansion

of the system and additional greener energy sources, and required PCL Investments and TD Securities, as financial advisor, to create an innovative approach to the financing structure.

Members of the Innovate Energy team (PCL Investments, ENGIE Services Canada and PCL Constructors Canada and) have partnered together in the past on successful P3 projects such as the Centre for Addiction and Mental Health (CAMH) Phase 1C Redevelopment Project in Toronto and the Gatineau 2 Library and Archives Preservation Centre in Quebec. This marks the first time PCL has partnered with Black & McDonald Capital Limited on a P3.<sup>16</sup>

Construction is underway on the project, which is slated to reach substantial completion in October 2025. On March 31, 2020 during the height of the first wave of the COVID-19 pandemic, ENGIE Services Canada successfully took over interim operations and maintenance responsibilities for the current system. At the time of publication in July 2021, the project was slightly ahead of schedule.<sup>17</sup>

The agreement is also unique in that it has built-in flexibility for PSPC to extend its heating and cooling system to other partners, including municipalities. PSPC plans to work closely with the cities of Ottawa and Gatineau as well as local industry to ensure the program is scalable and adaptable to include new partners. Currently, ESAP is finalizing plans to add the new Ottawa Public Library-Library and Archives Canada joint facility to the district energy system, when that facility completes construction in late 2024.<sup>18</sup>

<sup>11</sup> <https://www.fvbenergy.com/the-esap/>

<sup>12</sup> Interview with PSPC in June 2021 and PSPC Energy Services Acquisition Program (ESAP) – Federal Land Use and Design Approval (FLUDA) for Final Developed Design of Level 3 project components: Cliff Plant, Tunney's Pasture Plant and River Pump Station submission to the National Capital Commission's Board of Directors, June 23, 2021, page 2 <https://ncc-website-2.s3.amazonaws.com/documents/06.0-2021-P154-ESAP-Cliff-Tunneys-River-Pump-Station.pdf?mtime=20210623105256&focal=none> (Accessed June 23, 2021)

<sup>13</sup> Interview with PSPC in June 2021.

<sup>14</sup> Only four plants will be part of the modernized system. The current National Research Council Plant on Sussex Drive provides backup to the existing system and will be decommissioned. The asset will be managed through the government's disposal process.

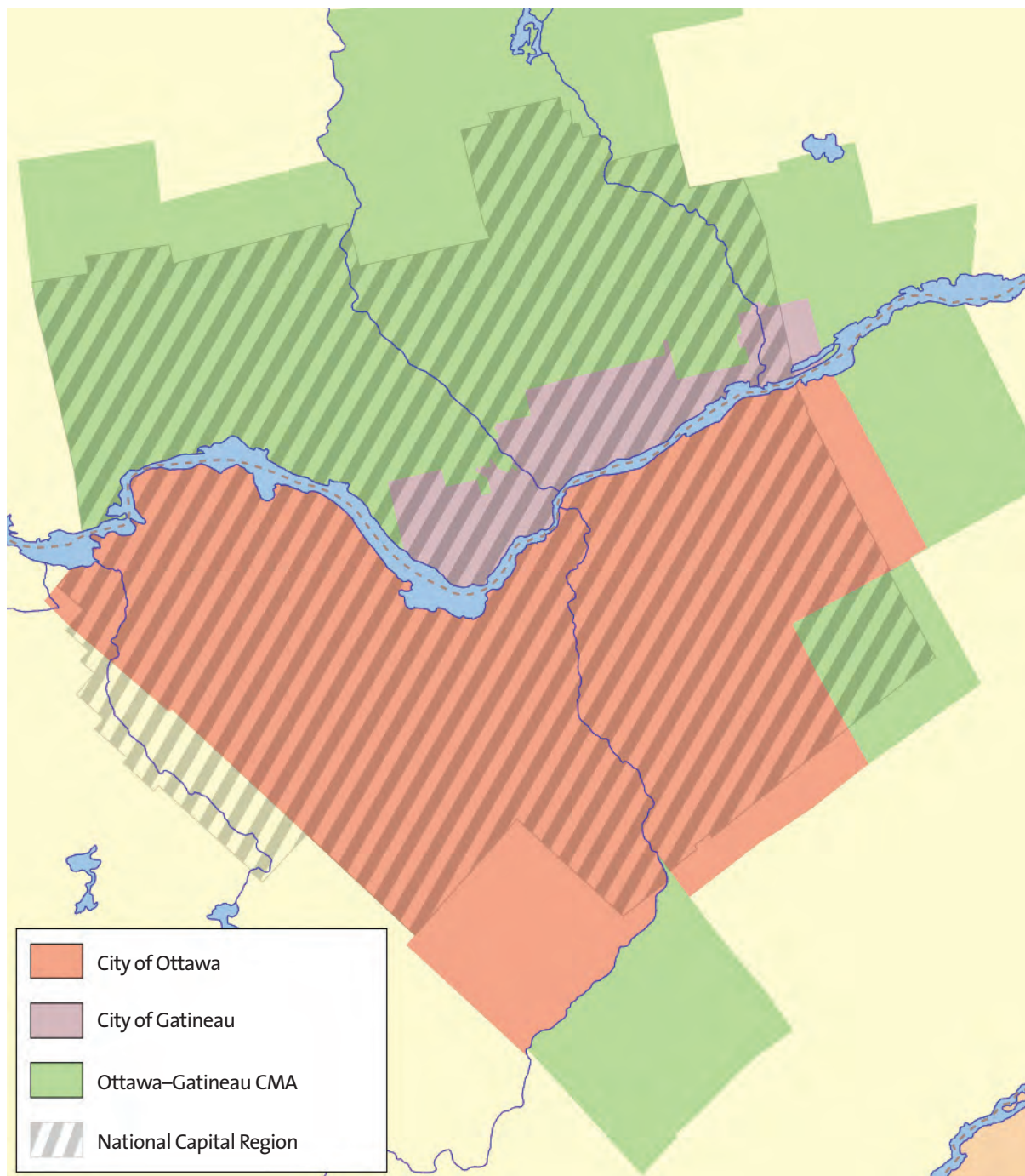
<sup>15</sup> The conversion of connected user buildings is not part of the public-private partnership agreement with Innovate Energy.

<sup>16</sup> Interviews conducted with PCL and ENGIE in May and June 2021.

<sup>17</sup> Interview conducted with PSPC in May 2021.

<sup>18</sup> Ibid.

Figure 1: ESAP location



## Background and Rationale

The real property division of PSPC has a core strategy of shifting its role from the direct delivery of services towards the oversight and management of services delivered by others, wherever there are clear businesses and financial benefits to do so. The Energy Services Acquisition Program (ESAP) was established to:

- Evaluate options for the modernization of the existing district energy system to improve its efficiency, reduce greenhouse gas emissions and provide a platform to allow Canada to explore the feasibility of using alternative “low or no carbon” sources of energy, the adoption of which could further reduce emissions; and
- Explore potential new business models for the provisions of energy services in the National Capital Region.<sup>19</sup>

Budget 2016 reaffirmed the Canadian government’s commitment to modernizing the existing system and provided the incremental funding required to achieve the short-term goals of the program.

As a result of the program’s work, the Energy Services Modernization Project (ESM), a component of ESAP, was established to modernize the heating and cooling energy service capability currently being met by the existing district energy system.

## Government objectives

The Government of Canada’s objectives for the project are to:

- Improve environmental performance:
  - Reduce the level of greenhouse gas emissions;
  - Phase-out the use of ozone depleting substance refrigerants; in line with the Government of Canada’s commitment to the Montréal Protocol;
  - Support the *Pan-Canadian Framework on Clean Growth and Climate Change*;
  - Use modern technology, including low-temperature hot water distribution and delivery technology, to increase efficiency and lower environmental impacts; and
  - Expand the modernized district energy system in order to deliver heating and cooling to additional government buildings thereby achieving environmental benefits as well as stimulating expansion. The expansion can potentially include privately-owned buildings in order to achieve further environmental benefits and greenhouse gas emission reductions.
- Reduce the costs of heating and cooling operations for the government:



MP Steven MacKinnon gestures to show federal Infrastructure and Communities Minister Catherine McKenna the incredible view from the roof of the existing Cliff Plant, with Tomasz-Smetny-Sowa (left) and Will Amos (right) looking on.

<sup>19</sup> Awards submission submitted to CCPPP in September 2020.

- Be significantly less expensive to operate, and achieve or exceed industry standards for operating costs and efficiencies;
- Offer substantial gains in thermal efficiencies, both in the production and distribution of building heating and cooling; and
- Be scalable to adapt to changes, including potential expansion and integration of new technologies to achieve economies of scale benefits.
- Increase safety and reliability of heating and cooling operations<sup>20</sup>:
  - Eliminate steam and reduce system operating temperature below 100°C to diminish operational hazards associated with the provision of heating;
  - Improve health and safety for both plant operators and the public by reducing concerns and consequences of failure, and minimizing legislative and regulatory liabilities;
  - Lessen the risk of operation failures and subsequent interruption in service; and
  - Increase the system’s redundancy.
- Leverage private sector innovation, capacity, and expertise:
  - Increase the efficiency, cost-effectiveness, safety and security of the energy service modernization solution and future energy systems to levels consistent with district energy system best practices;



The Cliff Plant (centre) is located west of the Supreme Court of Canada in downtown Ottawa. In 2020, the Innovate Energy team demolished the 69-year-old vacant boiler room (on the right of the building). The adjacent chiller plant, constructed in 1916, will remain in operation until the first phase of the new Cliff Plant is built by late 2023.

- Ensure high level of district energy service maintenance over the long-term; and
- Provide accelerated delivery of services and facilitate PSPC transition from a service delivery role to a service management role.
- Grow the modernized district energy system throughout the National Capital Region:
  - Contribute to making the region a showcase of innovative energy solutions within a community energy system;
  - Design for potential future expansion to other building owners so the community can benefit from economies of scale for greater technical, environmental, and economic outcomes; and
  - Implement iterative solutions that foster improvements in technology deployment, environmental performance, and overall efficiency as the system grows.
- Integrate an education platform as part of system transformation and operation:
  - Establish a physical location for information sharing with the public, and with educational institutions;
  - Create a platform within this location for heightened learning about energy efficiency and sustainability; and
  - Create an educational program to support the physical location that is flexible and can be adapted to the technical aptitude of audience, as well as make good use of available tools, including web, print, video, and social media.
- Design the new Cliff Plant to be an architectural landmark:
  - Design the Cliff Plant to be architecturally pleasing, integrated with the local landscape and the Parliamentary and Judicial Precincts, and an attraction for the local community; and
  - Build the facilities as a community asset that inspires community pride and that attracts interest in the energy system.

<sup>20</sup> On October 19, 2009, a boiler exploded at the Ottawa Cliff Heating and Cooling plant. An operator died and two others were injured. Heating and cooling capacity to 52 buildings in Ottawa’s downtown core was also shut down. A new temporary heating plant was built in less than two months <https://www.cbc.ca/news/canada/ottawa/man-dies-after-ottawa-steam-plant-explosion-1.836384> (Accessed June 23, 2021).

## Description of the Project

### Project components

The project is under development across five sites containing five plants across Ottawa and Gatineau.

The five plants currently contain a total of 16 steam boilers, four high-temperature hot water boilers, two steam chillers and 21 electric chillers. The distribution piping networks consist of approximately 60 kilometres of piping located in 10 kilometres of tunnels, including a major tunnel in the City of Ottawa's downtown core.

This system is one of the largest district energy systems in North America and provides heat to 80 buildings and cooling to 67 in the Ottawa-Gatineau area, including critical assets such as the Parliament buildings, the Office of the Prime Minister and the Privy Council, the Supreme Court of Canada and National Defence headquarters.

The Cliff Plant is situated in a landscape full of cultural symbols of national significance to Canadians with historic sites, designated heritage buildings and ceremonial routes. Exterior modifications, additions or new construction require review and approval by the National Capital Commission and coordination with other important stakeholders, including the cities of Ottawa and Gatineau and the Parliamentary committees that oversee the operations of the House of Commons and the Senate.

The scope of the project includes:

- Private partner taking over operations as of March 31, 2020, at the end of the transition period;
- Construction of two new plants as architectural landmarks at Cliff and Tunney's Pasture in Ottawa, as well as a visitor education centre at the Cliff location;
- Construction of a new River Pump Station that will draw water from the Ottawa River to the CHCP chillers for the purposes of providing condensing cooling;
- Replacement of the steam and HTHW boilers and the steam chillers;
- Replacement of electric chillers whose refrigerants do not meet current standards;

- Expansion of capacity at the National Printing Bureau in Gatineau and the decommissioning of the National Research Council Plant on Sussex Drive in Ottawa;
- The provision of approximately 60 kilometres of piping located in 10 kilometres of tunnels to interconnect the Tunney's Pasture, Cliff and National Printing Bureau plants to create a more robust network for the central core of the Ottawa-Gatineau area<sup>21</sup>;
- Operations and maintenance of the existing district energy system during the design and construction period, while ensuring service standards are met; and
- Operations and maintenance of the modernized system and ensuring service standards are met over a 30-year period, post-substantial completion.

In parallel with the project (and separate from the P3 agreement), the government is undertaking the conversion work necessary to the internal HVAC systems in the buildings connected to the district energy system to ensure they are compatible with the new LTHW technology. Each building will have its own scope of work and will involve a range of stakeholders from building managers to tenants.

By June 2021, 56 buildings connected to the district energy system had been equipped with Smart Buildings technology, and renovations started in all 80 buildings, with work finished in five.<sup>22</sup>

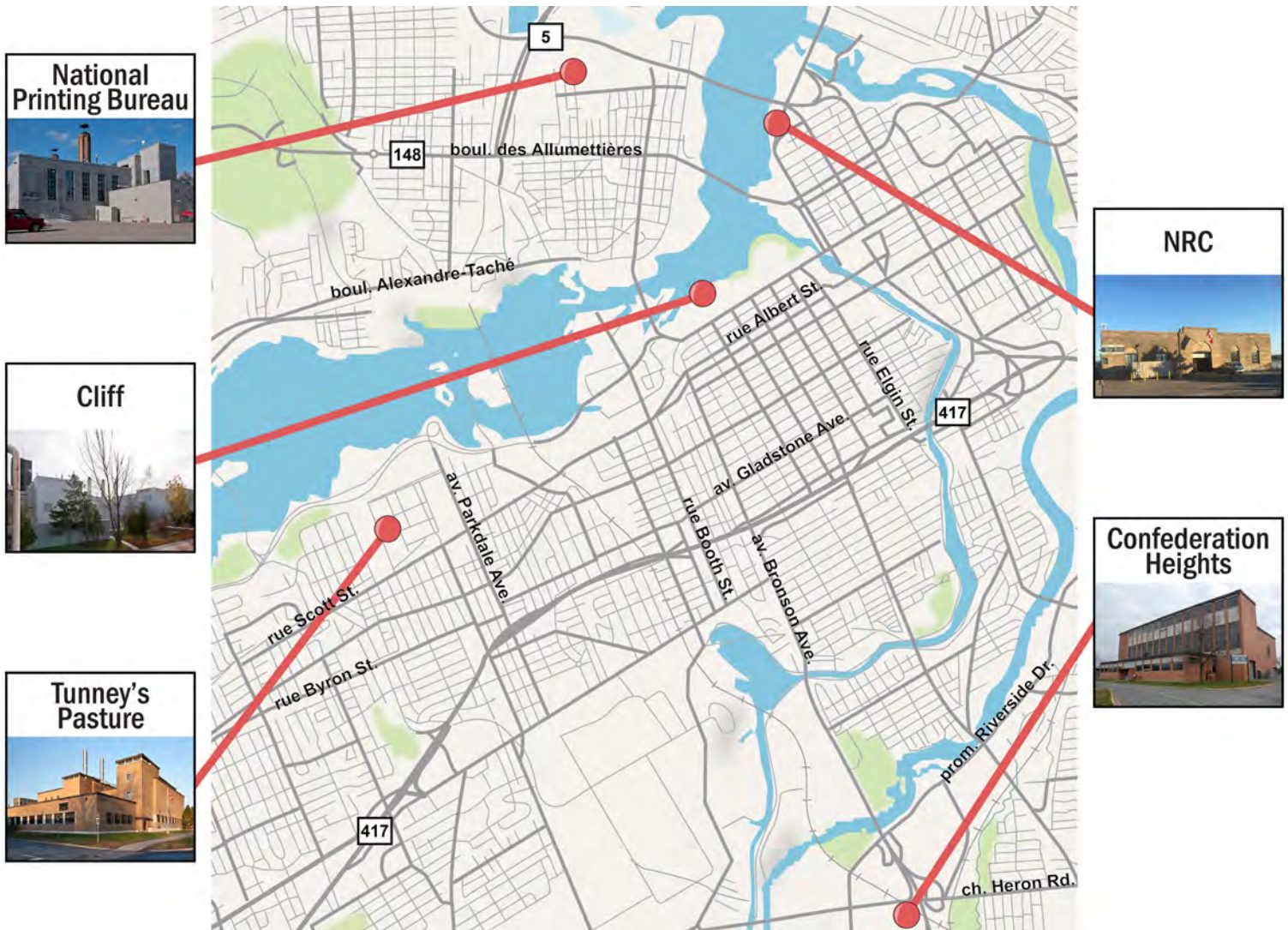
In relation to this initiative, the scope of the project also includes:

- Installing the new connections to the buildings;
- Replacement of the temporary energy transfer stations installed by the building conversion team that provide the interface between the district energy system and the building HVAC systems;
- Design, construction and operations of an interim steam supply for a few buildings that will not be converted by substantial completion; and
- Coordination work with the building conversion team, the building custodians and other key stakeholders.

<sup>21</sup> Steam, HTHW and chilled water are distributed through a network of multiple pipe systems located in these tunnels. In addition, some five kilometres of pipes are direct buried.

<sup>22</sup> Interview with PSPC in June 2021.

Figure 2: Location of existing plants



## Innovative Features

### Design

Given their downtown locations, size and complexity, the designs of the Cliff and Tunney's Pasture plants needed to camouflage their industrial nature to blend in and enhance their historical surroundings. Both cutting-edge plants will also enable the public to enjoy green spaces and views from their roofs.

#### Cliff Plant

The design for the Cliff Plant, which is located along the base of Parliament Hill and just west of the Supreme Court of Canada, had to do two important things, which would seem to be incompatible with each other: create an architectural landmark and make a gigantic industrial plant in the core of the nation's capital disappear.

Yet the design by the Innovate Energy team succeeds. It fits the massive site snugly in the topography and contours of the bluff overlooking the Ottawa River, while also creating a new urban park where visitors can stand on the edge of the plant's undulating, landscaped roof to take in a fantastic vista of the river. Importantly,

the building also does not block scenic views of the river from the Supreme Court.

The overall height of the building, including a visitor education centre concealed below the upper plateau's grade level, is 69.7 metres and the length of the building is approximately 142 metres from the edge of the plant to the outermost corner of the visitor education center. Two stacks located above the building are designed to virtually disappear using mirrored stainless-steel panels with a pattern to mitigate the risk of bird strikes.

To further disguise the massive length and height of the new Cliff Plant, the envelope design will screen the mechanical plant behind an organically flowing, freeform curtain wall. This "exterior skin" will be free of ducts and grills, however the building's technical envelope for weather protection will remain in place just behind the enclosure.

As the site is located in an area heavily visited by tourists and locals, the team designed a cascading public staircase to connect the upper Parliamentary/Judiciary precincts to the lower multi-use pathway along the river. Known as the Cliff Climb, this staircase will:

- Create a dramatic and memorable series of experiences with three projecting 'theatre boxes' intended to provide framed views towards the river;
- Educate visitors on the energy advancements at the Cliff Plant and across Canada, even without entering the visitor's centre; and
- Include a publicly accessible elevator to ensure all who visit can enjoy the site.

Innovate Energy is also demolishing and rebuilding the plant from the lower plateau, reducing the impact of construction to the public. The phased demolition started in October 2020 and construction of the new plant will finish in 2025.

The design work does not stop at the exterior. The new plant, which serves as the central operating hub for the entire district energy system, is designed to house all required boilers and chillers that weigh 110,000 pounds each<sup>23</sup> with additional space provided to accommodate new equipment to serve energy demand growth over time. As the team's architect likes to say they are "building mechanical plants housing bespoke mechanical equipment."<sup>24</sup>



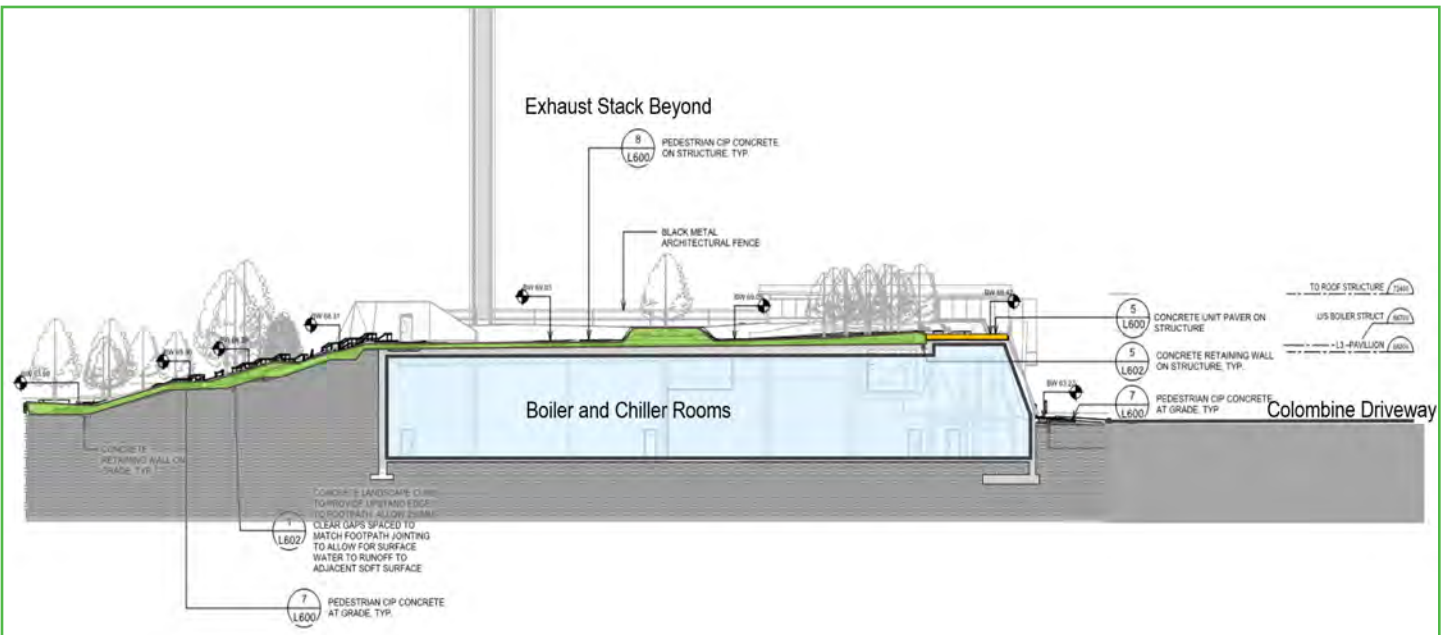
<sup>23</sup> Interview with PCL and ENGIE in June 2021.

<sup>24</sup> Ibid.





The park and viewing platform atop the Cliff Plant's roof.



The Tunney's Pasture Plant is partially depressed below grade. This enables a publicly accessible green roof, urban plaza and water feature.

## Tunney's Pasture Plant

The plant, which will start construction in 2022 and take two years to finish, is designed with strong, contemporary lines to complement the nearby scenic Sir John A. Macdonald Parkway, which winds along the Ottawa River, and to integrate with a nearby light rail transit stop and a future mixed-use development envisioned at Tunney's Pasture.

The plant will be depressed three metres below grade, with an expansive, publicly accessible green roof (directly above the chillers room), urban plaza and water feature on its south elevation. This connects with sloped parklands to the south, the precipice walk overlooking the parkway and to the north river lands.

The northern elevation features an office block towards the west side of the site and entrances for staff and the public. The glazing for this part of the plant consists of a vertical curtain wall system.

To the east side of the site, the northern and eastern elevations will use a sloped curtain wall system punctuated with large architectural panels. From the sidewalk, the public will be able to peer inside the basement of the facility to see the plant's complex system of chillers and boilers at work.

Inside on the building's mezzanine level, a multi-use room will also provide a view overlooking the boiler room. The lower floor boilers and chillers rooms have been planned efficiently and designed to double in capacity with minimal interruption in the future.

A stack on the site will also be disguised, using a consistent design and similar materials as the two stacks at the Cliff Plant.

## Operations & Maintenance

ENGIE is optimizing its operations and maintenance capabilities with the use of its Smart Digital Solution (SDS) to enable real-time monitoring and alarms, connection to buildings, energy consumption optimization, asset life cycle improvement, monitoring of key performance indicators (efficiency, coefficient of performance) and decreasing carbon footprint.

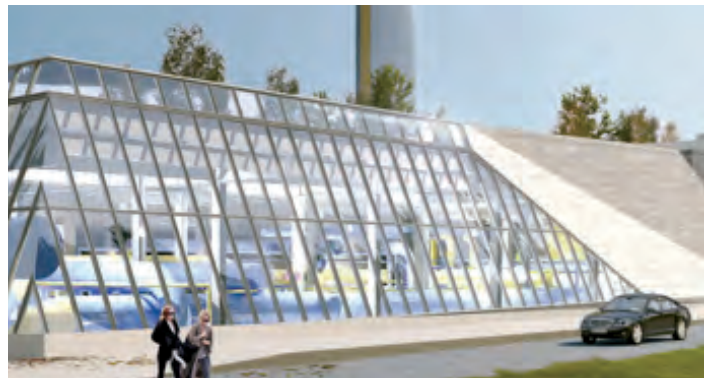
This marks the first time the technology has been used for a district energy system in Canada.<sup>25</sup>

SDS will integrate Computerized Maintenance Management System (CMMS) and Network Energy Modelling and Optimization (NEMO), a GIS system for network maintenance, and specific digital tools that create value and sustainable solution.

<sup>25</sup> Interview with ENGIE in June 2021.



By pushing the Tunney's Pasture Plant into the ground, a part of its roof will create a new green space for the public to enjoy.



From the sidewalk, the public will be able to peer inside the basement of the new Tunney's Pasture Plant to see the plant's complex system of chillers and boilers at work.



The northern elevation of the Tunney's Pasture Plant features an office block with vertical curtain wall glazing towards the west side of the site. This area includes the main public entrance which is also shown in this rendering.

Once the district energy system is fully modernized, the consortium will implement NEMO software to assist the O&M team on making the optimal dispatch strategy to achieve maximum efficiency of the networks and to achieve greenhouse gas savings targets.

In August 2020, PSPC, in collaboration with Innovate Energy, became the first public sector organization in North America to achieve ISO 50001 Energy Management System Standard Certification for the ESAP project.<sup>26</sup>

Under the P3 agreement, Innovate Energy is contractually committed to continued compliance with ISO 50001 over the next 35 years. ESAP and Innovate Energy will review energy performance with operations personnel on a weekly and monthly basis and review the effectiveness of the energy management system in annual Internal Audits and ISO 50001 re-certification audits every three years.<sup>27</sup>

### Testing

Fully testing and accepting the modernized district energy system requires the system to be evaluated at load over a full heating and cooling cycle of one year. To address this requirement, ENGIE developed a unique solution in consultation with industry that incorporated a one-year validation period, post-substantial completion, to verify the system's performance.

The solution includes protections against underperformance through a letter of credit structure. By decoupling the validation period from substantial completion, this framework provides lenders with an acceptable level of assurance related to the funds being advanced while protecting the government's performance requirements.

## Procurement Process

### Selecting the P3 model

Between 2016 and 2017, PSPC studied different delivery options for the project with the help of PPP Canada and other advisors.

The DBfOM delivery model was selected based on demonstrated qualitative and quantitative benefits of the approach over other alternatives, including Design-Bid-Build. The DBfOM model provided superior value for money relative to the other options evaluated and ranked the highest in meeting Canada's objectives for the project.

In addition, choosing a P3 model enabled Canada to maximize efficiency, cost-effectiveness, safety and security of the energy service modernization solution and future energy systems to levels consistent with best practices. It also provided a solution for operations and maintenance of the district energy system over the long-term, accelerated delivery of the modernization effort and facilitates Canada's transition from a service delivery role to a service management role.

The evaluation considered a traditional DBFOM model with long-term financing as the P3 option. However, analysis of DBFOM financial arrangement structures and the typical terms and conditions needed by lenders to support this type of model suggested a long-term financing approach would not provide the flexibility the Government of Canada needed to address two of its key objectives for the operations period:

- The flexibility to expand the system to additional buildings in the National Capital Region; and
- The ability to introduce low carbon thermal energy sources to further reduce greenhouse gas emissions.

After consulting the market, particularly lenders, the decision was made to limit private financing to the construction period.

To support the discipline and risk transfer that is typically provided by long-term financing over the life of the agreement, a robust security package was added to achieve this objective during the operations period.

### Selecting a partner

The competitive procurement process for the Energy Services Acquisition Program/Energy Service Modernization project was conducted in a "fair, open, and transparent manner," the fairness auditor reported in 2019.<sup>28</sup>

<sup>26</sup> Interview with ENGIE in June 2021.

<sup>27</sup> ISO 50001 integrates energy efficiency into management practices and enables organizations to establish the systems and processes necessary to continually improve energy performance, promote an energy performance improvement culture and make better use of existing energy-consuming assets and processes. ISO 50001 also helps organizations evaluate and prioritize the implementation of new energy-efficient technologies.

<sup>28</sup> HKA Global (Canada), Inc. Energy Services Acquisition Program/Energy Service Modernization Fairness Monitor Final Report, March 17, 2019, page 3 <https://www.tpsgc-pwgsc.gc.ca/se-fm/2019/documents/mars-march17-2019-eng.pdf> (Accessed June 22, 2021)

In March 2017, Public Services and Procurement Canada issued a Letter of Interest<sup>29</sup> to inform industry of the upcoming opportunity and to outline the procurement process. Prior to the fairness monitor coming on board, PSPC conducted two other Requests for Information (RFI) to sound out the market before issuing its RFQ because of the unique characteristics of the project.<sup>30</sup>

The intent of all RFIs was to seek information from industry regarding potential solutions for the acquisition of energy services in the NCR. The information was used to further develop and refine ESAP's approach by:

- Providing insight into the level of interest of the private sector in ESAP and preferred types of procurement options;
- Increasing PSPC's understanding of the relevant experience, types of capabilities and technology options that third-party proponents might offer in response to any ESAP opportunity;
- Assessing the viability of environmentally sustainable energy acquisition, generation and distribution technologies and possible barriers and opportunities for their adoption in the NCR;
- Assessing the potential for opportunities to reduce the environmental footprint of PSPC energy service operations; and
- Identifying additional information and processes needed by respondents to support a decision to participate in potential ESAP opportunities.

### Request for Qualifications

In August 2017, Public Services and Procurement Canada issued an RFQ to solicit interested parties to qualify to submit a proposal for the DBfOM project.

There was an open period of two months for the RFQ and two months for the federal government to evaluate and identify a list of qualified respondents.

Evaluation criteria were developed to ensure successful respondents met or exceeded the technical and financial standards required for this complex and large project.

<sup>29</sup> Solicitation Number EP635-173247/A

<sup>30</sup> Interview conducted with PSPC in June 2021.

<sup>31</sup> Government of Canada, "ESAP - Respondents List (EP635-173247/C)," December 19, 2017. <https://buyandsell.gc.ca/procurement-data/tender-notice/PW-NB-011-73994> (Accessed March 19, 2021).

Six respondents submitted proposals to the RFQ.<sup>31</sup> They included:

#### Climate Canada Connect

- EllisDon Capital Inc.
- EllisDon Design Build Inc.
- Modern Niagara Ottawa Inc.
- NORR Architects & Engineers Limited or NORR Limited
- Ramboll Group A/S
- Veolia Energy Canada, Inc.

#### ENMAX Energy Partners

- Black & Veatch Canada Company
- ENMAX Generation Portfolio Inc.
- Kiewit Canada Development Corp.
- Kiewit Canada Group Inc.

#### Future Energy NCR

- AECOM Canada Ltd.
- Aecon Infrastructure Management Inc.
- Brookfield Financial Securities LP
- EBC inc.
- Enwave North America LP
- MCW Consultants Ltd.
- Plan Group Inc.

#### Innovate Energy

- Black & McDonald Capital Limited
- Black & McDonald Limited
- ENGIE Services Inc.
- PCL Constructors Canada Inc.
- PCL Investments Inc.
- WSP Canada Inc.

#### Ottawa Energy Service Modernization Partners

- Ameresco Canada Inc.
- Forum Equity Partners Holdings Inc.
- H.H. Angus and Associates Limited
- Hatch Corporation
- Sacyr Concesiones, S.L.
- Sacyr Industrial, S.L.U
- Taggart Construction Limited

#### Rideau Energy Partners

- NRG DG Development LLC
- Pomerleau Inc.
- SNC-Lavalin Capital Inc.
- SNC-Lavalin Construction (Ontario) Inc.
- SNC-Lavalin Inc.
- SNC-Lavalin Operation & Maintenance Inc.

As a result of the consensus evaluation meetings, it was determined that, of the six responses received, four did not meet the mandatory minimum scores.<sup>32</sup> Therefore, two consortiums were pre-qualified to participate in the RFP process:

- Innovate Energy
- Rideau Energy Partners

### Request for Proposal

In February 2018, an RFP was issued by Public Services and Procurement Canada to the two pre-qualified proponents, setting out the bid process and the first draft of the project agreement.

Due to the complexity and uniqueness of the project, a longer-than-usual RFP phase provided additional time for proponents to perform due diligence and enabled the government to work collaboratively with them in commercially confidential meetings to refine the risk allocation regime.

Due to the impact the ESAP/ESM project would have on National Capital Commission lands, project officials obtained NCC approval of an “indicative design” for the project that would be used to provide general design guidance to proponents. On May 9, 2018, presentations were made to each proponent of the NCC approved indicative design and project officials answered questions. It was critical for the project to obtain endorsement from the National Capital Commission and its representatives were included during these commercially confidential meetings to provide certainty to proponents that their design would be able to obtain NCC approval since the government had transferred this risk to the project proponents. NCC provided feedback to the proponents as well.<sup>33</sup>

The proponents spent 12 months preparing their technical and financial submissions — both submitted their documents on time.

An extensive evaluation process was conducted by PSPC. Submissions were evaluated based on the criteria set out in the RFP, which provided proponents with the opportunity to obtain different credits for evaluation purposes.

These credits were applied to the score obtained in specific (tangible) technical packages and acted as a reduction to the financial offer NPV for evaluation purposes only.

Moreover, energy costs and greenhouse gas emissions over the term of the contract were also assessed during the RFP technical and financial evaluation to encourage proponents to find solutions to make the system more efficient and greener.

The evaluations were conducted by evaluation teams comprised of subject matter experts, including public and private sector technical and financial professionals.

The P3 contract was awarded to the proponent with lowest financial offer NPV.

### Preferred Proponent and Financial Close

Innovate Energy was selected as the preferred proponent with the project agreement signed on May 29, 2019. Financial close was achieved two days later.

The consortium brought a unique approach to the project, with its phasing, scheduling and planning to operate the existing system parallel to construction rather than build temporary structures that later had to be removed and the system “flipped” to the new permanent builds.<sup>34</sup>

*“The Innovate Energy Team members . . . are honoured to have the opportunity to work with PSPC to modernize the district energy system. This project will be one of the country’s most significant projects to reduce greenhouse gas emissions, save operational costs, and improve safety.”*

~ Tony Cook

*Construction Manager, PCL Constructors Canada Inc.<sup>35</sup>*



<sup>32</sup> HKA Global (Canada), Inc. Energy Services Acquisition Program/Energy Service Modernization Fairness Monitor Final Report, March 17, 2019, page 7 <https://www.tpsgc-pwgsc.gc.ca/se-fm/2019/documents/mars-march17-2019-eng.pdf> (Accessed June 22, 2021)

<sup>33</sup> Interview with PCPC in June 2021.

<sup>34</sup> Interview with PCL in May 2021.

<sup>35</sup> Government of Canada news release, “Government of Canada invests in cleaner energy system for the National Capital Region,” June 4, 2019. <https://www.newswire.ca/news-releases/government-of-canada-invests-in-cleaner-energy-system-for-the-national-capital-region-858757072.html> (Accessed on March 19, 2021).

**Table 1: Project timeline**

<p><b>2016-2017</b></p> <p>Assessment of different delivery options by PSPC, PPP Canada, PwC and other advisors</p>	<p><b>May 31, 2019</b></p> <p>Design work starts</p>
<p><b>March 17, 2017</b></p> <p>Letter of Interest released by PSPC to inform industry of the upcoming opportunity and to outline the procurement process</p>	<p><b>March 31, 2020</b></p> <p>Innovate Energy assumes control over operation and maintenance of the existing system</p>
<p><b>July 18, 2017</b></p> <p>Government of Canada announces the Energy Services Acquisition Program</p>	<p><b>March 31, 2020</b></p> <p>Construction starts</p>
<p><b>August 31, 2017</b></p> <p>RFQ issued</p>	<p><b>October 31, 2022</b></p> <p>Initial interim completion payment</p>
<p><b>November 1, 2017</b></p> <p>RFQ closes</p>	<p><b>December 31, 2023</b></p> <p>Second interim completion payment</p>
<p><b>February 5, 2018</b></p> <p>RFP issued / qualified teams announced</p>	<p><b>October 31, 2025</b></p> <p>Scheduled Substantial Completion date</p>
<p><b>January 7, 2019</b></p> <p>Technical proposals submitted</p>	<p><b>October 31, 2025</b></p> <p>End of P3 agreement</p>
<p><b>February 25, 2019</b></p> <p>Financial proposal submitted</p>	
<p><b>May 29, 2019</b></p> <p>Preferred proponent announced</p>	
<p><b>May 31, 2019</b></p> <p>Financial close achieved</p>	



## Fairness of the process

HKA Global (Canada), Inc. was retained by the federal government as an independent third-party fairness monitor to observe the competitive procurement process. Their role consisted of:

- Reviewing the letter of intent, RFQ and RFP documents and addendums, as well as plans and procedures for the evaluation of responses;

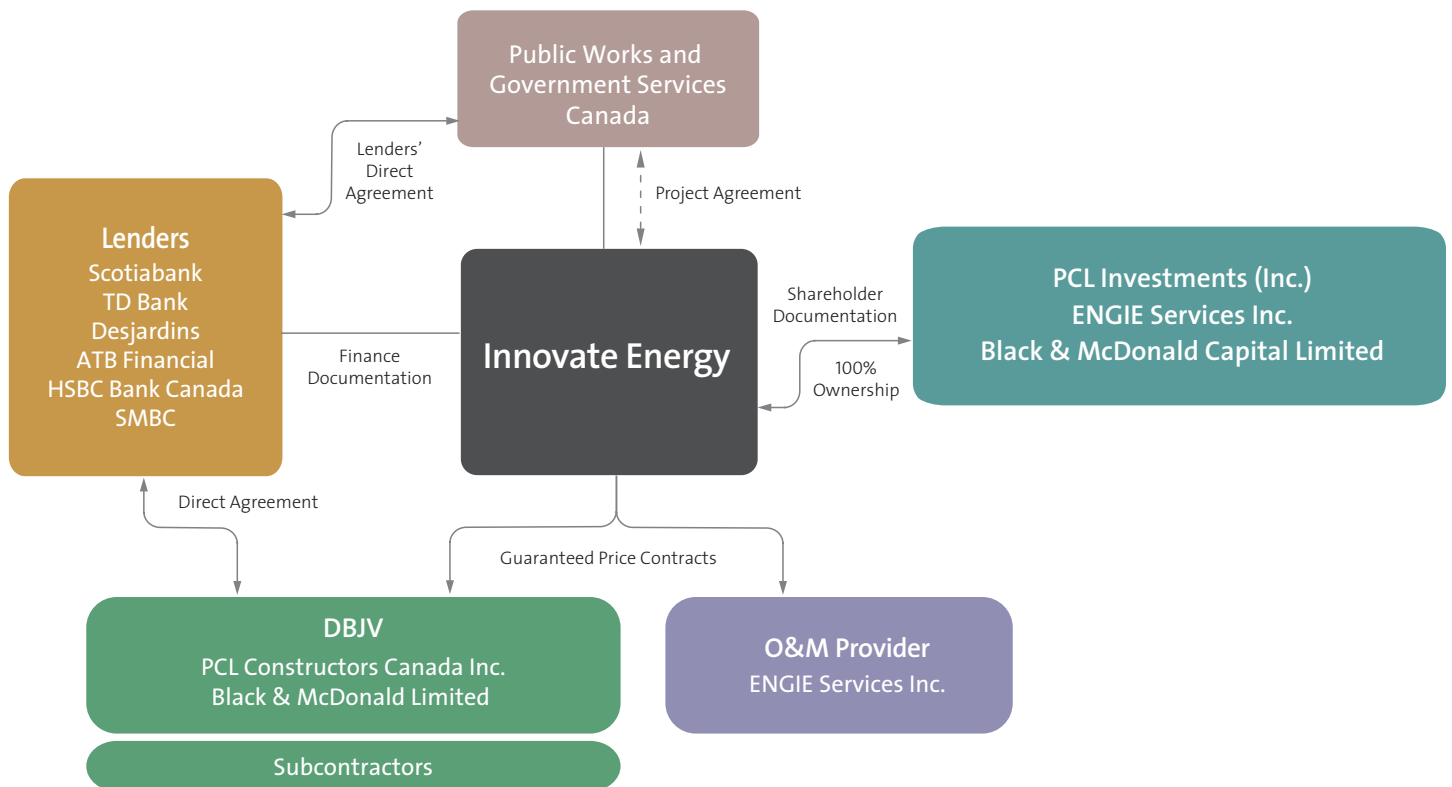
- Attending all meetings between PSPC and the proponents;
- Monitoring site visits;
- Observing or monitored all commercially confidential meetings;
- Observing Evaluation Review Committee meetings; and
- Providing an attestation that the competitive procurement process was conducted in a fair, open, and transparent manner.<sup>36</sup>

## Overall Structure of the Agreement

A typical P3 construct is employed on this project, where Innovate Energy is acting as Project Co.

Innovate Energy has a direct contractual relationship with the Government of Canada through the Project Agreement; lenders through the finance documentation; and the DBJV and O&M provider through guaranteed price contracts. Shareholder documentation outlines the ownership of Project Co. by the private partner entities.

Figure 3: Partnership structure



<sup>36</sup> HKA Global (Canada), Inc. Energy Services Acquisition Program/Energy Service Modernization Fairness Monitor Final Report, March 17, 2019, page 5 <https://www.tpsgc-pwgsc.gc.ca/se-fm/2019/documents/mars-march17-2019-eng.pdf> (Accessed June 23, 2021)

### Allocation of Responsibilities between the Partners

PCL Investments acted as bid lead and is Project Co. lead on the transaction during the construction period, performing the majority of the project management tasks.

The private partner's risk related to the construction, including the design, construction and commissioning, is transferred to the design-build joint venture (DBJV) between PCL Constructors Canada Inc. and Black & McDonald. Each of the members is liable for the DBJV's obligations on a joint and several basis.

PCL Constructors Canada Inc. and Black & McDonald have worked collaboratively to assign performance risk related to all elements of the design, construction and commissioning work to the partner best suited to take on the risk based on their experience and expertise.

For instance, Black & McDonald has completed mechanical and electrical projects within the existing plants and taken on the risk for mechanical and electrical construction for the project.

The DBJV is also responsible for obtaining, maintaining and renewing all permits, licences, approvals and agreements required for the performance of the project.

Prior to the transition completion date on March 31, 2020, when the operations and maintenance provider ENGIE Services Inc. took over interim operations and the DBJV took over care and control of the

sites, the DBJV focused on the design, development, permit activities and procurement of the project.

The private partner's risk related to existing structural latent defects and existing mechanical and electrical systems latent defects is transferred directly to ENGIE. The private partner's risk related to interim and post-substantial completion O&M is transferred to ENGIE.

ENGIE is responsible for 100 per cent of the O&M work during the interim O&M period and the 30-year period post-substantial completion. Once construction is complete, ENGIE will take over Project Co. responsibilities during the 30-year operating period.

As of March 31, 2020, ENGIE is responsible for operating the five steam central heating and cooling plants and four distribution networks during the interim O&M period. During the interim steam design and construction work, ENGIE Services Inc. is required to generate, deliver and provide the interim steam supply to the remaining steam user buildings.

During the operations period, ENGIE will be responsible for general maintenance, controls, high voltage maintenance, landscaping, snow and ice removal, security equipment, fire alarm/sprinklers, refrigeration equipment, regulatory inspections, operating Cliff Plant, which serves as the central operating hub for the project, and operating the Confederation Heights site.



A rendering of what the River Pump Station will look like from the Macdonald-Cartier bridge. The station is embedded into the shoreline bank and provides a green roof extending seamlessly from the top of that slope.



## Financial Arrangements

The total project cost is \$1.84 billion NPV<sup>37</sup> (including total capital costs of \$1.03 billion). The nominal value of the contract is valued at \$2.6 billion and is broken down into two parts.

- The first, valued at \$1.1 billion, is for the design and construction of the new system, to be completed by 2025; and
- The second portion is for the operation and maintenance, which includes energy and fuel costs, of the new system over a 35-year period, valued at \$1.5 billion.<sup>38</sup>

### Capital costs

The project includes a 30-year operational term beyond substantial completion; however, the project is unique in that only construction period financing was required, and the sole financing facility was a revolving construction credit facility provided by six lenders.

There was technically no equity requirement aside from nominal amounts to document ownership. One hundred per cent of construction financing was provided by debt.

The revolving credit facility has a maximum commitment amount of \$560 million, but will have total draws just under \$1 billion, due to the revolving nature and payment structure of the project that provides for an:

- Initial interim completion payment;
- Second interim completion payment; and
- Substantial completion payment.

The revolving credit facility provided is a floating-rate bank facility with a variable interest rate tied to one-month Canadian Dollar Offered Rate (CDOR), which fluctuates daily.

Given that every dollar needs to be accounted for during the construction period, Innovate Energy complemented the facility with an interest rate swap that effectively mitigates interest rate risk for the entire term of the project.

Innovate Energy entered into an interest rate hedge for 100 per cent of the notional balance of the revolving credit facility, with timing and balances consistent with the financial model so that interest costs are limited to a fixed amount during the construction period.

<sup>37</sup> Net present value (NPV) calculated in 2019.

<sup>38</sup> <https://www.tpsgc-pwgsc.gc.ca/trans/pq-qp/qp15-eng.html>

## Payments

### Interim completion payments

The payment mechanism for the project includes two interim completion payments (earned value-based payments) during construction:

- \$232,289,575.14 paid when 45 per cent of total capital costs have been completed; and
- \$232,289,575.14 paid when 75 per cent of total capital costs have been completed.

Payment of \$567,818,961.46 upon reaching substantial completion to fully repay the construction period revolving credit facility.

### Operations and maintenance payments

Interim operations and maintenance (O&M) payments and post-substantial completion O&M payments are fixed and include the cost of operating and maintaining the facilities, as well as life cycle costs.

- Interim O&M payments total \$180 million NPV
- Post-substantial completion payments will total \$740 million NPV over 30 years

## Responsibilities and Risk Allocation

The Government of Canada worked collaboratively with proponents in commercially confidential meetings to refine the risk allocation regime and ensure risks were allocated to the party best capable to mitigate and manage the risk.

Due to the lack of precedent projects in district energy systems and the unique considerations found in this project, the negotiation during these meetings was complex but necessary to optimize the deal structure. This approach provided the government and the private partner the most efficient solution to allocate the risks and obtain the highest value-for-money (VfM) solution.

For the ESAP/ESM project, the risks of design, construction, operations, maintenance and financing were completely transferred to the private sector given the fixed price contracts entered between the private partner and the government.

The DBJV is wholly responsible for the construction of the system at a fixed price, including committing to the fixed schedule bid with a substantial completion date of October 2025. The O&M provider is responsible for interim and post-substantial completion operations on a fixed-priced basis for a 30-year period.

The following examples demonstrate the complexity and uniqueness of this deal structure:

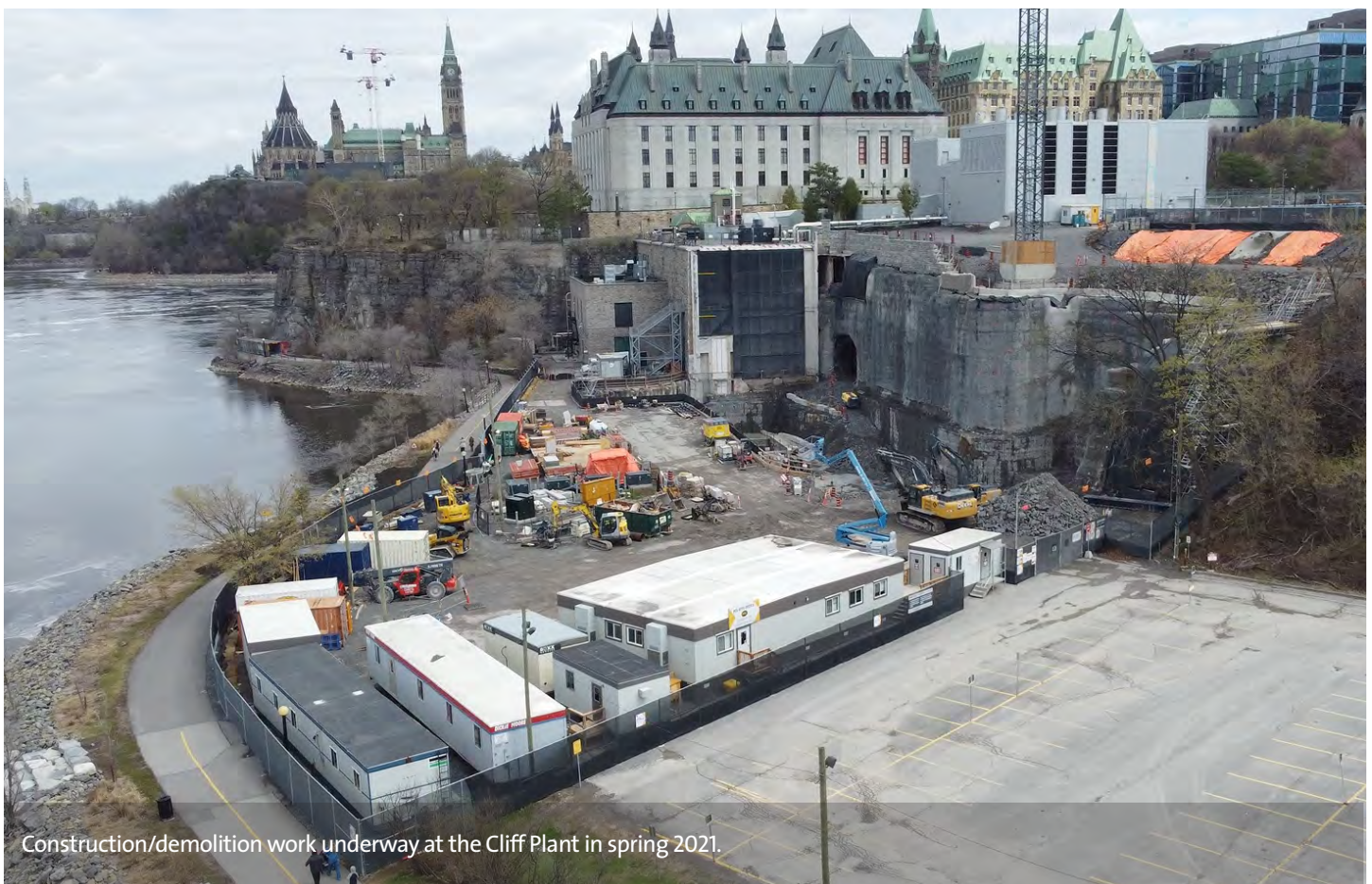
- Proponents and the government found optimal and different solutions for latent defects depending on the nature of each asset (buried tunnels, building integrity or electromechanical equipment) and project stage (prior and after substantial completion).
- Limitation of liability is particularly relevant to this project due to the nature of the services provided to third-party users. Adjustments were made to the draft Project Agreement during the solicitation period to design an appropriate structure of inclusions and exclusions for proponents to bid on, with the objective of achieving an

optimal risk allocation between the government and the successful proponent.

Specific adjustments were made to the typical risk allocation found in other P3 projects for utilities, environmental permits, design approvals and applicable law and regulations to address the unique characteristics of this project.

For example, a particular challenge was adapting the P3 model to the timing and processes associated with securing federal environmental permits. Significant consultation took place with the federal organizations involved with this permit and with industry to propose an optimal risk allocation that would provide clarity and certainty for all parties.

From a safety perspective, another challenging aspect is the parallel operations of the existing district energy system while construction work is undertaken at the same sites, as well as the sequencing of the demolition of the existing Cliff Plant and the construction of a new plant in its place, while maintaining operations.



Construction/demolition work underway at the Cliff Plant in spring 2021.

**Table 2: Allocation of key risks**

Risks and Responsibilities	Risks and responsibilities principally assigned to:	
	Innovate Energy	Government of Canada
<b>Permits &amp; Approvals</b>		
Canadian Environmental Assessment Act determination: The project is considered a “project” under section 66 of the Act		■
Applicable Mitigation Measures form and/or Environmental Effects Evaluation and obtaining associated authorities’ approvals	■	
National Capital Commission land and use approvals		■
National Capital Commission design approvals	■	
Construction and municipal permits	■	
Operating permits	■	
<b>Transition Period</b>		
Operation, maintenance & rehabilitation of existing district energy system		■
Efficiency of existing district energy system		■
<b>Design and Construction Work Period</b>		
Operation, maintenance & rehabilitation of existing district energy system	■	
Efficiency of existing district energy system		■
Latent defect risk of existing building structures, existing steam production units and existing tunnel structure	■	■
Design and construction of the modernized district energy system	■	
Building conversions to LTHW		■
Cost overruns	■	
Delays	■	■
Relocation of public utility infrastructure	■	
Contaminated soil: Known conditions or resulting from construction and O&M activities for which the private partner is responsible	■	
Contaminated soil: Unknown conditions	■	■
Geotechnical risks: Known conditions	■	
Geotechnical risks: Unknown conditions	■	■
Testing & commissioning	■	

Risks and Responsibilities	Risks and responsibilities principally assigned to:	
	Innovate Energy	Government of Canada
<b>Modernized National Capital DES Operational Term</b>		
Operation, maintenance & rehabilitation of the modernized district energy system	■	
Efficiency and reduction of greenhouse gas emissions of the modernized district energy system	■	
Latent defect risk of existing building structures and existing tunnel structures	■	■
Building demand, building energy consumption & commodity price risk		■
Selection, procurement, management & optimization of input fuel	■	■
Hand back requirements	■	
<b>Finance</b>		
Financing during design & construction period	■	
Inflation risk during design & construction period	■	
Financing of any future district energy system expansion		■
Inflation risk during modernized DES operational period		■
<b>Expansion</b>		
Marketing activities	■	■
Energy supply agreements with third parties		■
Design of rate structures associated with energy services to third parties		■
Identification of work required	■	■
Capital investment decisions		■
Design & construction	■	
Operation & maintenance work	■	
<b>Customer services</b>		
Meter reading	■	
Customer billing & payment management		■
Help Desk services	■	

## Benefits

### Cost savings/VfM

The integration of DBfOM activities and the bundling under one contract of the work required at the different central heating and cooling plants and their distribution networks is providing the Government of Canada with significant value and cost savings because of the economies of scale achieved, lower transaction costs and reduced coordination issues.

More importantly, with this contractual integration the government is leveraging the private partner's innovation and a "whole-life" investment planning approach that provides quality, reliability, sustainability and performance to the project.

Shifting from long to short-term financing in the DBfOM delivery model provided significant savings, however additional contractual performance guarantees had to be introduced to mitigate the lack of private capital after construction completion. Introducing two interim payments based on earned value during construction contributed additional cost savings and kept significant capital at risk during construction without adding construction scheduling constraints.

The competitive procurement process also generated significant innovation and cost savings in the form of improved designs or processes not specified in the Project Agreement and tapped market leading approaches to the effective and efficient delivery of district energy services.

Incentives introduced in the RFP to provide higher efficiency levels and lower greenhouse gas emissions also provided significant benefits.

Canada worked with PwC, PPP Canada and other advisors to quantitatively assess the DBfOM delivery model against the public-sector comparator model.

A VfM analysis, conducted in July 2019 following financial close, showed the actual savings achieved were 12.2 per cent relative to the estimated traditional procurement method costs.

In addition, the government investment in ESAP's modern technology will result in an estimated cost savings of approximately \$400 million over the life of the contract, however, these estimates will be revised once the modernized system has been operating for two years and all necessary adjustments have been made.<sup>39</sup>

## Community socio-economic benefits

### Environment

The project is making a significant contribution to the Government of Canada's goal of reducing its energy consumption and greenhouse gas emissions. ESAP, when it is fully implemented, will use carbon neutral heating and cooling for baseload operations and lower government greenhouse gas emissions from the system by at least 90 per cent, the equivalent of taking more than 21,000 cars off the road.<sup>40</sup>

Contractual flexibility embedded in the contract will enable expansion of the system to other buildings in the National Capital Region owned by public or private sector organizations, as well as the introduction of other greener initiatives. This will enable existing and new connected buildings to further reduce the carbon footprint of their operations.

### Local job creation

In addition, Innovate Energy is hiring and using local trades where possible over the course of the construction period to ensure the project is constructed on-time and on-budget, adding to the economic health of the region.

### Indigenous Involvement

The Government of Canada has a duty to consult, and where appropriate, accommodate Indigenous peoples when it considers conduct that might adversely impact potential or established Aboriginal or treaty rights. Since this project is essentially a renovation of existing equipment, it is not a designated project, and ESAP decided to focus on engagement.

ESAP is working with local Algonquin communities, collectively known as Algonquin Anishinabeg Nation. As a step towards reconciliation, the project is working with the Algonquins of Pikwakanagan First Nation on the Cliff Plant site. A community-led committee has provided ESAP with specific options for commemorative installations to celebrate Algonquin culture and history. An example is a series of six engraved stones in the upper plateau walkway that will include quotes/words of significant importance to the First Nation in Algonquin, English and French.

<sup>39</sup> Interview with PSPC in June 2021.

<sup>40</sup> Ibid.

A second option identified by the community members is the incorporation of copper rain chains into the design to commemorate the trade of copper along the Ottawa River by First Nations peoples 10,000 years ago.<sup>41</sup>

## Communications

### Between the partners

From the outset, regular meetings were established between PSPC and Innovate Energy. As required by the project agreement, a monthly work committee meeting is held during the construction and interim operations and maintenance phase to review progress and resolve issues as they arise. This meeting is supplemented by other monthly and weekly meetings and working groups to promote effective communication among the project teams.

The group also uses an online platform where it tracks Request for Information, Authority and Private Partner Notices and Changes. Interestingly, the Innovate Energy team needed to hold more discussions early on in the project with O&M provider ENGIE to ensure the demolition of sites didn't impact interim operations, as well as the health and safety of workers. In the case of the Cliff

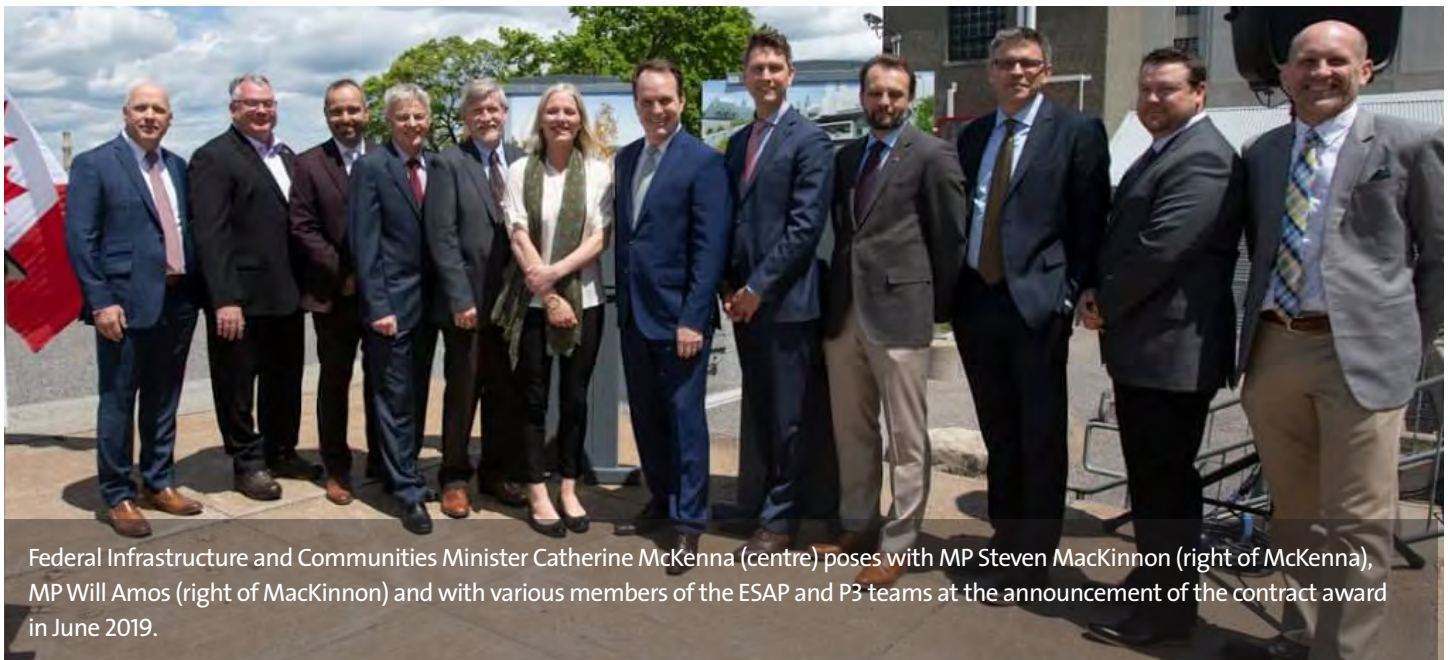
Plant, this demolition was taking place less than 20 feet from the boilers.<sup>42</sup> On other P3s, discussions with the O&M operator usually come later as construction nears completion.

### With the public

The Innovate Energy communications team and the PSPC communications team meet on a monthly basis to co-manage communications, discuss engagement strategies and share project updates. The Government of Canada has the final say over all content and messaging.

Innovate Energy's initial User Communications Plan has been executed seamlessly during the first year of the ESAP project. The plan was developed to include clear and safe instructions on the best way to communicate with the building occupants about the project when work is required in and around buildings.

The ESAP website ([www.nationalcapitaldistrictenergy.ca](http://www.nationalcapitaldistrictenergy.ca)) provides members of the public with a way to learn about the project in both official languages. The website introduces the Innovate Energy partners, showcases awards and achievements the project has received and has a regularly updated gallery of progress images on construction sites. Visitors are also able to reach out to the Innovate Energy team via an email address monitored by the Innovate Energy communications manager.



Federal Infrastructure and Communities Minister Catherine McKenna (centre) poses with MP Steven MacKinnon (right of McKenna), MP Will Amos (right of MacKinnon) and with various members of the ESAP and P3 teams at the announcement of the contract award in June 2019.

<sup>41</sup> Interview with PSPC in June 2021.

<sup>42</sup> Interview with PCL and ENGIE in June 2021.

The project is also using social media to deliver messages and project updates to the public and other interested parties in both English and French.<sup>43</sup>

Specific operational plans are focused on building occupants and targeted communications are aimed at nearby residents to share traffic changes or other impacts. These are managed by the consortium.

PSPC also has a communications program with building custodians and operators, tenants and other key stakeholders associated with the building conversion work it is undertaking.

## With governments & other stakeholders

Given the location of the project in the National Capital Region, which includes municipalities on both sides of the Ontario-Quebec provincial boundary, there are several government stakeholders the public and private sector partners need to consult with and manage.

### Prior to construction

Significant due diligence, consultation and project development activities were required prior and after contract execution with the National Capital Commission (NCC), the Department of Fisheries and Oceans and Transport Canada.

Both the provinces of Quebec and Ontario, the City of Ottawa and Ville de Gatineau are also highly involved with the development of the project.

Utility companies such as Hydro Québec, Hydro Ottawa, Enbridge and Gazifere are also playing an important role in the project.

The entire region is also located within the traditional and unceded territory of the Algonquin people. The federal government has initiated a process of engagement with local First Nations organizations, a process that will involve consideration of how to recognize and commemorate the use of the land the Cliff Plant sits on over thousands of years by the Algonquin people.

One challenge, for example, was ensuring the aesthetic features of the Cliff and Tunney's Pasture plants would meet NCC approvals.

This strategy had to balance the specific considerations required by NCC, as the principal steward of Canada's nationally significant places, with the flexibility needed during the bidding period to enable innovation by proponents. To lessen this risk, PSPC hired a team of architects who met with the members of the technical

services teams within PSPC, as well as with NCC members. Later, the team of architects presented the indicative design to the Advisory Committee on Design, Property and Reality, which reports to the NCC board. NCC also participated and collaborated during the different stages of the procurement process.

Discussions with the NCC to finalize aspects of the designs for the plants was continuing in mid-2021.

Another key challenge was the acquisition of property rights. The need to address the linear nature of the project within two different municipalities and the NCC made this activity highly complex. Failure to secure the proper property rights or not having them available in time for project implementation would have put the project in serious jeopardy.

To secure land rights, PSPC is providing:

- Robust lines of communications with stakeholders;
- A dedicated team supported by consultants to produce the different deliverables required in land right transactions;
- Comprehensive planning to advance negotiations but be ready to accommodate changes as design evolves; and,
- Coordination between stakeholders and Innovate Energy.

## Dispute resolution

Innovate Energy and the Authority have established a collaboration method where different committees and working groups have been established to coordinate and collaborate. If conflict occurs, there is an escalation ladder that involves the participation of different individuals at different management levels. Resolution would first be sought between these groups and committees.

If no resolution is reached, the parties would then use the dispute resolution protocol contained in the Project Agreement, which starts with the amicable resolution by representatives or senior officers.

If a solution is not found, the independent engineer is engaged to go over disputes of a technical nature. Decisions with certain value made by the independent engineer are binding for both parties.

Non-technical issues would be examined by an expert or adjudicator. Litigation or arbitration would be the last step in the dispute escalation ladder.

<sup>43</sup> Twitter: [https://twitter.com/DES\\_REQ](https://twitter.com/DES_REQ); LinkedIn: <https://www.linkedin.com/in/nrcdes-rcnreq/detail/recent-activity/>.

## Performance Monitoring

### Project committee and general oversight

The Project Agreement follows typical reporting requirements for design, construction, operations and maintenance. However, unique to this transaction are the monthly inspections of the Independent Engineer and their quarterly reports.

The independent engineer is supporting the monitoring of construction progress, as well as certifying that conditions have been met prior to paying the interim payments and substantial completion payment.

Lenders also benefit from having a technical advisor (BTY Group) that will certify each draw of Project Co. and present monthly construction monitoring reports to lenders.

### Key performance measures

Innovate Energy has strong incentives to meet the project requirement as payments are based on availability, performance and quality of the system. A number of measures have been put in place to provide a robust performance management and monitoring capability for the project. Performance management measures include:

- Maintaining significant capital at risk during the design and construction period, supported by parent company guarantees and letters of credit between the lenders and the consortium, to ensure the quality and timeliness of the construction deliverables;
- A one-year validation period to verify system performance and efficiency and greenhouse gas emission commitments with penalties, backed by letters of credit, for any failure to meet these requirements;
- A performance indicator regime with deductions for non-performance that cover other key areas of the project, including:
  - System reliability;
  - Distribution piping integrity (based on corrosion rates);
  - Maintenance of external appearance and grounds of assets;
  - Security requirements;
  - Health and safety;

- Environmental performance;
- Customer service; and
- Quality and timeliness of deliverables and reports.
- Non-performance deduction thresholds that trigger step-in rights and default;
- Energy payment “pain share/gain share” formula for missing/exceeding efficiency commitments; and
- Deductions for missing greenhouse gas commitments.

## Lessons Learned

### Commercially Confidential Meetings

Commercially confidential meetings demonstrated the added value they provide to P3 procurement processes. In particular for this project, they provided an excellent venue to promote understanding, ensure clear lines of communications, clarify project requirements, support the due diligence of this significantly complex project and, more importantly, to refine the risk allocation and key commercial obligations given the lack of previous P3 district energy transactions. It was also critical to have the engagement of the National Capital Commission in these early discussions with proponents to reduce the approval risk.

The introduction of incentives to proponents during the evaluation phase to meet and further increase the energy efficient targets and reduce the greenhouse gas emissions triggered competitive tension that resulted in innovative design, construction and operation solutions that support key objectives of the Government of Canada.

### Financing with multiple lenders

The costs and benefits of having a large lending group versus a smaller club of lenders enabled the consortium to obtain the most competitive form of financing, even though at times it proved challenging to negotiate and work with six different lenders.

Having six lenders kept the process competitive during negotiations and maintained price tension as the financial commitments obtained had a full one lender redundancy. If any lender proved to be off market in terms and conditions, or require additional financing costs or considerations, that lender could have potentially been removed.



With a six-lender transaction, having redundancy in the commitment levels was paramount in providing the best value for money for the government and Project Co.

### Interim Operations & Maintenance

One consideration for a possible improvement on future projects of a similar nature is the consideration of interim O&M risk for short-term lenders.

If the Project Agreement on future transactions can be structured in a way where short-term financing does not face risk of interim O&M or even in nuanced scenarios, O&M post-substantial completion, it can provide for less complicated and more competitive financing to be obtained.

### Transition Period

PSPC also noted it was helpful to have almost a year, from the time of financial close to when the interim O&M period started, to have ENGIE “shadow” it on site seeing how operations and equipment worked before taking over. This time period, when no construction took place, also enabled Innovate Energy to focus on design and planning, leapfrogging ahead of what is normal for most projects before shovels hit the ground.<sup>44</sup>

### Pandemic

Although the pandemic has had notable impacts on infrastructure projects across Canada, the ESAP project has managed to stay on track through the partnership of the Innovate Energy and ESAP team and was slightly ahead of schedule in June 2021.<sup>45</sup>

Determined to make sure there were no delays in the start of interim O&M and construction, Innovate Energy implemented applicable health and safety measures from local health authorities on work sites.

Proactive communications between parties to have a protocol in place to identify, track and report additional expenses was helpful to have this issue handled from a contractual point of view.

### Collaborative Nature

The collaborative nature of the two partners and past experience on P3s is also notable, the consortium noted. It is still a fixed schedule project but when challenges have occurred to date, both partners have worked together to find solutions.

<sup>44</sup> Interview with PSPC in June 2021.

<sup>45</sup> Public Services and Procurement Canada, The Energy Services Acquisition Program: stage 1, June 4, 2021. <https://www.tpsgc-pwgsc.gc.ca/apropos-about/histoires-stories/galerie-gallery/energie-energy-eng.html#wb-info> (Accessed June 24, 2021)



A pano shot of the construction/demolition underway at the Cliff Plant in spring 2021.

## Concluding Comments

The Energy Services Acquisition Program (ESAP)/Energy Service Modernization (ESM) Project is a unique project among Canadian public-private partnerships and is breaking new ground in its innovative approach, using a DBfOM model with short-term financing only for the first district energy P3 project to close in Canada.

It is a critical infrastructure upgrade for the National Capital Region, straddling Ontario and Quebec, and is a key component in the Government of Canada's plan to reduce greenhouse gas emissions from federal operations over the long term.

This large project is balancing a number of complexities not normally considered for new greenfield P3 projects. In addition

to reusing locations where previous plants stood, there were additional levels of risk to be assessed given the work required within heritage buildings and in receiving security clearances to work in federal buildings during the construction period. The project also transferred efficiency and greenhouse gas targets from the government to the consortium.

In addition to the socio-economic benefits the project will bring to the region and public sector, its use of short-term financing only required a new mechanism to backstop the performance obligations post-substantial completion for its lenders.

This new and unique structure offers an additional option when governments consider how to finance and structure future P3 projects.

Cliff Plant at night.



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# Appendix: CCPPP's National Award Case Studies 1998 - 2020

## Defence

Communications Security Establishment Canada Long-Term Accommodation Project (2011)

## Education

Quad at York University, Ontario (2018)  
Saskatchewan Joint Use School Projects (2015)  
Alberta School Alternative Procurement – Phase 1 (ASAP I), Alberta (2010)  
O'Connell Drive Elementary School, Nova Scotia (1998)

## Energy

Energy Services Acquisition Program (ESAP)/Energy Service Modernization (ESM) Project, Ottawa-Gatineau (2020)  
Fort McMurray West 500-kV Transmission Project, Alberta (2018)  
John Hart Generating Station Replacement Project, B.C. (2014)  
Britannia Landfill Gas to Electricity Project, Ontario (2005)  
Vancouver Landfill Gas Cogeneration Project, B.C. (2003)  
Bruce Nuclear Power Facility, Ontario (2000)  
Waterloo Landfill Gas Power Project, Ontario (2000)

## Government Services

Archives of Ontario – Offsite Archival Storage (2006)  
Cook Chill Food Production Centre, Ontario (2005)  
DriveTest: Ontario Driver Examination Services (2004)  
Transforming the Delivery of Ontario's Social Assistance System (2003)  
Emergency Service Mobile Communications in Ontario (2000)  
Electronic Child Health Network, Toronto, Ontario (1999)  
Teranet, Ontario (1998)

## Health

New Oakville Trafalgar Memorial Hospital, Ontario (2016)  
Humber River Hospital, Ontario (2015)  
BC Cancer Agency Centre for the North and Fort St. John Hospital & Residential Care Project, B.C. (2012)  
Centre Hospitalier de l'Université de Montréal Project (2012)  
Glen Campus – McGill University Health Centre, Quebec (2010)  
Women's College Hospital Redevelopment Project, Ontario (2010)  
Royal Jubilee Hospital Patient Care Centre, B.C. (2009)  
VIHA Residential Care and Assisted Living Capacity Initiative, B.C. (2007)  
Abbotsford Regional Hospital and Cancer Centre, B.C. (2008, 2005)  
Facility Management for the Royal Ottawa Health Care Group, Ontario (2000)  
Devonshire Care Centre, Alberta (2000)  
Shaikh Khalifa Medical Centre, United Arab Emirates (2000)

## IT Infrastructure

Connecting Small Schools in Newfoundland (2003)

## Justice & Corrections

Forensic Services and Coroner's Complex, Ontario (2016)  
Okanagan Correctional Centre, British Columbia (2015)  
Elgin County Courthouse, Ontario (2014)  
Ontario Provincial Police Modernization Project (2013)  
Surrey Pretrial Services Centre Expansion, B.C. (2011)

Durham Consolidated Courthouse, Ontario (2007)  
Central North Correctional Centre, Ontario (2002)  
Five Corners Project, B.C. (2002)

## Real Estate

Aurora College Family Student Housing, Northwest Territories (1999)  
Legislative Chamber, Offices and Housing, Nunavut (1999)

## Recreation & Culture

L'Adresse symphonique, Quebec (2011)  
SHOAL Centre: Seniors Recreation Centre, B.C. (2004)  
John Labatt Centre, London, Ontario (2002)  
Skyreach Place, B.C. (2000)

## Social Housing

Single Room Occupancy Renewal Initiative Project, B.C. (2013)

## Transportation

Gordie Howe International Bridge Project (2019)  
Tłı̨ch̓ All-Season Road Project (2019)  
North Commuter Parkway & Traffic Bridge Replacement, Sask. (2018)  
Iqaluit International Airport, Nunavut (2017)  
Southwest Calgary Ring Road, Alberta (2016)  
Disraeli Freeway and Bridges Project, Winnipeg, Manitoba (2012)  
Canada Line, B.C. (2009)  
Confederation Bridge, PEI (2009)  
Highway 407 ETR, Ontario (2008 & 1999)  
Autoroute 30, Montreal, Quebec (2008)  
Northwest Anthony Henday Drive, Alberta (2008)  
William R. Bennett Bridge, B.C. (2008)  
Autoroute 25, Montreal, Quebec (2007)  
Kicking Horse Canyon Project – Phase 2, B.C. (2007)  
Golden Ears Bridge, B.C. (2006)  
Anthony Henday Drive Southeast Leg Ring Road, Alberta (2005)  
Sea-to-Sky Highway Improvement Project, B.C. (2005)  
Sierra Yoyo Desan Resource Road, B.C. (2004)  
Fredericton-Moncton Highway Project, New Brunswick (2003)  
Belledune Port Authority, New Brunswick (2000)  
Retendering Alberta's Highway Maintenance Contracts (2000)  
Cobequid Pass Toll Highway, Nova Scotia (1998)

## Water, Wastewater & Biosolids

Calgary Composting Facility, Alberta (2017)  
City of Saint John Safe Clean Drinking Water Project, New Brunswick (2017)  
Regina Wastewater Treatment Plant Upgrade Project, Saskatchewan (2014)  
Biosolids Management Facility, Sudbury, Ontario (2013)  
Britannia Mine Water Treatment Plant, B.C. (2006)  
Goderich Water and Sewer Services, Ontario (2000)  
Port Hardy Treatment Project, B.C. (2000)

These case studies can be obtained through CCPPP's online bookstore at: [www.pppcouncil.ca/web/bookstore](http://www.pppcouncil.ca/web/bookstore)

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