Modernizing the DES in Canada’s Capital Region

Presented by:
Tomasz Smetny-Sowa and Jim Manson
Energy Services Acquisition Program and FVB Energy Inc.
Public Services and Procurement Canada

What is Canada’s National Capital Region?

• The National Capital Region is not just Ottawa, Ontario but Gatineau, Quebec as well
• While they are not ‘twin cities’ they are separated only by the Ottawa River
• So while Ottawa is the official capital of Canada, the federal government views the whole region as one ‘area’
• The DES is in both cities
Recent Climate Events in the National Capital Region

In September 2018, six tornados touched down in Ottawa.

One hit a power station and half of the urban area lost power.
Recent Climate Events in the National Capital Region

• In 2019, Ottawa and Gatineau experienced once in 100 year flooding for the second time in three years
• Canada's climate is changing and temperatures in Canada have been increasing at roughly double the global average
• Climate change and extreme weather events can cause electrical failures and blackouts that impact existing facilities
• Now, more than ever, resiliency in the face of climate change has become a significant driver for expanding our DES in Ottawa and Gatineau

Sand bag operations in Ottawa during spring floods of 2019
The Energy Services Acquisition Program (ESAP) is modernizing the District Energy System (DES) which provides heating services to 80 buildings and cooling services to 67 buildings in the National Capital Region (>1.6M m² of floor space), accommodating 55,000+ occupants.

There are **three stages** to ESAP:
- Stage 1: DES Modernization
- Stage 2: Deeper Greening
- Stage 3: Expansion
Stage 1: Modernization

- **National Printing Bureau**
- **Cliff**
- **Tunney’s Pasture**

**Existing connections**

**New connections**

- **NRC**
- **Confederation Heights**
Stage 1: Creating a Thermal Grid

• In Stage 1: Modernization, one of the most important benefits will be the creation of a thermal grid
• It will be able to distribute hot and cold water as energy sources
• This will include not only delivering energy but also receiving energy from other plants, buildings and waste heat sources
• Buildings in the downtown core will be connected to 3 plants in 2 provinces
Sneak Peak at the Design for Stage 1: Modernization
Cliff Plant – Historically

1920s

Today
Stage 1: Architectural Design – Cliff Plant

View of the Cliff plant from Gatineau showing the exterior and stainless steel stacks.
Stage 1: Aesthetic Design - Cliff Plant

View of the Cliff CHCP from the NCC’s multiuse pathway (MUP).
Stage 1: Architectural Design - Cliff Plant

View from the public meeting area. Notice the access from top to bottom by staircase and by elevator.
Stage 1: Architectural Design – Cliff Plant

View of the upper plateau blending walkways, seating areas, trees and plants and offering spectacular views.
Stage 1: Architectural Design – Tunney’s Pasture Plant

View of the Tunney’s Pasture CHCP looking towards the Ottawa River.
Stage 1: Architectural Design – Tunney’s Pasture Plant

View of the Tunney’s Pasture CHCP from the street in front.
Stage 2: Plan for Low Carbon Heating and Cooling

• By 2025 the DES in the National Capital Region will be modern and highly efficient
• Cooling will use 100% clean electricity and will be carbon neutral
• Studies and pilot projects are underway to examine carbon neutral energy sources and how they can be used for heating
Modernizing the DES will:

- Provide long term financial savings
- Reduce Greenhouse gas (GHG) emissions

It is part of a portfolio of solutions for GHG reduction:

- Using smart buildings and plants
- Reducing building energy demand with efficient retrofits
- Constructing new buildings to high energy standards
- Enabling distributed renewable energy generation capacity
Stage 2: Aligning with Net Zero Design

• Government of Canada direction is that “all new buildings should be constructed to be net-zero carbon ready at the latest in 2022”

• Net zero buildings are more resilient as they require less backup energy

• ESAP can help clients in the transition to Net Zero buildings and can provide heating backup
Stage 3: Expanding a Resilient Network

Buildings can be connected to low carbon heating and cooling from three locations:

- Existing PSPC DES locations
- Existing Plants
- Potential DES
- Growth and Expansion
- New Hospital

- Supply new development at LeBreton Flats
- Supply new development at Tunney’s Pasture
- Supply new development at Confederation Heights
- Connect to more buildings in the downtown core

New connections
Possible future connections
Stage 3: Ultimate Future DES Network

Ultimately we can connect to large federal campuses and our municipal landfill.

- Connect to federal campuses in West End
- Connect to landfill if City moves to Energy from Waste

New connections:
- Potential DES
- Growth and Expansion

Existing Plants:
- New Hospital
- Trail Road Landfill
- Shirley's Bay Campus
- Carling Campus
By 2030, we will achieve carbon net zero.
Summary of Stages: Energy Sources

ESAP Stage 1 – Modernization
1. Chiller Heat Recovery Heat Pumps
2. River water free cooling

ESAP Stage 2 – Deeper Greening
3. Low Carbon Energy Source (large)
4. Low Carbon Energy Source (building scale)
5. Renewable NG

ESAP Stage 3 – Future Opportunities
6. QC Electricity
7. ON Electricity
Summary of Stages: Pathway to Net Zero DES

- **Existing Buildings** (95°C/65°C) + **Renovated Buildings** (70°C/40°C)

**Stage 1 – ESM - 2025**
- Heating: 200 g CO₂e/Kwh
- Cooling: 4 g CO₂e/Kwh

**Stage 2 – ESM - 2027**
- Heating: 40 g CO₂e/Kwh
- Cooling: 4 g CO₂e/Kwh

**Stage 3 – ESM - 2030**
- Heating: <10 g CO₂e/Kwh
- Cooling: 4 g CO₂e/Kwh

- **Net Zero New Building Requirement**
- **Smaller Scale DES Technologies**
- **Ongoing System Optimization**
- **Carbon Neutral Baseload**
- **Renewable NG**
- **Carbon Capture**
- **Client Carbon Allocation**
Thank You - Any Questions?

Tomasz Smetny-Sowa
Energy Services Acquisition Program
Public Services and Procurement Canada
Tomasz.Smetny-Sowa@tpsgc-pwgsc.gc.ca

Jim Manson
FVB Energy Inc.
jmanson@fvbenergy.com