Public Services and Procurement Canada - Real Property Branch

Energy Services Acquisition Program (ESAP)

National Capital Region

BCIT District Energy Workshop
February 16, 2017
Jim Manson
FVB Energy Inc
Prime Consultant to ESAP
Commitment: Federal Budget March 2016

- Leadership on Climate Change
- More Efficient Technology
- GHG Reduction of > 45% from Plant Baseline Emissions
- Long-Term Cost Reduction
- Future Use of Renewable Energy Sources
What is ESAP?

Renewal and Modernization of federal DE systems

- 80+ federal buildings
- >1.6M m²
- 55,000 occupants
- 140 MW htg / 105 MW clg

Goals & Objectives:

- Reduce Greenhouse Gas (GHG) emissions
- Reduce Costs
- Increase Safety & Reliability
- Leverage Private Sector’s Innovation & Expertise
PSPC DES in the NCR - Location

CHCP* PLANTS:
- Cliff
- Tunney’s
- NPB
- NRC
- RCMP
- Confederation Heights

* CHCP - Central Heating & Cooling Plant

District Energy Systems:
- Cliff/NRC
- Tunney’s
- RCMP
- Confederation Hts
## PSPC DES the NCR - Composition

<table>
<thead>
<tr>
<th>DES</th>
<th>Ottawa Address</th>
<th>Year Built *</th>
<th># of Boilers</th>
<th># of Chillers</th>
<th>Tunnels (meters)</th>
<th>Buried Piping (meters)</th>
<th>Number of Buildings Heated</th>
<th>Cooled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cliff</td>
<td>1 Fleet St</td>
<td>1916</td>
<td>7</td>
<td>6</td>
<td>6,558</td>
<td>2,048</td>
<td>51</td>
<td>41</td>
</tr>
<tr>
<td>NRC (on Cliff Loop)</td>
<td>98 Sussex Drive</td>
<td>1930</td>
<td>2</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tunney’s Pasture</td>
<td>50 Chardon Drive</td>
<td>1952</td>
<td>4</td>
<td>5</td>
<td>1,417</td>
<td>2,026</td>
<td>18</td>
<td>16</td>
</tr>
<tr>
<td>Confederation Heights</td>
<td>501 Heron Road (HTHW)</td>
<td>1958</td>
<td>4 (HTHW)</td>
<td>5</td>
<td>2,078</td>
<td>352 (HTHW)</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>RCMP</td>
<td>1200 Vanier Parkway</td>
<td>1971</td>
<td>4</td>
<td>4</td>
<td>127</td>
<td>492</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>NPB</td>
<td>45 Sacre-Coeur Blvd, Gatineau</td>
<td>1954</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td></td>
<td><strong>24</strong></td>
<td><strong>27</strong></td>
<td><strong>10,180</strong></td>
<td><strong>4,918</strong></td>
<td><strong>85</strong></td>
<td><strong>71</strong></td>
<td></td>
</tr>
</tbody>
</table>

* Year built is the original plant construction date & does not reflect current condition as some of the plant boilers and chillers have been replaced together with some auxiliary systems.
PSPC DES in the NCR - Challenges

• Outdated steam technology

• Operation is 25% less efficient than industry best practice

• Several elements are well past their expected life spans

• Requirement to reduce GHG emissions and phase out use of Ozone-Depleting Substances
Why DES?

- Consultant Study to review options
  - Refurbish Steam System
  - Standalone Systems
  - Modernize to a LTHW DES

* Consultations with DES owners worldwide
DES - Schematic

- Building
- ETS* to ETS*
- Loop to other buildings
- LTHW Supply
- LTHW Return
- Chilled Water Supply
- Chilled Water Return
- Heating Plant
- Cooling Plant
- Natural Gas or Low/No GHG Fuel
- Electrical Power

* ETS – Energy Transfer Station
#CHCP – Central Heating & Cooling Plant
DES Benefits
ESAP Schedule and Timeline

**ESAP WORK COMPONENTS**

- **ESAP Team**
- **Building Conversions**
- **Continued Operations and Maintenance of Existing Systems**
- **Energy Service Modernization**

**Pre-Contract Phase**

- **FY 2016 - 2019**

**Transition Phase**

- **FY 2019 - 2020**

**Modernization & Operations Phase**

- **FY 2020 - 2025**

**Conversions Complete Dec 2022**

- **P3 Assumes Operations Apr 2020**

**Plant Modernization Complete 2025**

- **P3 Contract Award Jun 2019**

**P3 Energy Service Delivery Phase**

- **FY 2015 - 2055**

3 years

36 years
## GHG Reduction – Base Scope

### National Capital Region – Central Heating & Cooling Plants

<table>
<thead>
<tr>
<th>Stage</th>
<th>GHG Reduction (kt/yr)</th>
<th>Plant GHG Emissions (kt/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Plant Baseline</td>
<td></td>
<td>117</td>
</tr>
<tr>
<td>Smart Buildings</td>
<td>12</td>
<td>105</td>
</tr>
<tr>
<td>LTHW/Chiller upgrade</td>
<td>61</td>
<td>44</td>
</tr>
</tbody>
</table>

**Total Reduction = 73 kt /yr**

*Equivalent to taking approximately 15,000 vehicle off the road @ 4.8 tons/vehicle/yr*
GHG Reduction - Low/No GHG Energy Sources

Heating – Future Possibilities

- **Biomass** – historical local industry
- **Green Gas** – available on the market
- **Renewable Fuel Oil** – local supply
- **Industrial Waste Heat** – local industry

GHG Reduction - Low/No GHG Energy Sources

Cooling - Future Possibilities

Thermal Energy Storage
### GHG Reduction Extended Scope - No GHG Emitting Fuel

**GHG Reduction with Biomass & Green Gas/Bio-Oil – Carbon Neutral**

<table>
<thead>
<tr>
<th>Stage</th>
<th>GHG Reduction (kt/yr)</th>
<th>Plant GHG Emissions (kt/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Scope</td>
<td>73</td>
<td>44</td>
</tr>
<tr>
<td>Biomass</td>
<td>29</td>
<td>15</td>
</tr>
<tr>
<td>Green Gas/Bio-Oil</td>
<td>5</td>
<td>10</td>
</tr>
</tbody>
</table>

**Total Reduction = 107 kt /yr**

*Equivalent to taking approximately 22,000 vehicle off the road @ 4.8 tons/vehicle/yr*

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**National Capital Region – Central Heating & Cooling Plants**

[Graph showing GHG Reduction (ktonnes/year)]
GHG Reduction Extended Scope – Additional Government Buildings

*Expansion to downtown core buildings (eco-district, see following slide)*

<table>
<thead>
<tr>
<th>Stage</th>
<th>GHG Reduction (kt/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Scope</td>
<td>73</td>
</tr>
<tr>
<td>No GHG Emitting Fuel</td>
<td>34</td>
</tr>
<tr>
<td>Additional Government Buildings</td>
<td>50</td>
</tr>
</tbody>
</table>

Total Reduction = 157 kt /yr

Equivalent to taking approximately 33,000 vehicle off the road @ 4.8 tons/vehicle/yr
GHG Reduction - Extended Scope

Expansion to downtown core buildings (eco-district)

Renewable Energy Plant(s) with hot water transmission

Waste heat source with hot water transmission (Industrial & data centres)

District Energy Systems:
- Cliff/NRC
- Tunney’s
- RCMP
- Confederation Hts
Future Possibilities

GHG Reduction Extended Scope

GHG Reduction

Overall Emissions Baseline 2005 | kt/yr
--- | ---
Federal Baseline Emissions | 1319

Federal Government Operational Target
Base Scope (=15,000 Vehicles)
Extended Scope No GHG Emitting Fuel (=22,000 Vehicles)
Extended Scope Additional Government Buildings (=33,000 Vehicles)

ESAP Implementation Start 2016

17%
Future Possibilities

GHG Reduction - Stakeholder Engagement
GHG Reduction - The Future

Additional Developments

- Expansion to downtown core buildings (eco-district)
- Renewable Energy Plant(s) with hot water transmission
- Waste heat source with hot water transmission (Industrial & data centres)

District Energy Systems:

- Cliff/NRC
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Future Possibilities
Questions?

Thank you