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# Analyzing Biomass and Other Carbon Neutral Fuels

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Public Services and Procurement Canada



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# Program Overview

The **Energy Services Acquisition Program (ESAP)** is modernizing the District Energy System (DES) which provides heating services to over 80 buildings and cooling services to 67 buildings in the National Capital Region (>1.6M m<sup>2</sup> of floor space), accommodating 55,000+ occupants

There are **two stages** to ESAP:

- Stage 1: DES Modernization
- Stage 2: Deeper Greening



# ESAP Has Two Stages

## Stage 1 – DES Modernization

- Convert to industry-standard low temperature hot water technology (LTHW)
- Switch from steam driven to electric chillers
- Implement Smart Buildings data analysis to improve efficiency
- Test new carbon neutral fuels for deeper greening - pilot projects, feasibility studies

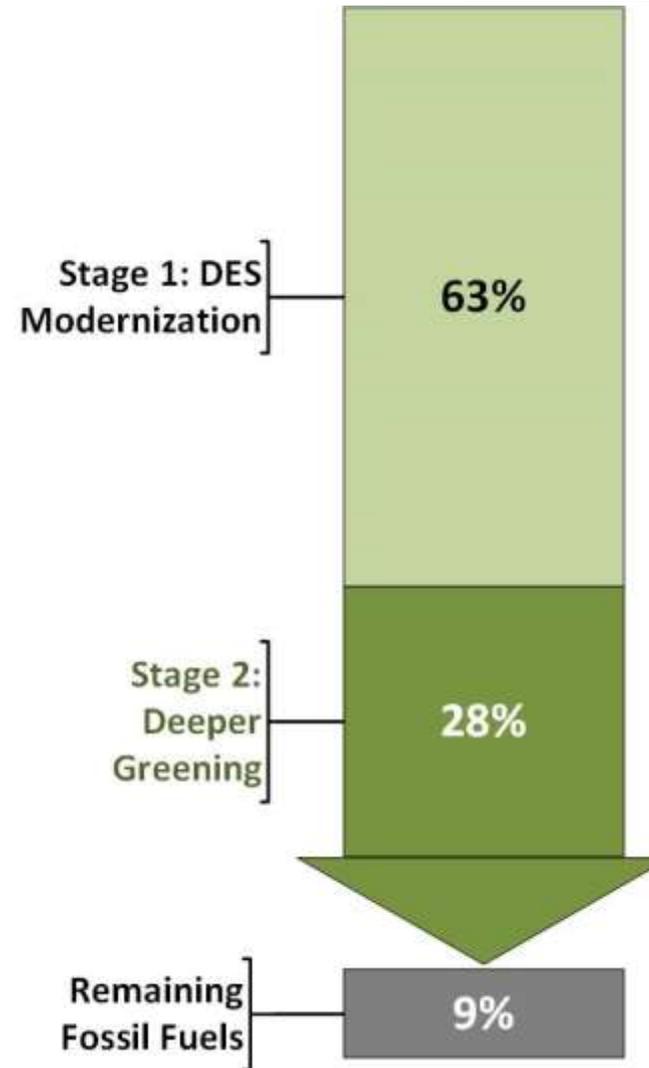
## Stage 2 – Deeper Greening

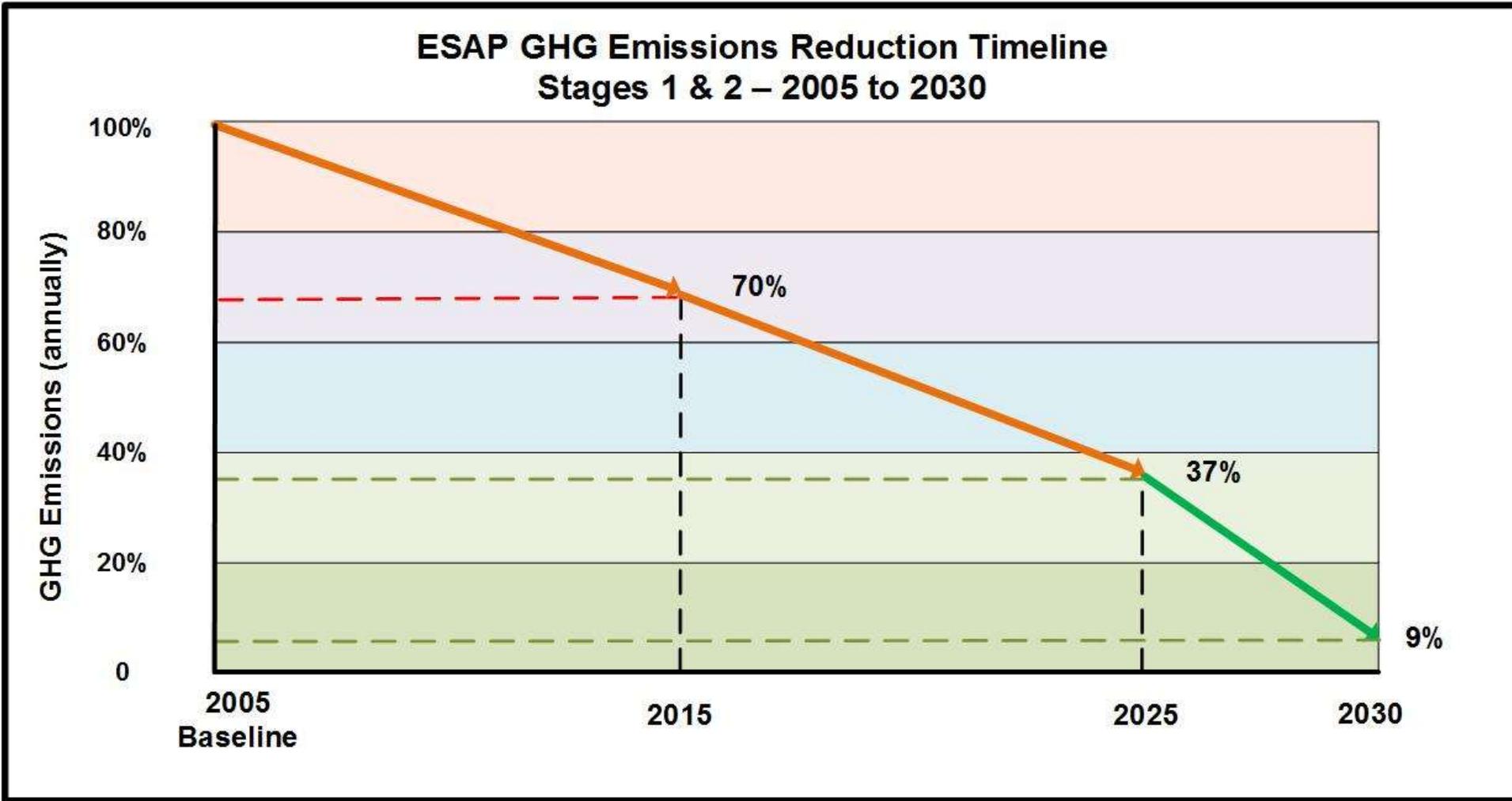
- Convert base load to carbon neutral fuels – achieve **low carbon government**
- Increase the number of government buildings connected to the DES
- Expand and share carbon neutral energy with non-federal buildings in the community



# GHG Emissions Reduction Stages 1 & 2

- By 2030, GHG emissions will be reduced to less than 10% of 2005 baseline emissions if we complete Stage 2





# Going Carbon Neutral – What Are The Options?

- Biomass Thermal
- Biomass CHP
- Biogas (Locally Produced)
- Renewable Natural Gas
- Bioliquids
- Electric Boilers  
(Solar; Wind; Hydro; or Nuclear)
- GeoExchange
- River Heat Pump
- Waste Heat Recovery
- Chiller Heat Recovery
- Industrial Heat Recovery
- Solar Thermal Energy
- Waste-to-Energy CHP
- Deep Geothermal



## Preliminary Results from Feasibility Study

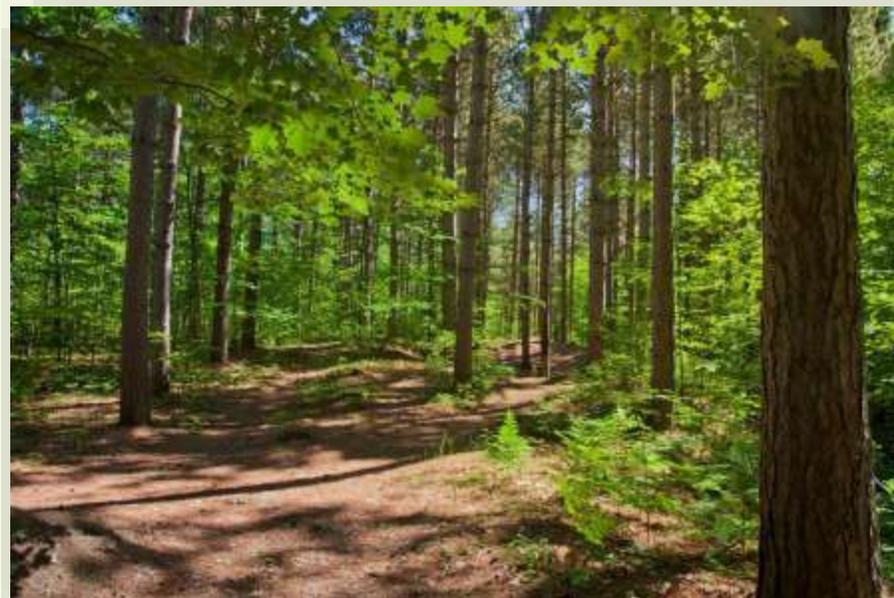
- **Biomass Thermal** – good in terms of distance to system; energy costs; GHG reductions; jobs & economic development; and reliability
- **Electric Boilers** – good in terms of reliability; distance to system; GHG emissions; and other environmental and social factors
- Both options provide a good balance between estimated costs vs improved environmental performance



*Boilers at the National Printing Bureau CHCP*

## If Biomass, Focus on Wood Residue

- Wood residue, broadly defined, is any woody material that is a by-product of another industrial process (e.g. timber harvesting) or chipped material from tree clean up
- ESAP has commissioned a study that shows that the amount of wood residue available within a 200 km radius is at least five times what would be required for a 40 MW plant



*Forest on federal lands near Ottawa  
(source: NCC)*

# Biomass Pilot Projects

- To learn more about biomass two 1.5 MW boilers were installed in February 2018
  - Wood chip and bio-fuel
- Five year pilot test will examine:
  - Ease of use, maintenance and operations
  - Level of air emissions
- The goal will be to better understand the benefits and costs of use



*Biomass pilot project at the Confederation Heights Plant*

# Biomass Pilot Project: Wood Chips –Specifications

- We are testing grade A1 wood chip fuel which follows the CAN/CSA-ISO 17225 Part 4 wood chip specification. We are using double screened wood chips
- For moisture content we are specifying 45% maximum (on wet basis) with a tolerance of +/- 5%., and ash w%:  $\leq 3$  (on dry basis)
- The wood chips must be sourced from sustainably harvested forest that has been certified by a recognizable 3rd party agency such as the Forest Stewardship Council (FSC) or the Sustainable Forestry Initiative (SFI); and the wood chips must be mill residue or wood residue; forest shall not be harvested for the sole purpose of supplying wood chips
- We plan to use approx. 2,500 Bone Dry Metric Tonnes (BDMT) per year



## Biomass Pilot Project: Wood Chips – Early Results

- The operation of the boiler system is highly susceptible to the quality and moisture content of the wood chips
- The moisture content varies with the time of year as well as the species of wood that is used
- In order to keep the moisture content below 50% we are using hardwood chips



*Biomass Pilot Project at  
Confederation Heights CHCP*

## Biomass Pilot Project: Bio Oil – What is it?

- It is a low carbon liquid fuel for heating that can be combusted in commercial and industrial boilers
- It is produced using a thermal conversion process that generates biocrude from renewable cellulosic biomass
- Our supplier converts a range of “woody” biomass feedstocks such as hardwoods and softwoods, with or without bark; and mill and forest residues into liquid fuels



*Confederation Heights CHCP*

## Biomass Pilot Project: Bio Oil – Early Results

- The ESAP team is currently commissioning the 1.5 MW installation
- There is a fuel cost premium associated with this option that would need to be substantiated to continue use
- The choice of fuel sources is much more limited than for wood chips



*Renewable Fuel Oil Boiler  
Pilot Project*

## Logistics for Siting an Urban CHCP

- Any technology will require environmental assessments, traffic assessments and other planning steps
- It will be subject to approval from the National Capital Commission
- We will seek municipal support – both Ottawa and Gatineau want to reduce GHGs
- Wherever it is located we will engage with the broader community to secure support for the transition to carbon neutral energy
- Residents and businesses in the immediate vicinity will be consulted



## Next Steps

- ESAP remains committed to supporting the overall PSPC goal of having a carbon neutral portfolio
- We will continue to test fuels and assess feasibility in order to better understand which technology options would work best for our application
- We will continue to support market innovation by pilot testing products that have market potential



*Cliff Temporary Boiler Plant*

# Thank you.



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