



Quality Urban Energy  
Systems of Tomorrow

# From Plans to Action:

Success Factors for **District Energy System & Combined Heat and Power** Implementation

*December 9, 2015*

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*IDEA 2015 evolvingENERGY*



# > Advancing Smart Energy Communities in Canada

- QUEST is a non-profit organization that conducts research, engagement and advocacy to advance Smart Energy Communities in Canada.
- Smart Energy Communities improve energy efficiency, enhance reliability, cut costs, and reduce greenhouse gas emissions.
- QUEST brings together key stakeholders from government, utilities and energy service providers, and the real estate sector among others to transform Canada's 5400 communities into Smart Energy Communities.

# > Agenda

## Purpose

## Overview of Community Energy Plans (CEPs)

## Research methodology

## Findings

- DES and CHP in CEPs
- DES and CHP integration by CEP and community factors

## Conclusion

# > Purpose

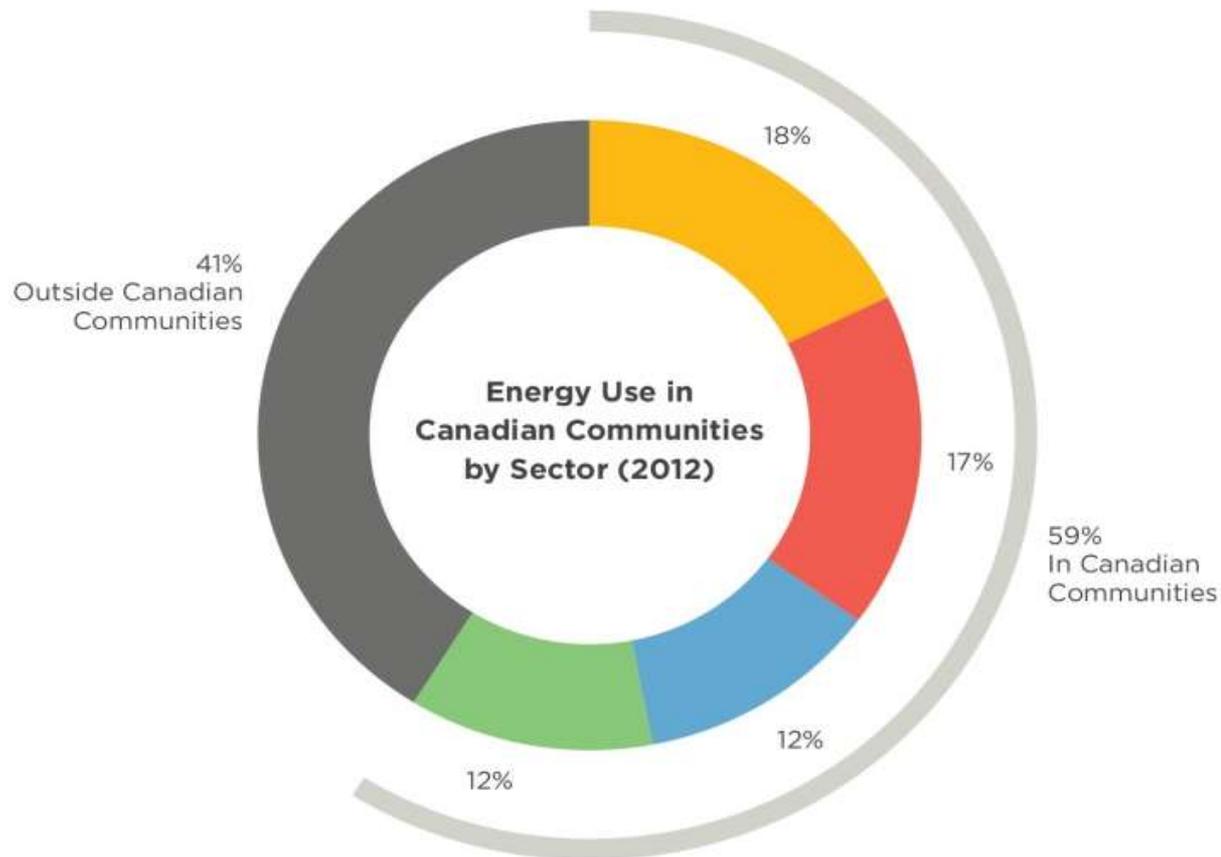
## Challenge

- Lack of market potential research
  - CIEEDAC Inventories feature completed projects; not forward looking
  - Market projections are sectoral ; nonspecific

## Opportunity

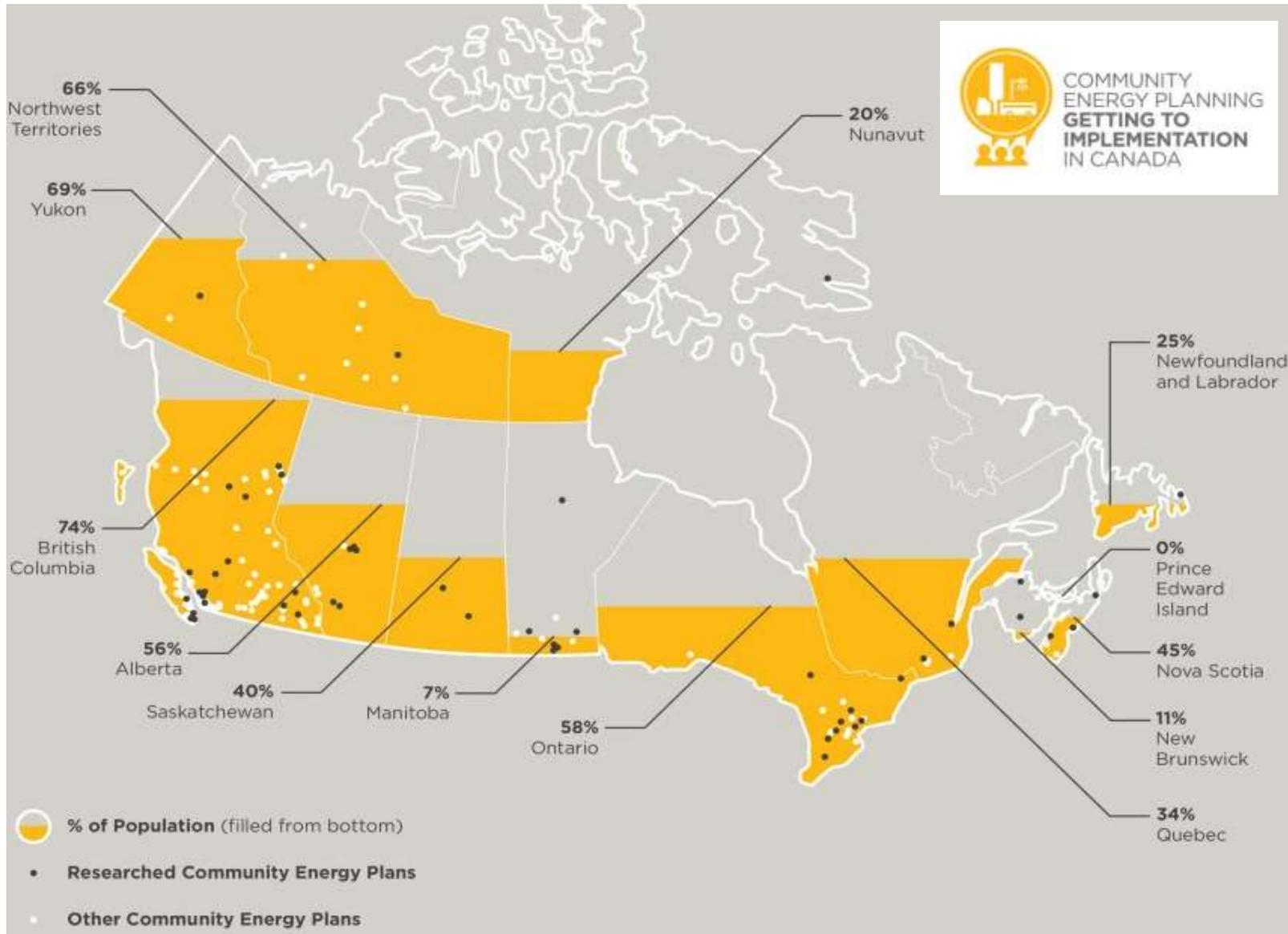
- Investigate CEPs to improve and specify understandings of DES and CHP market potential

# > Energy Use in Canadian Communities



Source: (Natural Resources Canada, 2012)

# > What is a Community Energy Plan?



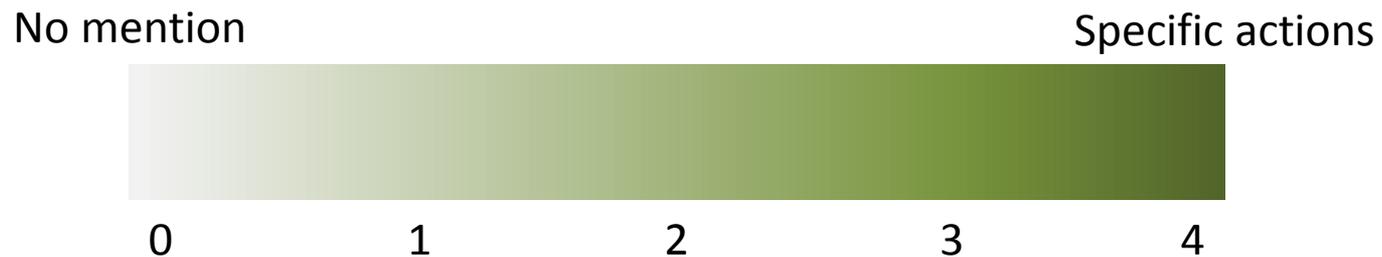
# > What is a Community Energy Plan?

## A CEP often contains:

- A baseline inventory of energy and GHG emissions
- Energy and GHG reduction targets
- Energy models
- Actions to achieve targets
  - Sometimes DES and/or CHP

## > Methods

- Assessed all CEPs publicly available online (n=148) for inclusions of DES and CHP



## > Quesnel, BC (Score of 1)

### **Energy, Water, Resources & Waste**

The Energy, Water, Resources and Waste strategy is concerned with community energy needs in an affordable, reliable and sustainable way. It focuses on provincial, regional and small **district energy** generation and delivery systems and management practices related to the community as a whole. (The energy demand from transportation, buildings and land use patterns is primarily covered by those respective strategies.) This strategy area also addresses the supply of high quality water and materials for appropriate uses while minimizing environmental impacts. It focuses on the entire water and material system, including appropriate sourcing, delivery, use and end-of-life systems, and addresses both physical infrastructure and management practices. The scope of this strategy also extends to flood control.

## > National Capital Region, ON QC (Score of 2)

2. Facilitate development of cost effective, low emission, high efficiency district energy projects

### Example Actions

- **District Energy Pilot:** Explore potential for a new district energy system as part of a major high sustainability, smart growth greenfield development as well as the intensification and revitalization of a major corridor or node.

## > Delta, BC (Score of 3)

### Action 31 Evaluate district energy feasibility for select development areas

The low density of existing development, and the high cost of retrofitting existing buildings for district energy indicate that the best DE opportunities arise would arise from new developments. The Corporation has already evaluated the opportunities for connecting municipal buildings precincts.<sup>36</sup>

To ensure that future development does not exclude district energy opportunities for existing development the Corporation of Delta will undertake a district energy feasibility study to:

- Understand where potential opportunities exist for district energy and identify where specific opportunities exist (Appendix C provides a scoping level assessment of these opportunities);
- Identify potential energy supply sources, and;
- Investigate partnerships, financing and governance models to advance potential district energy systems.

A district energy system is a substantial investment and to be viable for an operator requires sufficient heating loads, growth in development, and a relatively compact development area. This inherently requires either a major institutional customer (school or hospital) or sufficient multi-family residential development. The scoping review (appendix C) indicates that some potential might exist for the completion of the Marina Landing neighbourhood, as the developer is evaluating whether to seek a rezoning to allow for some apartment buildings in the project.

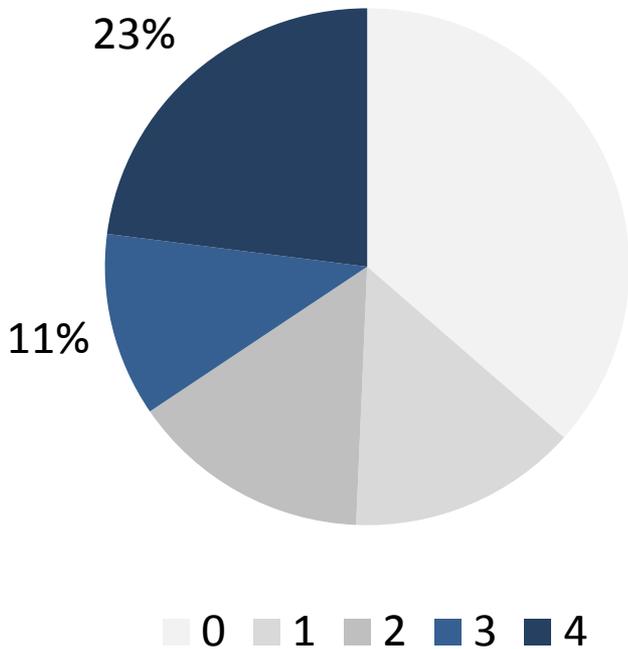
# > Edmonton, AB (Score of 4)

TACTICS	2014-2017				2018-2021				Lead		
	14	15	16	17	18	19	20	21			
<b>4.2.1 District Energy: Understand the potential for district energy systems in Edmonton and establish these systems where economically justified.</b>											
<b>A:</b> Develop a feasibility study and business plan for district energy in the Quarters. As part of this study: <ul style="list-style-type: none"> <li>Outline ownership/partnership options (for constructing, operating and maintaining the system) and recommend one that is best for the Quarters/Downtown.</li> <li>Recommend a policy whereby City-owned and -leased buildings would be required to connect to the district energy system.</li> </ul>		•	•							REHES	
<b>B:</b> Conduct a city-wide district energy feasibility study, including: <ul style="list-style-type: none"> <li>Establish energy intensity data on existing high density developments.</li> <li>Establish energy intensity data for proposed new developments.</li> <li>Identify significant sources of waste energy streams.</li> <li>Create an energy intensity map for the entire city.</li> <li>Establish ranking criteria for DE opportunities (energy density, available energy sources, land use forms and development timelines).</li> <li>Screen and rank the potential DE opportunities</li> <li>Assess justification to proceed with development of detailed business cases for specific district energy systems.</li> </ul>			•	•	•	•					SD
<b>C:</b> Develop business cases for priority district energy opportunities and present them to City Council for approval.			•	•							SD



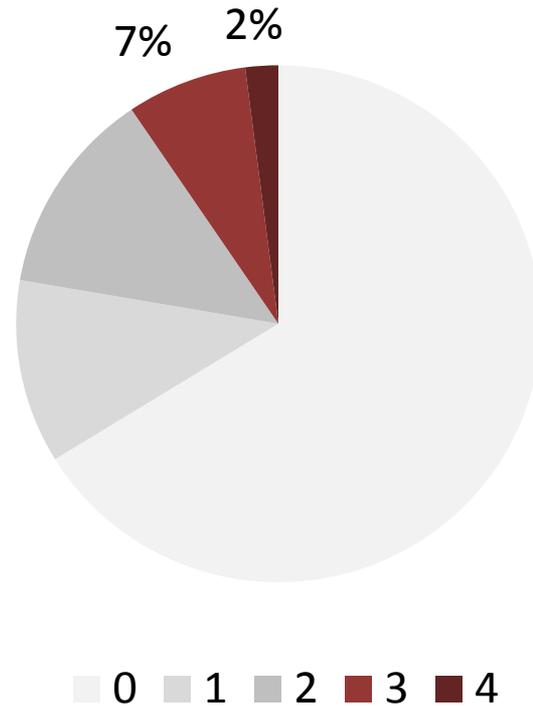
# > DES and CHP in CEPs

### DES in CEPs



**34% High Scoring Plans**

### CHP in CEPs

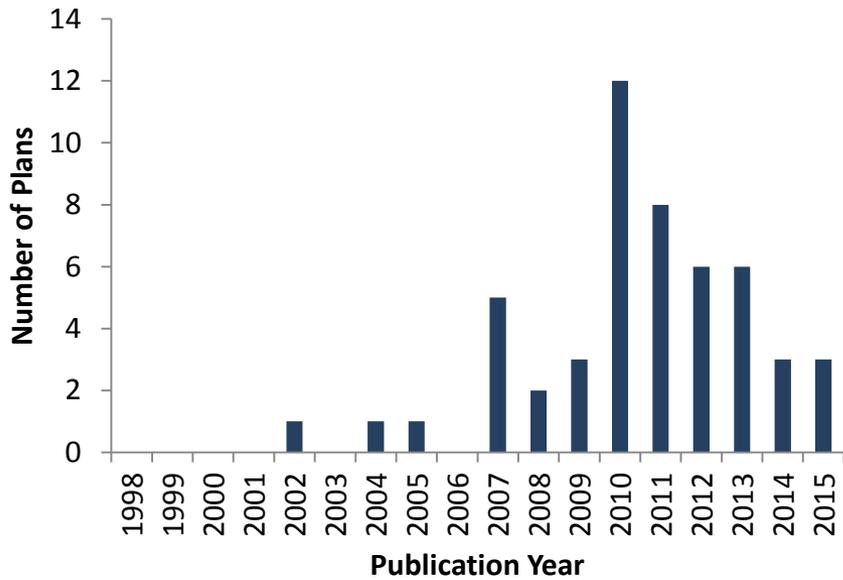


**9% High Scoring Plans**



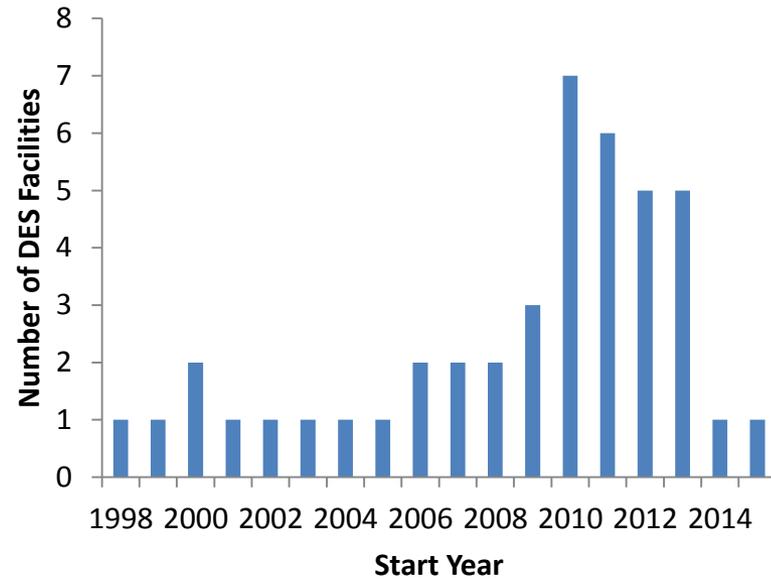
# > DES by Plan Year

## High Scoring CEPs for DES by Year



Source: Getting to Implementation

## DES Facilities by Start Year

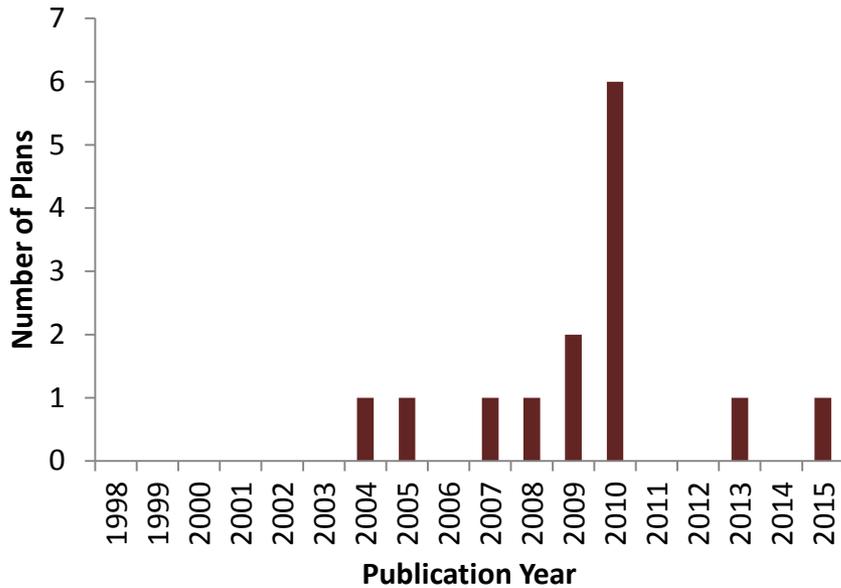


Source: CIEEDAC (2015)



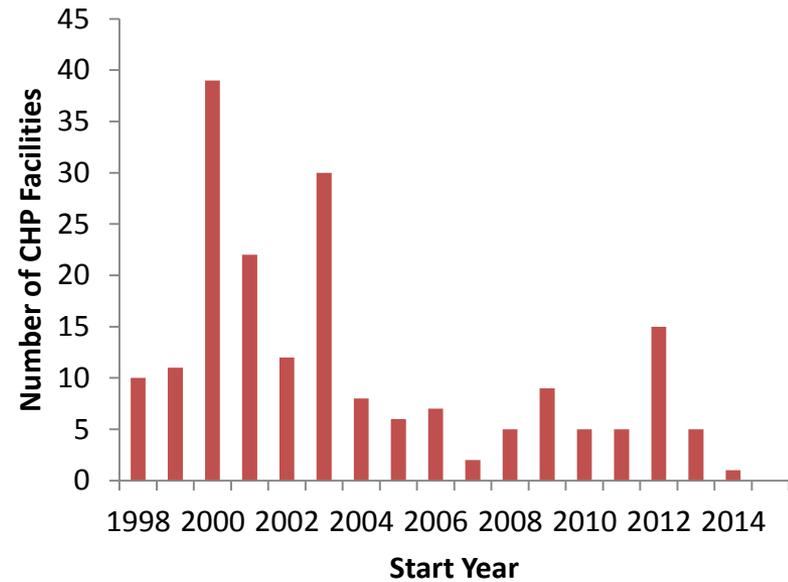
# > CHP by Plan Year

### High Scoring CEPs for CHP by Year



Source: Getting to Implementation

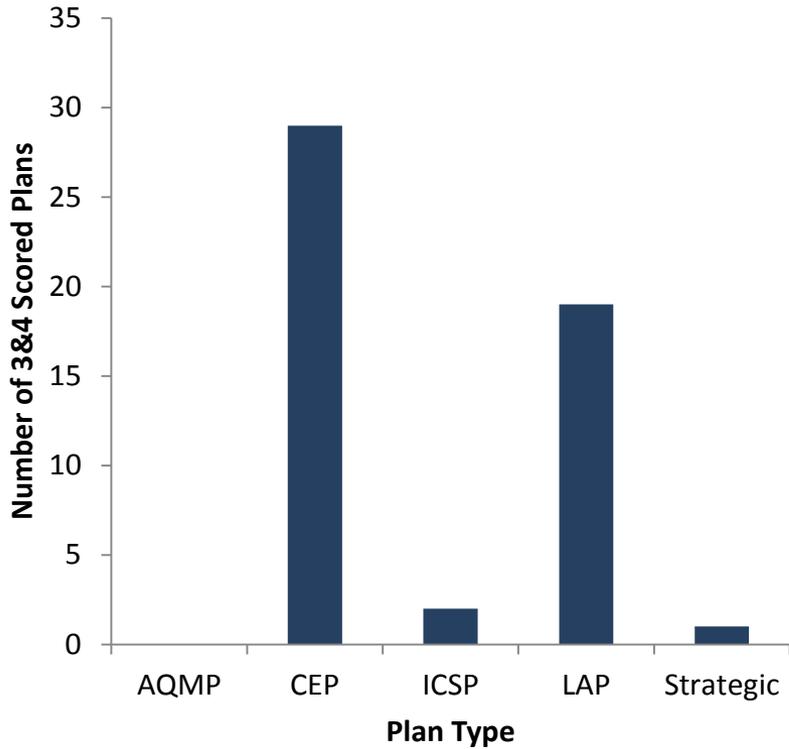
### CHP Facilities by Start Year



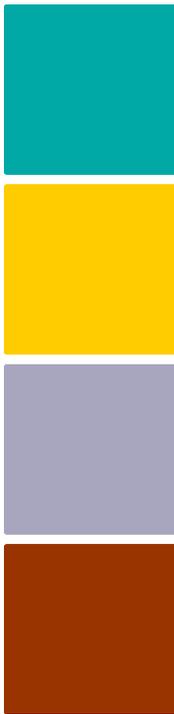
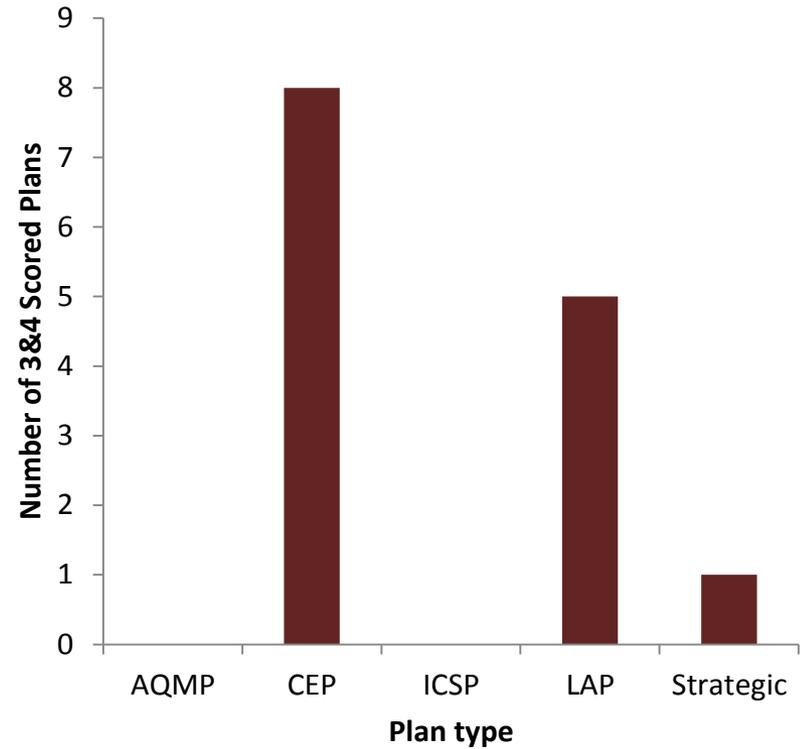
Source: CIEEDAC (2015)

# > DES and CHP by Plan Type

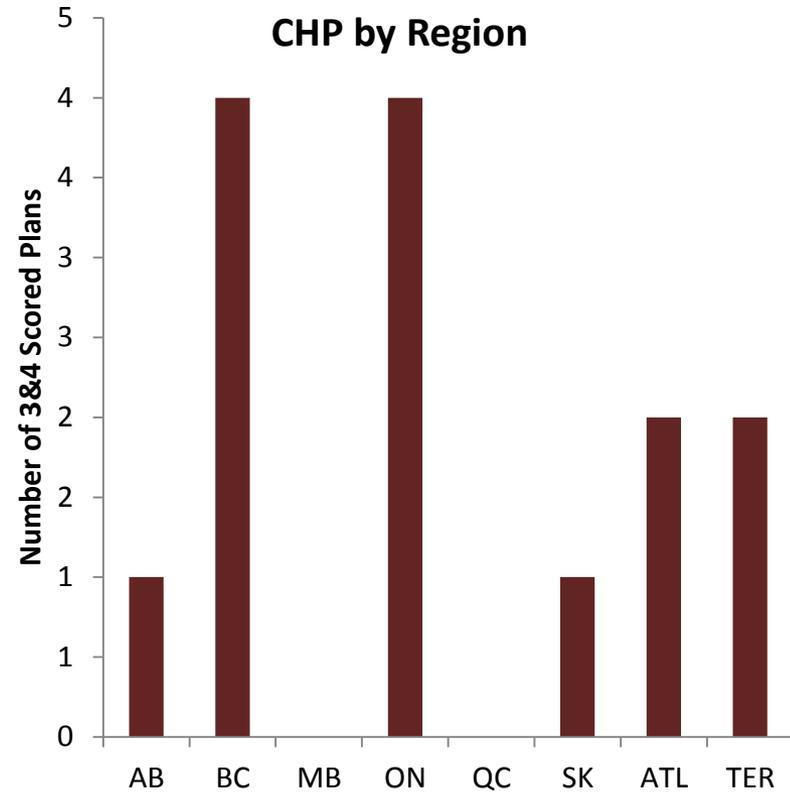
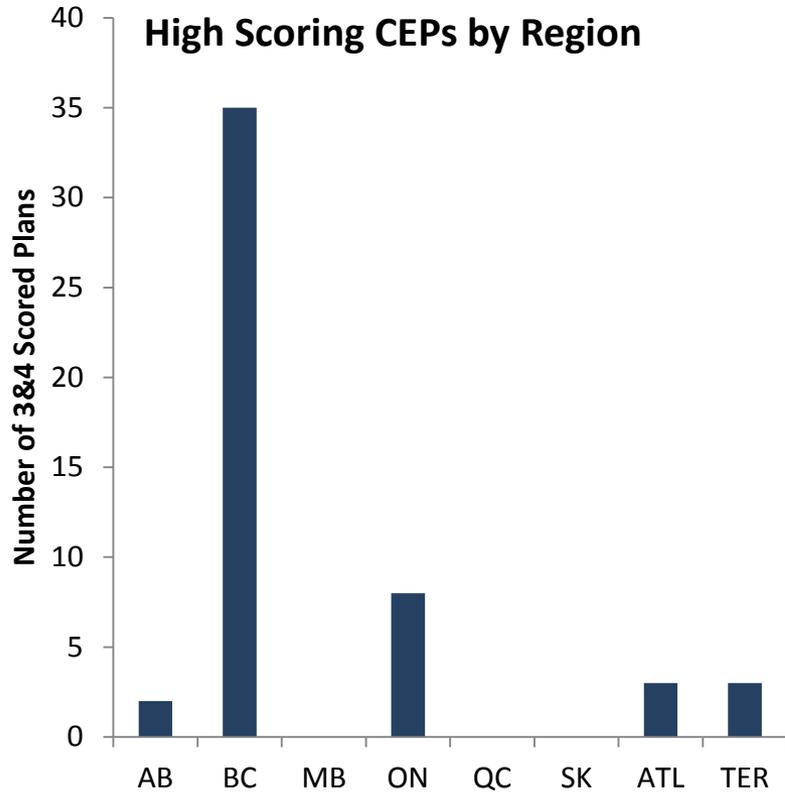
### High Scoring Plans by Type



### High Scoring Plans by Type



# > DES and CHP by Region



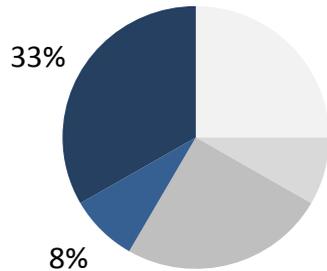
# > DES and CHP by Plan Type

Large: > 100,000

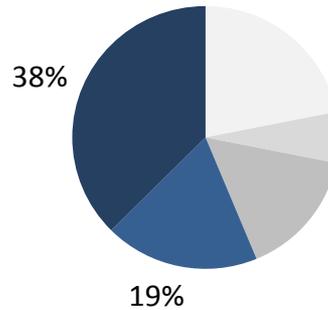
Mid-size: 20,000-100,000

Small: < 20,000

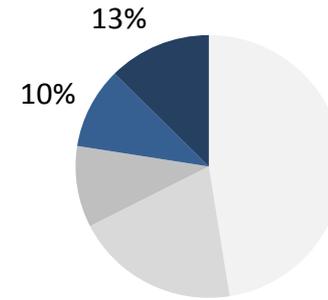
DES in Large CEPs



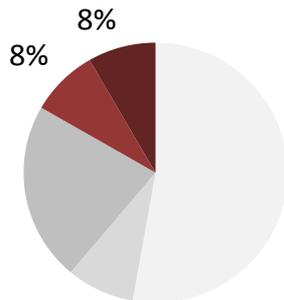
DES in Mid-size CEPs



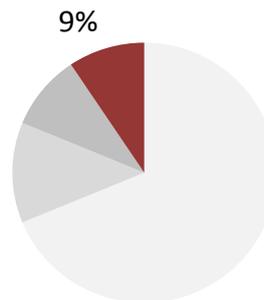
DES in Small CEPs



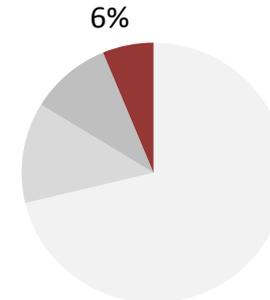
CHP in Large CEPs



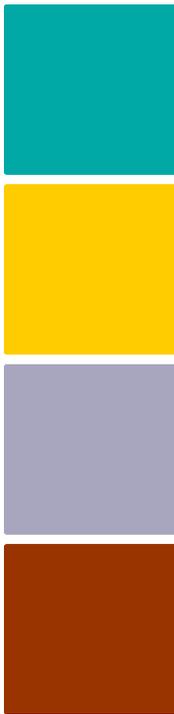
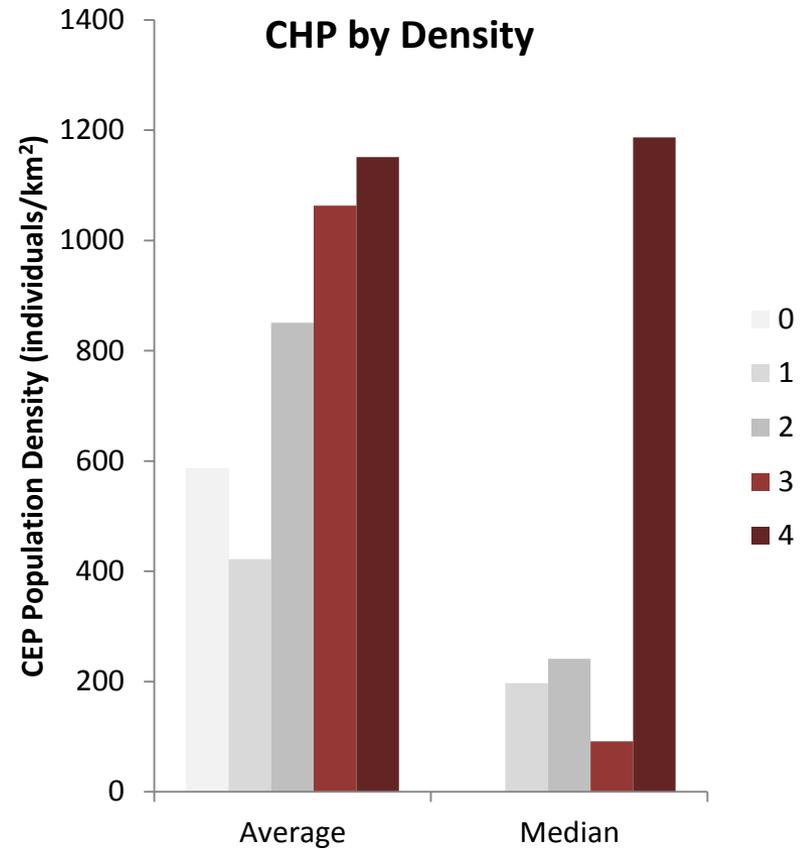
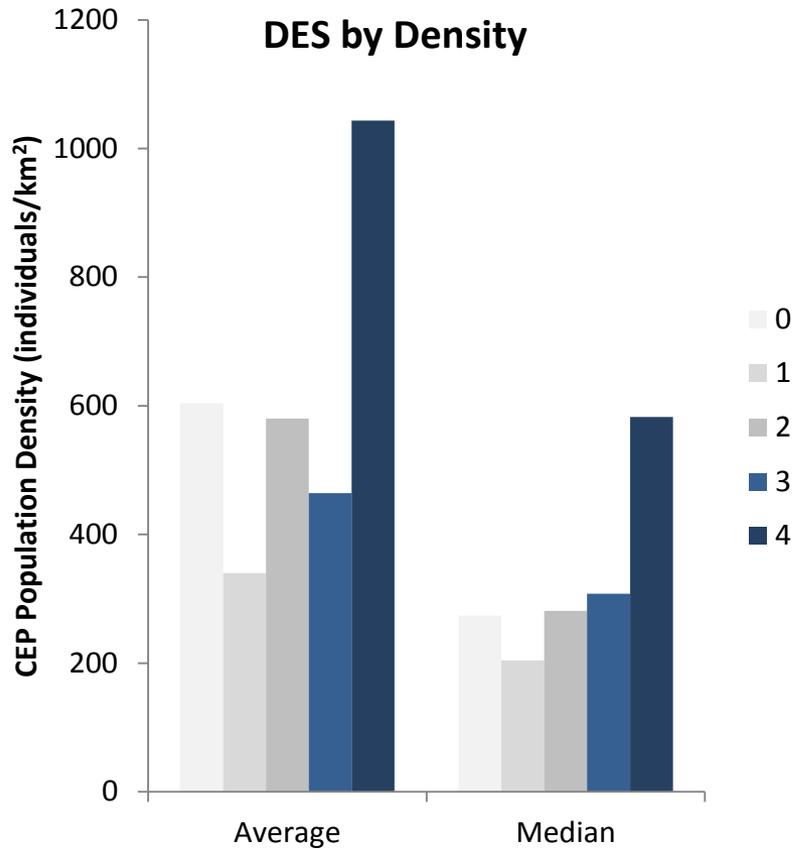
CHP in Mid-size CEPs



CHP in Small CEPs



# > DES and CHP by Plan Type



## > Summary

- Plans and DES facilities are correlated and appear to be increasing over time
  - CHP appears the opposite
- Plan specificity to energy is important
  - CEPs scored the highest for both DES and CHP
- BC has a high degree of plan potential for DES, and Ontario for both DES and CHP
- Increasing community size and density are correlated with support for DES and CHP

## > Potential Next Steps

- Expand assessment to other distributed energy resources (solar? EVs? Retrofits?)
- Investigate implementation of plans more directly and specifically
- Expand scope to include corporate plans
- Evaluate opportunities for advancing DES and CHP through CEPs
  - CHP working groups
  - Getting to Implementation
- Equipping communities with best practices for including DES and CHP into CEPs



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**Thank you for your time!**

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