Strategies for Successful Early Phase District Energy Development

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Overview

• Content applies to:
  – Expanding existing DE utility
  – Replacing existing DE utility
  – Creating a new DE utility

• Planning for DE in a new or growing community

• Strategies to defer capital investment
Terminology

Energy Transfer Stations (ETS)

Energy Center
Challenges with Developing New DES

• DE is capital intensive

• DE serving new neighbourhoods can have significant financial challenges

• Key is to match capital investment to revenue
Strategies to Control Cost

- Minimize amount of DPS installed early
- Avoid pre-servicing future development sites
- Consider small, modular Energy Centres
Changes to the Development Timeline

- Changes in market conditions
- Developer’s schedule
- Funding availability for larger DE infrastructure

- DE owner needs to manage risks
Deferring Capital Investment

- Identify groups for early energization
• Modular Energy Centers with micro-grids can defer large upfront capital investment.
Deferring Capital Investment

- Modular Energy Centers with micro-grids can defer large up front capital investment
- Reduce the DPS required to get started
- Quick start
- Defer construction of main plant
Modular Energy Centre

- Prefabricated, assembled off site
- Mobile: Containerized or Skid-mounted
- Various capacities and configurations possible
- Generally want to avoid on-site operator supervision
Modular Energy Centers

- Defer capital investment on permanent energy center
- Defer capital investment on DPS
- Quick implementation / lean construction
- Start construction before completing full build-out plan
- Variable development plans
- Hard to access locations
- Green field applications
Oval Village, Richmond, BC

- 2 x 4 MW\textsubscript{t} coil-tube natural gas hot water boilers in a 53ft shipping container
UniverCity at SFU, Burnaby, BC

- TEC1: 3 x 1 MW \(_t\) natural gas hot water boilers in a 40ft shipping container
- TEC2: 2 x 3 MW \(_t\) natural gas hot water boilers in a 53ft shipping container
River District Energy, Vancouver, BC

- 5 x 700 kWt natural gas condensing hot water boilers in a custom container
Skid-mounted ECs

- 2 × 1.5 MW$_t$ coil-tube natural gas hot water boilers
- Skid-mounted in a pre-engineered building
Challenging Locations

- Forests and parks
- Tight spaces
- Temporary locations
- Barren lands
UBC Neighbourhood, Vancouver, BC
Other Options

• In customer building
• District Cooling – e.g. air-cooled chillers
• Air-source heat pumps
Gain Trust

- Community Members
  - Proven Technology
  - Utility gains presence in community

- Funding Authorities
  - Proven business case in phases
  - Proven schedules
  - Proven technology
Distribution Piping System

• Strategic design and layout

• Minimize amount of installed pipe

• Optimize System $\Delta T$

• “Right size” DPS:
  – Competing interests of future growth vs. controlling costs
Energy Transfer Stations

- “Right-size” ETS
- Locate close to DPS entry
- Possibly modular or prefabricated
When to Move On?

- When modular Energy Centre(s) reach capacity
- When load justifies fuel-switch
- When DES can afford it
Good Rate Design

• Appropriate selection of rate type
  – energy, capacity (fixed) and/or connection charges

• Appropriate initial rate and manage rate escalation

• Possible use of rate stabilization or deferral accounts
Summary

- Plan for the future. Build for the present.
- Prove project success with smaller phases (micro-grids)
- Plan for change
- Manage project risks

- Modular Energy Centres
  - Defer early large investments
  - Allow for variable development plans
  - Quick implementation
  - Flexible Energy Centre locations
Questions