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IDEA 107th Annual Conference

Hydraulic Analysis – The Extra Mile

Presented by: Jason Owen & Ayman Fahmy

Why Do we need Hydraulic Analysis for District Energy Systems?

Referesher: Design Criteria

Pipe Sizing rule of thumb

- Maximum speed in the pipe
  - 8 ft/s (exceed for non-lined steel piping)
- Hydraulic gradient (pressure drop 2 – 2.5 ft per 100 ft)
- Diversity Factor (0.85, lower for mixed architype)
- Future Expansion
- Total pressure (Hydraulic + Static)

Pump Sizing

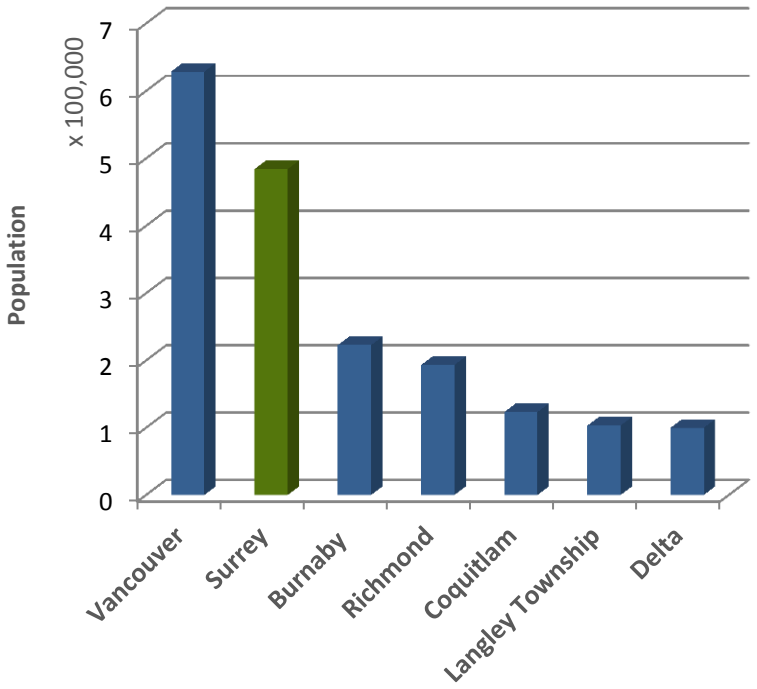
- Impact of elevation
- Pipe material / life
- Viscosity of medium
- Redundancy

Understand your System

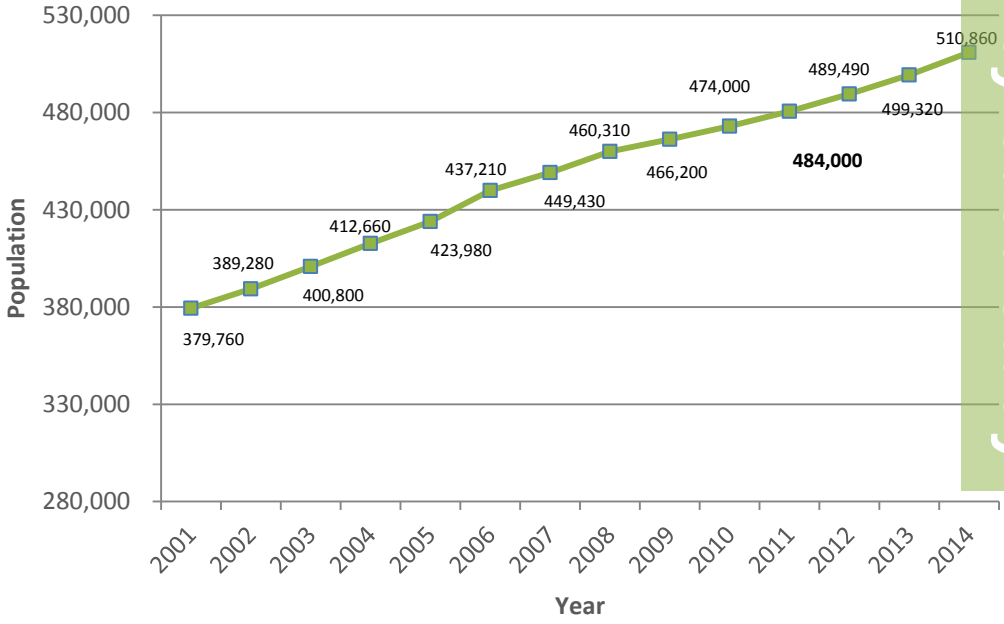
- DPS redundancy / resilience
- System age / development projections
- Phasing of overall system
- System optimization / utilization
- Cost Saving opportunities
  - Early vs. late capital investment
  - Operation Cost
  - Central vs. satellite plants

Regional Context

Rapid Population Growth



Metro Vancouver Population



City of Surrey Population Growth

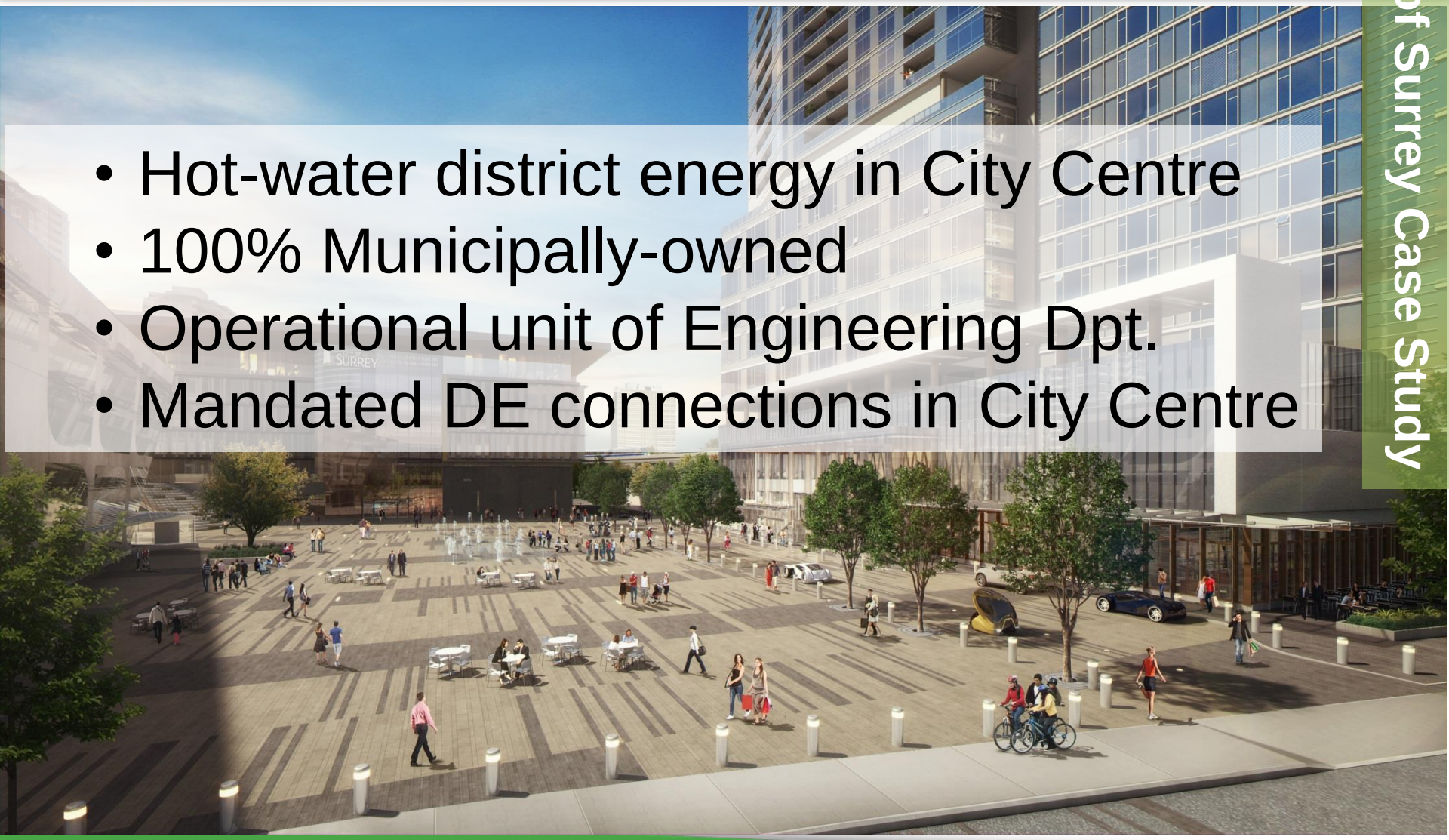
Surrey is the third fastest growing city in Canada.

City Centre Then

1992

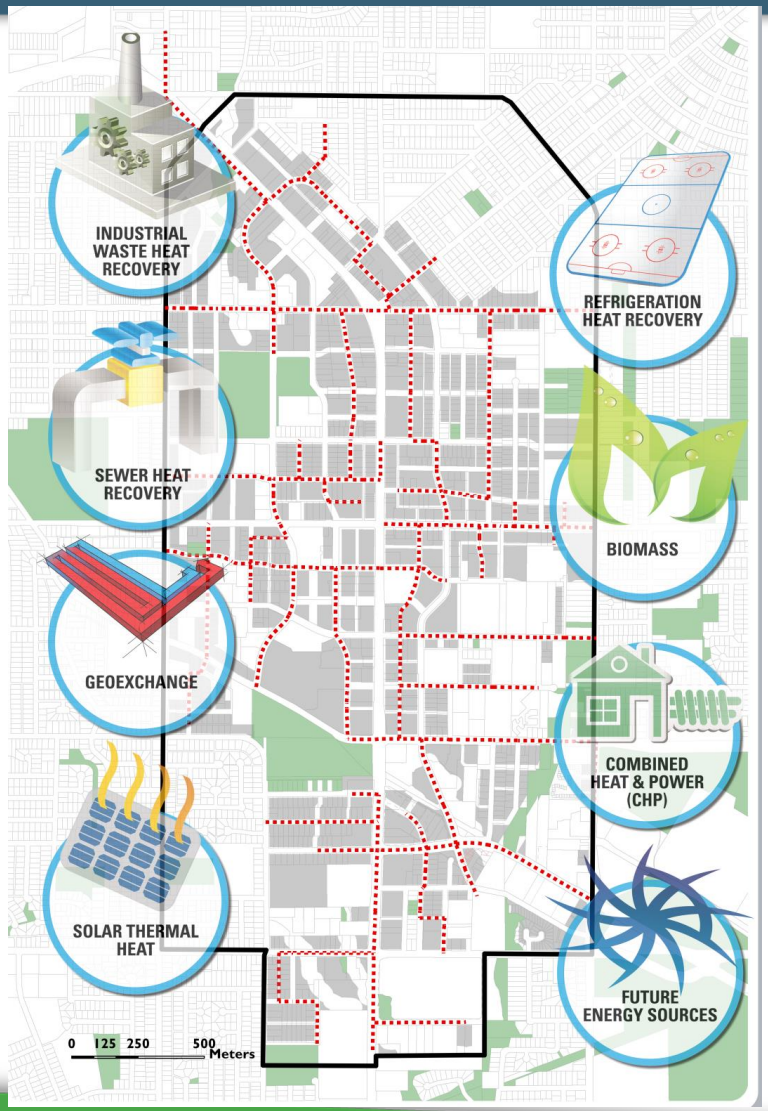
Planned Redevelopment

Surrey City Energy

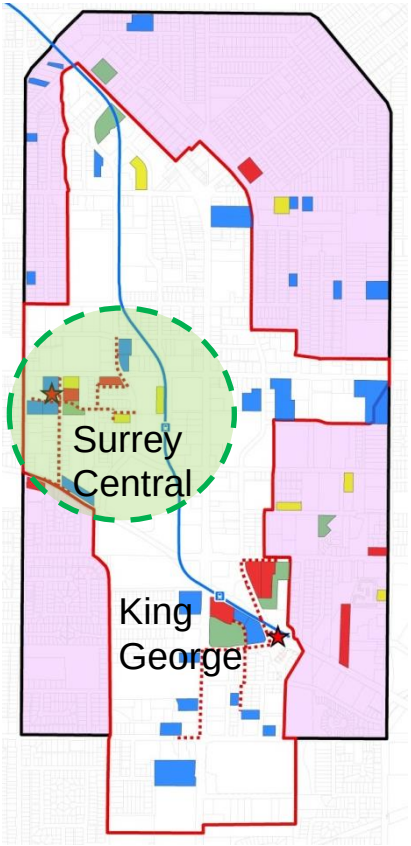


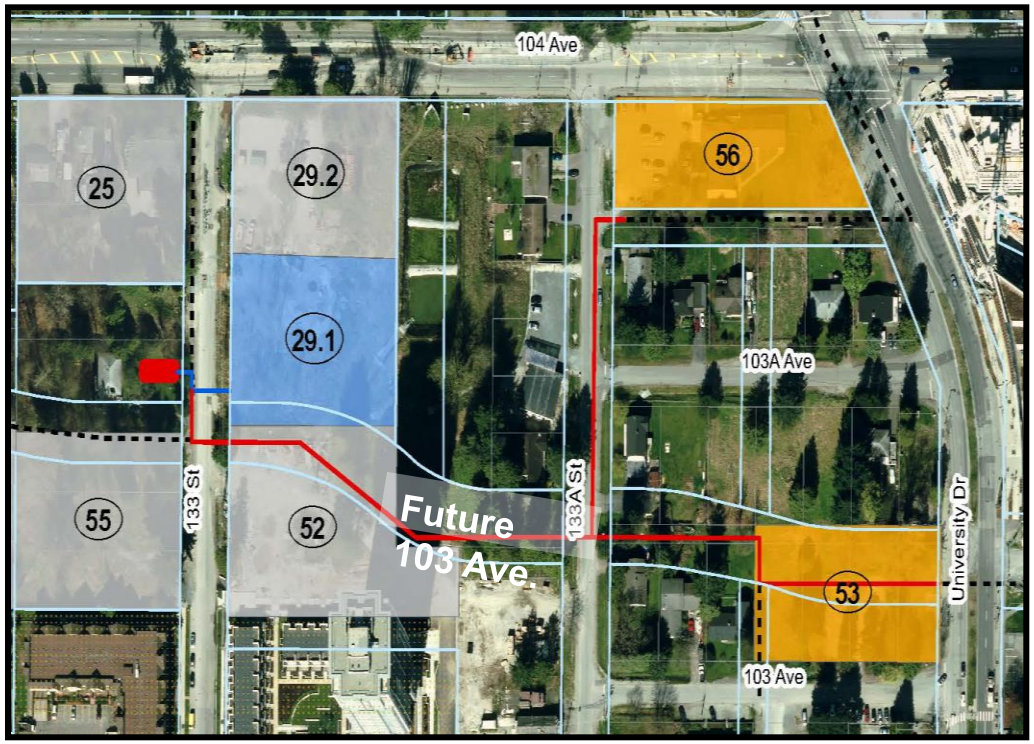
- Hot-water district energy in City Centre
- 100% Municipally-owned
- Operational unit of Engineering Dpt.
- Mandated DE connections in City Centre

Long-term Vision

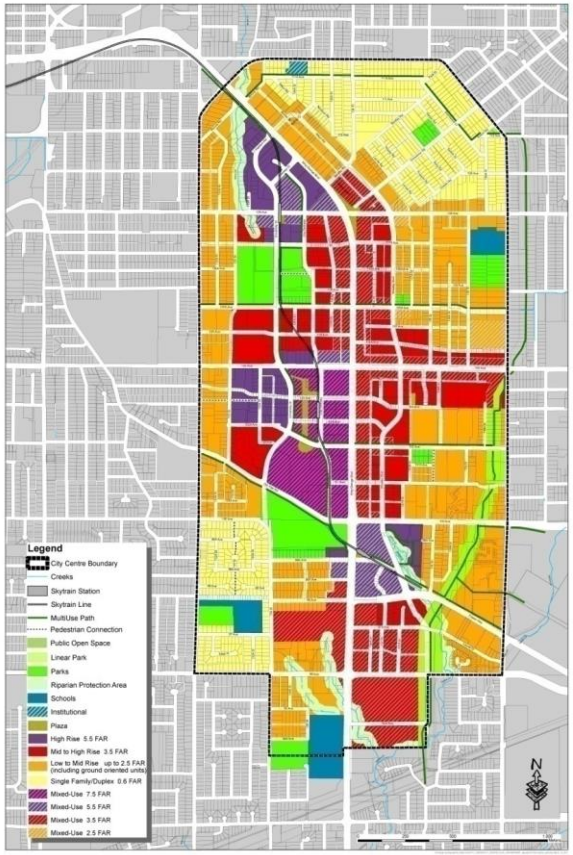


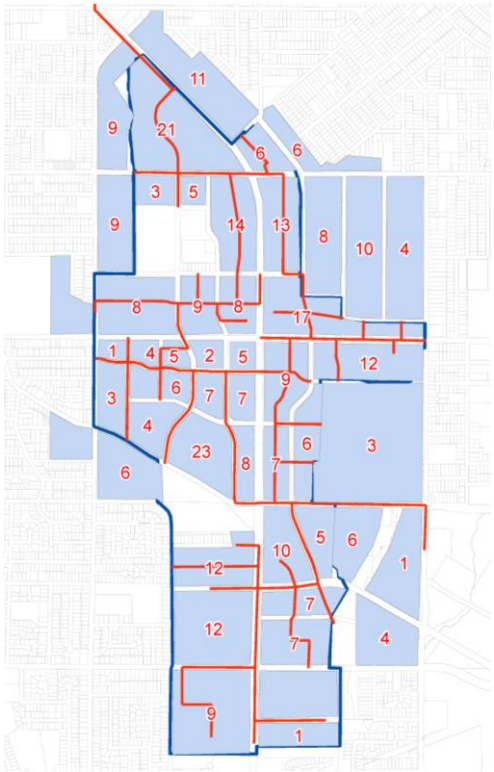
Phase 1 – Nodal Approach





Planning System Expansion





1. Land Use Plan → 2. Load Projection → 3. Pipe Route Optimization

Challenges

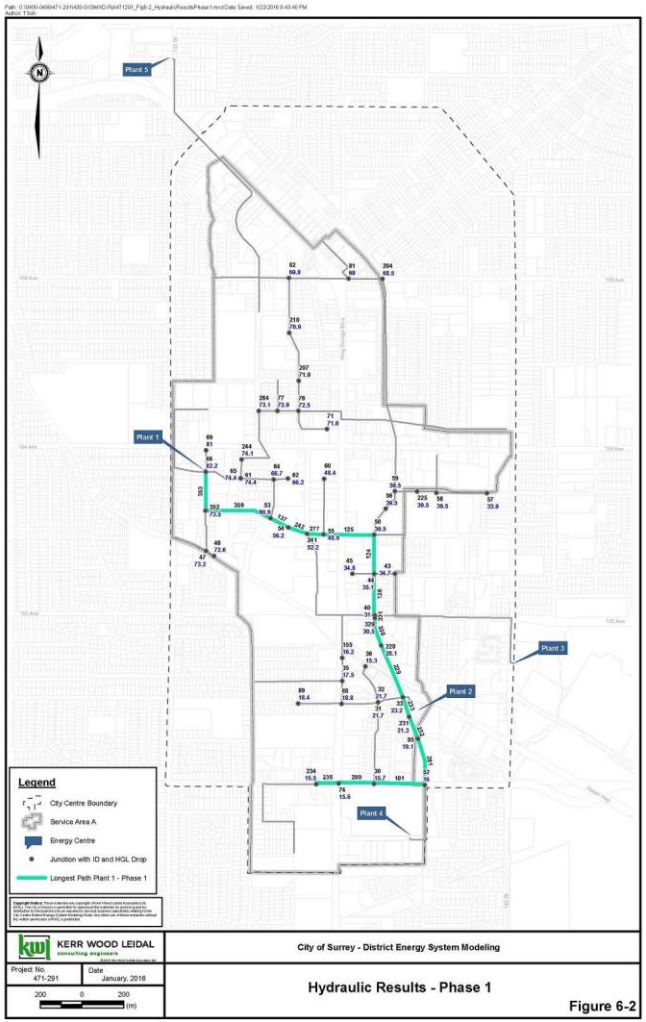
- New DES projected to be one of the largest in North America
- Uncertain timing of future development projections
- Phasing of DPS & Central Plants
- Coordination in a rapidly re-developing city

The Extra Mile - GIS

Link to Geographical Information System (GIS)

- City of Surrey well advanced with GIS
- Hydraulic Analysis software 2 way communication with GIS
- Planned density is the base of demand analysis
- GIS data base for street types basis for DPS routing
- GIS figures facilitate communication between client and engineer

GIS Figures


Plant 1
Plant 2
Plant 3
Plant 4
Plant 5
Legend
City Centre Boundary
Service Area A
Energy Centre
Junction with ID and HGL Drop
Longest Path Plant 1 - Phase 1
KERR WOOD LEIDAL
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City of Surrey - District Energy System Modeling
Project No. 471-291
Date January, 2016
Hydraulic Results - Phase 1
Figure 6-2

Conclusion

- **The Hydraulic Analysis process can bring so much more**
- **Understand your system (Where you are now, and where you want to be)**
- **Set up the ground rules with, keeping seamless communication between the Owner and the Engineer**
- **With the right tools, the output can be right for the application**

Questions ?

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