



Core Area Wastewater Management

Program Development Phase



Making a difference...together

Capital Regional District

Presentation
Technical Advisory Committee
August 12, 2008





The Minister's Approval

- Submit a Summary Report on Program Development status by December 31, 2008
- Submit a Summary Report on the Distributed Wastewater Management Strategy by June 30, 2009
- Submit the procurement strategy by October 31, 2009
- Submit the formal Amendment to the LWMP by December 31, 2009



Strategy for Decision Making

- Continue with the conceptual planning through 2008 to provide the data for decision making
- Conduct a series of workshops with elected officials in spring of 2009
- Adopt a selected wastewater management strategy by late spring of 2009
- Select a procurement strategy by the fall of 2009



Program Development Phase - Conceptual Planning

The Technical Activities

Integrated Resource Management Strategy

Greenhouse Gas Management Strategy

Wastewater Flow Management

Biosolids / Resource Management

Distributed Wastewater Management Strategy

Discussion Papers



Workshops



Summary Reporting



Resource Recovery – What is happening around the world?

Water ... an obvious resource



Resource Recovery – What is happening around the world?

Water

- long global history
- still limited application
- diverse range of possibilities
- planning new development and re-development to maximize opportunities





Landscape Irrigation

- golf courses
- cemeteries
- freeway and street medians
- schoolyards
- parks and playgrounds
- commercial and planned residential yards



The Koele Golf Course on the Island of Lanai, Hawaii, has used reclaimed water for irrigation since 1994.



Environmental Enhancement

- decorative ponds/lakes in golf courses, park, and developments
- creation and/or augmentation of wildlife habitats and wetlands
- stream flow augmentation
- recreational lakes with incidental human contact such as fishing and boating
- recreational lakes with full body contact
- groundwater recharge

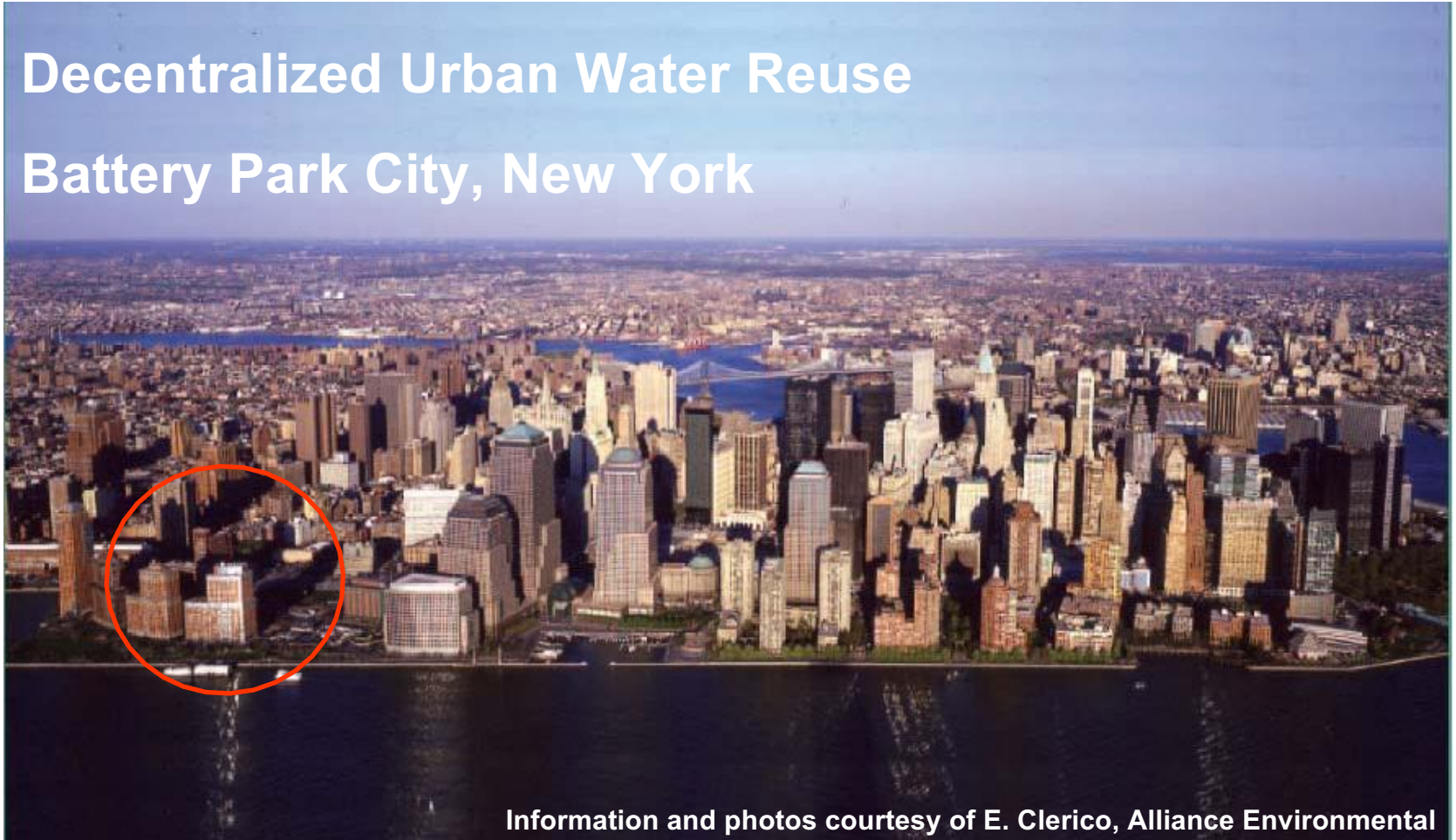


Reclaimed water is used in Nevada to expand an existing wetland habitat



Resource Recovery – What is happening around the world? A water reuse case study

Decentralized Urban Water Reuse Battery Park City, New York



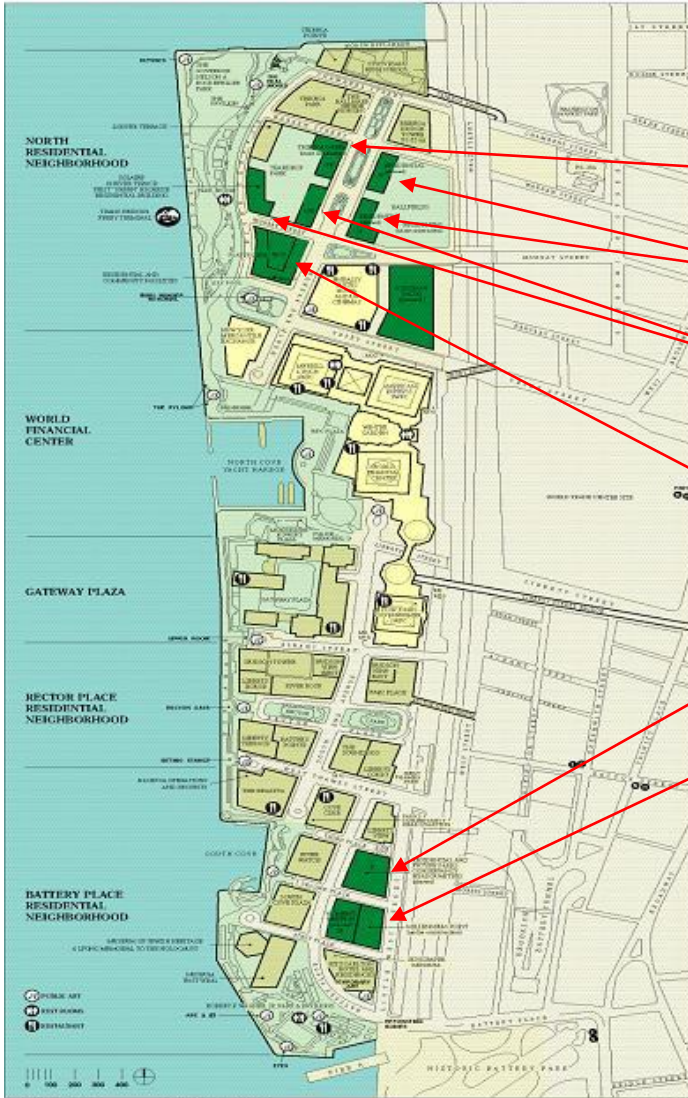
Information and photos courtesy of E. Clerico, Alliance Environmental

Managing micro-watersheds in urban environments – drawing reuse water from multiple sources for multiple end uses





BATTERY PARK CITY



Integrated Water Reuse Systems

- Site 19B – Tribeca Green
- Site 23 – 24 Millstein Properties
- Site 18A and 18 B- **The Solaire** and The Verdesian
- Site 16-17 – Riverhouse
- Site 3 – Albanese Development
- Site 2 – Millennium Point
- The Helena – 57th Street – Durst Development
- One Bryant Park – 45th Street Durst Development – Bank of America

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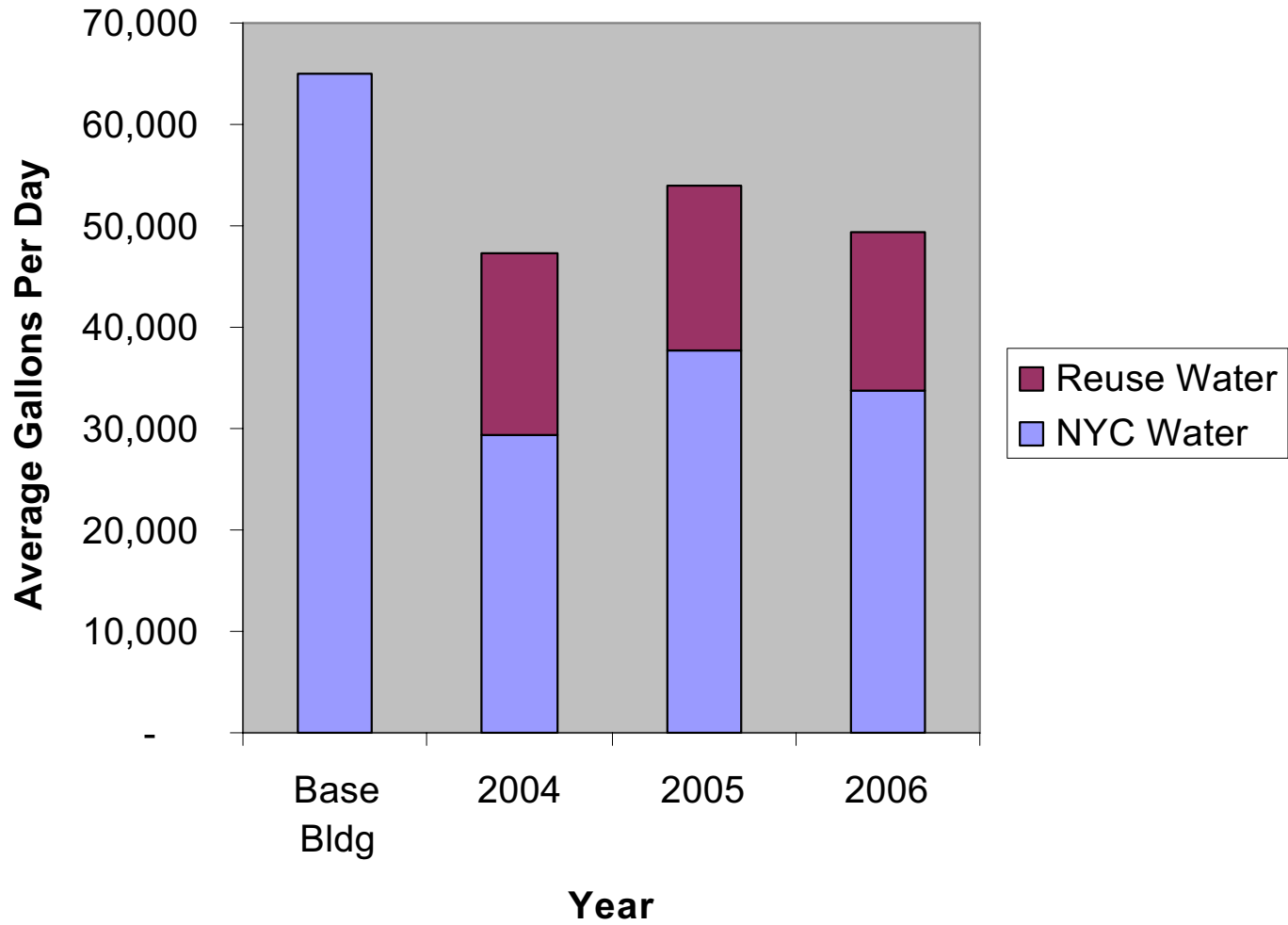
The Solaire Building

- 293 units
- 100 m³/d wastewater treatment facility
- LEED™ Gold Certification
- Water Efficiency earns 5 points under LEED™ rating system
- **48%** reduction in water use
- **56%** reduction in wastewater discharge



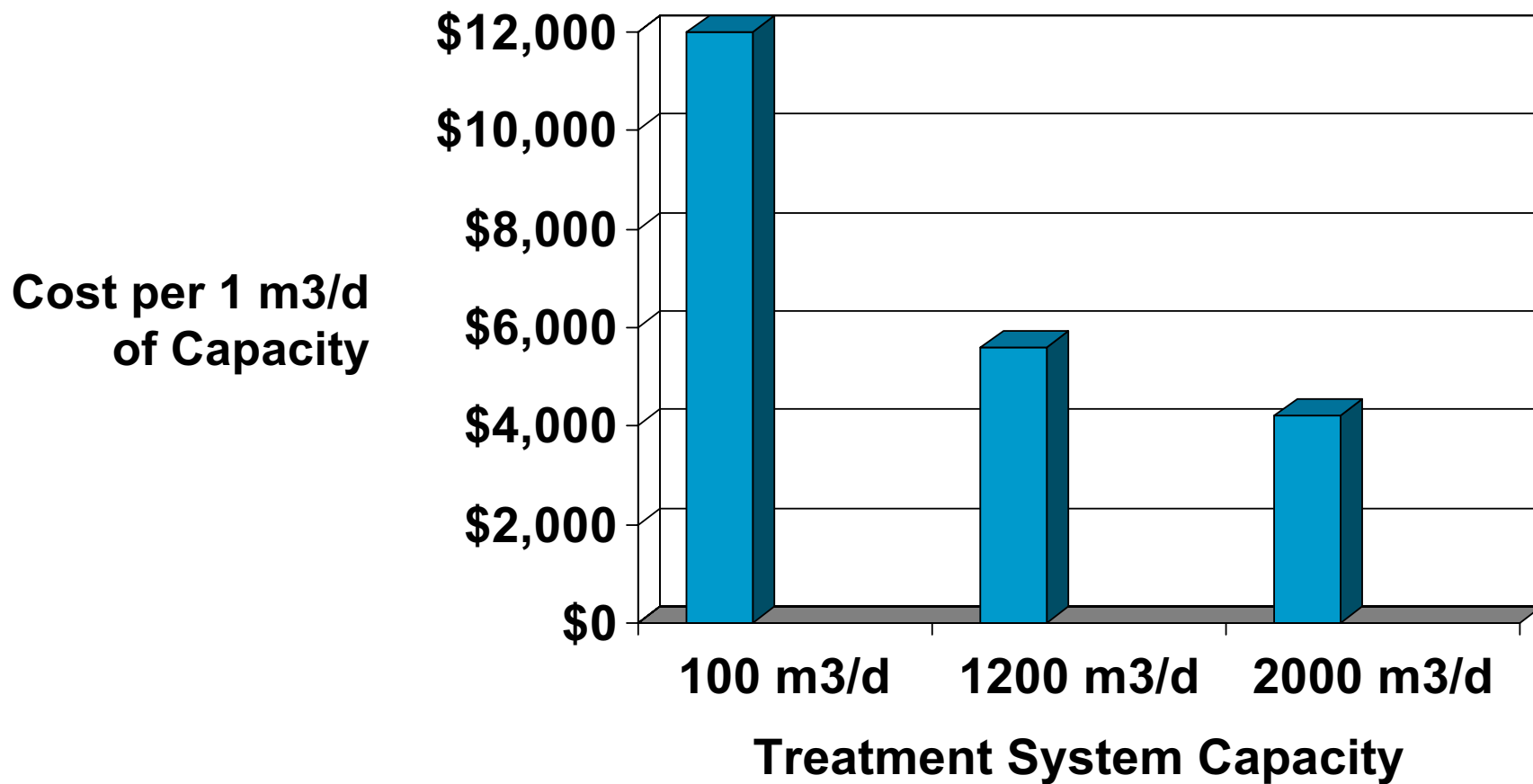


The Solaire Actual Measured Water Use





Preliminary Capital Cost Projections





Resource Recovery – What is happening around the world?

Organics

- biomethane (vehicle fuel / pipeline gas) and energy-from-waste (electricity generation)
- co-management of wastewater and solid waste organics
- rapidly increasing global experience base
- positive BC setting creates CRD opportunities



Resource Recovery – What is happening around the world?

Heat

- relatively new within industry
- wastewater and effluent applications
- significant potential within CRD
- planning new development and re-development to maximize opportunities





Resource Recovery – What is happening around the world?

Hydro Pressure

- capture energy in flowing wastewater / effluent (electricity generation)
- new application of old idea
- local opportunities, minor energy potential within CRD relative to heat and organics

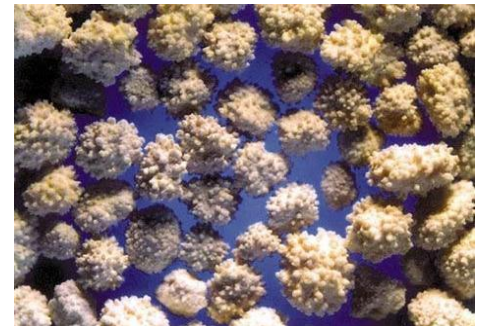




Resource Recovery – What is happening around the world?

Phosphorus

- commercially marketable fertilizer product
- “innovative” development level
- BC at forefront of technology
- greatest CRD application opportunities at larger treatment facilities



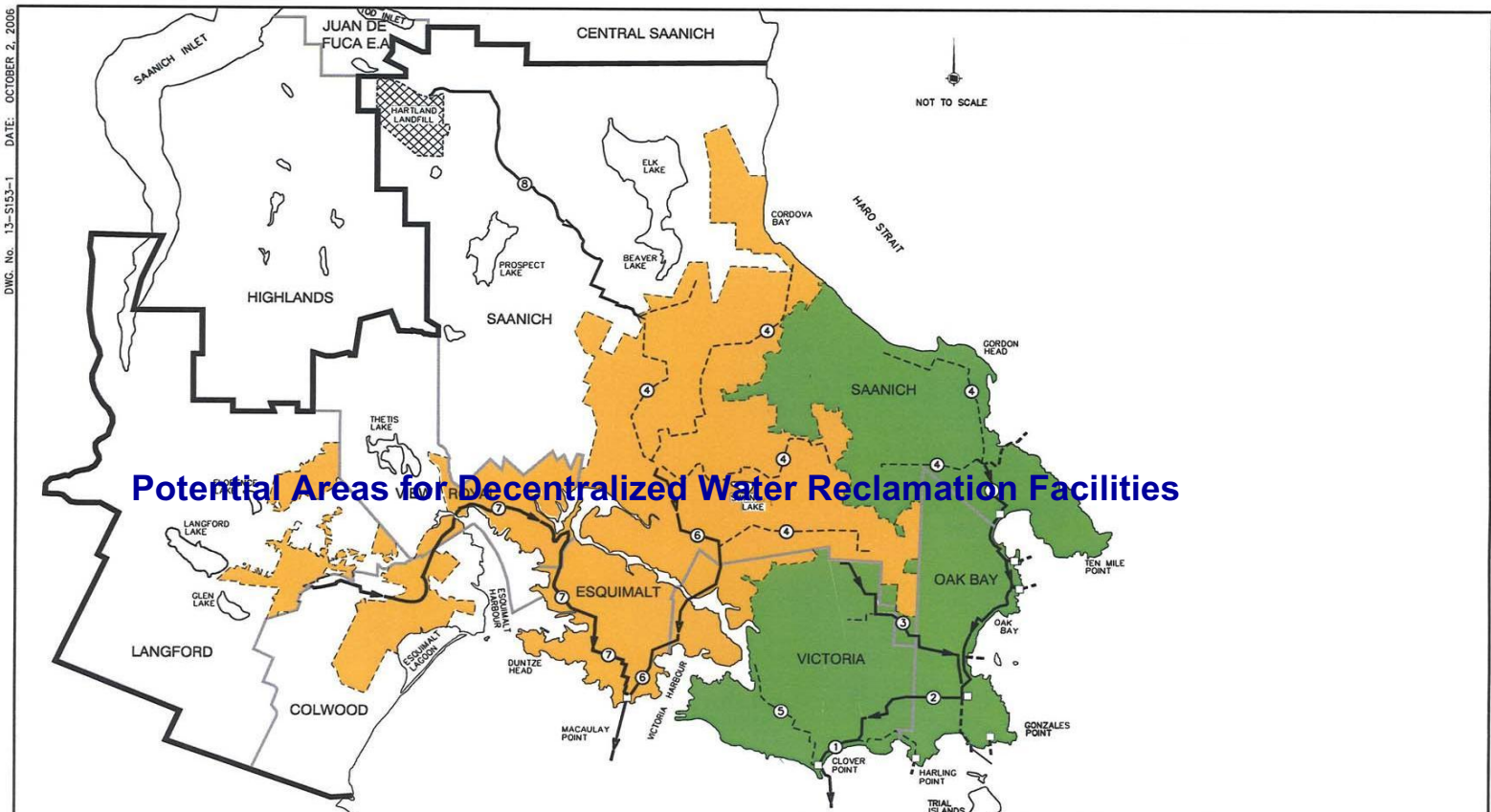
Resource Recovery – What is happening around the world?

Urine Separation

- a fertilizer source
- reduce energy requirements for wastewater treatment
- micro-constituent control
- “embryonic” development level; various pilot projects in Europe
- longer-term prospect on future developments



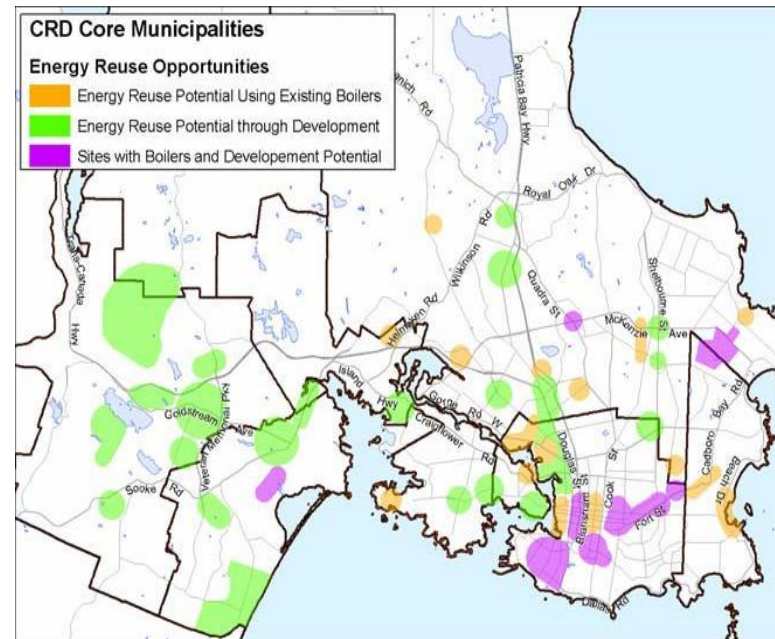
Distributed Wastewater Management What Might It Look Like?





Distributed Wastewater Management Strategy


- Determination of the long-term strategy – how many facilities?
- Assessing resource recovery opportunities with resource availability
- Move from a long-list to short-list
- TBL analysis to determine the optimum strategy





Overview of Approach

- Identify opportunities to match potential with market demand
- Refine the options; two levels of screening
 - Optimize energy resource recovery within market
 - Optimize GHG reduction
 - Technology fit/suitability with development
 - Define range of revenue potential and carbon tax reduction
- Perform triple-bottom-line analysis to define near term actions within a long-term plan
- Evaluate opportunities for water re-use associated with energy recovery facilities.



Land-uses, Densities and S/D Compatibility = Opportunities

- Existing land use
 - Residential densities
 - Institutional facilities
 - Commercial and industrial
- Redeveloping land-uses
- Planned growth/development
- Long-term regional growth strategy
- Supply and Demand Technical Requirements

CRD Core Municipalities Candidate Resource Recovery Areas

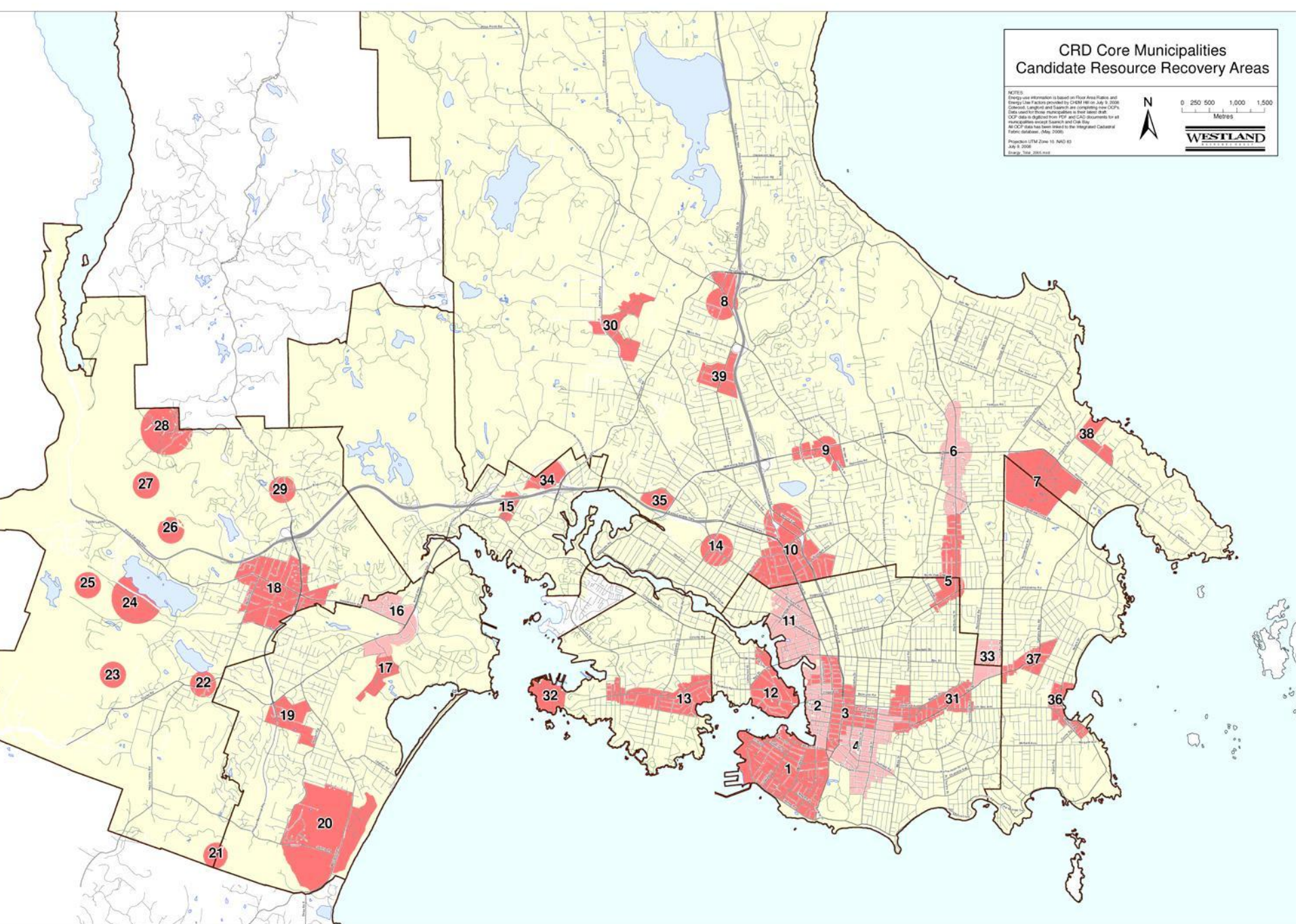
NOTE:
Energy use information is based on Floor Area Ratios and Energy Use Factors provided by CRDM Fall of July 9, 2008. Corrected length and bearing are compared with CIPs. Data used for these municipalities is their latest data. CIP data is applied from VCP and CIP documents for all municipalities except Queen and Oak Bay. All CIP data has been read to the Integrated Coastal Fabric database. (May 2009)

Projection: UTM Zone 18, NAD 83
July 9, 2009
Esri, 2008, Inc.

N

0 250 500 1,000 1,500

Metres





Four Sites Evaluated to Test System

- Douglas Corridor
- Royal Bay
- Olympic View
- Fort Street

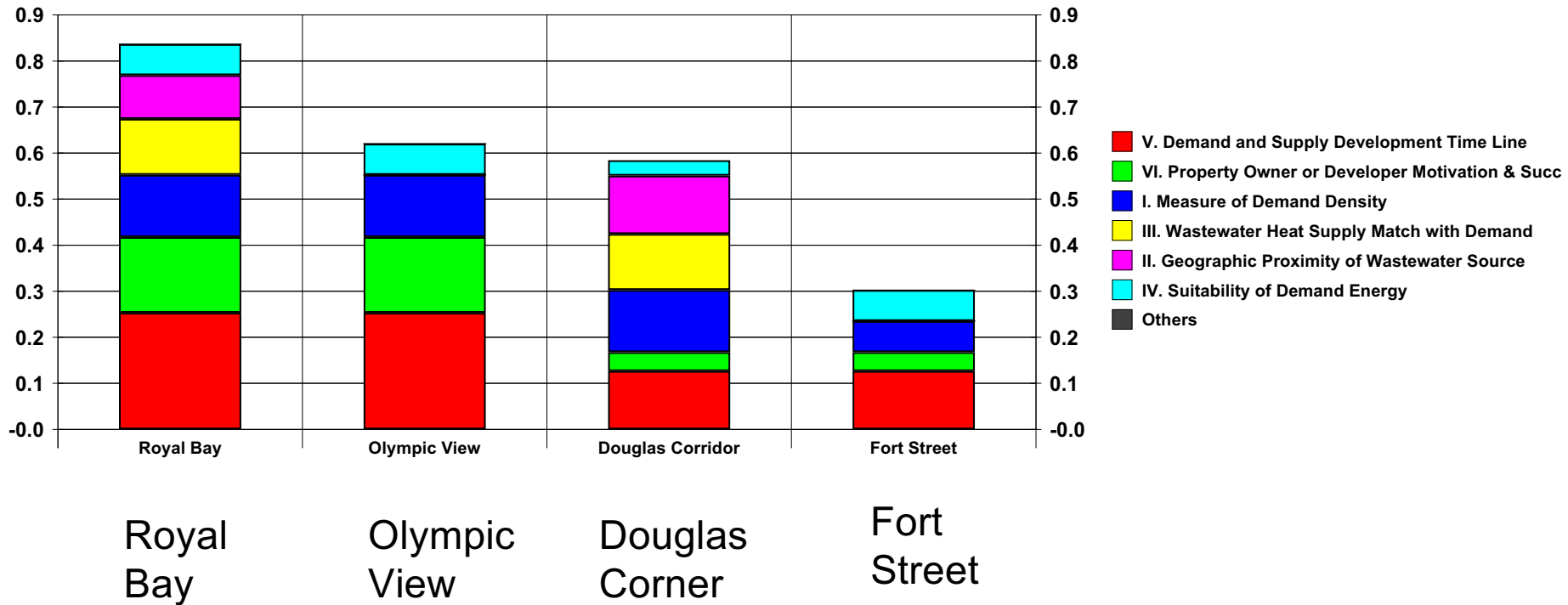


Screening Criteria

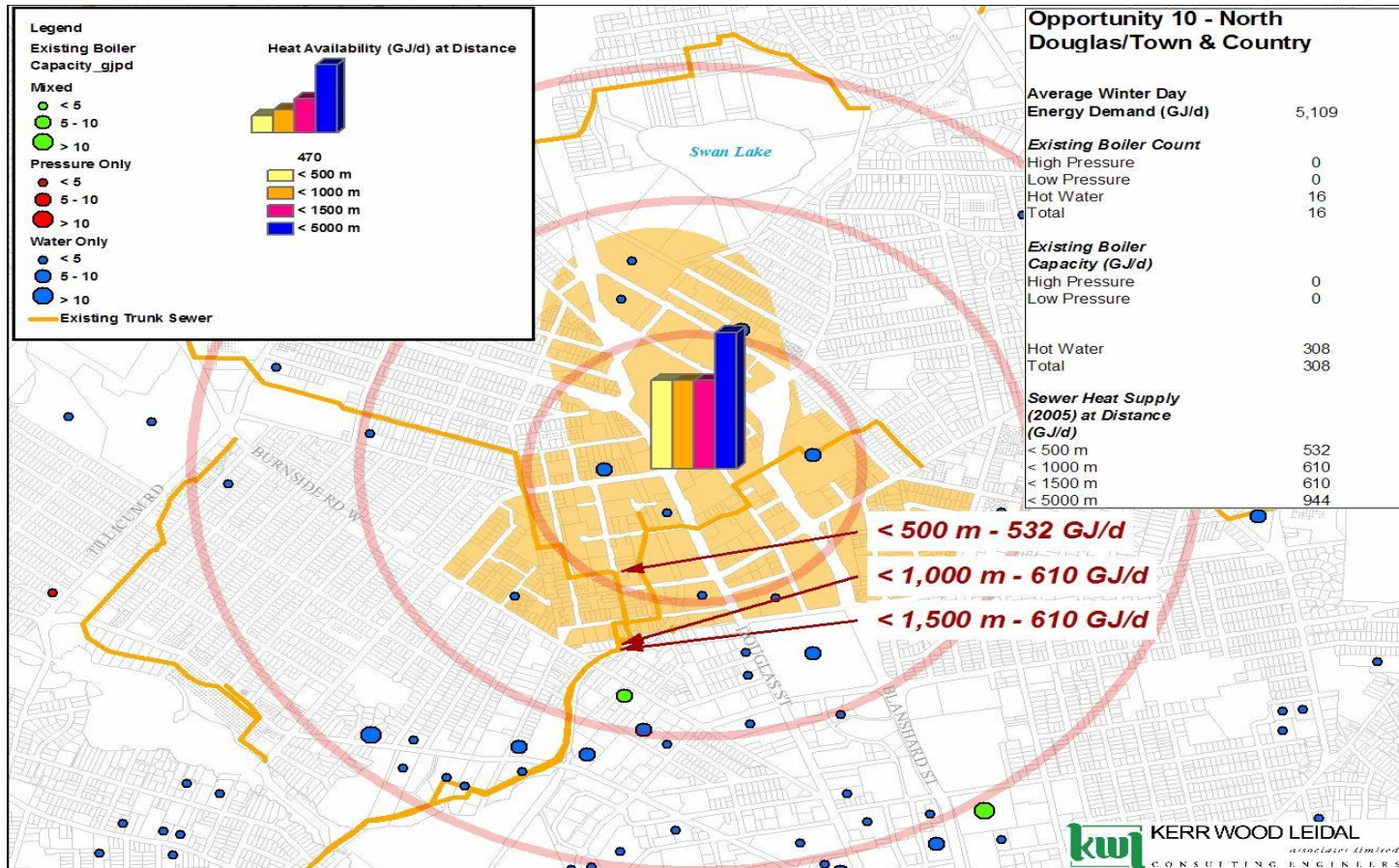
- Density of heat/energy demand
- Geographic proximity of demand to wastewater source
- Waste water heat supply match with demand
- Suitability of demand load to supply requirements
- Potential to use recovered heat by 2020
- Number of landowners or developers in specified area needed for successful energy project
- Institutional/legal barriers to overcome
- Capital available

Contributions by Criteria Example of Analysis

Contributions to Site Selection from
Level:Criteria



Example of Analysis – Douglas Corridor





Potential Distributed Wastewater Management Scenarios

- Maximum GHG reduction
- Early Start -Demonstration
- Maximum use of combined heat energy from effluent and water re-use
- Development/re-development driven schedule and program



Tasks Underway

- Complete rating of all sites
- Match supply side to all sites
- Configure scenarios
- Technology choices by site
- Financial Framework
 - Evaluate scenarios
 - Revenue structure
 - Tax credits
- Concept level project description by site
- Cost estimates and financial evaluation



Financial Evaluation – Key Elements

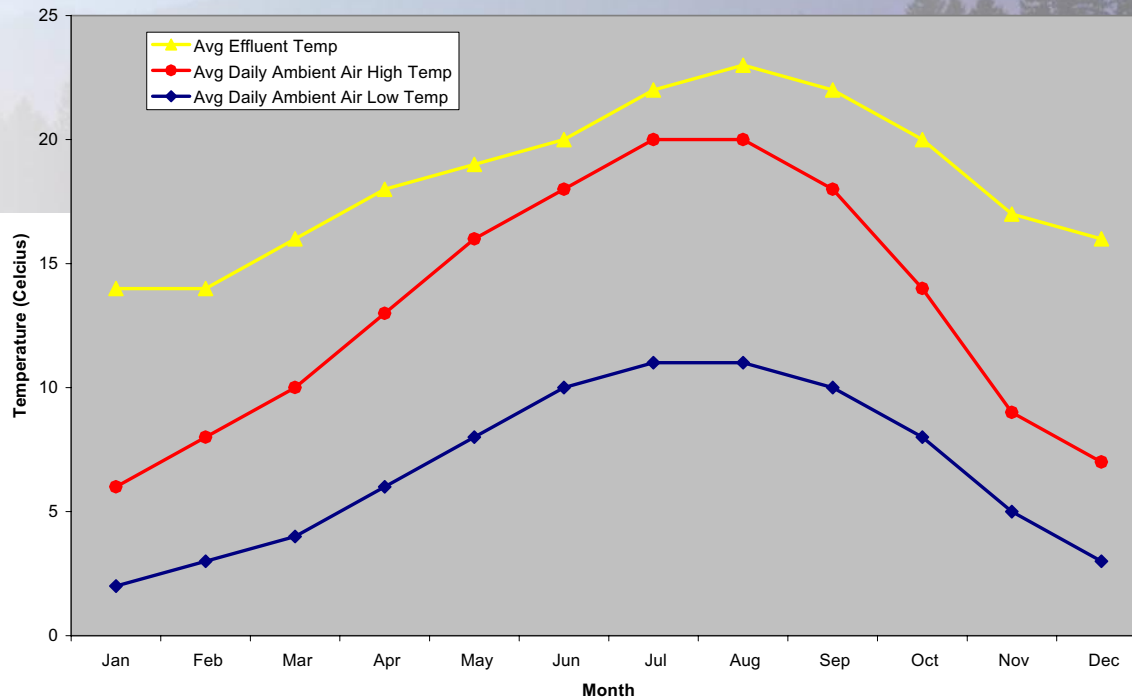
- Broad review of each scenario
- Institutional structure
- Revenue expectations
- Cost estimates; Capital and O&M
- Carbon Tax credit
- Use of grant and loan funds
- Financial impact (Supplier and Customer)
 - Capital
 - O&M



Technical Requirements for Energy Recovery

- Nature of demand and mix of demand
 - Heating
 - Cooling
- Timing of demand
 - Seasonal
 - Diurnal requirements
- Technology compatibility
- O&M requirements

Average Temperatures for Macaulay Point in a Year



The graph shows how the effluent temperature fluctuates much less than the air temperature and maintains a much higher average. It also shows that there is almost always a higher temperature in the effluent than the outside air, creating a potential for heating year round if required.



Figure 2.0: STANDARD HEAT PUMP DIAGRAM

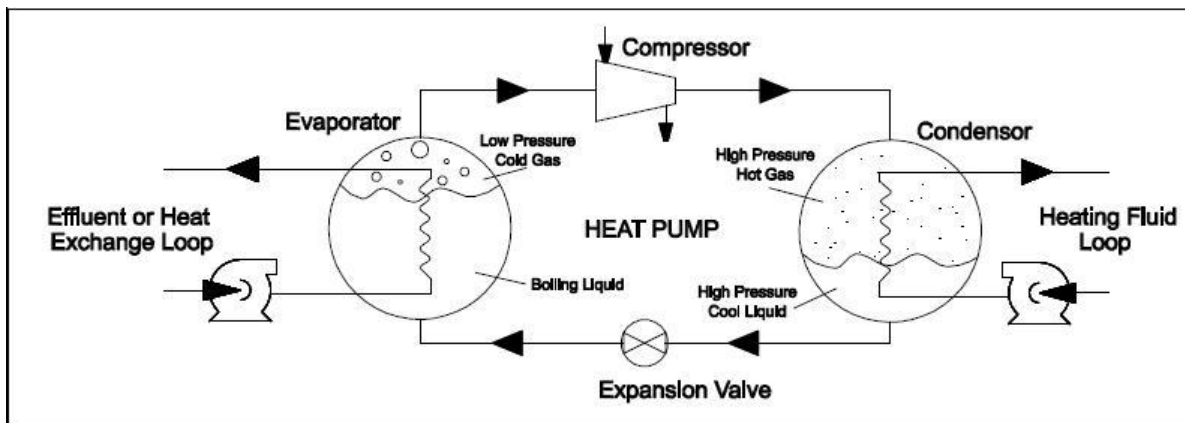
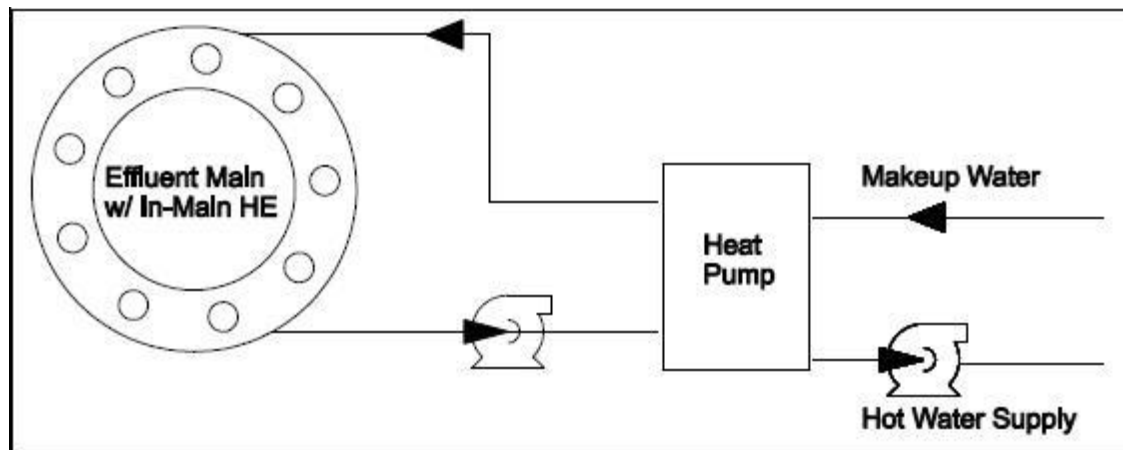
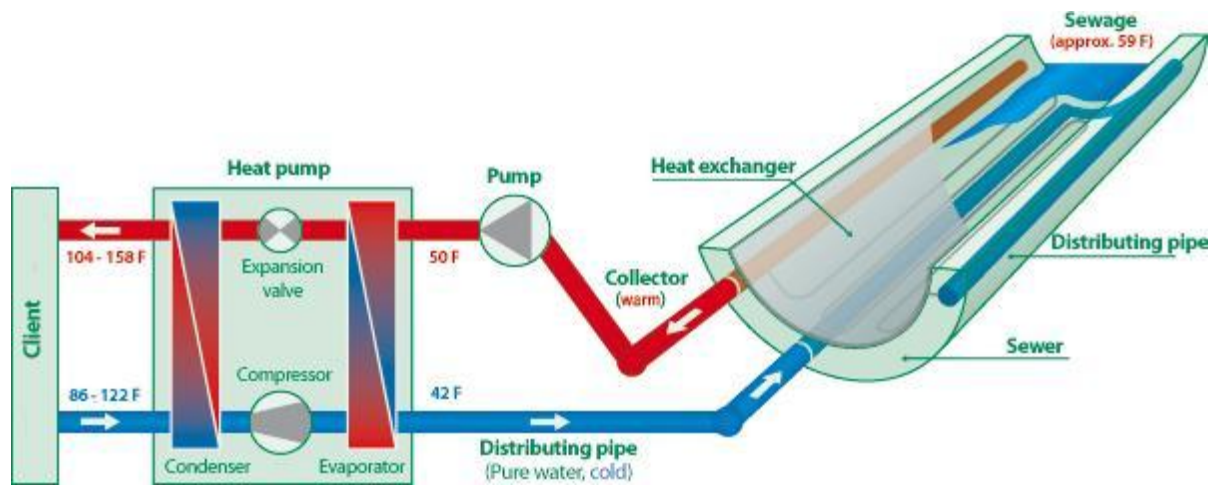


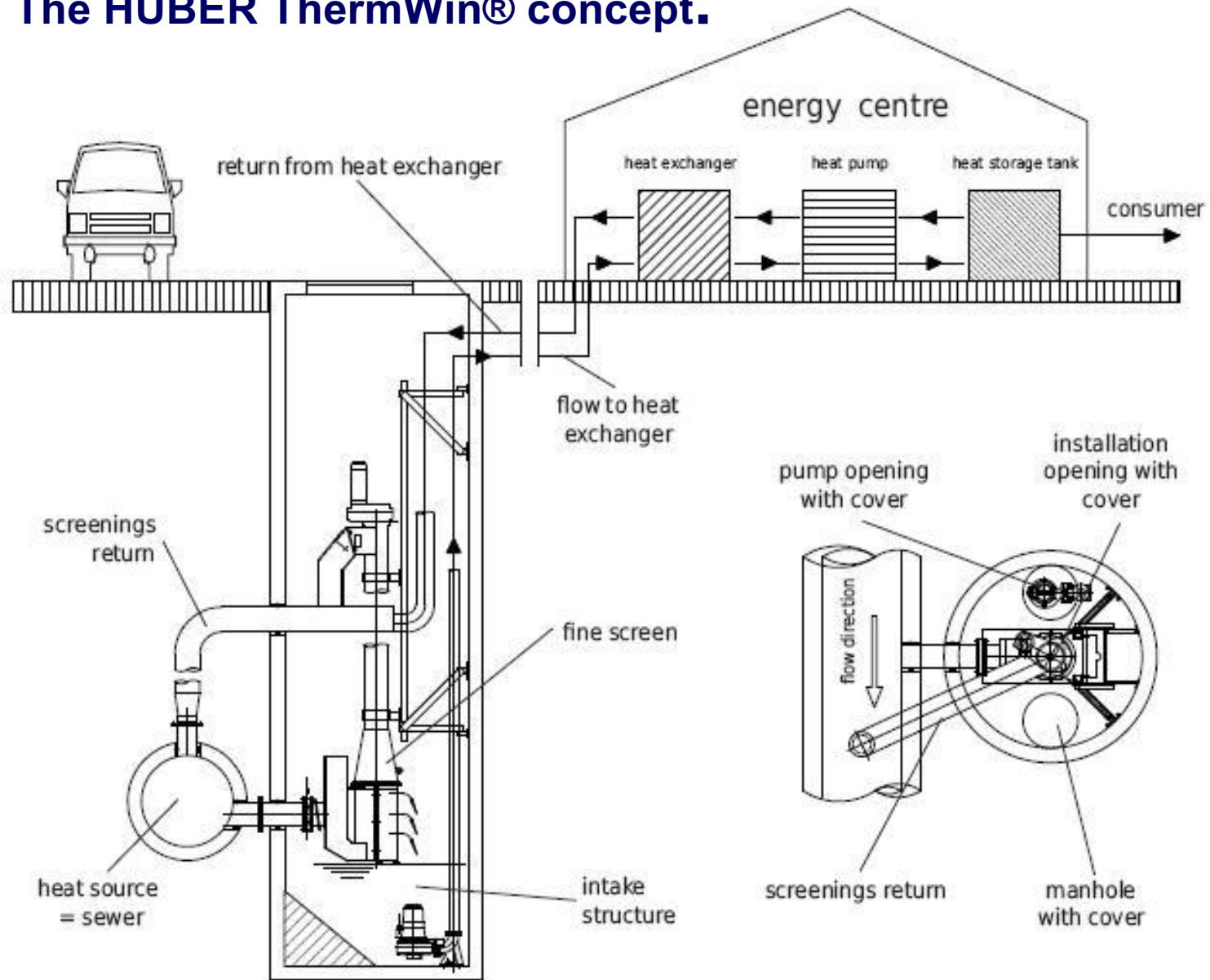


Figure 2.3: IN-MAIN HEAT EXCHANGER SCHEMATIC





The HUBER ThermWin® concept.



Schematic diagram of the HUBER ThermWin® system for the recovery of heat from raw sewage whereby heat exchanger and heat pump are installed above ground

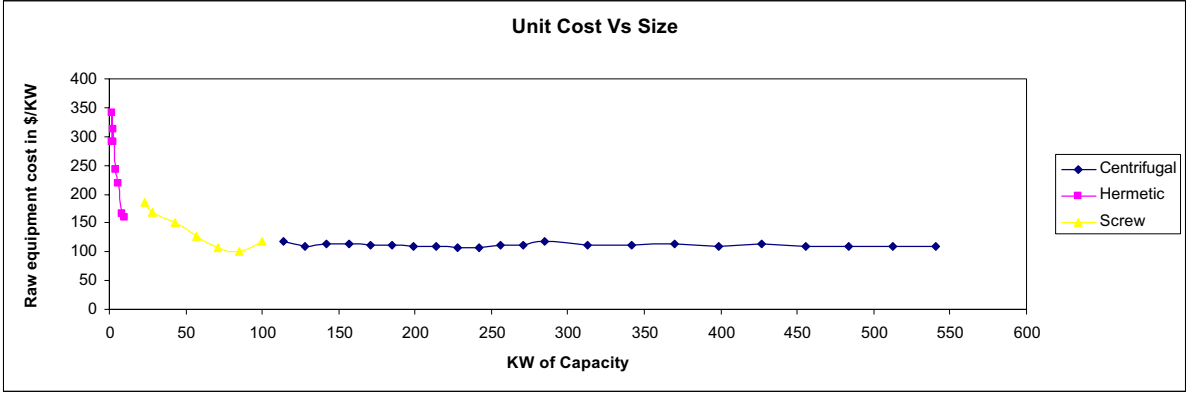


Figure 1 – Raw heat pump equipment cost based on installed unit capacity.



Distributed Wastewater Management Strategy - Schedule

- August
 - Short list completed
 - Scenarios developed
- September/October
 - Technology selection/site
 - Financial/cost estimate framework developed
 - Additional jurisdiction meetings
- October/November
 - Technology layout per site
 - Environmental evaluation
- December
 - Discussion Paper drafted
- First Quarter 2009
 - Financial analysis completed



What We Need To Know:

- Pools: Heating source for pools.
- Heating plant for campus buildings
- Ice rinks: refrigeration system used for ice rinks
- Is energy consumption & energy cost data available?
- Cooling system for campus buildings
- Domestic hot water generation approach
- Capital investment plan
- Mechanical systems life expectancy