

Tri-generation for Downtown Halifax

Presented to:

Environment and Sustainability
Standing Committee



Presented by:



A division of:

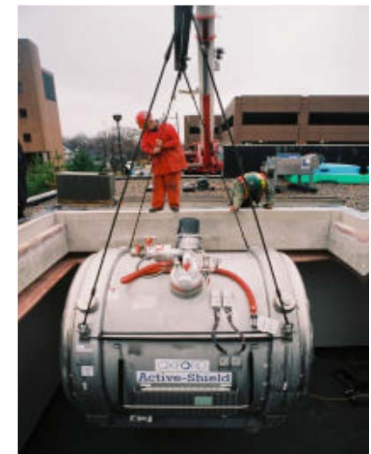


September 6, 2012

About East Port Properties



- Best known as a development solutions and property management company
- Approaching 2 million sf of space under management in HRM and St. John's
- Major clients – HOOPP and Greystone
- Developer of Purdy's Wharf
- First in North America to deploy seawater air conditioning
- East Port Energy (EPE) is a wholly owned subsidiary of East Port Properties Limited
- EPE's mission is to identify, finance, develop and operate green energy infrastructure assets



Terms

- CHP - Combined Heat and Power (Production), sometimes called co-gen or co-generation - electricity production and the capture of waste thermal energy
- Tri-generation = CHP + the production of cooling energy
- DE - District Energy - the conveyance of thermal energy for heating and / or cooling purposes to buildings in the district

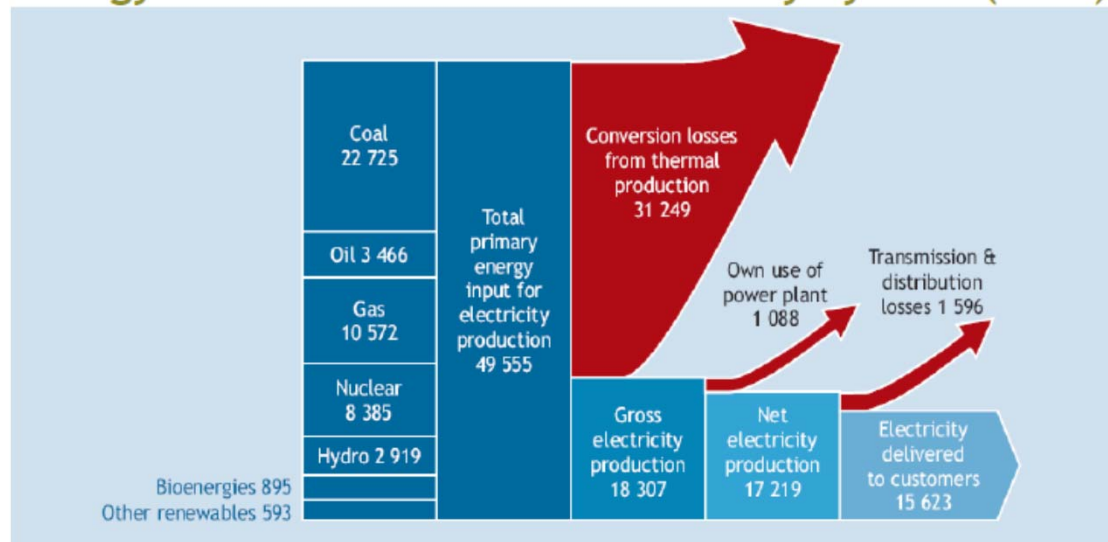
Project Description

- Production of Electricity and Thermal Energy (Tri-generation) for sale to customers:
 - Electricity - produced by using natural gas in high efficiency generators
 - Hot water - produced from “waste” heat recovered during electricity generation and from high efficiency boilers
 - Chilled water - made primarily by passing cold seawater through heat exchangers. Polishing will be achieved with absorption chillers using generator waste heat and with high efficiency centrifugal chillers. All heat rejection achieved with seawater cooling (no cooling towers needed)

Striving for Energy Efficiency

Energy supply inefficiency is a huge opportunity

Energy Flows in the Global Electricity System (TWh)



Source: IEA, CHP: Evaluating the Benefits of Greater Global Investment (2008).

**2/3 of the fuel we use to produce power is wasted --
CHP and district energy more than double this efficiency**

“This graphic comes from a recent IEA publication, the first one dedicated to analysing the prospects for CHP and district energy.”

It makes the very important point that 2/3 of the fuel we use to generate power globally is wasted—simply vented out of the window as waste heat...”

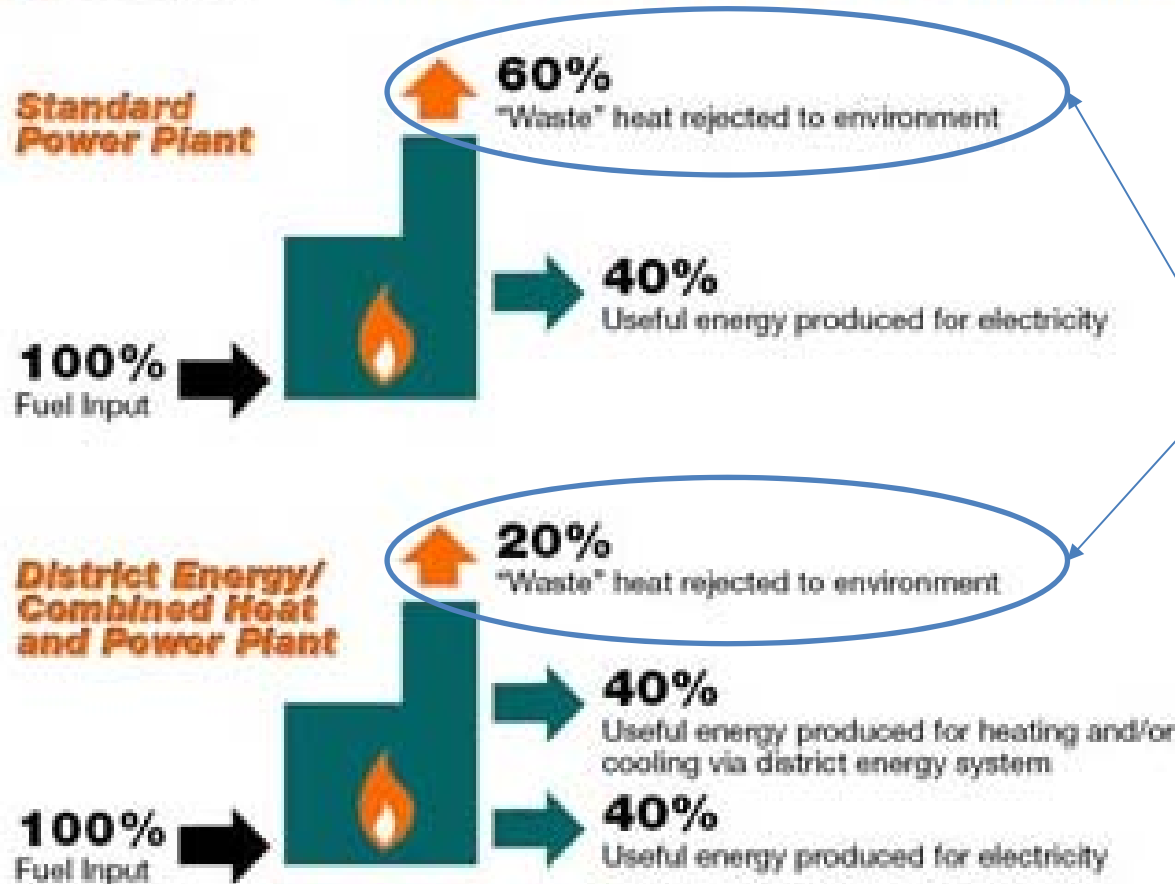
- Jayen Veerapen, Energy Analyst, International Energy Agency

Source: Presentation Notes from “Combined Heat and Power (CHP): a no-brainer route to higher EE” - IPEEI Seminar, Paris, April 22, 2010

CHP and Energy-Efficiency

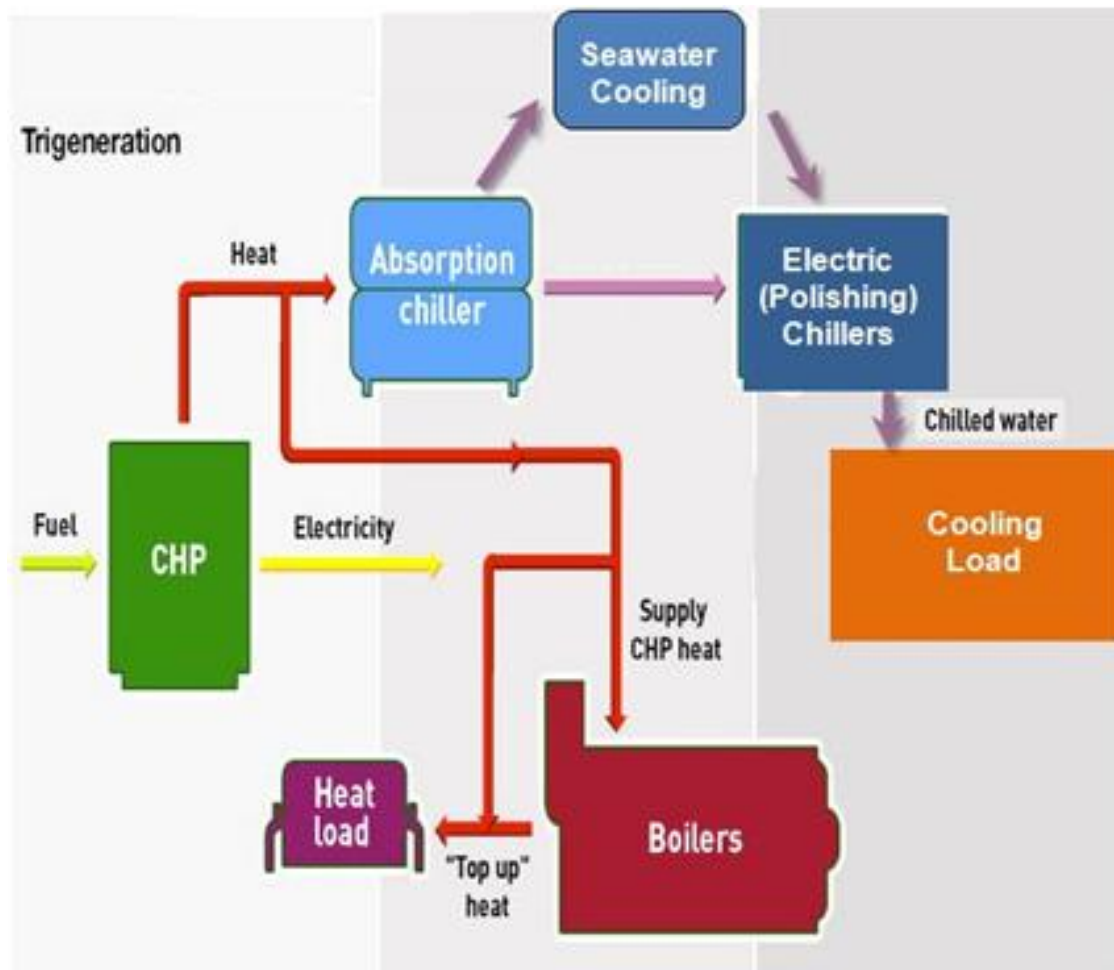


Energy-Efficiency Comparisons



It is District Energy (thermal energy production and distribution) that sets the project apart from pure electricity generation

Tri-generation Concept



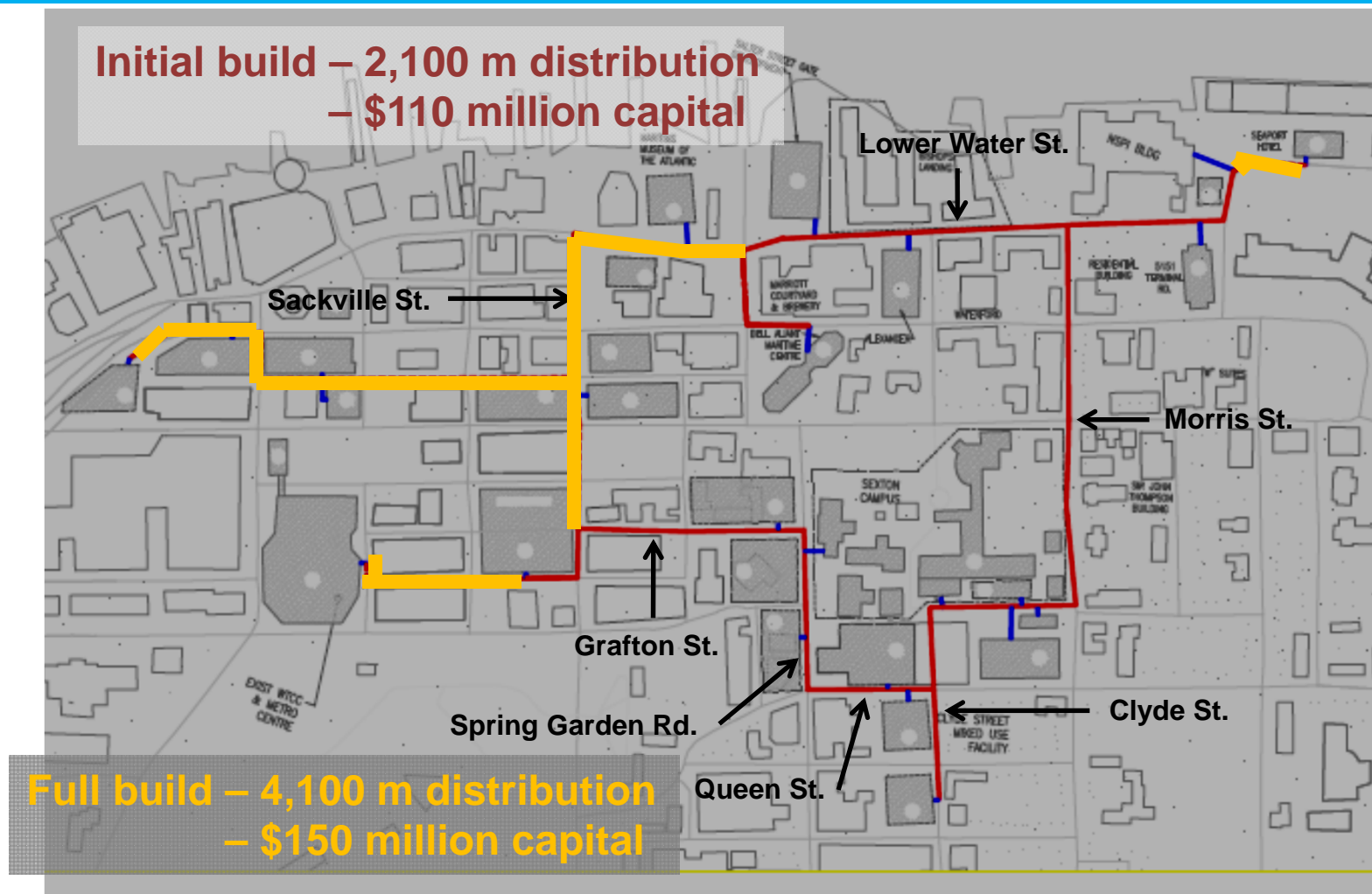
Tri-generation meets:

- An electricity load
- A heating load
- A cooling load

Tri-generation Principles:

- Optimize the efficiency of input fuel by maximizing the amount of useful energy created, captured and utilized (electricity and thermal energy)
- Minimize electricity consumption for cooling

DE System Build-outs



- Initial build-out denoted by solid red lines
- Full build-out denoted by solid red and orange lines
- Hypothetical building connections for illustration

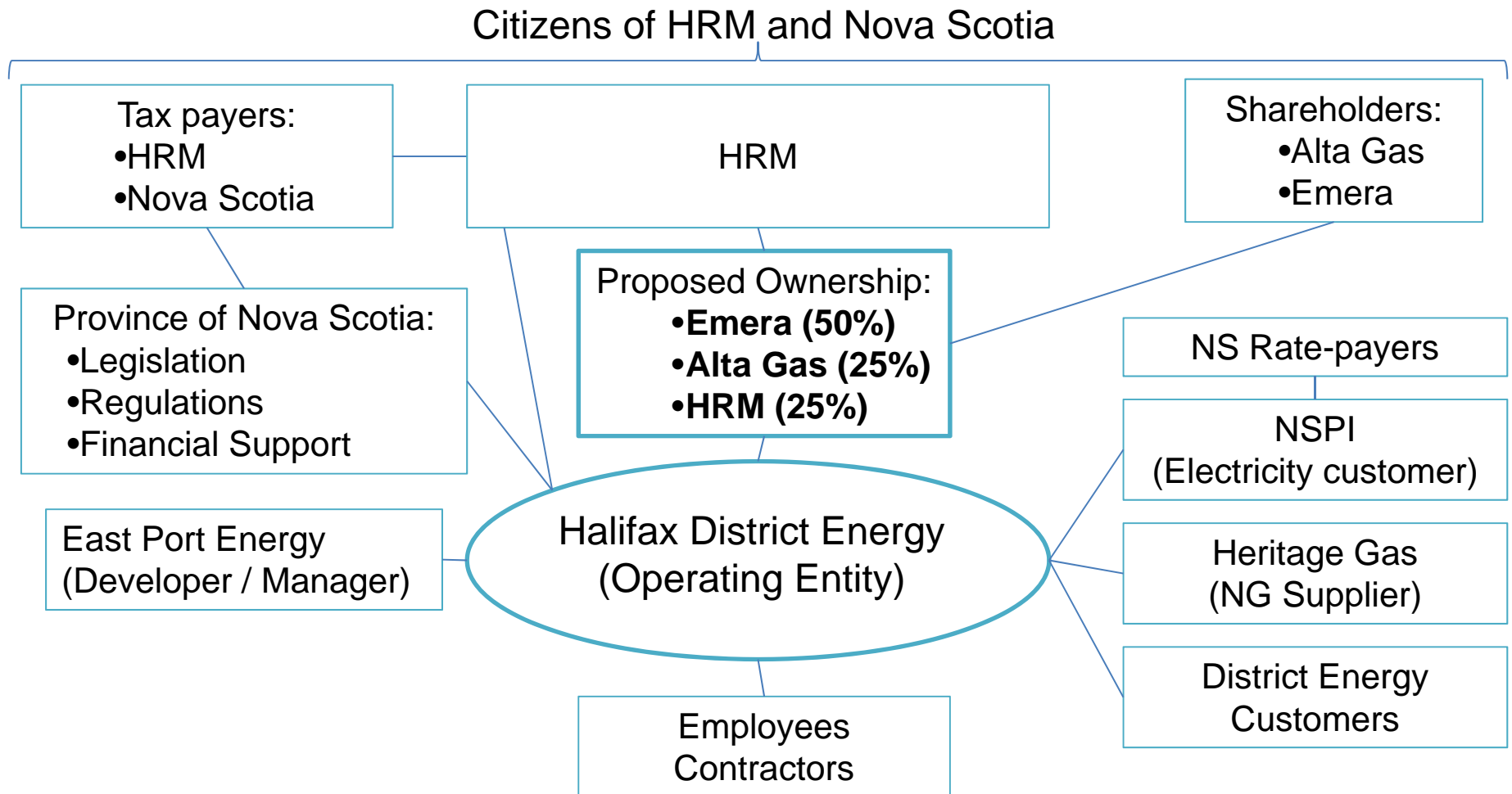
DE Benefits for Building Owners

- Economic
 - Frees up capital
 - Lower maintenance costs – fewer on-site personnel are needed; no chemicals to buy for air conditioning equipment.
 - Increases revenue generating space – if equipment like boilers and chillers no longer need to be housed on site, space is freed up
 - Avoid on-going costs associated with on site cooling and heating – insurance costs and maintenance contracts associated with equipment
 - Improved architectural appearance – the absence of rooftop cooling units and boiler stacks enables a better and more aesthetically pleasing design
- Risk mitigation
 - Improves safety – removal of boilers and fuel storage on site
 - Lowers insurance costs
 - Eliminates vibrations, noise and stacks in buildings
- Green aspects of DE – can lead to rent premiums and more desirable buildings:
 - Reduced noise complaints, better air quality, green roof opportunities

East Port's Activities

- On the job for four years:
 - Began with a market survey to understand DE potential
 - October 2010 - full business plan prepared
 - February 2011 - updated business plan based on better prospect feedback
 - May 2011 - Emera completes initial due diligence
 - May 2011 to present - moulding a workable and fair opportunity for stakeholders

Vision - Stakeholder Relationships



HRM Opportunity

- Ownership in the tri-generation project
- A fair project return
- Possible incremental property taxes and encroachment fees related to in-street piping
- Possible increased natural gas tax revenue
- Alignment with HRM's Community Energy Plan and specifically contributes to HRM greenhouse gas reduction targets
- Access to a platform for economic growth from which DE based opportunities can be advanced locally and globally

Selected Project Benefits

Estimated Benefits (Initial Build-out Scenario)

<u>Benefits</u>	<u>Notes</u>
Emission Reductions <ul style="list-style-type: none"> • GHG reduction per year - 98,643 Tonnes • SOx reduction per year - 1,590 Tonnes • NOx reduction per year - 120 Tonnes • Mercury reduction per year - 2 Kg 	<ul style="list-style-type: none"> • Versus NSPI fleet (2009) • Represents yearly, steady-state reductions as of 2018
Energy Saved (by customers choosing DE option) <ul style="list-style-type: none"> • Natural Gas saved per year - 143,015 GJ • Electricity saved per year - 4,189 MWh 	<ul style="list-style-type: none"> • Yearly saving from co-gen as of 2018 • Yearly savings from seawater cooling as of 2018
Jobs Created <ul style="list-style-type: none"> • Construction - > 900 person years • Equipment maintenance - approx. 30 F/T • Operations and management - approx. 15 F/T 	<ul style="list-style-type: none"> • Finite construction benefit • Ongoing benefit once operating • Ongoing operational benefit

HRM's Community Energy Plan's Vision (2007) - *"In partnership with other agencies, HRM intends to achieve the most significant improvement to energy sustainability, security, renewable technology, and environmental emissions among similar sized cities in Canada over the next 10 years."*

Why Now?

If thermal energy contracts cannot be negotiated soon the district energy opportunity for downtown Halifax may be lost for a generation.

Needed Now

- A commitment by HRM to preparing and finalizing all of the agreements necessary to allow the tri-generation project to move forward
- Asks of HRM:
 - Negotiate and finalize a ownership/equity agreement with Emera and Alta Gas
 - Negotiate and finalize a management and development agreement between the project owners and East Port Energy
 - Pursue and finalize agreements with the province of NS and its agencies with respect to project financing (for the project and HRM's long term ownership)
 - Participate in the drafting of all legislation required to enable the project and agreements

Summary

- Project offers HRM a leadership position in a conspicuously green project
- Project helps HRM reach sustainability goals:
 - climate change mitigation
 - increases our overall community energy efficiency
 - improves our energy security going forward
- Project is perception changing
- Project offers a foundation to do more of the same

Proposed Recommendation

1. That the Environment and Sustainability Committee of HRM's Council endorse that the environmental benefits of the project are sufficient and will create needed civic infrastructure that will serve the environmental and sustainability goals of HRM, subject to items in 2. being addressed.

Proposed Recommendation

2. HRM will participate in the positive study of the project - i.e. identify ways to facilitate the project's construction and operation:
 - HRM must determine that a combination of the incremental project returns, municipal taxes, encroachment fees and other relevant revenue sources are sufficient to carry and retire related debt
 - HRM must gain assurance that it have will the legislative right to participate as a minority public partner in a private company
 - HRM must determine that a sufficient up-front (project) loan will be made available by the Province of Nova Scotia
 - HRM must be satisfied that a loan from the Municipal Finance Corporation for this project share does not crowd out its borrowing capacity for other HRM projects
 - HRM to engage will all other private and public stakeholders in the project:
 - engage with other equity partners in establishing a co-ownership agreement that properly protects HRM's public interest and
 - engage in any other agreements necessary for the project



THANK YOU

Some Plant Metrics

- Electricity:
 - 22.5 MWe (3 – 7.5MWe reciprocating engines)
 - Anticipated generator uptime - 94.5%
 - Expected simple cycle heat rate - 8.25 GJ/MWh
 - Expected co-gen cycle heat rate - 5.48 GJ/MWh
- DE design capacities at full plant build-out:
 - 58 MWt (heat recovery from electrical generation plus high efficiency boilers)
 - 14,500 Tons (cooling from seawater, absorption chiller, and polishing from centrifugal chillers)