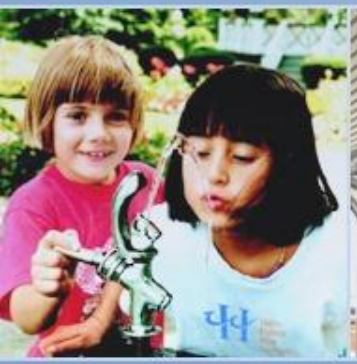
Halifax Water

Renewable Energy Projects

Presentation to:

HRM - Environment & Sustainability Standing Committee - June 7th, 2012



Striving for World Class

Overview

- Energy from Bio-Solids
- Energy from Water
- Wind Energy Projects Update

Halifax Water

Energy from Bio-Solids

Energy from Bio-Solids

Halifax Water

Energy from Bio-Solids

What are Bio-Solids?

- Organic material (sludge) obtained from wastewater treatment process.
- Minimal Options for use: fertilizer/soil amendment or as a renewable/sustainable energy source.
- Bio-Solids are **NOT** Municipal Solid Waste (MSW).

Energy from Bio-Solids

Regional Solutions

- Ontario – Government commitment to develop bio-solid power programs. Sewage bio-solids are defined as “bio-mass” under the Electricity Act and are permitted for use under the Environmental Protection Act.
- California – using bio-solids for green energy is the new opportunity. “Bio-solids Power Generation Facilities”
- Europe – Long history of recycling bio-solids for green energy generation.

Energy from Bio-Solids

Bio-Solids in HRM

- Produced by Halifax Water's wastewater treatment plants.
- Currently produce ~ 30,000 Wet Tonnes/year.
- All currently processed into N-Rich ®, a "Class A" soil amendment, and labelled under the "Fertilizer Act".

Halifax Water

Energy from Bio-Solids

Existing Facility

- Produces N-Rich® soil amendment.
- Uses significant amounts of energy (Natural Gas) at significant expense.
- Can also produce a N-Viro Fuel®.

Energy from Bio-Solids

N-Viro Fuel ®

- N-Viro Fuel® is a renewable fuel source having ~ 50% of the energy of Coal.

- N-Viro Fuel® will be produced using a patented process developed through research conducted by N-Viro and Halifax Water.

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Energy from Bio-Solids

Proposed Project

- Modify existing BPF to install a 2.8 MW Bio-Mass / Bio-Solids Combined Heat & Power (Co-Generation) Facility.
- Produce ~20 GWh/yr of *Electrical Energy* for sale under COMFIT program (Bio-Mass Pilot).
- Produce ~110 MMBTU/yr of *Thermal Energy* to be used in the production of both N-Viro Fuel® and N-Rich® soil amendment.

Energy from Bio-Solids

Proposed Project

- Will re-use Fly/Bottom Ash as a supplement for the production of N-Rich®.
- Will offset ~25% of the current energy used by Halifax Water with a renewable, sustainable energy source.
- Will use Bio-Solids (N-Viro Fuel ®) and Bio-Mass as a fuel source.
- Will not impact the availability of N-Rich ® soil amendment.

Energy from Bio-Solids

Project Details

- Estimated Cost ~ $11.0 MM CDN
- Estimated Return on Investment ~ 16%
- Estimated Simple Payback ~ 7 Years
- Located adjacent to existing BPF
- Supply heat energy to BPF

Energy from Bio-Solids

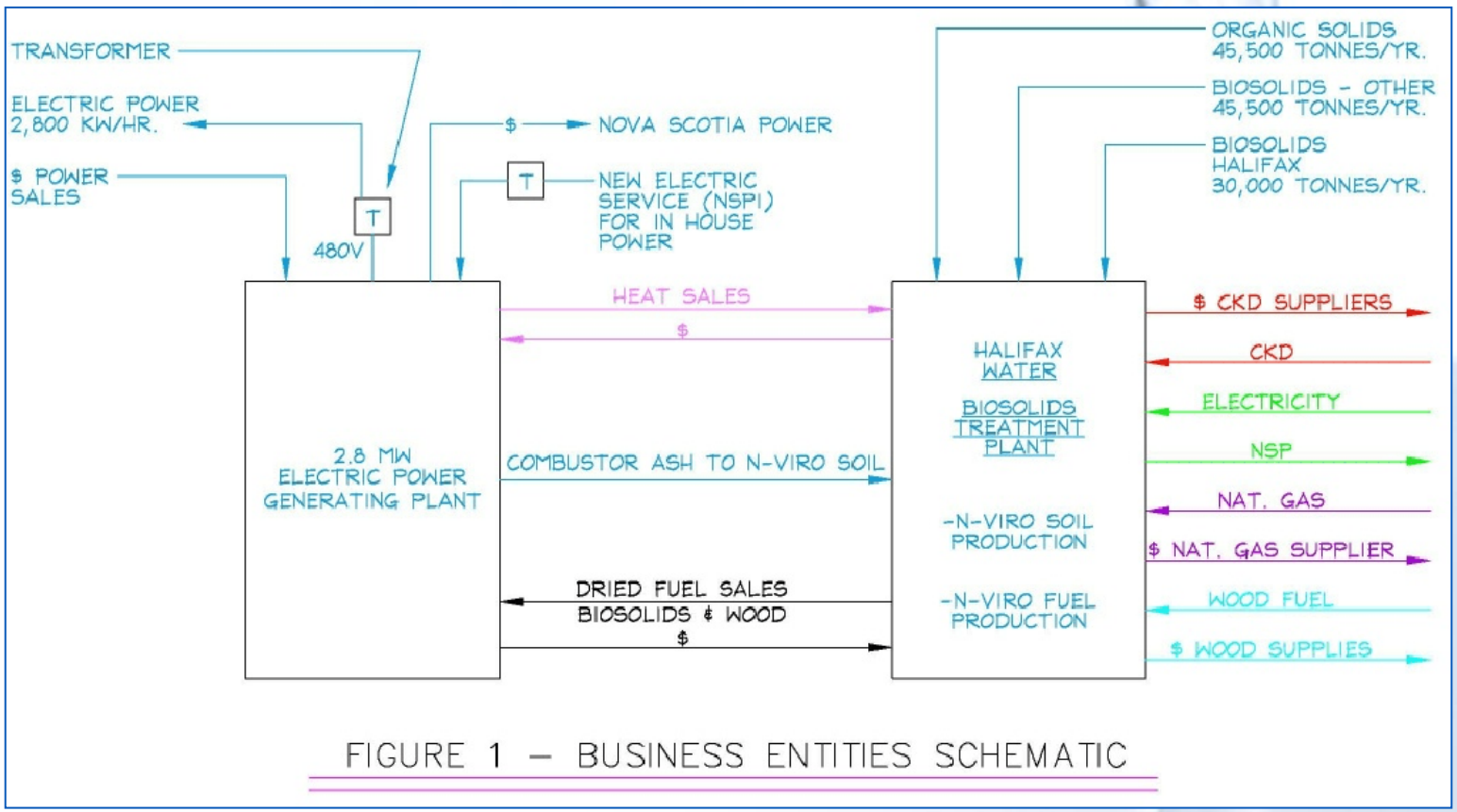
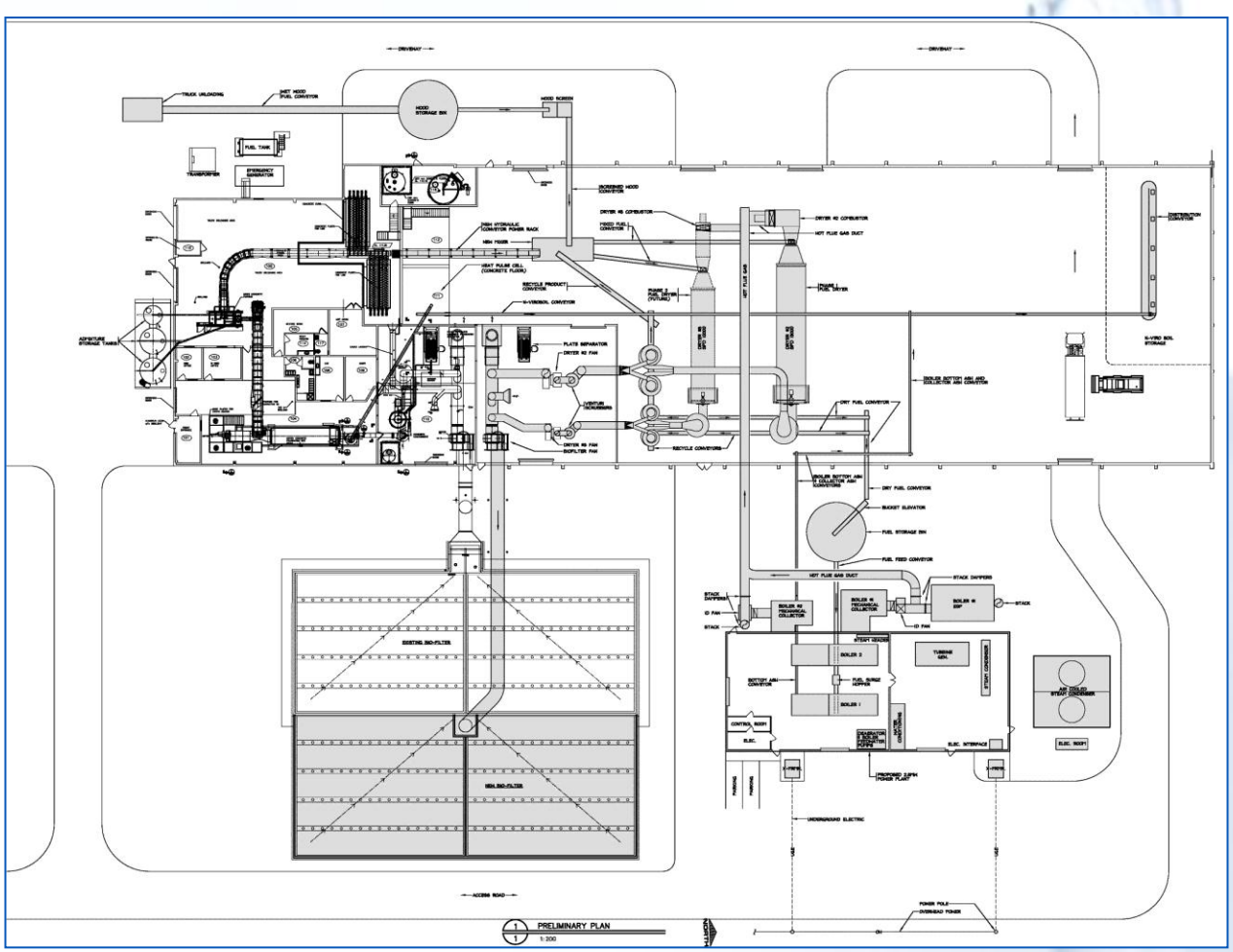


FIGURE 1 – BUSINESS ENTITIES SCHEMATIC

Halifax Water

Energy from Bio-Solids



Energy from Bio-Solids

Requests for Endorsement

- ESSC endorsement of the COMFIT application and referral to HRM-RC
- HRM-RC endorsement of the COMFIT application

Next Steps

- Directive + Ministerial Approval by NSE
- Directive + Ministerial Approval from DOE
- COMFIT Project Approval from DOE
- Environmental Assessment
- Community Consultation
- Project Development

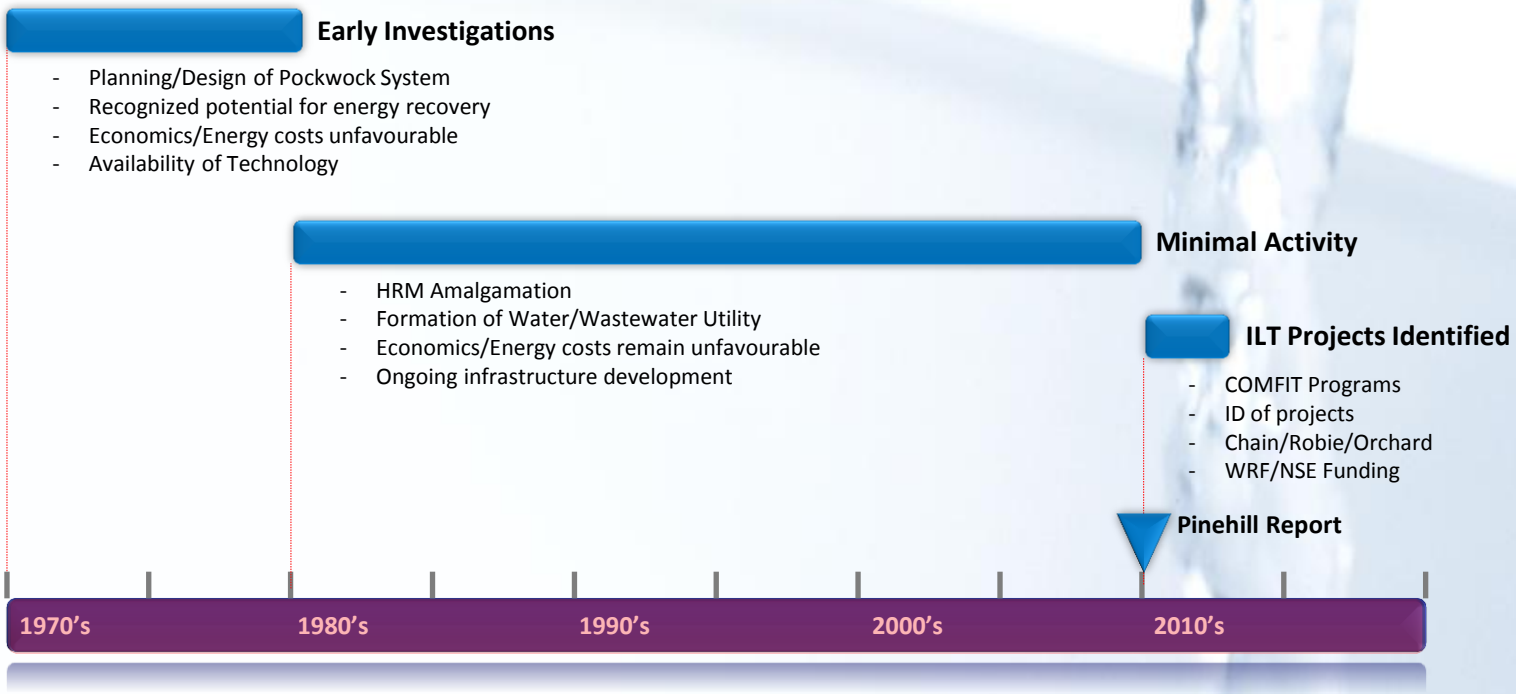
Energy from Water

Energy Recovery Using In-Line Turbines

Halifax Water

Energy from Water

A Brief History



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Energy from Water

Background

- Energy recovery using turbines in an *Open* (i.e. atmospheric pressure) water system is very common.
- Energy recovery in a *Closed* (i.e. pressurized) water system is not common.
- Energy recovery from a *Closed* water transmission system involves the installation of a “turbine” to replace the normal function of a Pressure Reducing Valve (PRV) in the system.

Halifax Water

Energy from Water

Available Technology

- *Replace PRV with Turbine*

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Energy from Water

Key Project Locations

The Pinehill Report identified five key sites with high potential for economically feasible energy recovery:

- Chain Control Chamber (65 kW)
- Robie 1 Control Chamber (85 kW)
- Orchard Control Chamber (28 kW)
- Titus/Evans Control Chamber (15 kW)
- Bedford Reservoir Control Chamber (30 kW)

Energy from Water

Orchard Pilot Project

Orchard chosen as the best location for a Pilot/R&D Site:

- Available natural head from Pockwock Lake;
- COMFIT eligibility (equiv. Run-of-the-River Hydro);
- Lowest technical risk for downstream pressure control - Sackville reservoirs mitigate downstream pressure transients;
- Stable flow and pressure profile;
- Available space and infrastructure;
- Available electrical capacity in the local distribution zone;
- R&D due to uncertainties of downstream pressure control using an in-line turbine (reverse pump).

Energy from Water

Project Details

- COMFIT eligible
- Estimated Cost ~ $633,000 CDN
- Estimated Net Revenue ~ $33,000/Yr
- Estimated Simple Payback ~ 14 Years*
- Life Expectancy > 40 Years
- Funding From Water Research Foundation + NS Department of Environment ~ $200,000

* Based on Halifax Water Contribution Only

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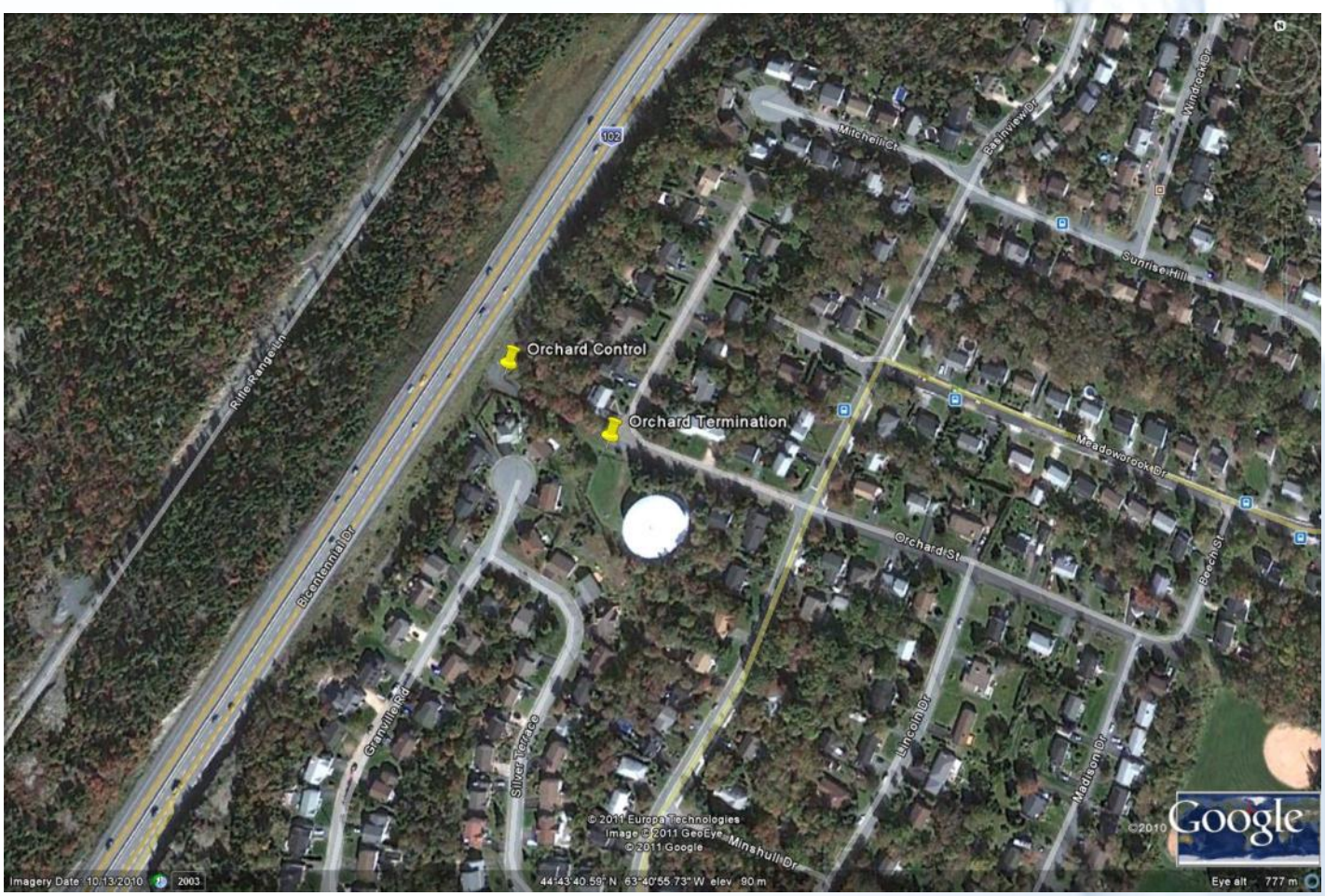
Energy from Water



Halifax Water

Energy from Water

Requests for Endorsement

- ESSC endorsement of COMFIT application and referral to HRM-RC
- HRM-RC endorsement of COMFIT application

Next Steps

- Directive from DOE + Ministerial Approval
- COMFIT Project Approval from DOE
- System Design
- Procurement
- Installation & Commissioning

Wind Energy Update

- ***Two Possible Locations***
  - Pockwock Watershed
  - Lake Major Watershed
- ***COMFIT Projects***
  - 2 Approved @ Lake Major
  - 1 Pending @ Pockwock

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Wind Energy Update

- ***Pockwock Wind Project***
  - Competitive Applications
  - Partnership Identified
  - Chebucto Wind Fields Inc. / juwi Wind Inc.
- ***Next Steps***
  - System Impact Study by NSPI
  - Community Consultation (1st Meeting May 29th)
  - Data Collection (Met Towers)
  - Environmental Assessments
  - Timeline ~ 2 years

Wind Energy Update

- ***Lake Major Wind Project***
  - Roadway Access & Upgrade Study
  - System Impact Study by NSPI
- ***Next Steps***
  - Assess Impact to Watershed (Go/No-Go)
  - Identification of Development Partner(s)
  - Community Consultation
  - Data Collection (Met Towers)
  - Environmental Assessments
  - Timeline ~ 2 – 3 years

Questions or Comments?

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