Enviro-STEP Technologies inc.

Innovative Eco-Efficient Solutions
for Onsite Wastewater Treatment

Presented by:

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INNOVATIVE WASTEWATER TREATMENT STRATEGIES USING DECENTRALIZED TECHNOLOGIES

3rd Annual AFN National Water Symposium and Tradeshow, Toronto

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1. WHO IS ENVIRO-STEP TECHNOLOGIES
2. PARTNER OF FIRST NATION COMMUNITIES
3. CONVENTIONAL APPROACHES TO WASTEWATER MANAGEMENT
4. INNOVATIVE STRATEGIES
5. DECENTRALIZED TECHNOLOGIES TAILORED FOR FIRST NATIONS WASTEWATER CHALLENGES
6. A FEW EXAMPLES

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Enviro-STEP Technologies

- ✓ 23 years of expertise in the design, development, fabrication and distribution of Decentralized Wastewater Treatment Technologies
- ✓ Offices in Québec, Manitoba and Nova Scotia and over 19 distributors in Canada
- ✓ Offers more than 13 different technologies (residential, commercial and communal)
- ✓ Invests massively in Research and Development exclusively in technologies dedicated to the small flows applications

Association des entreprises spécialisées en eau du Québec AESEQ

Waste Water Nova Scotia Society

IWA the international water association

Water Environment Federation the water quality people

Atlantic Canada Water & Wastewater Association

NOWRA National Onsite Wastewater Recycling Association

Ontario Onsite Wastewater Association 20 YEARS

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Enviro-STEP Technologies

Enviro-STEP Technologies Mission:

- Offer a portfolio of technologies addressing the technical and financial needs of small flows Wastewater Applications while meeting the most stringent environmental regulations.

Observations:

- ✓ Technologies used in small communities are downscaled from large applications which too often come with a level of complexity not compatible with small community resources. Small community system must be as simple and robust as possible.
- ✓ What is good for larger communities is not necessarily applicable to small communities. Small communities require innovative approaches;
- ✓ First Nations communities have been often used as testing ground for new technologies not enough proven ending up having major operational problems or failures. First Nations deserves proven and robust technologies;
- ✓ First Nations communities often have to rely on outside resources to implement construction, operation and maintenance. Every project should be developed to optimize the use of local resources. First Nations communities must master their wastewater infrastructure;

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Partner of First Nations Communities

The Example of Kitigan Zibi:

- ✓ Several Individual Onsite Septic System needed to be replaced;
- ✓ Soils conditions were often not compatible with conventional septic tank and leach beds. This results in the need for advanced treatment allowing surface discharge in ditched and streams;
- ✓ The solutions on the table were mechanized biological reactors or media biofilters both combined with ultraviolet disinfection. Cost and complexity were very high and the risk of having operational problems was also very high;
- ✓ Enviro-STEP has that type of technologies in its portfolio, but we offered the community a proven and fully passive advanced treatment system producing high quality effluent and requiring no electricity and no maintenance;
- ✓ We developed a partnership with the community where they purchased the technology directly from us at privileged price in exchange for allowing us to promote the project in other First Nation Communities.

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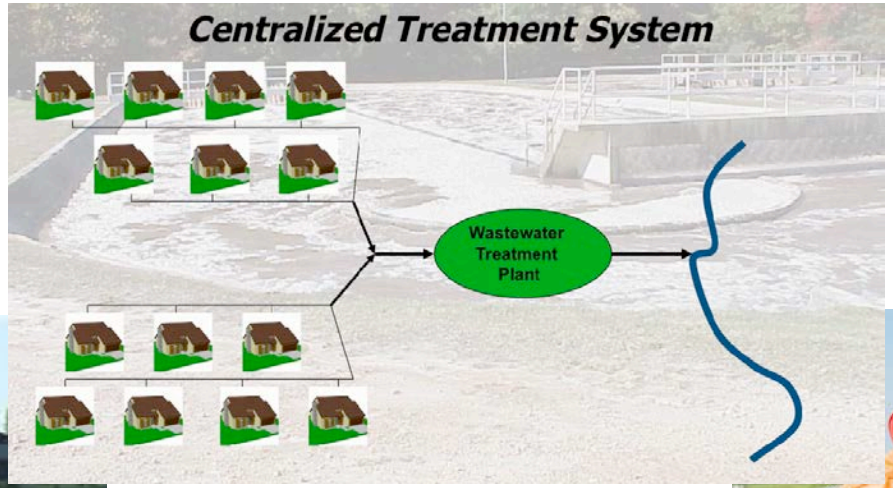
Conventional Approaches to Wastewater Management

Communal Wastewater Management usually consists in:

- Municipal Sewer Network
- Centralized Wastewater Treatment Plant (WWTP)
- Operation and Maintenance performed by Qualified Operators



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Conventional Approaches to Wastewater Management

Advantages of Centralized systems:

- ✓ Easier to manage a single WWTP;
- ✓ Expertise easy to find within large Engineering firms or specialized companies;
- ✓ Longer track record with thousands of installations (perception of reliability and confidence);
- ✓ Being usually overdesigned, it offers more flexibility for future expansions;

Disadvantages of Centralized systems:

- ✓ Expensive for smaller communities. Many communities cannot afford or sustain a centralized WWTP;
- ✓ Do not maximize the use of local resources. Community less involved in the construction and operation. Communities often subcontract to outside firms;
- ✓ Level of complexity is higher (mechanical components, substantial plumbing, PLCs, etc.). This has led to higher risks of failure or bad performances;
- ✓ Higher energy consumption, higher emission of GHG;

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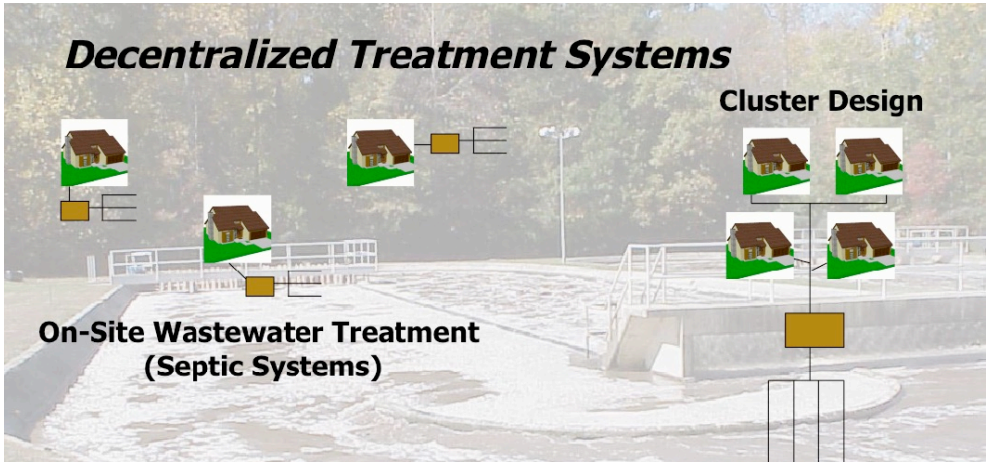
Innovative strategies using Decentralized or Hybrid Approaches

What is Decentralized Wastewater Management ?

- Managing Wastewater closer to where it is produced to minimize collection and infrastructure costs;



Examples are:

- ✓ Individual Septic Systems
- ✓ Cluster Systems
- ✓ A combination of individual and cluster systems
- ✓ Alternative sewer collection systems
- ✓ Septic sludge collection

- An Hybrid approach is one which incorporates both centralized and decentralized strategies to offer complete and optimal wastewater management to a community

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Innovative strategies using Decentralized or Hybrid Approaches

Onsite / Decentralized Wastewater Technologies mostly consists in:

- Use of simple and natural processes such has:
  - ✓ Soil based technologies
  - ✓ Granular filters
  - ✓ Artificial Wetlands
- Small and less mechanized Packaged Treatment Systems:
  - ✓ Fixed Film Bioreactors
  - ✓ Organic and Synthetic Biofilters
  - ✓ Combined Treatment and dispersal Systems

DECENTRALIZED TECHNOLOGY DEVELOPMENT IS BASED ON THE ADAPTATION OF SIMPLE AND PROVEN PROCESSES USED IN SMALL SCALE APPLICATIONS

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Innovative strategies using Decentralized or Hybrid Approaches

Advantages of Decentralized systems:

- ✓ Uses more simple and natural processes;
- ✓ Technologies are easier to install, operate and maintain;
- ✓ Compatible with stringent discharge criteria;
- ✓ Projects are significantly faster to implement;
- ✓ Overall costs are significantly lower than centralized systems;
- ✓ Maximize community resources involvement at all levels (construction, operation and maintenance);

Disadvantages of Decentralized systems:

- ✓ More than one WWTP to manage;
- ✓ Infrastructures are closer to the community;
- ✓ Less common approach and shorter track records can give perception of lower reliability;
- ✓ Fewer Engineering firms with expertise in decentralized technologies and strategies.

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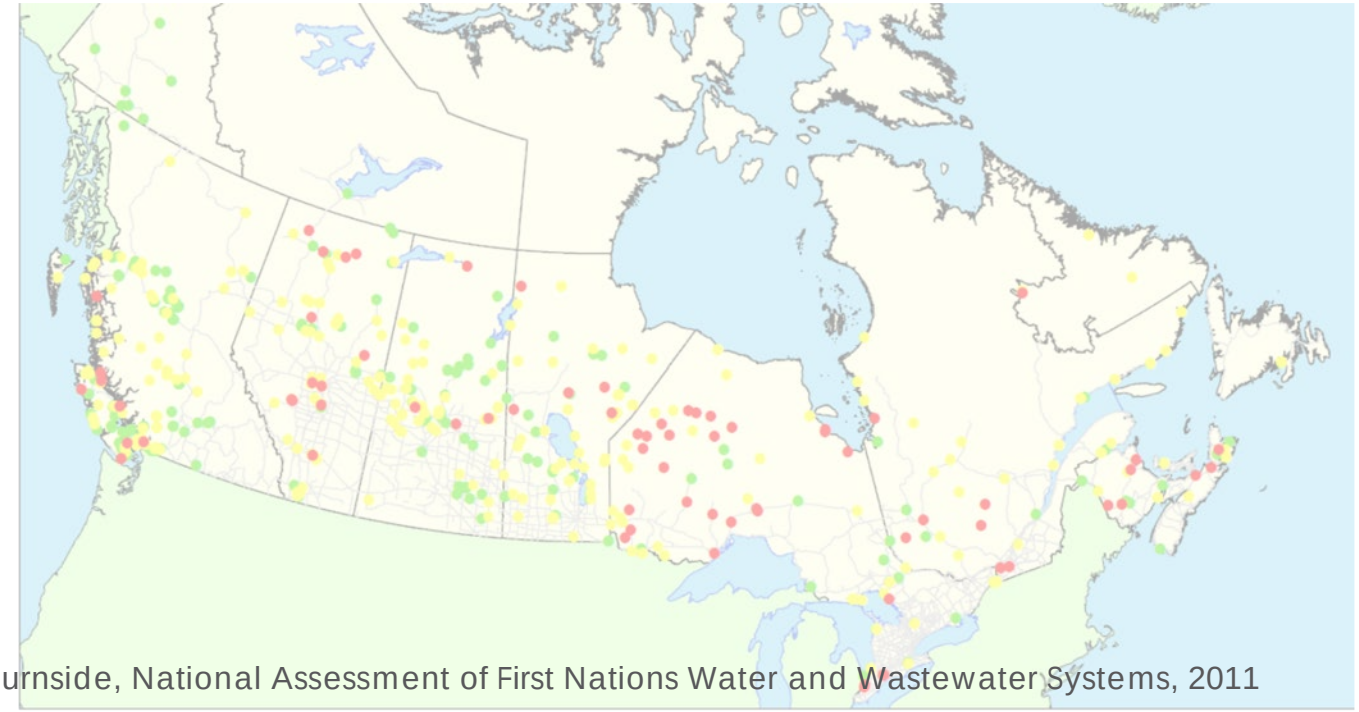
Technologies tailored for First Nations Communities

First Nations are facing great challenges in Wastewater Management.

Why Decentralized Technologies can help First Nation Communities ?

- 50% of First Nations communities have less than 400 people;
- 2 centralized WWTP out of 3 is considered to be of medium to high risk, mostly related to their complexity and communities capacity to operate them;



Source: Neegan Burnside, National Assessment of First Nations Water and Wastewater Systems, 2011

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Technologies tailored for First Nations Communities

What you can expect of Decentralized technologies

- ✓ Appropriation and self management of your Wastewater infrastructures with the use of simple and affordable technologies that your community control;
- ✓ Reduce the energy costs and sludge management costs compared to centralized systems or pump and haul systems;
- ✓ Maximize the use of local resources in your community for the installation, operation and maintenance of your wastewater infrastructures
- ✓ Protect the Environment with systems offering superior performances, more simple sludge management, protecting your water resources and producing less greenhouse gas.
- ✓ Do more with your money by reducing the cost of your wastewater infrastructures or by servicing more people with decentralized systems

DECENTRALIZED WASTEWATER MANAGEMENT CAN ACHIEVE THESE OBJECTIVES FOR FIRST NATIONS COMMUNITIES

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Examples of Decentralized Technologies

Artificial Wetlands – The Phyto-Filter System

- ✓ Simple and natural system blending in the Environment;
- ✓ Can be designed to meet high effluent quality (nitrogen, phosphorus, etc.);
- ✓ Perform well under Canadian climate conditions;
- ✓ Very low maintenance and operation cost;
- ✓ Becomes a living ecosystem comparable to natural wetlands;
- ✓ Easy to build;
- ✓ Can be sized for various flows;

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Examples of Decentralized Technologies

Modular Recirculating Filter – The Filtro-Flex System

- ✓ Robust and prefabricated;
- ✓ Uses a proven multi-pass granular filtration process;
- ✓ Simple and passive system with minimal energy cost and very low maintenance;
- ✓ Modular configuration allows for easy increase in capacity;
- ✓ Proven in Canadian climate conditions;
- ✓ Easy and fast installation;

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Examples of Decentralized Technologies

Combined Geotextile and Sand biofiltration – The ELJEN GSF System

- ✓ Fully passive, no electricity, no moving parts;
- ✓ Compatible with subsurface or surface dispersal of treated effluent;
- ✓ Easy and fast to install by local resources;
- ✓ Minimal maintenance;
- ✓ Proven in thousands of installations in the US and Canada;
- ✓ Can be configured for nitrogen removal;

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Decentralized Technologies
Kitigan Zibi Anishinabeg, Qc

The ELJEN GSF System is part of a Technology Window Initiative in Kitigan Zibi First Nation for Individual Homes' Septic Systems

ELJEN GSF System is used in both subsurface and surface discharge configurations. By the end of 2020, tens of houses will be treating their wastewater in the most simple, performing and economical way.

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Kitigan Zibi, Qc

Confined Eljen GSF
for surface discharge

Fast and easy installation
by Kitigan Zibi employees

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Kitigan Zibi, Qc

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Thank You !

Questions ?

www.enviro-step.ca
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