

A PROPOSAL FOR RECYCLING OF PLASTIC WASTE



**Oil Recovery from Plastic Waste # 4, #5, #6, #7
including the
integration of a proprietary Volume Reduction process
for Expanded Polystyrene (Styrofoam)**

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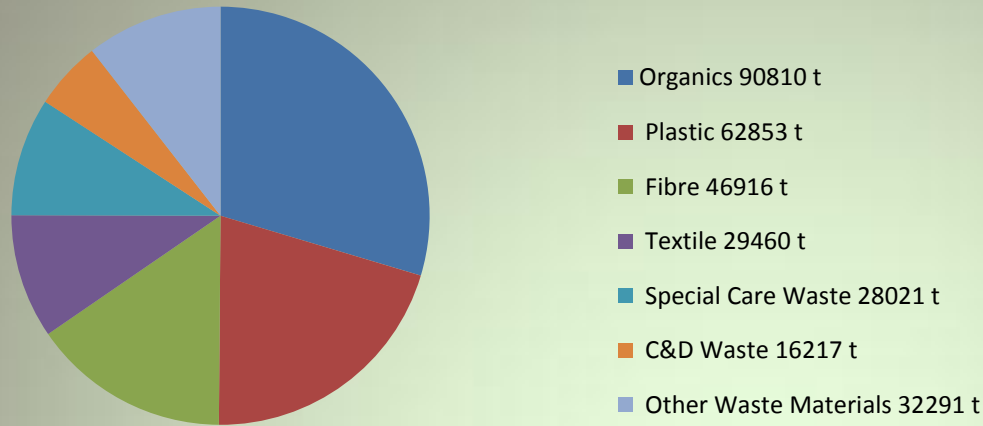
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Why are we approaching Halifax Regional Municipality?

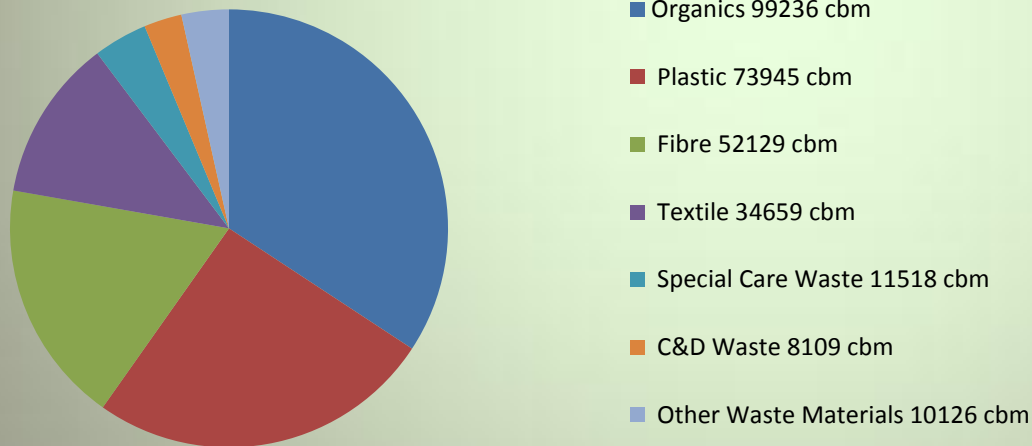
- Project is consistent with the Mayor's leadership - Sustainable Energy Management Office 2012-2020
- HRM is the municipal unit with the largest portion of waste in Nova Scotia
 - secure feedstock for the operation of the P2O system
- Halifax has real estate that is zoned properly for the project
- Access funding opportunities, e.g.
 - Federation of Canadian Municipalities
 - FCM Green Fund

Total Residential & ICI Waste by Weight

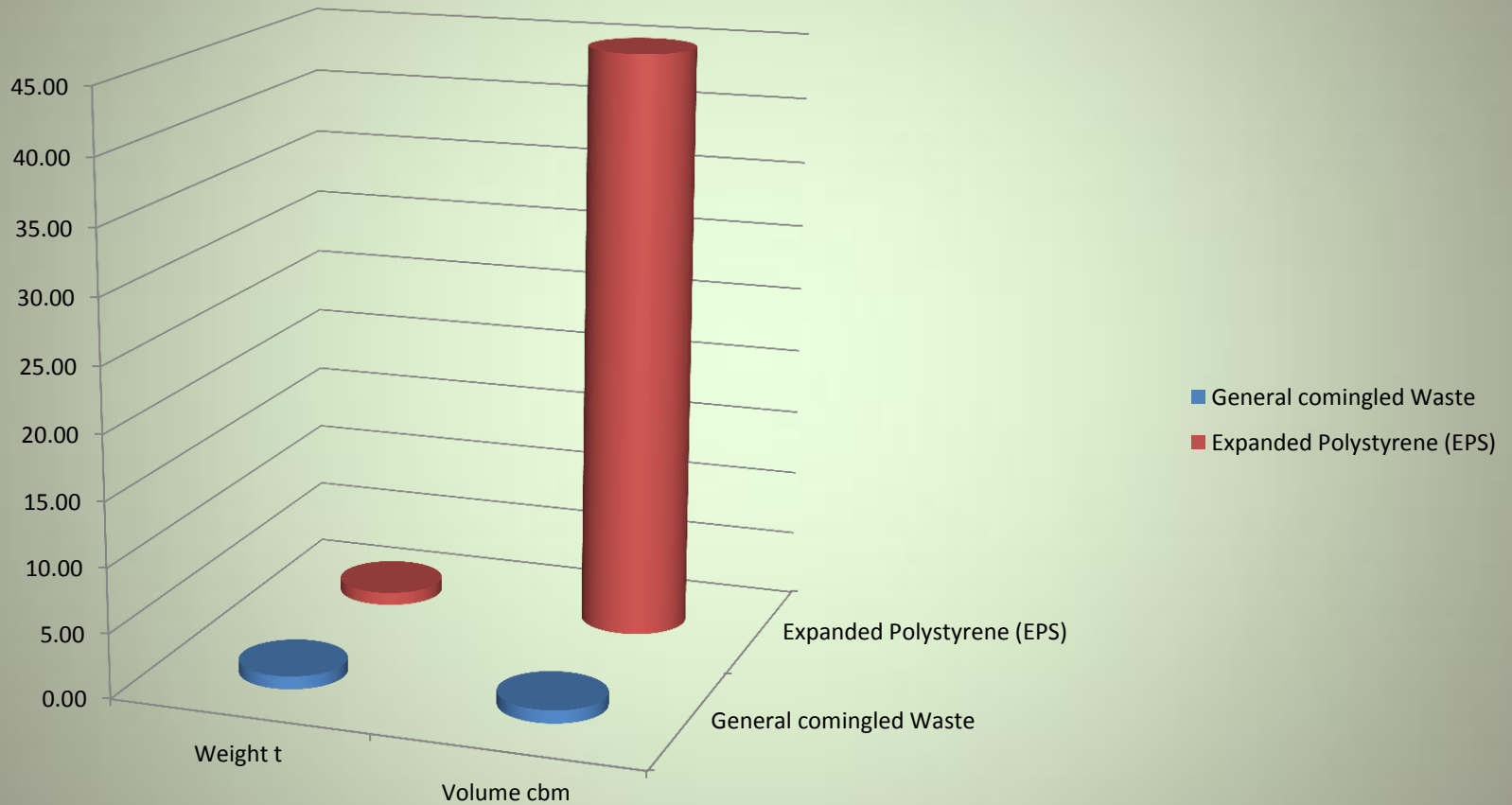


Source Data –
Nova Scotia Department of Environment

Total Residential & ICI Waste per Volume



Volume Comparison of Comingled Residential and ICI Waste and Expanded Polystyrene



Product/Solution/The Consortium

Eco Resource Management (ERM) & Adams Management Group (AMG)

- Advanced Technology (continuously operating system)
 - ERM/AMG P2O operates continuous 24/7 except for maintenance period twice per year.
 - For optimal operation, organise waste management system and pre-sorting of plastic waste products suggested.
 - Modular system allows for custom designed facilities depending on amount of input material.
 - Modular system is expandable to accommodate increasing feedstock
- EPS Volume Reduction Process (Patent pending)
 - ERM/AMG P2O reactor operates in oxygen free environment
 - Expanded Plastic Type #6, EPS, not suitable as is, requires pre-processing
 - EPS Volume Reduction Process (Patent pending)
- Process combination (Volume reduced EPS plus #4 to #7)
 - ERM/AMG P2O technology is designed to process volume reduced EPS in combination with Plastic Types #4 to #7
- Resulting Products
 - Simplified Technology – resulting product – Crude Oil (synthetic)
 - Advanced Technology – resulting product – Naphtha (Toluene), Kerosene, Ultra Low Sulfur Diesel or Heating Oil
 - Resulting products meet regulatory requirements (ASTM Standards)
- Resulting Yields
 - Recoverable oil content from ERM/AMG P2O process depends on:
 - Input material, mainly type of plastic resin
 - Simplified or Advanced Technology
 - Recoverable amount from comingled Plastic Types #4 to #7 - approximately 85% to 90%
 - Amount required for facility operation - approximately 10%
 - Saleable Product - approximately 75% to 80%
 - Example: 1,000 kg input material yield approximately 850 to 900 liters of oil equivalent
 - Facility operation -approximately 100 liters of oil equivalent
 - Saleable Product -approximately 750 to 800 liters of oil equivalent

BENEFITS FOR HRM

Landfill Savings

- Waste disposal reduction – EPS volume reduction
- Landfill longevity – life-cycle extension

HRM becomes the premier champion of plastic waste recycled in North America

- HRM becomes Centre of Excellence for plastics-to-diesel technology
- product used to offset hydrocarbons on HRM vehicles and HRM plant heating
- National/provincial attention to HRM through strategic partners that venture will attract:
 - RRFB Support - Waste Reduction
 - National Research Council Canada (NRC/IRAP)
 - Green Municipal Enabling Fund (FCM)
 - Sustainable Development Technology Canada (SDTC)
- Long Term Job Creation and will contribute Property Taxes to the municipality

Target Markets

- **FEEDSTOCKS**

The target market for input material of an Eco Resource Management (ERM) & Adams Group (AMG) processing/recycling facility is threefold:

- Residential, industrial, commercial and institutional Plastic Waste generators
- Plastic waste collectors/haulers
- Disposal facilities (landfills)

- **OUTPUT FUELS**

The target market for the final product from an Eco Resource Management (ERM/AMG) processing/recycling facility is fourfold:

- Oil industry in general
- Refineries
- Oil distributors
- Product end-users

- Both target markets, the providers for the input materials as well as the customers for the final products, will be contributing to the revenue stream of ERM/AMG because the envisioned market provides for the two separate sources of revenue.
- After the technology is proven in Nova Scotia, the Canadian market and the world market will be targeted for the sale of the technology either as equipment for a processing/recycling facility, or as licensing/franchise opportunity for private investors. This will provide ERM/AMG additional revenue streams.

ERM BUSINESS SUMMARY

PHASE	DESCRIPTION	FUNDING SOURCE/AMOUNT/PARTNERS	TIME FRAME
I	<p>Technology development, incorporating the proprietary Expanded Polystyrene Volume Reduction (Styrofoam) EPS technology, as a laboratory scale system with a bench scale prototype RPC Fredericton will perform tests</p>	<p style="text-align: center;">NRC/IRAP</p>	<p style="text-align: center;">Start date: May 2012</p> <p style="text-align: center;">9 - 12 months</p>
II	<p>Design and construction of a full scale commercial system in Halifax, Nova Scotia that allows the professional operation of the facility. This facility would also act as a Center of Excellence to showcase and sell the technology to other jurisdictions in Canada and around the world The system will be modular to allow for the extension of the facility in case additional feedstock becomes available.</p> <ul style="list-style-type: none"> • Approach Halifax to secure the municipality as Partner in a PPP venture • Approach RRFB, NRC, InnovaCorp, FCM and SDTC for funding • Potential approval dates: Summer/Fall 2013 	<p style="text-align: center;">Present the ERM/AMG Plastic Waste Solution to HRM-ESC</p> <p style="text-align: center;">Private equity/venture capital</p> <p style="text-align: center;">Green Municipal Enabling Fund (GMF) Industry Canada RRFB, NRC, InnovaCorp, FCM and SDTC</p> <p style="text-align: center;">ACOA</p>	<p style="text-align: center;">Potential start date: Spring/Summer 2013</p> <p style="text-align: center;">18-24 months</p>
IIa	<ul style="list-style-type: none"> • Phase IIa: Develop comprehensive Business Plan 		

The Challenge

Plastics & Styrofoam Waste

- Total plastic waste generated worldwide is estimated being about 100 million tonnes per year according to the German Department of Environment and UNEP Conference in Bali 2009. Out of this amount, close to 60 million tonnes are plastic materials #4 to #7.
- Nova Scotia presently generates approximately 720,000 tonnes of Residential and ICI (Industrial, Commercial, Institutional) solid waste annually. Of this about 9% or 65,000 tonnes is plastic waste.
- In Nova Scotia plastic materials #4 to #7 are estimated to be 40,000 Tonnes annually and are either landfilled or shipped out of the province for further processing
- Styrofoam is mostly uneconomical to recycle or otherwise to process. As waste material it exists in massive quantities, is environmentally useless and can be lethal to any bird or sea creature that swallows significant amounts. Weight based the volume of Styrofoam is approximately 50 times that of municipal solid waste.
- U.S. Environmental Protection Agency (EPA) states: "Each year Americans throw away 25,000,000,000 Styrofoam cups. Even 500 years from now, the foam coffee cup one used this morning will be sitting in a landfill."
- For this proposed project, the proponents in consortium, are targeting the following recyclable plastic type targets presently collected and partially sorted in the province of Nova Scotia:

#4 Low Density Polyethylene (LD PE)

#5 Polypropylene (PP)

#6 Polystyrene (PS)

and the non-recyclable plastic waste fraction:

#7 Not specifically classified co-mingled Plastic