

Framework for a Request for Expressions of Interest: Treatment Through Resource Recovery for Core Area Sewage

Prepared for the CRD Core Area Liquid Waste Management Committee:

Alan Lowe (Chair)	Jody Twa
Denise Blackwell (Vice Chair)	Frank Leonard
Geoff Young	Susan Brice
Dean Fortin	Judy Brownoff
Chris Causton	Vic Derman
Chris Clement	Leif Wergeland
Graham Hill	

Copy to Minister Barry Penner

Prepared by:
Stephen Salter PEng
Victoria Sewage Alliance
Phone: (250) 370-9664
email: Stephen_VSA@telus.net

July 26, 2006

Executive Summary

Background

On July 21, 2006 Environment Minister Barry Penner directed the Chair of the CRD Board under sections 24 (3) of the Environmental Management Act to amend the CALWMP "detailing a fixed schedule for the provision of sewage treatment".

Given the continuing increases in the price of energy and the value of water, it is critical to find ways of treating sewage which maximize recovered resources and minimize environmental, social, and economic costs.

Proposal

It is proposed that the CRD Board arrange for an open Request for Expressions of Interest to solicit information about treatment based on resource recovery technologies that provide the greatest benefits for the least cost, and to share those ideas with the public.

Alternatives

A capital cost estimate of \$447 million based on two traditional sewage treatment plants was prepared by a consultant and presented to the Board on July 6, 2005. An alternative to the RFEI process is to enter into a fee contract with this consultant to update the \$447 million estimate to account for inflation in construction costs.

Recommendations

Proceed with the Request for Expressions of Interest to be completed by November, 2006.

Use the results of the RFEI, and public feedback on the submissions, to help write the Request for Proposals for sewage treatment based on resource recovery for the Core Area.

This option has been proven in other municipalities to yield a broad range of options. It is expected that the RFEI can be completed in a cost effective and timely manner.

Cost Implications

It is expected that the RFEI could be administered by one staff member, and that an advertising budget of approximately \$20,000 will be required.

1. Background

On July 12, 2005 the SETAC Scientific and Technical Steering Committee Report was presented to the CRD Board. The comprehensive report praised aspects of the CRD's management of liquid wastes, but indicated that current practices were not sustainable in the long term. The report also indicated that the existing seafloor trigger was not protective, and was critical of the assumptions on which the CRD's estimate of the cost of treatment of \$557/home/year was based.

On July 21, 2006 Environment Minister Barry Penner directed the Chair of the CRD Board under sections 24 (3) of the *Environmental Management Act* to amend the CALWMP "detailing a fixed schedule for the provision of sewage treatment".

Currently, Environment Canada and the CCME are developing the National Sewage Regulations which will require secondary sewage treatment at a minimum.

The Minister's directive shifts the focus to the question of the best form of treatment. Not having invested in primary or secondary treatment, the Core Area is fortunate to be able to take advantage of modern treatment and resource recovery options which are being successfully used elsewhere. The region has a unique opportunity to discover the technologies which could not only recover resources such as energy, water, and minerals from sewage, but also from solid organic waste being buried in the Hartland Landfill.

Other municipalities have shifted from a waste disposal to a resource recovery mindset. For example, in 1999 the executive committee of Kristianstad Municipality, Sweden (pop. 75,000) declared themselves a Fossil Fuel Free Municipality, to help the district meet fifteen environmental goals set by the Swedish Parliament ⁽¹⁾. Biogas from the sewage treatment plant is used to fuel buses and other vehicles. In 2002 the biogas cost CND\$0.32 per litre, and the Kristianstad Municipality further encourages the public to buy cars that run on biogas by providing free parking places for biogas-powered cars and by subsidizing 50% of the cost of converting cars to run on biogas.

The City of Toronto completed an RFEI process to solicit information about resource recovery technologies to process its municipal solid waste, including sewage sludge ⁽²⁾. In 2006, Toronto won the Federation of Canadian Municipalities Sustainable Communities Award for diverting waste, and the City plans to divert 100% of its waste from landfill by 2012.

This document explains the framework for an open Request for Expressions of Interest (RFEI) to solicit information about treatment based on resource recovery technologies which provide the greatest benefits for the least cost, and to share those ideas with the public. The proposal was presented to the CRD Core Area Liquid Waste Management Committee on July 26, 2006.

2. Objectives of the Request for Expressions of Interest

The primary goal of an RFEI is to solicit information about current technologies which will maximize the environmental, social, and economic benefits of treatment through resource recovery, and minimize the environmental, social, and economic benefits.

A second goal of the RFEI process is to inform the public of available resource recovery options.

A third goal is to comply with Minister Penner's July 21, 2006 direction to the Chair of the CRD concerning the implementation schedule for sewage treatment in the Core Area.

A fourth goal is to help fulfil the CRD's own intentions of reducing greenhouse gas emissions, diverting organic waste from the Hartland landfill, and water conservation.

A final goal of the RFEI process is to uncover the best options for the least administrative cost.

3. Principles of the Request for Expressions of Interest

The Request for Expressions of Interest will be based on the following principles;

- The RFEI should solicit the best ideas from around the world;
- The results of the RFEI should be shared with the public, to help citizens understand the costs and benefits of treatment through resource recovery;
- That sewage and organic municipal waste represent a resource recovery opportunity;
- Although solid and liquid waste streams have often been handled separately by municipalities, this separation is more of an administrative convenience based on the view that the two streams represent different waste disposal problems rather than combined resource recovery opportunities;
- It is cost-effective to take an integrated approach to solid and liquid waste, since processes for recovering resources from organic waste can handle several waste streams;
- Questions of how to treat waste and recover resources are of vital interest to the public, and therefore the RFEI process should be as open and transparent as possible, and should actively engage the public in choosing solutions;
- While construction costs in BC are increasing, innovative technologies require less space and materials than traditional designs, which may result in lower overall cost.

4. Steering Committee

A Steering Committee could be formed to direct the RFEI process. The Committee could include members with a wide range of backgrounds, including a CALWM Committee Member as the Committee Chair, City planners, CRD staff, citizens from the Core Area, representatives of environmental groups, an architect with a sustainability background, and an expert in planning for sustainable communities. Steering Committee appointments could be approved by the CALWM Committee Member (Committee Chair).

5. Timeline

The City of Toronto's RFEI process was completed within three months ⁽²⁾:

- The RFEI was issued June 2, 2003 and closed July 14, 2003
- Fifty submissions were received
- Results were reported on August 15, 2003
- A vendor forum was hosted in the Fall of 2003 to share the results with the public

A similar schedule is proposed for the CRD process:

August	Form a panel of reviewers.
August	Develop terms of reference
August	Solicit submissions through advertisements
November	Share the results with the public; Panel recommendations to the Board
December	Update Minister Penner on progress
1Q2007	Develop an RFP for design and construction
2Q2007	Issue the RFP for design and construction
June, 2007	Update Minister Penner with firm plans

6. Terms of Reference

RFEI responses will be judged according to the degree to which they meet the following criteria:

Maximize the Environmental, Social, and Economic Benefits of Resource Recovery:

1. Emissions to air, land and water must comply with existing environmental acts and regulations
2. Maximize value of recovered resources (e.g. energy, minerals, water)
3. Maximize social benefits:
 - a. reputation, enhanced tourism including urban ecotourism, reputation as a progressive city
 - b. enhanced tax revenues (e.g. from municipal sales of fuel)
 - c. reduced cost of landfill operation
 - d. value of combined land use (e.g. public parks, social housing)

Minimize the Environmental, Social, and Economic Costs:

1. Minimize deposits to land
2. Minimize emissions to air:
 - a. Minimize direct impacts of the treatment/resource recovery processes, including greenhouse gas emissions and odours
 - b. Minimize indirect impacts of pollution (e.g. from sludge transportation)
 - c. Maximize benefits of avoided pollution (e.g. by displacing fossil fuels with biofuels, reducing inner-city air pollution using cleaner fuels)
 - d. Maximize greenhouse gas credits
3. In addition to downstream impacts on the environment (e.g. at the outfalls), minimize upstream impacts of:
 - a. plant construction
 - b. electricity generation
 - c. chemical production and consumption (e.g. flocculating agents, sterilizing chemicals)
4. Minimize social impacts, such as odours, sightlines, and noise
5. Minimize cost, with a target of \$120 per household per year

Applicability of Alternative Funding

It is expected that resource recovery design and construction work could be supported through federal and provincial grants which may be available to support green technologies and renewable energy technologies.

Other inputs to the RFEI would need to include criteria such as:

Cost of money:	Municipal Finance Authority 30-year rate of 5.15%
Amortization period:	30 years
Cost sharing:	Federal and Provincial cost sharing of 1/3 each
Greenhouse Gas Credits:	\$10/tonne
Cost of electricity:	\$0.055/kwhr
Cost of natural gas:	\$13/Gj
Organic waste available (landfill diversion):	40,000 tonnes/year
Raw sewage properties (BOD/TSS/volume):	per CRD Marine Monitoring Reports
Core Area Population Equivalents:	340,000 in 2006
Value per tonne of diverted landfill, etc.	

7. The Benefits of Resource Recovery

When issues of sewage, municipal solid waste, air pollution and climate change are considered in isolation, we limit the scope and creativity of our solutions. European municipalities are showing how green energy can be derived from several waste streams at the same time, and how waste-to-energy infrastructure can effectively treat sewage and also reduce inner-city air pollution and greenhouse gases. Countries like Sweden are dealing with sewage and municipal solid waste in concert, so that energy recovery plants convert organic materials from garbage, offal from abattoirs, and sludge from sewage plants in single processes. For example:

- There are 3,000 biogas plants in Europe, producing methane from sewage treatment plants and from organic municipal waste ^(3,4).
- Sweden runs 5,300 vehicles and much of its transit system on biogas ^(1,3,4). Replacing diesel with biodiesel or biogas (natural gas) in buses and cars in Victoria will reduce particulate emissions and will also reduce greenhouse gases by 30,000 tonnes/year (please see Appendix I *Energy and Greenhouse Gas Calculations of Treatment Through Resource Recovery: Options for Core Area Sewage, Victoria Sewage Alliance Submission to the SETAC Panel* <http://www.georgiastrait.org/CAW/Resource-Recovery-Submission-SETAC.pdf>)
- Sweden is enacting environmental legislation which will require that 60% of phosphates be recovered from municipal sewage ⁽⁵⁾.

We have an opportunity to take a more holistic approach to pollution by dealing with liquid and solid waste streams, and reducing their combined environmental impacts on water, land, and air. Ironically, while one section of the CRD has discouraged sewage treatment, another section (Greenhouse Gas Emissions Subcommittee: <http://www.crd.bc.ca/rte/greenhse.htm>) is actively seeking greenhouse gas reduction opportunities. The CRD's Regional Planning page, Greenhouse Gas Emissions section states: "*The CRD is currently looking for partners to fund co-ordination of a community energy program for the CRD area, which will include a greenhouse gas inventory.*" (6)

The CRD's *Wastewater and Marine Environment Program 2003 Annual Report* (7) shows the size of the resource recovery opportunity which the region's untreated sewage represents.

We can recover:

- Biodiesel from approximately 5 million kgs/year of fat, oil and grease
- Biogas from approximately 16 million kgs/year of other organic material
- Biodiesel from residual sludge
- Fertilizers and metals from the approximately 2 million kgs/year of inorganic materials
- District heating through sewage-source (water-source) heat pumps
- Water for reuse from the 38 cubic kilometres of water discharged per year

Discussions of treatment costs must also take into account the actual and potential benefits ^(8,9), including;

- The opportunity to displace fossil fuels with biofuels which can be recovered from sewage, amounting to enough biodiesel to run 200 buses and enough biogas to run 5,000 cars. This energy is worth \$6 million/year at 2006 prices.
- The value of approximately \$300,000/year of greenhouse gas credits
- Protection and enhancement of the region's \$1 billion/year tourism industry
- Recovery of the currently closed shellfish and swimming scallop fisheries
- Protection of salmon, orcas, and other species from pollution
- Protection of marine habitats, including sediments, from further contamination

Appendix I - References

- 1) *Fossil Fuel Free Kristianstad*
http://www.energie-cities.org/meels/documents/case_studies/kristianstad_se.pdf
- 2) *Summary of Individual Responses to Toronto's REOI on New and Emerging Waste Management Technologies*
http://www.toronto.ca/wes/techservices/involved/swm/net/pdf/oct15_review.pdf
- 3) *Alternative Transportation, Helen Isaac, University of Calgary, Calgary, Alberta*
http://www.cseg.ca/recorder/pdf/2005/09sep/sep05_05.pdf
- 4) *Biogas as transportation fuel*
http://www.fv-sonnenenergie.de/fileadmin/fvsonne/publikationen/ws2003/02_d_biogas_01.pdf
- 5) *Phosphorous Recovery from Phosphate Rich Sidestreams in Wastewater Treatment Plants*
<http://www.lwr.kth.se/forskningsprojekt/Polishproject/JPS10s47.pdf>
- 6) *CRD's Managing Natural Resources and the Environment Sustainably*
<http://www.crd.bc.ca/regionalplanning/growth/toolbox/naturalresources.htm>
- 7) *CRD's Macaulay and Clover Point Wastewater and Marine Environment Program Annual Reports*
- 8) *Treatment Through Resource Recovery: Options for Core Area Sewage*
Victoria Sewage Alliance Submission to the SETAC Panel
<http://www.georgiastrait.org/CAW/Resource-Recovery-Submission-SETAC.pdf>
- 9) *Experimental Determination of Energy Content of Unknown Organics in Municipal Wastewater Streams,*
Ioannis Shizas and David M. Bagley Journal of Energy Engineering, Vol. 130, No. 2, August 1, 2004
- 10) *CCME National Sewage Regulation background document on the capital and operating costs of Canadian sewage treatment facilities*