



Notice of Meeting and Meeting Agenda Integrated Waste Management Task Force

Friday, February 19, 2016

8:40 AM

Room 107

COMMITTEE MEMBERS:

DIRECTORS: V. Derman (Chair), K. Williams (Vice-Chair), R. Atwell,
A. Finall, C. Hamilton, C. Plant, J. Ranns, G. Young,
B. Desjardins (Board Chair, ex-officio)

1. Approval of Agenda

2. Adoption of Minutes

2.1. 16-260 February 15, 2016 Minutes

Recommendation: That the February 15, 2016 minutes be adopted.

Attachments: [February 15, 2016 Minutes](#)

3. Chair's Remarks

4. Presentations/Delegations

4.1. 16-249 Presentation - Highbury Energy Inc.

5. Committee Business

5.1. 16-259 Board Approved Revised Terms of Reference

Recommendation: That the Task Force receive the Board Approved Revised Terms of Reference for information.

Attachments: [Board Approved Revised Terms of Reference](#)

5.2. 16-261 Draft Report to the Core Area Liquid Waste Management Committee on February 24, 2016 - Discussion

Recommendation: That the draft report to the Core Area Liquid Waste Management Committee be received for information.

Attachments: [Draft Report to CALWMC](#)

6. New Business

7. Adjournment

Next Meeting: February 26, 2016 at 8:40 a.m. in Room 107



Capital Regional District

Meeting Minutes Special Task Force on Integrated Resource Management

Monday, February 15, 2016

8:40 AM

Room 652

PRESENT

DIRECTORS: V. Derman (Chair), K. Williams (Vice-Chair), R. Atwell, C. Hamilton, C. Plant, J. Ranns (8:54), G. Young (8:49), B. Desjardins (Board Chair, ex-officio)

ABSENT: A. Finall

STAFF: R. Smith, Senior Manager, Environmental Resource Management, D. Dionne (recorder)

1. Approval of Agenda

Agenda Item 5.1 was amended to read "Preliminary Discussion of the Report to the Board".

**MOVED by Director Plant, SECONDED by Director Atwell,
That the agenda be approved as amended.
CARRIED**

2. Adoption of Minutes

2.1. 16-255 Adoption of the Minutes of February 12, 2016

**MOVED by Director Williams, SECONDED by Director Plant,
That the minutes of February 12, 2016 be approved.
CARRIED**

3. Chair's Remarks

Chair Derman remarked that the Capital Regional District (CRD) Board Chair has requested that the Task Force have a report prepared for the February 24 Core Area Liquid Waste Management Committee (CALWMC) meeting.

G. Young and J. Ranns joined the meeting

4. Presentations/Delegations

4.1. 16-246 Presentation from Mr. Duncan Cameron – Cameron Group International

Mr. Cameron presented responses to questions submitted by Chair Derman (on file) on Hydra IWR₂M wastewater management process. Following the

presentation there was discussion and Mr. Cameron responded to further questions from the Task Force.

Mr. Cameron handed out written response (on file) to the questions submitted by Chair Derman.

5. Committee Business

5.1. 16-247 Preliminary Discussion of the Report to the Board

The Task Force discussed the handout from Chair Derman, "Preliminary Ideas re Initial Report to the CRD Board" (on file), noting that the report would be going to the CALWMC on February 24 and that this report would then form the basis for the report to the Board.

Discussion ensued with the following items noted:

- *The report should include information on the presentations seen by the Task Force:*
 - *how they propose to manage all waste streams and the proposed costs to the CRD*
 - *key information regarding their ideas of procurement*
 - *what the possible revenue options are*
- *That the Technical Oversight Panel has expressed support for an integrated approach.*
- *That the Task Force provide objective analysis of technologies; technology, timing, cost, funding, procurement and revenues.*
- *Possible pilot information; what we have seen to date, how that informs a pilot, how a pilot fits in with the timeline.*
- *If there are some directions or recommendations that are relevant to the CALWMC, they should be brought forward noting that ultimately it will be a Board discussion.*

10:09 B. Desjardins and C. Plant left the meeting

- *Need to be conscious of organizations' requirements to treat all municipal solid waste, and that there are provincial regulations in place for dealing with recyclables.*
- *Land size for each technology and processing varies significantly*
- *There is private sector interest and there is evidence that there are revenues associated with an integrated approach.*

Chair Derman will prepare a draft report and email out to the Task Force for their review prior to the next Task Force meeting.

6. New Business

No new business.

7. Adjournment

**MOVED by Director Atwell, SECONDED by Director Young,
That the meeting be adjourned at 10:23 a.m.
CARRIED**

CHAIR

RECORDER

Terms of Reference

The logo for the Capital Regional District (CRD), consisting of the letters 'CRD' in a stylized, bold font.

SPECIAL TASK FORCE ON INTEGRATED RESOURCE MANAGEMENT

TERMS OF REFERENCE

PREAMBLE

The Capital Regional District (CRD) Special Task Force on Integrated Resource Management is a select committee (Committee) established by the CRD Board and will examine options for integrated resource management of liquid and solid wastes.

The official name is to be:

CRD Special Task Force on Integrated Resource Management

1.0 PURPOSE

- To hold discussions about Integrated Resource Management
- Committee to:
 - define scope and parameters of Integrated Resource Management objectives
 - recommend to the CRD Board a process for broadly seeking submissions from the private sector for implementing the recommended initiative
 - recommend options to the Board for endorsement

2.0 ESTABLISHMENT AND AUTHORITY

- The Committee will make recommendations to the Board, for consideration;
- The Board Chair will appoint the Committee Chair and Committee members; and
- The Task Force, through staff, may retain consultants for the purpose of high-level evaluation of technologies for an amount up to \$10,000.

3.0 COMPOSITION

- Committee members will be CRD Directors and CRD Staff
- The CRD Board Chair is an ex-officio member of the Committee.

4.0 PROCEDURES

- The Committee shall meet at the call of the Committee Chair; and

- The Committee Chair shall determine the agenda or meetings, and any Committee member may request that a matter be placed on the agenda.
- At the request of a Committee member and with the consent of the Committee Chair guests or delegations may be invited to attend and participate in the meeting.

5.0 RESOURCES AND SUPPORT

- The General Manager, Parks and Environmental Services will provide strategic support and act as a liaison
- Minutes and agendas are prepared and distributed by the Environmental Resource Management Division.
- The Environmental Resource Management Division will provide additional administrative support as required.

Approved by CRD Board November 4, 2016
Revised by the CRD Board February 10, 2016

Report From The CRD Integrated Resource Management Task Force

February 24, 2016

Purpose of the Task Force

The CRD Integrated Resource Management (IRM) Task Force was created to examine the question of whether an IRM approach to managing waste streams might provide substantial financial benefit and substantially improved environmental outcomes to the region and its residents.

Phase 1 – Proof of Concept

Initially, the task force has examined the question of whether IRM approaches are “real” and “doable” today or remain a desired outcome for the future. To answer this question the task force has entertained presentations from four potential providers. Each provider was given a list of questions to be answered and the opportunity to provide additional information. Presentations lasted 50 – 70 minutes followed by 20 – 25 minutes for questions from task force members.

*It should be noted that none of the information in this report represents any attempt by the task force to suggest a preferred provider. Instead, information provided aims to establish “proof of concept”.

Providers, in order of appearance, included:

1. Pivotal IRM

This potential provider offers a distributed approach to dealing with all of the region’s waste streams. Wastewater treatment would utilize Membrane Bioreactor technology while Advanced Gasification would be used for biosolids, municipal solid waste (MSW) and kitchen scraps. Both technologies are well established and have operated successfully for at least 10 years. In the case of Advanced Gasification, commercial experience with biosolids in the mix is limited to six months’ continuous operation. According to Pivotal, testing has indicated that with the right mix of sludge and wood, biosolids can be successfully and beneficially gasified. A distributed solution is the preferred approach, however, a 1 ½ acre site for processing and pelletizing solid wastes prior to gasification would be required.

Beneficial use of resources would include heat, cooling and potential water re-use on the liquid site along with production of syngas(electricity), heat, biochar and water on the solid side.

Pivotal has developed a complete application for managing waste streams in the capital region. While much of this is proprietary and has not been disclosed to the Task Force, the company expects total project capital costs would be in the \$250 - \$400 million range. Optimal procurement, infrastructure and design choices would move the final capital cost closer to the \$250 million figure. The company has also indicated that with optimization, life cycle costs could be revenue positive given the multiplicity of revenue streams involved. Pivotal has expressed a

willingness to be flexible in determining contractual arrangements with the CRD and has suggested that a profit sharing partnership is a possibility.

On the environmental side, wastewater treatment would be to a level of tertiary disinfected. This “very clean” effluent could initially be used to recharge aquifers and streams and would offer the ability to develop extensive water re-use around distributed plants over time. Greenhouse gas (GHG) mitigation is projected to be the equivalent of removing 24,000 cars from regional roads.

The principles in Pivotal IRM are local, however, the company has partnered with established large Canadian infrastructure and construction firms capable of funding and guaranteeing the project. These include EPCOR and the AECON Group.

Pivotal has indicated a willingness and ability to insure performance and structure a project so that the CRD would be insulated from financial risk. Finally, given that Pivotal was the first presenter, the task force has considered a “high level” evaluation of the viability of the wastewater treatment and gasification technologies as well as the feasibility of projections for GHG mitigation. If this evaluation is carried out, results are expected to be available in the near future.

2. **Ark Power Dynamics**

Rather than presenting a complete solution to dealing with the region’s waste streams, Ark Power Dynamics showcased a specific technology called “The Ark Reformer”. This technology appears to be a unique, patented adaptation of plasma arc technology and is described by the company as follows:

*“an **internally generated** high-energy sustained reaction zone converting ‘feed stocks’ into their simplest molecules - hydrogen, carbon monoxide, and other compounds forming a synthetic gaseous mixture used to generate electricity or produce valuable fuel and chemical by-products.”*

While the company has not presented a solution for treating waste water, Ark has indicated that the reformer is able to deal with all carbon based materials including biosolids, kitchen scraps and MSW. The company indicates the reformer offers advantages of a small footprint, the ability to treat waste that has up to 75% moisture content, thus eliminating the need for drying, and the ability to produce substantial amounts of Sulphur free crude oil, substantial amounts of syngas and residual “fertilizer” material. Furthermore, Ark indicates that the reformer creates no emissions and completely destroys pathogens and emerging chemicals of concern.

At present, Ark has no completed projects in operation. However, a pilot plant has operated successfully in Arkansas and has tested a variety of feed stocks. As such, the reformer is probably the least tested of the technologies presented to the task force. This does not mean it is without considerable potential. Ark would utilize one central, 100 ton per day processing plant requiring a site of approximately 10 acres. A substantial part of that site would be taken up by a small “tank farm” necessary to store the synthetic crude produced while waiting transport to nearby refineries. Cost for the hundred ton per day facility is estimated to be approximately \$50

million. The company indicated that Hartland Landfill would provide a suitable location. GHG mitigation would be considerable over the lifespan of any project given the substantial renewable resources that would be created.

Finally, Ark has indicated an ability to insure the CRD against risk and has indicated a willingness to enter into a profit sharing relationship.

3. **Hydra Renewable Resources**

Hydra would provide a complete solution encompassing all waste streams. Primarily, this would be through a distributed system with waste water being treated by Salsnes Filters and “CBUM” modules. Effluent produced would be “very clean”. Solid wastes would be handled by “Bio-Green Pyrolytic Reactors” along with final stage distillation columns for renewable diesel fuel production. Again, the technologies chosen appear to be well established with at least 10 years of successful operation. It is unclear, however, whether sewage slug has been utilized in the mix of solids being handled by the reactors. While the approach suggested is distributed, Hydra would include a 4 acre central site for processing solid wastes prior to processing in the pyrolytic reactors.

Beneficial use of resources would include heat (district energy) and water re-use on the liquid side along with production of renewable diesel fuel, syngas (electricity), heat and biochar on the solid side. Hydra also promotes the possibility of substantial food production in a “coolhouse greenhouse” and indicates that their model for treating wastes produces no residuals requiring disposal.

Hydra suggests a financial model that would require no upfront capital investment by the CRD. Instead the company would seek a 30 year lease on existing CRD infrastructure. In return, Hydra would build and operate all new infrastructure, maintain existing CRD infrastructure and provide the CRD with a substantial annual lease payment. Sale of renewable resources would pay for the company’s investment and operating costs as well as provide for profit margins. At the end of the lease, the company would return all infrastructure to the CRD with a remaining life expectancy of at least 10 years for plants the company built. Hydra describes this model as “BOOT” (build, own, operate and transfer) and is ready to guarantee no job or benefit loss in the transition to a lease system. Again, GHG mitigation would be significant over the lifespan of the project given the substantial renewable resources that would be created. At present, Hydra has no completed projects on the ground. However, a project for Kingston, Jamaica is ready to proceed while several other projects are at various stages of planning.

Hydra has partnered with established larger firms including amongst others: the Mace Group (project and construction management), Hyder Consulting (wastewater design), the Ramboll Group (mechanical, electrical and sustainability design) and DLA Design (architectural design). Finally, Hydra has indicated a willingness and ability to insure performance and structure a project in a manner that would remove financial risk from the CRD.

4. **Highbury Energy (To be updated after Feb. 19th task force meeting)**

Highbury Energy

Summary of Benefits Suggested for a IRM Approach

The four presentations to the task force resulted in many situations where at least two of the potential providers suggested similar beneficial outcomes including:

Potential cost advantages

- Reduced, or nearly eliminated, need for new liquid waste conveyancing infrastructure. In the case of Rock Bay, this could be \$250 million or more (distributed system in particular)
- Reduced, or nearly eliminated, property acquisition costs (distributed system)
- Opportunity to utilize a “just on time” approach to infrastructure needs (distributed system)
- Avoidance of future infrastructure costs through the ability of the selected technology to handle multiple waste streams. e.g. no separate facility for kitchen scraps
- Increased revenue through the creation of additional marketable resources (crude oil, biodiesel, syngas, biochar, heat and potentially water)
- Opportunity, through siting of distributed plants, to “set the stage” for increased future water re-use. Purple pipe system could be expanded on an “as needed” basis
- Opportunity to lower costs to taxpayers by transferring existing tipping fee revenues to the project
- Ability to substantially extend the life of the Hartland Landfill
- Creation of value in the region through technology and/or job growth.
- Avoided costs to construct new outfalls
- Substantially reduced capital costs and virtually eliminated life cycle costs through transfer of existing revenue and creation of new revenue (Contractual agreements could transfer revenues to the CRD annually)

Potential environmental advantages

- Very substantially increased GHG mitigation
- Elimination of the need to handle residual “treated” biosolids. In all cases, very little or no residual material is created
- Opportunity, if so chosen, to increase levels of recycling through “pre-sorting”
- Production of very clean tertiary disinfected level effluent suitable for supplementing streams and aquifers and/or for future water re-use
- Near elimination of emerging chemicals from both liquid wastes and biosolids
- Ability to meet and exceed all current legislative requirements for discharge and emission regulations

Potential process advantages

- For distributed approaches on the liquid side, an opportunity to substantially avoid re-zoning if publicly owned and zoned sites are utilized e.g. existing pump stations. Liquid treatment technology could be underground

It should be noted, however, that several presenters emphasized orally, or in their literature, that maximum benefit will be achieved not just by technology but by a process of overall system design developed **from the outcomes desired**. In other words, cost reduction and environmental gain must

become the goals around which a proposed system is designed and built. This allows the marriage of technology, sites and opportunities for resource recovery to be optimized in a manner that an “add-on approach” is unlikely to obtain.

Presentation from Dr. Jon O’Riordan

The task force also received a presentation from Dr. Jon O’Riordan. Dr. O’Riordan is a former British Columbia Deputy Minister of the Environment. Currently, he is a consultant dealing with IRM approaches to waste streams. In his presentation, Dr. O’Riordan indicated that an IRM approach can provide lower net costs and increased environmental benefits in current circumstances. He strongly emphasized the need to frame decisions in the context of an emerging “world of climate change” and other ecological issues. He is of the belief that traditional approaches, not centered around the need to meet these challenges, can no longer be considered appropriate. Dr. Riordan went on to explain how many proposed IRM approaches could meet existing provincial regulation and accomplish permitting without any requirement for legislative change. Finally, he expressed doubt about the ability of “standard” procurement processes to encourage innovation and suggested the need to consider new procurement paradigms that would promote and accommodate innovative solutions

Conclusions

Based on the considerable investigation carried out to date, the IRM task force concludes it is very likely that IRM approaches to dealing with waste streams are “real” and “doable” today. Several of the presentations feature proven technologies. In addition, the potential applicants have partnered with substantial firms well recognized in the construction and wastewater industries. The task force also concludes that such approaches could provide financial and environmental benefits so substantial that a compelling case for IRM exists. The task force recommends that current and future regional waste management decisions must take place under the umbrella of an IRM approach. It should be noted that presenters have indicated a willingness and ability to guarantee performance and insulate CRD residents from financial risk.

The task force agrees with Dr. O’Riordan’s contention that all significant infrastructure projects now, and in the future, must aim to optimally address the emerging world of climate change and other significant ecological issues. Solution sets for infrastructure projects **must be designed around** this outcome and other desired outcomes such as lowered net costs and value for money. The task force further agrees that current “standard” procurement processes are likely unsuitable for encouraging innovation and concludes that other, more appropriate, procurement paradigms need to be investigated and potentially engaged. It is clear that a robust and competitive environment is emerging for IRM approaches to waste stream management. With a lack of existing treatment infrastructure, the CRD is well placed to take advantage of this environment, but must establish mechanisms to broadly engage the widespread ingenuity emerging in the private sector.

Finally, the task force recognizes that the various technologies for treating solid wastes put forward in the four presentations generally do not have an extensive track record of including biosolids in the mix to be processed. The task force recommends that a “demonstration level” pilot of at least one of the

proposed solid waste technologies should be conducted in the region as soon as possible. The task force will recommend a path to accomplishing such a pilot and other next steps in a report to the March meeting of the CRD Board.