Capital Regional District

625 Fisgard St.,
Victoria, BC V8W 1R7

Notice of Meeting and Meeting Agenda
Integrated Waste Management Task Force

Friday, March 4, 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

16-361 February 26, 2016 minutes.

Recommendation: That the minutes of February 26, 2016 be adopted.

Attachments: February 26, 2016 Minutes

3. Chair's Remarks

4. Presentations/Delegations

5. Committee Business

16-359 Gasification Pilot Regulatory Requirements

Recommendation: That the Task Force receive report, Gasification Pilot Regulatory Requirements, for information.

Attachments: Gasification Pilot Regulatory Requirements
Appendix A - Gasification Pilot Regulatory Requirements
Appendix B - Gasification Pilot Regulatory Requirements

16-365 Report to the Capital Regional District Board

Recommendation: That the Task Force approve the report and forward to the Capital Regional District Board.

Attachments: Integrated Resource Management Options for the CRD
Appendix 1
Appendix 2
Appendix 3

6. New Business

7. Adjournment

Next Meeting: Friday, March 11, 2016 at 8:40 a.m. in room 107

Capital Regional District

Meeting Minutes
Special Task Force on Integrated Resource Management

Monday, February 26, 2016 **8:40 AM** **Room 107**

PRESENT

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

1. Approval of Agenda

MOVED by Director Finall, SECONDED by Director Plant,
That Brian Gilbert be added as a speaker under Item 4 Presentations/Delegations.
CARRIED

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

2. Adoption of Minutes

2.1. 16-297 Adoption of the Minutes of February 19, 2016

MOVED by Director Williams, SECONDED by Director Hamilton,
That the minutes of February 19, 2016 be approved.
CARRIED

Director Plant acknowledged the work of the Chair in the preparation of the report to the Core Area Liquid Waste Management Committee (CALWMC).

3. Chair's Remarks

Chair Derman remarked on the CALWMC's discussion of the Task Force's report, noting that it was received for information and that there were five members who were opposed to receiving it for information.

4. Presentations/Delegations

4.1. Brian Gilbert - Delegation

Mr. Gilbert spoke to the Task Force and thanked them for the work they have done.

5. Committee Business

5.1. 16-312 Question and Answer with Rudy Kilian of Carollo Engineers, Inc. – Conference Call

Mr. Kilian joined the meeting by telephone and responded to questions from the Task Force regarding Integrated Resource Management (IRM) technologies, cost, feedstock, revenue potential, anaerobic digestion, biochar and energy output.

5.2. 16-300 Preliminary Discussion of March Report to the Board

Chair Derman noted that, under normal circumstances, any report going to the March 9 Board meeting would have to be in Legislative Services by March 1. Chair Derman will discuss with staff about delaying the Task Force report so that it can be drafted and considered by the Task Force at its March 4 meeting prior to forwarding to the Board. The Task Force agreed to this process.

Discussion ensued and the following changes and additions were requested:

- *Include an Executive Summary at the beginning of the report*
- *Recommend that staff consider IRM*
- *Note that there may be significant benefits to combining municipal solid waste (MSW), wood waste and biosolids*
- *Note that the information in the Urban Systems Carollo report is incomplete, due to its narrow parameters.*

5.3 16-310 Recommendation on a Demonstration Pilot

Chair Derman spoke to his handout (on file) for Task Force consideration. The Task Force discussed the information and noted the following:

9:55 B. Desjardins left the meeting

- *Add to the Rationale section the question, "how can the heat requirements from external fuels be minimized?"*
- *Include before the Rationale section the statement, "Based on the Terms of Reference, provided to us from the Board, we are coming back with some responses to those Terms of Reference."*

10:00 C. Plant left the meeting

- *Need to get someone who can manage the pilot criteria evaluation process. Chair Derman has identified Don Harfield of Alberta Innovates as a possible candidate.*

10:06 R. Atwell left the meeting

- *Note that the pilot should be at the Peninsula Waste Water Treatment Facility*
- *Provincial approval process - the Task Force should request that the Board authorize the Task Force to, on its behalf, meet with ministry staff to discuss a pilot*
- *The report should identify that it is submitted by the entire Task Force*
- *Ladysmith received some resource money for a new technology they are using in their wastewater system – what is that technology – this information should be provided in the report*
- *Add under Evaluation Criteria the question, "Can the pilot be incorporated into a full proposal?"*
- *That the Task Force write to the Peninsula Waste Water Commission, identifying its support of a pilot at the Peninsula Waste Water Treatment site, and that the Task Force is prepared to recommend to the Board that they allow MSW and/or kitchen scraps, collected on the peninsula, to be diverted to a pilot facility for integrated waste management treatment.*
- *Evaluation Criteria 4b should specify biosolids, kitchen scraps and MSW as the waste streams and that the system should be flexible to handle the variations of the waste streams*
- *Staff involvement in the process needs to be acknowledged within the report*
- *Include information about the Board approved kitchen scraps pilot – it may want to be included as part of the gasification pilot*

5.4 16-311 Recommendation on Next Steps to Canvass the Private Sector Broadly for a Full Project

Chair Derman provided a discussion paper (on file) regarding procurement and advised that Director How, Chair of the Finance Committee, is interested in partnering with the Task Force to review the CRD procurement process and whether there needs to be change.

Chair Derman identified the Omni Processor by Janicki Bioengery as another possible presentation, and asked the Task Force if they would like him to invite them to present their technology. The Task Force agreed.

5.5 16-295 Action List Update

Staff provided an update on the last two outstanding items on the action list. (On file).

6. New Business

There was no new business.

7. Adjournment

MOVED by Director Finall, SECONDED by Director Hamilton,
That the meeting be adjourned at 10:36 a.m.
CARRIED

_____
CHAIR

_____
RECORDER

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REPORT TO SPECIAL TASK FORCE ON INTEGRATED RESOURCE MANAGEMENT MEETING OF FRIDAY, MARCH 4, 2016

SUBJECT **Gasification Pilot Regulatory Requirements**

ISSUE

To provide an overview of regulatory requirements for a gasification pilot.

BACKGROUND

At its January 29, 2016 meeting, the Task Force inquired about the regulatory requirements to run a gasification pilot. Staff spoke with Ministry of Environment (MOE) staff to compile the following information.

The Waste Discharge Regulation identifies a number of industries and activities that require authorization to discharge under the Environmental Management Act (EMA). Gasification is an identified activity requiring a waste discharge authorization, usually through a permit. However, EMA has a provision to allow identified activities for a period of up to 15 months without issuing a permit. In such instances, the Ministry could issue a short term approval (maximum 15 months) that cannot be renewed at the end of its term. Ministry staff advise that a short term approval may be an option for a temporary small scale gasification pilot project utilizing both liquid waste residuals and solid waste.

The Ministry's application process for a short term Waste Discharge approval is:

- completion and submission of a draft application form by the proponent
- pre-application meeting with Ministry staff during which legal, technical and notification/consultation requirements would be discussed, including air emissions criteria and bottom and fly ash management resulting from a gasification plant
- based on the pre-application meeting, Ministry staff determines the scope of activities required by the project proponent to prepare the final application for submission of the short term approval to the Ministry
- The Ministry processes complete Waste Discharge applications on a 'first in-first out' principle (as of January 27, 2016, the Authorizations-South region, which includes the Capital Regional District, had 214 applications in the application queue)

Note: a permanent gasification facility would require a number of additional authorizations, including a Solid Waste Management Plan amendment, issuance of an operational certificate, and the potential need for an Environmental Risk Assessment.

The MOE waste discharge application process flow sheet is attached as Appendix A. Anticipated MOE authorization timelines for both a gasification pilot (~12 months+), and a full scale integrated waste gasification project (~24 months+), are outlined in Appendix B. MOE authorization estimates are based on anticipated time required for the CRD, or its consultants, to complete MOE outlined technical requirements.

RECOMMENDATION

That the Task Force receive the report, Gasification Pilot Regulatory Requirements, for information.

Submitted by:	Russ Smith, Senior Manager, Environmental Resource Management
Concurrence:	Larisa Hutcheson, P.Eng., General Manager, Parks & Environmental Services

AB:dd

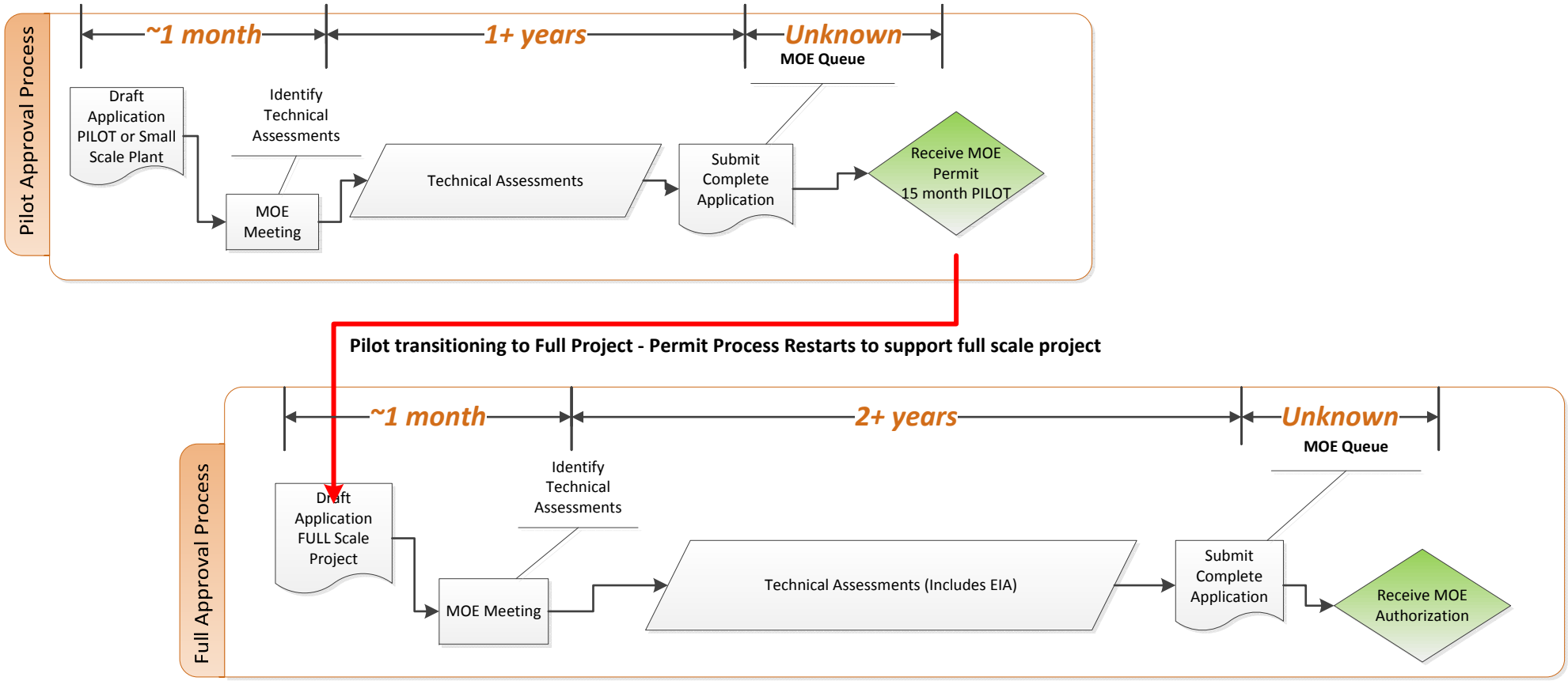
BC Ministry of Environment
Waste Discharge Authorization Application Process Flow Sheet

Stage	Activity	
1. Pre-Application	**A. Applicant –** review of authorization process	**Applicant:** ❖ reviews Ministry of Environment process/guidance documents on ministry internet web site ❖ reviews regulatory requirements that pertain to application.
	B. Applicant – preparation of draft application documents	**Applicant:** ❖ completes draft application documents: • application form • terms of reference for technical assessment, if aware that it is applicable • public and agency consultation plan • Environmental Protection Notice of application ❖ submits draft application documents to Ministry of Environment.
	C. Ministry of Environment & Applicant – pre-application meeting	**Ministry of Environment:** ❖ arranges for pre-application meeting with the applicant. **Ministry of Environment & Applicant:** ❖ meet for review of scope and detail of draft application documents (as referenced in B above) ❖ confirm whether Technical Assessment Report is required ❖ discuss circulation, posting and publishing requirements.
2. Preparation of Application	**A. Applicant –** ❖ preparation of application ❖ consultation	**Applicant:** ❖ based on pre-application meeting with Ministry of Environment, modifies draft application documents as necessary ❖ prepares draft version of technical assessment report and submits the report to the Ministry of Environment ❖ posts Environmental Protection Notice ❖ publishes the Environmental Protection Notice in newspapers and the BC Gazette in accordance with the Public Notification Regulation ❖ circulates the modified draft application form and Environmental Protection Notice to First Nations and agencies ❖ makes draft technical assessment report available to agencies, First Nations and the public ❖ consults with First Nations and the public according to the consultation plan, and responds to information requests and public, First Nations and agency comments *Note:* It is recognized that consultation may not be completed at this point.

Stage	Activity	
	B. Applicant – finalization of application	**Applicant:** ❖ prepares consultation report; and, in consideration of consultation, ❖ prepares final application form, ❖ prepares final technical assessment report**.**
3. Application	**A. Applicant –** submission of application	**Applicant:** ❖ submits to the Ministry of Environment • final application form • final technical assessment report • consultation report ❖ submits application fee in accordance with the Permit Fees Regulation.
4. Ministry Review	**A. Ministry of Environment –** review of application	**Ministry of Environment staff:** ❖ reviews application form, technical assessment report and consultation report ❖ if considered acceptable, prepares draft authorization with conditions necessary to protect the environment for applicant's review. *Note:* Significant changes may require repeated notification and publishing and/or consultation.
	B. Applicant – review of draft recommendations	**Applicant:** ❖ reviews draft recommendations including draft authorization ❖ provides comment to Ministry of Environment
5. Decision	**A. Ministry of Environment –** decision on application	**Ministry of Environment staff:** ❖ provides recommendations including draft authorization, if applicable, for Director's decision **Director:** ❖ makes a decision on the application.

APPENDIX B

Anticipated Timelines



Integrated Resource Management Options for the Capital Regional District

Report from the Integrated Resource Management Task Force – March 9, 2016

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 and environmental benefits to the region and its residents. In its terms of reference, the task force has been asked to define the scope and parameters of Integrated Resource Management objectives, to recommend options to the CRD Board and to recommend a process for broadly seeking submissions from the private sector and potentially implementing a recommended solution.

Initially, the task force examined the question of whether IRM approaches are feasible today or remain a desired outcome for the future. To answer this question, the task force 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. The task force also received presentations from Dr. Jon O'Riordan, a former British Columbia Deputy Minister of the Environment, who currently consults on IRM approaches and from Rudy Kilian of Carrolo Engineers, a consulting firm used by the Core Area Liquid Waste committee. Please see Appendix 1 for a detailed description of these presentations.

Based on the investigation carried out, the IRM task force concludes it is very likely IRM approaches to waste stream management exist and are feasible today. The task force also concludes that IRM approaches could provide financial and environmental benefits so substantial that a compelling case for IRM likely exists. Capital costs for a completed project, dealing with all waste streams, have been projected to be in the $250 - $400 million range. In addition, lifecycle costs are generally proposed to be revenue positive with at least one provider suggesting revenues would be sufficient to cover all capital costs. Without question, these cost estimates need further substantiation. Nevertheless, they are much lower than could be accomplished with current waste practices and waste projects being planned at the CRD. Similarly, estimates for GHG reduction are much greater than what could be expected from current practices and projects being planned. GHG reduction will become increasingly critical and is likely a very important consideration for federal and provincial funding partners. Given these possibilities, IRM approaches could offer very considerable benefits to the region as a whole. The task force concludes that current and future regional waste management decisions must take place in an environment that **fully investigates and appropriately evaluates IRM approaches**. Finally, the task force supports the establishment of a pilot program to use gasification, or other appropriate technology, for processing biosolids, kitchen scraps and municipal solid wastes. The pilot could provide proof of concept for an IRM approach to these resources and could provide valuable baseline data for any future IRM solution to managing regional waste streams. Appendix 3 contains task force suggestions re what should be asked of respondents to a Requests for Expressions of Interest for a pilot. To accomplish these goals the IRM Task Force makes the following recommendations to the CRD Board.

Recommendations:

1. That, subject to future approval of the costs involved, the Board authorize the establishment of an appropriate structure to attract, evaluate and potentially procure IRM approaches to managing CRD waste streams including:

    a. An Evaluation Team comprised of a Project Lead and members with expertise in: Procurement of Innovation, liquid waste (innovative design and implementation), solid waste to resources technologies, financial analysis of complex business cases, analysis of greenhouse gas (GHG) reduction claims and legal advice.

    The Evaluation Team would provide advice on creation and implementation of high level requests for expressions of interest (RFEI). On the solid waste side the team would evaluate RFEI submissions, provide a recommended short list and, through a process of competitive dialogue, work with those on the short list to shape a final proposed project. On the liquid side, the team would evaluate RFEI submissions, provide a recommended short list and evaluate submissions on the short list against a base case provided by the Core Area Liquid Waste committee. The team would also manage an RFEI for a solid waste to resource pilot project, would recommend a short list of respondents to be evaluated in greater detail and would recommend a provider for the pilot program. All Evaluation Team reports would be vetted by staff in order to provide analysis and advice on any recommendations included.

    b. A select committee comprised of the Board Chair, the Chair of the Environment Committee, the Chair of the Core Area Liquid Waste Committee and the Chair of the Finance Committee.

    The responsibility for solid and liquid wastes is currently divided between several board committees. The proposed select committee membership would reflect those divisions and interests. The committee would provide political oversight on behalf of the board. Specifically this would include recommending appointments to the Evaluation Team and, along with staff, providing oversight to the creation of RFEI documents and providing analysis and advice to the Board with regard to any reports or recommendations from the Evaluation Team. To further this oversight it is recommended that one member of the select committee should sit as a non-voting liaison on the Evaluation Team.

    Please see Appendix 2 for a schematic representation of the structures described above

2. That the board authorize the creation of RFEI documents for: a) a pilot waste to resource program for biosolids, kitchen scraps and municipal solid waste (MSW), b) a full region wide waste to resource program for biosolids, kitchen scraps and MSW and c) submission of conceptual designs for liquid waste treatment designed to be evaluated against a base case established by the Core Area Liquid Waste Management committee.

Vic Derman, Chair, IRM Task Force

Appendix 1 – Report to the Core Area Liquid Waste Committee

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. In its terms of reference, the task force has been asked to define the scope and parameters of Integrated Resource Management objectives, to recommend options to the CRD Board for endorsement and to recommend to the board a process for broadly seeking submissions from the private sector for implementing the recommended initiative.

Phase 1 – Proof of Concept

Initially, the task force has examined the question of whether IRM approaches exist and are feasible 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 side along with production of syngas(electricity), heat, biochar and water on the solid side.

   Pivotal has already 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 large and well established Canadian and US infrastructure and construction companies. According to Pivotal, these companies are able to guarantee and fund the project, in accordance with CRD's procurement and risk management preferences.

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 Pivotal was the first presenter, the task force has considered a "high level" evaluation of the viability of the wastewater treatment, the gasification technologies and 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 sludge has been utilized in the mix of solids being processed. While the approach suggested is distributed, Hydra would include a 4 acre central site for pre-processing solid wastes prior to utilizing the pyrolytic reactors.

Beneficial use of resources would include heat 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 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**

Rather than presenting a complete solution to dealing with the region's waste streams, Highbury Energy would provide a dual bed fluid dynamic gasification system to deal with

biosolids and, potentially, other solid wastes. High value syngas would be produced from the gasification process and could produce a variety of energy products for heating, cooling and electrical generation. Additional processing, could produce renewable liquid fuels such as diesel.

Highbury indicates that their gasification process provides a number of advantages in comparison to earlier generations of gasification including: conversion of low grade biomass, lowered capital costs through a patent-pending tar removal process, lower operating costs with a system that continuously runs on its own energy, production of high BTU syngas and production of syngas that is relatively clean.

Highbury Energy appears to be a company that has emerged in 2009 from the workings of a gasification research group at the University of British Columbia. The company is able to point to a body of research which includes gasification tests of a variety of materials including biosolids. These tests have taken place at a "lab scale" and involve smaller batches of material (kilograms per day) than would be expected with a demonstration level pilot. While demonstration level or larger installations do not appear to currently exist, the company points out that its process is scalable and expresses interest in establishing a demonstration level (tons per day) pilot.

Highbury has partnered with a number of established larger companies including the Eaton Group, MGX Minerals and Noram.

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
- 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 steams 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 exist and are feasible today. Several of the presentations feature proven technologies. In addition, potential providers indicate they have partnered with substantial firms well recognized in the construction and wastewater industries. Presenters have indicated that these partnerships create a willingness and ability to fund a project, guarantee performance and insulate CRD residents from financial risk. The task force does not wish to question the

potential provider's credibility. Nevertheless, additional research will need to be carried out to insure that appropriate contractual arrangements do in fact exist.

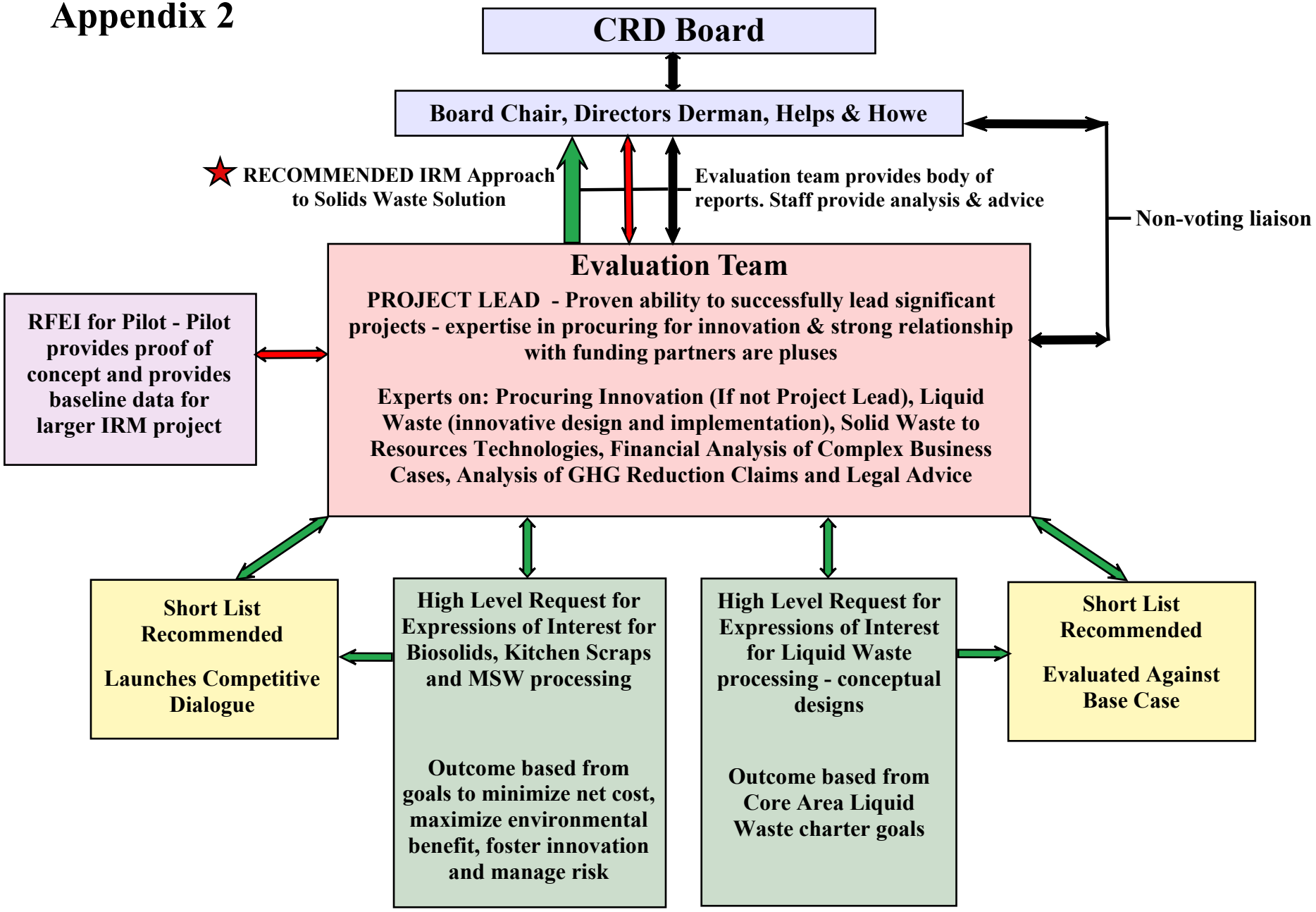
The task force also concludes that IRM approaches could provide financial and environmental benefits so substantial that a compelling case for IRM likely exists. Capital costs for a completed project dealing with all waste streams have been projected to be in the $250 - $400 million range. In addition, lifecycle costs are generally proposed to be revenue positive with at least one provider suggesting revenues would be sufficient to cover all capital costs. Without question, these cost estimates need further substantiation. Nevertheless, they are much lower than could be accomplished with current waste practices and waste projects being planned at the CRD. Similarly, estimates for GHG reduction are much greater than what could be expected from current practices and projects being planned. GHG reduction is increasingly critical in today's world and is likely a very important consideration for federal and provincial funding partners. Given these possibilities, it is likely IRM approaches could offer considerable benefits for the Core Area Liquid Waste Committee and the region as a whole. The task force recommends that current and future regional waste management decisions must take place in an environment that **fully investigates and appropriately evaluates IRM approaches**.

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 optimally reaching desired outcomes. Consequently, 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 proposed in the four presentations generally do not have an extensive track record of including biosolids in the process mix. 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 provide an updated report to the CRD Board at its March, 2016 meeting. In this report, the task force will recommend a path to accomplishing such a pilot and describe next steps the task force intends to carry out including:

- further investigation of possible technologies and solution providers
- additional research into the viability of technologies presented
- investigation into potential obstacles presented by current provincial regulation
- analysis and recommendation as to how any regulatory obstacles might be overcome
- examination of procurement methods best suited to attracting comprehensive, innovative IRM applications
- Examination of processes necessary to appropriately evaluate applications and select from amongst them

Appendix 2



*Potential Providers may respond to both requests as one integrated and optimized design or may respond individually to either of the requests

Appendix 3

IRM Task Force Discussion Re Initiating a Pilot

1. **Rationale for a "demonstration" level pilot**
   a. To determine if a mixture of regional wastes including biosolids, kitchen scraps and municipal solid wastes (MSW) can be successfully processed by the selected technology(s) and to determine the optimal mixture of these wastes.
   b. If the answer to "a" is positive, to determine if results are consistent with projected goals of minimizing costs, maximizing revenues and maximizing environmental benefit.
   c. To provide baseline data for a larger, region wide IRM project

2. **Process to procure a pilot**
   a. A high level Request for Expressions of Interest (RFEI) open broadly to the private sector could be used. This would certainly be seen as objective but would be lengthy in comparison to other approaches. Also, the fact that multiple "requests" have already been initiated by the CRD could result in fewer applications.
   b. A request for responses could be sent directly to providers of technology already identified by presentations to: Innovation days at Westside Committee, Technical Oversight Panel (TOP) and the IRM task force. This would possibly meet the test of objectivity since technologies and providers have already been broadly canvassed. Also, this approach is likely to be considerably more efficient and timely.
   c. A note could be sent to providers already identified indicating that a pilot is being procured and asking them to answer swiftly as to whether or not they wished to participate. At the same time, traditional RFEI advertisements could be run seeking new responses. Already identified providers would provide information and be evaluated while the time for new responses was open. Any new responses would be evaluated as they came in.

3. **Some suggested evaluation criteria for responses – should be included in RFEI**
   a. What technology(s) is proposed?
   b. Does the response deal sufficiently with the waste streams identified?
   c. Does the technology(s) and/or applicant have an established track record? E.G. has at least one commercial scale plant been operated successfully? If so, for how long has the plant operated continuously?
   d. Has this technology(s) been tested with a mix of the specified wastes? If so, at what scale and for what duration?
   e. What are the environmental benefits that might reasonably be expected from the response provided? – order of magnitude of the these benefits
   f. Does the response provide means for generating revenues? – order of magnitude
   g. Has a suitable testing program been proposed to provide the desired data (see #1)?
   h. How long would it take to begin the pilot?

i. How long would it take to produce the necessary information?
j. What would the net cost of the pilot be to the CRD?
k. Does the response provide for guarantees or warranting of performance?
l. Could the pilot infrastructure be incorporated into a larger region wide project

*The select committee should work with the Evaluation Team to tailor and add to the above questions

4. Evaluating responses and creating a short list

a. The Evaluation Team would evaluate responses based on the criteria in #4 above plus other questions considered to be germane and recommend a short list of 2 or 3 preferred respondents to the task force.
b. The Evaluation team would work further with these respondents to ultimately recommend a single preferred respondent.