

# Integrated Resource Management Task Force

February 15, 2016



Making a difference...together **with**



Providing innovative 21st Century Solutions  
to Municipal Waste Management Issues



L3D International, LLC

[duncan.cameron@l3dinternational.com](mailto:duncan.cameron@l3dinternational.com)





Making a difference...together **with**

**1. Which waste streams would be integrated and how would that integration take place?**

The Hydra System is designed to span ALL MSW, Red Bag (Biomedical) Waste, Construction and Demolition Waste and Waste Water. All Sludge from Waste Water Treatment Plant (WWTP) is dried and employed as a component of the Waste to Energy (W2e) centre where it is converted to Diesel (Ultra Low Sulfur), electricity and Char.

**2. What would the integrated system look like? What technologies would be used and how would they be integrated into the system design? Please be as specific as possible on aspects of system design such as siting requirements.**

Where possible, Hydra seeks to combine the W2e and WWTP in a single centre requiring a building of approximately 14,000 m<sup>2</sup> (150,000 ft<sup>2</sup>) about the size of a Super Walmart Store.

The negative pressure facility would house:

- A custom designed Materials Recycling Facility (*MRF*)
- A pelletizing facility converting processed MSW to Refuse Derived Fuel (*RDF*)
- Up to 7 Pyrolysis modules – designed by Bio-Green of France (field proven in Europe for 10 years) and manufactured under license by CCC Group of Austin TX - designed to handle 300 Tonnes each per Day (TPD) and
- A small distillation facility to dewater and desulfurize the Pyro Oil and
- A short distillation column (16 feet in height) to crack the last long chains of carbon.

Additionally, when co-located with W2e, at the opposite end of the building, would be the modular WWTP.

The wastewater treatment technology is Continuous Backwash Up-flow Media (CBUM) filtration supplied in modules that treat 175,000 GPD or 662,400 LPD. Each incorporates a UV unit supplied by Trojan. The CBUM filters are preceded by Salsnes Filters that filter the raw sewage in-flow through 25 micron screens taking out 80+% of the solids before it is passed to the filters.





Making a difference...together **with**

CBUM equipment is employed by over 500 municipalities in the USA alone for waste water treatment and water treatment.

The specifics of building design and facilities location are the subject of the CDN \$ 4.5 million Business Case & Design (BCD) Study that Hydra performs, at our expense, over a 4 – 5 month period on initiation of the contract.

If a distributed system were identified as preferable and acceptable to the community, individual WWTP for 4 – 7 Million Litres per Day (MLD) or 1 -1.5 Million Gallons per Day (MGD) would occupy a footprint of some 600 m2 or 6,500 ft2 .

The distributed facility can be created in a configuration that requires 10 foot side walls and a standard pitched roof and can be clad to fit the architectural language of the neighbourhood. As there is NO ODOUR it can be done so without disturbance/annoyance.

Hydra's objective is zero discharge since all of the water created is recyclable. The amount of water recycled will influence the site location. For the most part we do not believe that it will be necessary to locate adjacent to the sea. The BCD study will help determine the best location(s) and configurations

**3. Why are the technologies selected considered to be “leading edge but not bleeding edge?”**

All technologies selected have been in field use for 10 years or more and produce products that exceed the most stringent standards set anywhere in the world.

**4. What evidence is there to suggest that the technologies to be used can handle the mix of waste streams the CRD would provide?**

To our knowledge, the Victoria waste streams do not present any particular challenge and as the technologies have been in use for a decade or more in municipal environments in North America and Europe, we find little reason to suspect there will be a challenge. The BCD study will examine this issue and identify solution(S) should any challenges be identified.





Making a difference...together **with**

5. What would the estimated capital cost be and how has that cost been arrived at?

The Capital Cost to Victoria and your Taxpayers would be CDN\$ 0 (zero) as Hydra will finance the whole of the facility.

Hydra's cost will be in vicinity of CDN\$ 1.375 billion.

We have determined the cost by working closely with our equipment suppliers and our professional team.

**Funding:**

Hydra, in conjunction with partners in the UK, as well as prominent legal, accounting and actuarial participants, all of London, has developed a Bond based funding model that promises to be able to fund as many projects as Hydra can bring to the fore over the next five to seven years.

Project specific Bonds are to be structured and qualified for the Dublin, Frankfurt, Antwerp, and Dubai exchanges. The bonds are backed by an assured asset known as Senior Life Settlement (SLS) policies.

SLS are whole life insurance policies procured from the insured for a surrender cash payment.

SLS policies are bundled and tied to a specific bond issue. Actuarial assessment (we anticipate engaging Deloitte's UK Actuarial) is able to determine the cash value that will be realized by the maturation of the bundle over a 10-year term. The bundle is therefore scaled to guarantee the principal repayment of the structured bond issue on a ten-year term.

A bond trustee (we anticipate Grant Thornton UK) pays policy premiums and accumulates proceeds from "mature" policies while paying out the principal amount of the Bond issue to the holders at maturity.

The bond issue is scaled to provide for the purchase of the SLS bundle and sufficient capital reserve to accommodate premium payments - in total, some 25% of the whole bond issue.

Hydra is obligated to demonstrate a capacity to service the interest payment over the bond term (expected to be 6.75% pa) and, as component of the bond issue, provide a 2-year interest sinking fund. The Hydra Design and Business Case (DBC) Studies are structured and executed to provide such 'service' assurance.

Mutual Funds among others have indicated a willingness to underwrite Hydra bond issues so constructed.





Making a difference...together **with**

6. What would the estimated annual operating costs and ultimate life cycle costs be? How have these costs been estimated?

Again the annual Operating Costs and Life Cycle costs to Victoria will be CDN\$ 0 (zero). Hydra assumes all costs over the term of the agreement. Hydra has partnered with Utility Partners LLC (UP) of Atlanta which manages some 40 municipalities in the South East USA. UP have supplied guidance based upon their decades of experience.

Hydra has budgeted some CDN\$ 22.5 million per year for system maintenance and upgrade.

7. How is net cost to CRD taxpayers minimized including but not limited to: initial capital costs, reduced operating costs, revenue generation from resources, avoided infrastructure costs and transfer of existing taxation or revenue?

Questions 5 and 6 above address Capital and Operating Costs. Hydra represents a new 21st century approach to waste management – instead of “treat it just good enough to throw it away” we harvest virtually all resources in the “waste” stream. It is the revenue from these “waste” flows (a total of 8 revenue streams) that allows us to provide the system without cost to Victoria. We seek to lease the land required for the facility from the municipality to provide a new revenue source for the CRD (lease rate 5% of the total revenue - approximately CDN\$ 21 million per year.

Additionally, Hydra will freeze the wastewater rates for the term of the agreement.

Further Hydra commits to spend CDN\$ 21 million on the maintenance and expansion of the sewerage network annually with the anticipation that the budget can be doubled with grant funds dedicated for Climate Change from the World Bank, IMF, IFC UN etc.





Making a difference...together **with**

8. What are anticipated environmental benefits and how would they be accomplished? Please place particular emphasis on greenhouse gas (GHG) mitigation.

Two actions have a significant impact on GHG. The diversion of MSW from Land Fill to our facility attracts a significant GHG credit. In addition the CBUM technology releases 70% fewer GHG to the environment than does Activated Sludge in its many forms.

Additionally, the water released from our CBUM treatment is recyclable and can be potable. It is of such high quality:

- Less than 5 BOD<sub>5</sub>;
- Less than 5 TSS;
- Less than 3 Total nitrogen
- Less than 0.1 Phosphorous (can be produced to LT 0.01)
- And 2.2 MPN Fecal Coliform (Can be produced to 0 MPN)

That it will be of a superior quality than most of the water bodies and streams in the vicinity of Victoria.

9. Are any other specific advantages anticipated such as reduced property acquisition costs or avoidance or rezoning?

We are willing to purchase the land but prefer the Municipality to do so and thereby realize additional income for the Municipality. We will freeze sewage rates for the term of the agreements and seek to have recent increases reversed.

10. Are there opportunities to implement the system design on a phased basis? Are there any advantages to be gained from a phased approach?

The WWTP will be implemented on a phased basis with Hydra assuming the modular cost of expansion as needed through the term of the agreement. The obvious advantage is to minimize capital outlay up front.





Making a difference...together **with**

**11. If a “distributed” system design is being proposed, what are the advantages of such an approach?**

If a distributed approach is chosen the capital cost of new infrastructure required for the system is likely to be less than a centralized facility. The trunk sizes needed to service distributed systems are generally less. Distributed systems can be integrated through the CRD more effectively than a single central system.

**12. If your company were selected for implementation, how would you insure that the financial interests of CRD taxpayers were protected and risks were avoided to the highest degree possible?**

Hydra has a world class team that helps to ensure we bring the very best of design and execution to the task.

Mace Group for project and construction management  
([www.macegroup.com](http://www.macegroup.com));

Ramboll Group one of the very best engineering firms in the world  
([www.ramboll.com](http://www.ramboll.com));

DLA Design a top sustainable architecture firm ([www.dla-design.co.uk](http://www.dla-design.co.uk)); and  
Utility Partners LLC a top rated Facilities firm ([www.utilitypartnersllc.com](http://www.utilitypartnersllc.com))

Additionally, Hydra ensures that the entire facility is insured for performance and environmental hazard. Some CDN\$ 66.5 million is budgeted for insurance coverage.





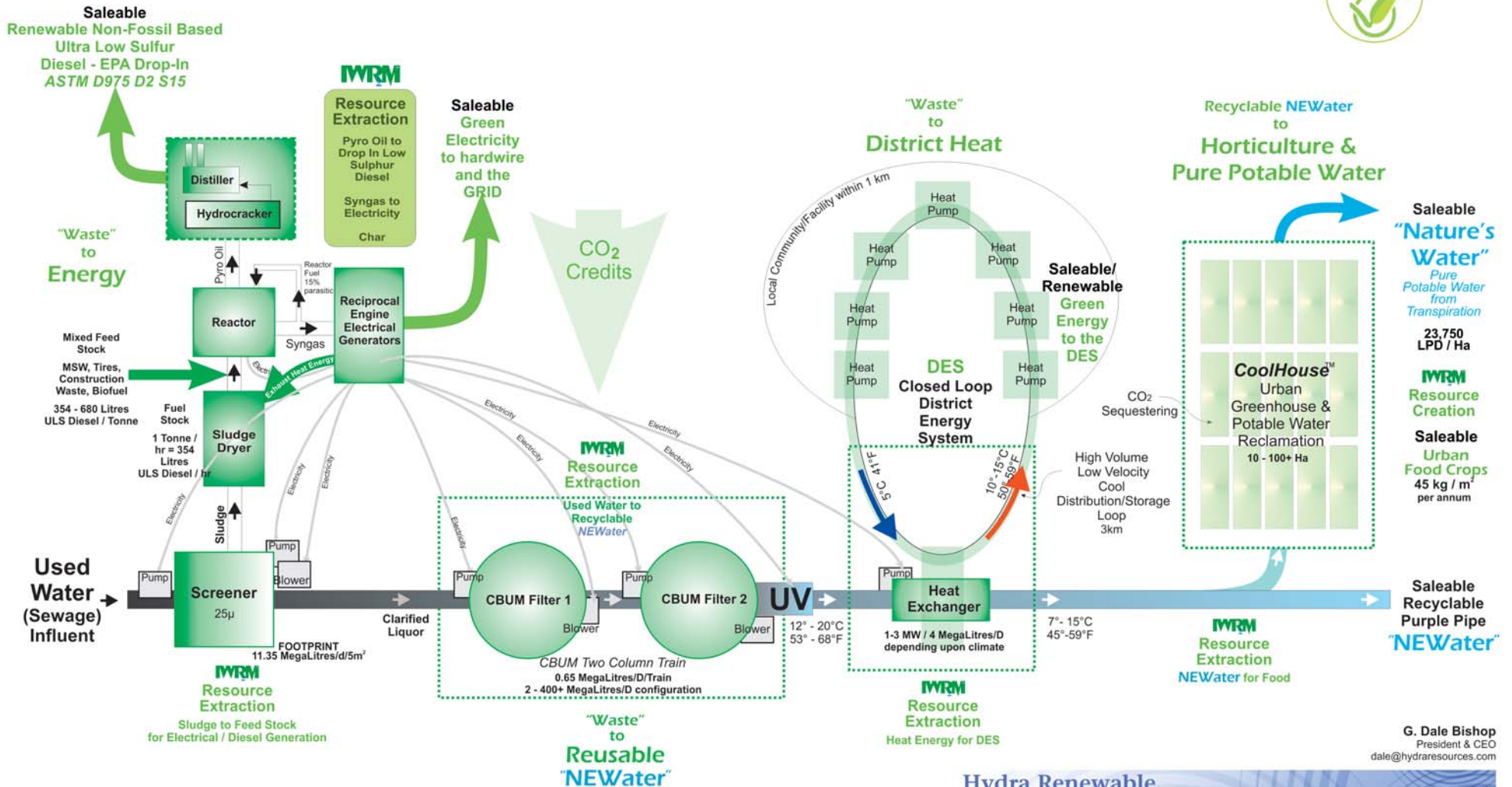
# Hydra's Process Diagram

## Integrated Waste Resource & Recovery Management IWRM

A Water, Energy & Food Nexus Archetype



Challenging the old paradigm of... "treat it just good enough to throw it away."



G. Dale Bishop  
President & CEO  
dale@hydrareources.com

Hydra Renewable Resources



Innovating 21<sup>st</sup> century solutions to waste management challenges

© 2012-2016 Hydra Renewable Resources, Inc.





Making a difference...together **with**

**Thank you for more Questions:**



Providing innovative 21st Century Solutions to Municipal Waste Management Issues