"**Why not achieve sewage treatment for the whole region for $250M capital cost, $0 new operating costs or better, complete water recovery, complete destruction of the "nasties", and support the local economy?**"

This is based on Pivotal's presentation to the CALWMC on June 9th.
http://crd.ca.granicus.com/MediaPlayer.php?view_id=1&clip_id=409

Who is giving costing advice? Why waste time on billion dollar solutions? Get to the best value solution now. Pivotal's credentials are exceptional so if they say this is possible then why are we still talking about billion dollar capital costs and multiple-billion dollar long term costs?

Action Item: Get a procurement process that allows vendors to provide this gigantic savings.

Gasification vs Anaerobic Digestion - Capital Costs
One of the largest cost savings is in the solids treatment.
Anaerobic Digestion: Seaterra funding is roughly $340m dedicated to the Hartland Resource Recovery Centre. This is the best the technical people could design and there is nothing to indicate the situation has changed. ($190M for the WWTP; $250M for other stuff)
Gasification: (1) Pivotal's presentation ~$75m. (2) Hamilton Ontario ~$30m for larger capacity than whole south Vancouver Island's MSW. (3) Email correspondence with gasification expert who says they are working on project to handle more than CRD sewage for around $15m USD.

Therefore gasification costs between $20-75m. Even if the cost is $100m there is no reason to ever talk about $300+ m anaerobic digestion systems.

Aside: Provincial WTE thresholds are shifting from “70% diversion” to “less than 350kg/capita”. CRD expects to be well below this by end of 2015.

Action Item: Stop discussing AD. Look for in depth analysis of AG.
Action Item: Start talking about total capital costs in $250-400m range.
Action Item: Start talking about revenues that exceed operating costs. Show this in 50 yr life cycle plans.
Action Item: Start talking about smaller initial capital costs which translate to little or no amortization costs.

Funding Timelines Tied to Solids Treatment Costs - False March 2016 Deadline
The RUSH to reach a decision is based on the March 2016 deadline for the P3 $83m funding for the biosolids facility. (1) If we don't do biosolids then this funding is either not needed or clearly up for complete renegotiation. (2) If we save $400-500 on capital costs then do we need to use this federal money on this project? Why not something that can benefit the environment like LRT?

Action Item: THERE IS NO RUSH. The deadline is dead. Long live another target date.

What is in Sewage and Where Does It Go?
Action Item: How does the solids treatment process deal with compounds of concern?
There are many such compounds but here are some key ones to resolve.

Micro-plastics are soon to be banned from products but they will persist for some time.

Micro-fibres are produced by laundry of certain fabrics. This will continue to be a concern in wastewater for decades.

Flame-retardants and other sources of endocrine disruptors.

Multi-drug resistant organisms: superbugs. Superbugs actually flourish in the warm wet nutrient rich sewage treatment processes. The organisms are perhaps killed during anaerobic digestion but their plasmids are not. These persist in the environment and can be absorbed into living organisms creating whole regions that are superbug breeding areas.

Hartland Landfill Leachate. Average of a million litres per day is to be mixed into sewage treatment process. It will affect the biological processes. It is highly corrosive and will shorten equipment lifespans.

Hartland Leachate

"… Average leachate flow in 2013/14 was 10.95 L/s, … The highest monthly leachate flow recorded in 2013/14 was 69,824 m3 (with an average flow rate of 26.07 L/s) for March 2014." "Leachate from the lagoons is discharged from the site through an 8.6 km long pipeline that discharges to the Saanich sanitary sewer and ultimately to an ocean outfall at Macaulay Point."

86,400 seconds/day * 10.95 Litre / seconds = 946,080 Litres / day ~= 1,000,000 Litres per day.

– HARTLAND LANDFILL –

Leachate from the Hartland Landfill in Victoria is discharged to Victoria's sewage collection system and released into the marine environment via the Macaulay Point outfall. The Hartland Landfill is a significant source of toxins. Concentrations of 8 of 21 chemicals in the Macaulay Point Outfall are raised considerably (see table below) due to the Hartland leachate. It is assumed that 3% of the outflow at Macaulay Point is leachate from the Hartland landfill.[1]

Chemicals From Hartland Landfill Leachate That Exceed Concentration of Macaulay Effluent

	Macaulay Point effluent µg/L	Hartland Leachate[1] µg/L	Macaulay Point outfall[1] µg/L	How much does Hartland **exceed** Macaulay effluent?
Sulfide	151	800	170	**5** times
Sulfate	55666	66 800	56 000	**1.2** times
Nitrogen-Ammonia	24412	144 000	28 000	**6** times
Cyanide-WAD	1.19	1.6	1.2	**1.3** times
Chromium (VI)	4.6	10	4.8	**2** times
Iron	832	8501	1062	**10** times
Thallium	0.21	20	0.8	**97** times
Phenol	12.8	35.3	13.5	**3** times

WAD = weak acid dissociable
Hartland leachate = mean concentration of Hartland leachate from 1997-2004
Macaulay Point outfall = mean concentration of Macaulay Point outfall from 2000-2004
Macaulay Point effluent = calculated assuming 3% of the outfall is leachate from the Hartland landfill

[1] Parametrix. *Screening-Level Risk Assessment of the Hartland Landfill, Victoria, British Columbia*, 2006. pg. 5-11 & 6-3

https://www.crd.bc.ca/docs/default-source/crd-document-library/annual-reports/environmental-protection/geoenvironmental/hartland-reports/2013-hartland-landfill-groundwater-surface-water-and-leachate-monitoring-program-annual-report-(april-2013-to-march-2014)-(appendix-a).pdf
See pg 98

http://sustainablefisheriesfoundation.org/programs/bccoi/impacts-of-sewage-discharge/sources-of-victoria-effluent-toxics/

Action Item: Ask what is to happen for Hartland Landfill leachate and devise a plan to treat it on site. Clean up the output before discharge into the larger system. This is called "source control".

Tertiary vs Secondary
The technical memos produced so far completely fail to account for the primary cost and environmental benefits of tertiary over secondary. All the plans shown, so far, include new pipes, pump stations, outfalls and more. Yet with tertiary water treatment the reclaimed WATER can be discharged into local water ways.

I told this to US/C last May but they have not shown any inclination to listen. At that time they discounted my claim merely because it would take some time to get the necessary approvals for local discharge. Other sources tell me that approvals are not difficult to obtain. They do require some study of the local conditions but that we could have that done within a year; well within the project timelines.

Action Item: get the studies started

Distributed Systems with Tertiary Cost Less
The technical memos have ignored a key cost benefit of tertiary treatment; local discharge of any excess reclaimed water. This means there is no need for new outfalls (use the existing outfalls as emergency backup); no need for new pipes or pump stations; etc. Therefore distributed systems can be smaller and extensible and cost less than secondary treatment systems. Seaterra plans called for about $200m in this extra stuff. Distributed with tertiary can save $200m.

If a technical memo says 4 plants costs more than 1 plant then it is not applying the principles of distributed with tertiary correctly.

Action Item: always consider distributed with tertiary, never with secondary.

Flows
Flows for 2045 may be based on faulty assumptions. First, the current flows are diminishing each year, per person, as we conserve water. Two, the population growth estimates assume growth on the west shore yet growth in the core is higher. Third, build just in time with optimized solution so no need to build for 2045. Build for now and augment smaller plants as needed. Have new large development pay for the plants.

Action Item: Ask for the actual flow data since 2006. Correlate with weather to remove severe weather events. Compare with the flow values being used in the technical memos. You will

likely see that the starting values are inflated. Then correct growth forecasts. Then think in terms of build-just-in-time.

WWTP Cost Breakdowns
The technical memos so far only show total WWTP costs without details. The public wants to know the cost-adder for tertiary on top of secondary, within the facility. But they also want to see the effect this has on system costs. In particular, secondary costs must include long ocean outfalls; while tertiary can use local discharge.

Action Item: give the public the details they need to assess the distribute with tertiary vs centralized with secondary options.

Extensibility
All WWTP are designed to be extended. The space is made for future WWT equipment. So the initial capital costs are mainly building and some WWT equipment. Tell us about this breakdown. So, instead of saying 50MLD plant costs $50m the reports should say "A 50 ML/d plant costs $Xm for the building and $Ym for the treatment equipment. The building has capacity to add Z ML/d treatment equipment if needed in the future with a cost adder of $A".

Action Item: Include information about how extensible WWTP can be.

Gasification vs Anaerobic Digestion - Environment and Revenues
http://crd.ca.granicus.com/MediaPlayer.php?view_id=1&clip_id=409

The first half of the meeting is Dr Simms presenting information on anaerobic digestion. Of particular note to me was two points.

1. Anaerobic digestion is a delicate process that can be affected by many factors. One such factor that Dr Simms may not be aware of is the plan to mix in the leachate from Hartland Landfill. This is a highly toxic and corrosive brew.
2. No mention was made about the outcome of the "nasties" in sewage that are not part of the anaerobic digestion process. Namely, micro-plastics, micro-fibres, superbugs, endocrine disruptors, etc.

It is my understanding that advanced gasification converts ~90% of the inputs into energy and the rest is biochar and ash. Further, it seems that AD only converts 50% into energy.

"...the UHTG process yields approximately 190% of the energy that may be produced by the AD process."
http://www.ncbi.nlm.nih.gov/pubmed/25145165

Thus, the volume of output from AG is much much smaller than AD.
Thus, the energy produced is much higher which means the revenues are much higher. 190% better?

Gasification converts all the inputs except heavy metals into energy. This destroys the compounds of concerns.
Anaerobic digestion does not affect the compounds of concern so they end up in the outputs.

Action Item: Stop discussing AD. Look for in depth analysis of AG.

Land Application Of Biosolids

The CRD has banned land application of biosolids. This has been sustained a number of times when motions have come forward to lift the ban. So, if the CRD does produce "biosolids" where will then go? The best option put forward by Seaterra was a 25 yr contract with a company that would use the solids "beneficially" up on the northern end of Vancouver Island. This can only mean "land application". Which means the CRD has banned the substance from local lands but is willing to risk someone else's land.The only other alternatives are incineration which could create a pollution problem in the airshed or gasification which is a complete waste of the energy in the material. See the paper referenced above which shows AG gets 190% more energy and AD.

Action Item: Stop discussing AD. Look for in depth analysis of AG.

About the author

Bryan Gilbert (bryan.gilbert@gmail.com) is a private citizen with no affiliation with any vendors or groups that may benefit from the sewage project. His main interest is how our capital region is dealing with with climate change. He opposes spending several billion dollars on a sewage project which has little environmental benefit. He supports a sewage project that follows the principles of the RITE plan (which is based on the principles proposed by Biowater/Pivotal).

Bryan is willing to discuss and validate everything in this report plus the following:
Why treat when science says it isn't needed? Is 2020 feasible? CRD Source Control.
How to explain gasification simply for the public yet in a way that experts can agree to.
Dockside Green. Future of WWTP is tertiary not secondary.

Bryan is a participant in an ad hoc group called the RITE plan. His views are his own but he has contributed to the discussion.

http://theriteplan.blogspot.ca/
https://www.facebook.com/groups/theriteplan/

Bryan is also a member of the Eastside Public Advisory Committee (email: bryanvicbc.epac@gmail.com/)

"Climate change is a very real challenge, and how we prepare for the increasing pressures on our eco-systems and our resources and our climate will be something that we will be judged on in coming decades and generations" Prime Minister Trudeau, G20 Summit in Turkey November 2015