"Environmentalism" That Does More Harm Than Good

A recent CBC article in opposition to an integrated biomass to energy and plastics to liquids plant [1] proposed by Synergy World Power (SWP) for the small town of Lewisporte in Newfoundland Canada got a lot more wrong about the project than it got right. The article did a great disservice to the environment and to the people of the Lewisporte area, Newfoundland, Canada and indeed Western Europe, starting with inaccurate information regarding the history and performance of SWP and its parent company EnviroPower Renewable (EPR), and continuing on with statements by an outside consultant that reflected inadequate understanding of the environmental issues and technology at hand.

In this blog post, we will describe where the CBC article went wrong. We will provide accurate information, backed by references to scientific literature where appropriate. Additional specific information regarding the project, including emissions data, can be found on the Frequently Asked Questions below.

We begin with a response to the controversial title of the CBC article ("Company Behind Lewisporte Energy Plant Has History of False Starts and Rejected Projects") and provide the relevant facts location by location. The first two projects mentioned were neither false starts nor rejections. Both are on track.

Hamilton, Scotland: The site in question near Hamilton was originally developed by another company for an anaerobic digestions plant with a waste incinerator. The previous developers were unable to meet the air emissions requirements for the project because of their fuel (minimally sorted municipal solid waste including organics) and restrictions in stack height. They were obliged to put the site up for sale. We understand that there were orchestrated protests at the previous project due to the odors produced by the anaerobic digestion plant and emissions. Because SWP technology will fit well on the site, used only dry fuel, and can easily meet the emission standards, SWP has taken out an option to purchase the site with the intent to develop it as a small gasification power plant. Because of its advanced reactor design and use of dry fuel with no odor causing components, SWP will be able to easily comply with the current planning permission established for this site.

Las Vegas: The properly zoned original site selected for the North Las Vegas gasification power plant project by the previous CEO of EnviroPower was too close to a school and residential areas to allow for future expansion. EPR elected to move the project to a larger site in the Apex Industrial Park in North Las Vegas Nevada,

and to include a plastics to liquid fuels facility. The North Las Vegas project is now designed and permitted with the electrical power interconnect agreement and a biomass fuel supply agreement in place. Construction will begin as soon as the final portion of the plastic feedstock material required is under contract.

The following project was terminated by EPR due to bureaucratic delays and changes in the local economics.

Ireland: A consortium in which EPR was a 70% equity holder won an open international competition to design and build a waste to energy power plant at the site of a closed landfill near Gortadroma in County Limerick. Subsequent to award, the project was formally reviewed by *An Bord Pleanala* and approved as a National Infrastructure project, ostensibly reducing the permitting period. However, the permitting process was delayed because the European Union had designated the closed landfill site as nesting habitat for the hen harrier, an endangered bird species. Regulators required the consortium to pay for one year of bird habitat observation at the closed landfill. By the time this observation period was successfully completed, an incineration plant project in the region, which had been in the permitting process for approximately 10 years, was finally approved by the government and the fuel originally intended for the Gortadroma plant was diverted to this incinerator at Indaver Ringaskiddy. This decision by the government prompted EPR management to place the Gortadroma project on indefinite hold, and eventually withdraw due to the deteriorating economic outlook.

The last project mentioned was not an EPR project.

Argentina: EPR had nothing to do with the project mentioned in Argentina, which was initiated in 2009 by a company called Innviron. An executive of Innviron did work for EPR for a few months in 2014 before leaving to rejoin the successor to Innviron, which no longer exists.

CBC brings in an "expert" to comment in opposition to the project and to SWP

Dr. Neil Tengri is a special projects manager with the Global Alliance for Incinerator Alternatives (GAIA). Although the CBC article stated that he had published a paper on gasification (inferring that he was an expert on the subject), the only document we could find by Tengri concerned incineration, which is not gasification.

Tengri provided no indication of the significant differences between incineration and gasification (see reference 1). From a check of Google Scholar, it does not appear that Dr. Tengri, who claims to be an environmental scientist, has ever published in peer reviewed scientific literature. Works we could find by Dr. Tengri included "Waste Incineration: a Dying Technology" and "On the Environmental Frontlines: Waste Pickers. Neither is in the peer reviewed literature. Nevertheless, Tengri felt qualified to comment on gasification power plants and plastics to liquids conversion technologies (information that is available in the technical papers in the EPR library on the SWP website).

We offer here accurate information in response to his comments regarding gasification of biomass to produce energy and pyrolysis of non-recyclable plastics to make liquid fuels, including ultra-low sulfur diesel (ULSD). As of January 1, 2020, a limit of 15 ppm for sulfur content will be placed on all transport diesel fuels, including marine bunker fuel. Limiting sulfur content in diesel fuel will decrease the concentration of sulfur oxide (SOx) acid gasses in the atmosphere and help to reduce the rate of acidification of lakes, rivers and the oceans.

Thermal conversion of non-recyclable plastic waste to clean ultra-low sulfur diesel (ULSD) requires 96% less energy than making the same amount of ULSD from petroleum

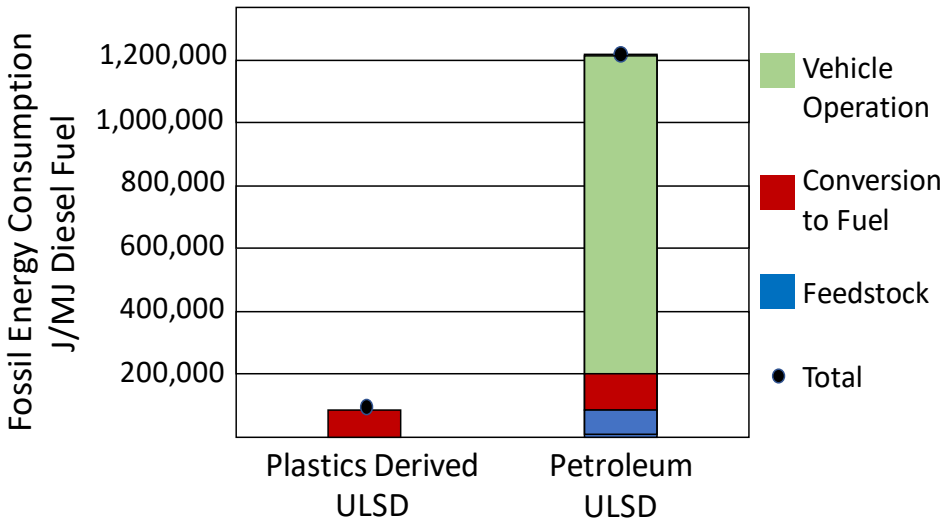

Figure 1. Data from a life cycle assessment study [2] by the Argonne National Laboratory showed that ultralow sulfur diesel (ULSD) derived from non-recyclable plastics requires less than 10% of the energy needed to produce than the same amount of ULSD from petroleum

It is unclear what other options for management of non-recyclable waste plastics Dr. Tangri had in mind when he commented to the effect that that '*converting plastics waste to fuel would not the best thing you could do with plastic'.* Plastic recycling markets are collapsing as fewer off-takers are accepting these waste materials. North America is no longer able to simply ship biomass and plastic waste to China, Indonesia or other Asian Pacific nations as it has in the past.

Reducing and reusing plastics are laudable goals and need to be pursued. However, plastics remain a vital class of materials in the global economy. Production currently stands at some 300 million tons per year, is increasing at a rate of approximately 4% annually, and is unlikely to diminish anytime soon. Waste plastics are accumulating in the environment at an accelerating pace now that the Asian market has collapsed. As shown in **Figure 1**, clean thermal Plastics to Liquid Fuel technology addresses a current problem with an environmentally responsible solution. The Lewisporte plant will produce ULSD.

In a life cycle assessment, thermal conversion of non-recyclable biomass to generate electrical energy produced less greenhouse equivalent emissions than other fossil fuels or placement in a landfill

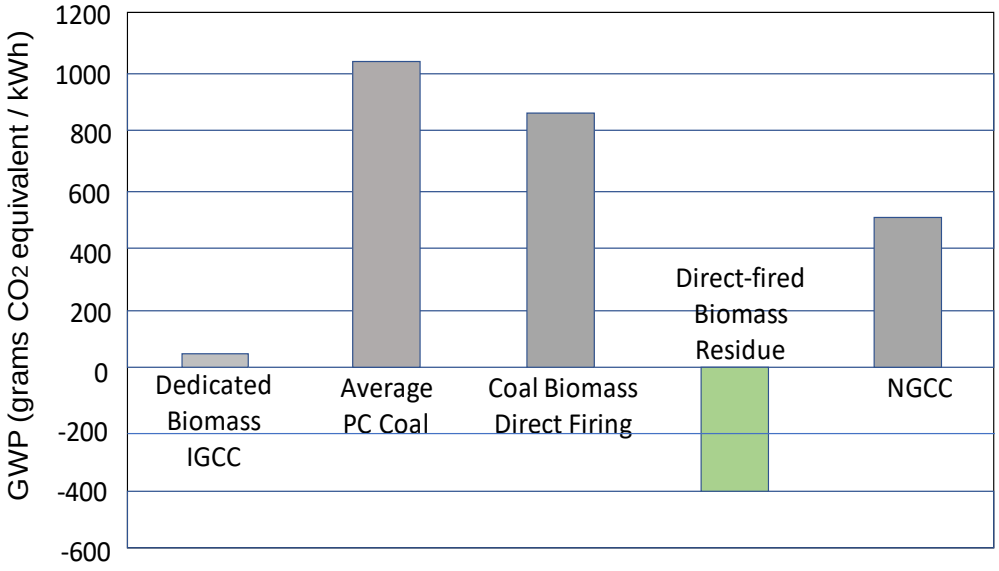

Figure 2. Life cycle assessment [3] shows that thermal conversion of biomass residue to energy results in a net reduction of greenhouse gas equivalent emissions because of the resulting diversion from landfill, where anaerobic decomposition would otherwise produce methane

In response to Tengri's comment to the effect that '*Critics of the process cite waste and other forms of pollution as environment worries'*, lifecycle analyses of waste management options show that thermal conversion of dry biomass waste to energy results in fewer greenhouse gas and other air pollutants equivalent emissions than does placement in landfills. In fact, because the biomass is diverted from landfill, generation of electrical energy by thermal conversion of biomass results in far less greenhouse gas equivalents emissions than use of any fossil fuel (**Figure 2**).

A ton of biomass, for example, generates approximately 2,500 kg of CO_2 equivalents when placed in a landfill [4]. The same amount of biomass, gasified to generate electrical power, produces 1050 kg of CO_2 equivalents. In other words, landfilling a ton of dry biomass generates more than twice as much greenhouse gas equivalents as gasification of that same ton of biomass.

Having fuel as a revenue rather than a cost allows design priorities to be placed on environmental performance, safety and reliability

SWP engineers recognize that having fuel as a revenue (in the form of tipping fees) rather than a cost, as with conventional coal or gas fired power plants, allows plant design to focus on environmental performance, reliability and safety rather than on getting the most power from a given amount of fuel. The management of gas phase, solid phase and liquid (aqueous phase), emissions at the plant are described below.

Air Emissions- SPW gasification systems use a multistage air pollution cleanup system that goes well beyond the requirements of Newfoundland, US, or EU regulations. This leads to very low concentrations of particulate, NOx (nitrogen oxide compounds), and SOx (sulfur oxide compounds) in the flue gas. Concentrations of mercury (Hg), also regulated by the Province of Newfoundland, and other metals regulated by the US EPA, are only a fraction of the standard limit. In the US, SWP plants have been permitted as type of minor stationary source, the same type of air permit that hospitals and small factories operate under.

Solid Waste- The primary solid waste from the plant will be spent catalyst, which is a mineral that does not leach into groundwater. Secondary solid waste is the sintered bottom ash from the gasification system. SWP has designed the plant to produce bottom ash that is consolidated into a material resembling gravel or sand that will not leach into groundwater. Similar ashes are used in other parts of the world as construction fill or aggregate. Finding the best beneficial use, such as construction fill or road sand for traction in winter, is a goal in development of the project.

Liquid Waste- The SWP facility will have similar wastewater to any large industrial facility. There will be an onsite wastewater system to handle sewage, blowdown, and water for washdowns and pipe flushing. Water that cannot be reused will be sprayed onto ash to minimize any dust during loading and unloading. There will be no untreated wastewater discharged into lakes, streams, or Burnt Bay. Stormwater from the site will be channeled to a retention pond, before being released into Burnt Bay.

SWP has a highly qualified technical team that has worked on projects all over the world, but never in a jurisdiction as well organized, goal oriented and knowledgeable as found in Newfoundland.

Referring to companies like SWP, Tengri opined that *"--they like going to smaller places where you don't have maybe an engineering university or somebody else to kind of knock them down a peg-"*

As described on the SWP website, the SWP technical team comes from engineering and science-oriented universities in the US and UK, including MIT, University of Washington and University of London. The team holds three Ph.D. degrees and four professional engineer licenses among them. They have worked on energy and infrastructure projects in more than a dozen countries, including a large infrastructure project in Labrador, and have overseen the design, management, construction and operation of more than 3 GW of electrical generation capacity. Further, the SWP team has more than 160 peer reviewed publications, and approximately a dozen energy related patents.

Tengri's comments seems to imply that, when it comes to decisions about bringing in new industry, people who live in small towns such as Lewisporte do not have the capability to ask the important questions, consult the experts when needed, weigh the evidence, and then decide what is best for their community and the environment.

Regarding the claim that companies like EPR market their technology in remote areas where there are no universities, it should be noted that EPR's North las Vegas gasification project, which is nearly identical to the one proposed for Lewisporte, is to be located in an area that can hardly be described as a remote small town. A major university in the American Southwest (University of Nevada Las Vegas), which hosts one of the largest renewable energy conferences in North America each year, is located a few miles from the plant site.

SWP Agrees with Dr. Tengri on some issues related to the environment

SWP agrees wholeheartedly with Dr. Tengri that waste incineration is a dying technology. (The current CEO of EPR made the decision to shut down his utility's MSW co-fired power plant years ago.) EPR's patented rotary kiln LoNOx gasifier appears to be the future when it comes to clean thermal conversion of non-recyclable waste biomass. SWP would also agree that the work done by waste pickers who Dr. Tengri supports, especially in developing countries, can help reduce the amount of waste going to landfill. SWP systems employ pickers to ensure hazardous and other unsuitable materials do not enter the plant. EPR strongly supports recycling and substantial reductions in the use of fossil carbon, whether it be for fuels or for the manufacture of plastics.

As is evident on the SWP and EPR websites, Dr. Tengri and SWP have much the same views regarding waste management, the use of fossil energy, and of our common responsibility to protect the environment in general.

As described on the SWP website, the Lewisporte plant will not be a mass burn incinerator of the type Dr. Tengri severely criticizes but, rather, a robust rotary kiln-based gasification fired steam power plant with flue gas recycle and LoNOx burners. The gasification plant operates on dry biomass and some plastic selected recovered fuel (SRF) that is sorted from dry, non-food, residential, commercial, industrial and construction and demolition solid waste streams.

As an environmental scientist, Dr. Tengri will understand that the alternative to thermal conversion of non-recyclable biomass and fossil carbon derived solid waste is placement in a landfill. In a landfill, biomass materials eventually undergo anaerobic degradation producing methane, a greenhouse gas that is more than 25 times as effective as carbon dioxide in trapping heat in the atmosphere. Most of the methane that will be released from a landfill escapes into the atmosphere before final cover and the installation of methane recovery wells; thus, landfills are a significant contributor to anthropogenic greenhouse gas production. Further, landfill airspace is rapidly diminishing leading to ever increasing tipping fees.

Dr. Tengri is likely familiar with life cycle assessment studies showing that thermal conversion by a process such as gasification, which has been properly permitted and

operated in compliance with the permit, represents a net reduction in greenhouse gas equivalents compared to placement of that same material in a landfill.

Dr. Tengri's apparent concerns regarding the Lewisporte project can be easily resolved by reviewing materials available on the SWP website or through discussion with the technical team at SWP. The extensive FAQ pages for the Lewisporte project explain that the ground level concentrations of criteria pollutants such as particulate matter emitted from the plant would be at levels much lower than those now measured at homes located anywhere near roads over which diesel trucks occasionally travel.

We believe that the environmental stewardship values of both Newfoundland and Synergy World Power can create a difference for our next generation.

References

1. BW Wilson, BR Wilson, B Liss (2019) Integrated Waste to Energy and Liquid Fuel Plants: Key to Sustainable Solid Waste Management https://eprenewable.com/wp-content/uploads/2019/05/L2-Waste-to-Energy-and-Liquid-Fuels-52119.pdf

2. P T. Benavides, et al (2017) Life-cycle analysis of fuels from post-use non-recycled plastics, Fuel 203, 11–22 https://www.researchgate.net/publication/316525873_Life-cycle_analysis_of_fuels_from_post-use_non-recycled_plastics

3. R.L., Bain, et al., (2003) Biopower Technical Assessment: State of the Industry and Technology. National Renewable Energy Laboratory. https://www.nrel.gov/docs/fy03osti/33123.pdf

4. U. Lee*, J. Han, M. Wang (2017) Evaluation of landfill gas emissions from municipal solid waste landfills for the life-cycle analysis of waste-to-energy pathways. *Journal of Cleaner Production* 166, 335-342 https://www.sciencedirect.com/science/article/pii/S0959652617317316