Manis Canning & Associates

January 25, 2021

The Honorable Kumar P. Barve, Chair
House Environment and Transportation Committee
Room 251
House Office Building
Annapolis, Maryland 21401

Dear Mr. Chairman and Members of the Committee:

We are writing on behalf of our client the American Chemistry Council (ACC) to advise you of their opposition to **HB 21 Environment – Recycling – Prohibition on the Chemical Conversion of Plastic**. We along with Steve Wise and Frank Boston represent ACC and we are relinquishing our time to testify at the hearing on January 29, 2021 so that you and the committee members can hear from representatives from ACC, experts in the technology and process as it relates to advanced recycling, Maryland and national companies, and others that are and would be directly impacted by this mandate.

We will be in contact with you and should you have any questions or further information is needed, please do not hesitate to contact us. We have also included in our testimony an article by Marco J. Castaldi, Ph.D., who is a Fulbright Global Fellow and Technical Fellow of the American Society of Mechanical Engineers that provides you additional information on Alternative Recycling.

We appreciate your consideration and ask that you **OPPOSE HB 21 Environment – Recycling – Prohibition on the Chemical Conversion of Plastic**.

Sincerely,

Nick Manis

John Favazza

CC: Delegate Sara Love
Steve Wise
Frank Boston

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In My Opinion: Industry's tech development must continue

Posted on October 14, 2020

by Marco J. Castaldi, City College of New York

Pyrolysis equipment inside the Agilyx facility in Oregon. | Jared Paben/Resource Recycling, Inc.

If there is one thing I have learned in my career as a practicing engineer, researcher and educator, it is this: You have to actually see, investigate and work with technology to make a credible assessment of its potential impact. Furthermore, impacts should be measured to the extent possible and incorporated into life cycle analyses.

Of course, impacts can be positive or negative. So, the question I'd like to address here is: On a life cycle basis, is the overall environmental impact positive or negative when it comes to using advanced recycling technologies to convert plastic wastes that would otherwise end up in a landfill? The answer is they are positive.

Before I discuss how I know this, I will explain why I am qualified to perform an analysis and draw a conclusion.

My perspective stems from nearly 15 years of in-depth, hands-on research on varied waste conversion technologies related to wastes that would otherwise be destined for landfills.

Prior to taking my current position with the City College of New York, I was an associate professor at Columbia's Earth & Environmental Engineering Department, and before that, I worked in industry for 10 years. I have globally collaborated on wide-ranging research from catalytic reactor development to combustion modeling to technology development. I have seven patents and two pending applications in the areas of catalysis and combustion and have authored over 100 peer-reviewed publications.

It is through these experiences that I am providing this perspective. The reason I am doing so is because, in general, there is far too much mischaracterization of some plastic recycling technologies and processes. The unfortunate result is confusion among policymakers, regulators and potentially the public.

An important aspect is that my team and I physically visit and work closely with the engineers and inventors of operations. We have assessed numerous technology development companies and laboratories all over the world. Many of those companies request that we quantitatively evaluate their system and suggest possible process improvements. To arrive at quantitative assessments of impacts requires site visits and direct contact.

Marco Castaldi

Mentioned above, there are multiple ways to interpret "impact," ranging from positive to negative. Specific to conversion technologies (thermal or chemical), my experience and the data convince me they have a significantly positive environmental impact on managing plastic waste.

Mismatch in supply and demand

Currently, there is a mismatch between the availability of recyclable plastic waste and the ability of markets to absorb it. For example, only 48% of plastics in New York's blue bins get recycled through traditional recycling methods, leaving opportunities for new technologies to use the rest.

What happens to the other 52%? There are only two options: landfill or conversion to some other product such as energy, synthesis gas or pyrolysis oil. Clearly, in this example, it is a positive impact to employ technologies that convert that plastic waste into something useful instead of going to landfill.

It is also important to acknowledge that conversion technologies produce emissions that are released into the environment, resulting in some negative impact (keeping in mind that emissions are produced by all waste management processes, from reuse to mechanical recycling to chemical or thermal conversion to disposal in landfills).

But it serves no good purpose when organizations or uninformed individuals make claims of "toxic emissions" being produced. The real question is what are the emissions and how do they compare to the regulatory limits established by credible institutions such as the EPA and state environmental protection agencies?

A review of the published literature reveals that emissions from conversion processes such as plastics-to-fuels demonstrates they are lower for volatile organic compounds and particulate matter, nitrogen oxides, sulphur oxides, and carbon monoxide than food processing plants, hospitals, universities and automotive manufacturing facilities.

The Earth Engineering Center, which I direct, has reviewed technical reports on numerous gasification and pyrolysis technologies, as well as conducted our own research. The center has found that they all emit below the regulatory limits that have been established for their respective systems.

Back to the ultimate question: On a life cycle basis, would the overall impact on the environment be positive or negative when deciding to use conversion technologies on plastic wastes that cannot be or are not mechanically recycled? Rigorous, peer-reviewed engineering and scientific studies have overwhelmingly found it is a positive impact.

Of course, many of these developing technologies are just that: still developing. All technology takes time to mature into a commercial system robust enough to be launched and relied upon for continuous operation for years at a time.

Technologies that are and have been developed to convert waste into something useful have an additional challenge. The feedstock (i.e. waste stream) is variable and has significantly changed over the years. For example, more attention has been given to collection, sorting and pre-processing systems to extract valuable products. That extraction, though is a positive thing, materially changes the input, thereby requiring adjustments to the conversion technology.

If a mixed waste stream could be completely separated into consistent, mainly pure streams of specific items (e.g. hard plastics, film wrap, paper, corrugated board, etc.) then it would accelerate the development of these technologies. They could be designed to accept a fairly narrow category of feedstock. To date, however, pure stream separation has proven prohibitively expensive and faces significant technology challenges. That doesn't mean we should stop trying. After all, past failures are lessons for future success.

Misunderstanding toxicity

I'd also like to address a false premise about the outputs of conversion technologies used to synthesize waste streams. It goes like this: Materials entering a given system can affect the make-up of the final product; therefore, toxic materials entering the system will result in toxic substances in finished fuels or chemicals. This is not correct.

As with all synthesis processes, the main goal of companies developing conversion technologies is to produce a final product that meets certain specifications. All technology developers recognize that the production of a fuel or chemical that has unacceptably high levels of contaminants, compared to the specifications, will have major implications for a potential buyer and user.

That applies not only to specifications designed to protect the environment, but also those designed to protect the equipment. Specifically, fuels must meet very specific viscosity, smoke point, boiling point, and halogen, oxygen and metal content for engines to perform properly.

Chemicals made from waste streams must also meet stringent specifications for downstream refiners or manufacturers to accept them, because they have billions of dollars of infrastructure at stake and have multiple options for feedstock. From our research, it is clear that conversion processes are designed to deliver products well within these stringent expectations.

We have a waste problem in the world. We need to consider all options to safely and sustainably manage the enormous amount of waste that you and I generate – nearly four pounds per person per day. The decisions we make about which options to use should be backed by reliable scientific data. When misinformation is used to mislead our decision makers and the general public about these options, we run the risk that these options will be taken off the table – and no action or misguided action will be taken to solve our waste problem. Ultimately, the common objective must be to divert as much waste as possible from landfills, recover as much material and energy as possible from the waste stream, and recirculate it through the economy.

Marco J. Castaldi, Ph.D., is a professor of chemical engineering at the City College of New York. He is a Fulbright Global Fellow and Technical Fellow of the American Society of Mechanical Engineers (ASME) and the American Institute of Chemical Engineers (AIChE).