



## NEWSLETTER, SEPTEMBER 2020

---

### Featured article:

#### **Summary of RCEEW's and MER's comments on the Request for Information of the Department of Energy on Hydrogen Production from Gasification of Plastics and Biomass**

RCEEW's and MER's comments were submitted to the Department of Energy (DOE) in its goals to advance hydrogen production from gasification of wastes, especially plastics and biomass. The main driver of the comments was to support the need for additional research and development in plastic recycling and gasification, which will improve the overall performance, reliability, and flexibility of existing technologies to produce hydrogen.

China's "National Sword" policy, enacted in January 2018, banned the import of most plastics and other materials headed for that nation's recycling processors, which had handled nearly half of the world's recyclable waste for the past quarter century. This policy has caused disruptions in the US recycling markets and it is believed that DoE's programs of recycling plastics could help municipalities and the recycling market.

The key messages of the comments are summarized below:

- Plastic that is recovered from the 10 states with beverage container laws should not be considered by DOE as feed stock for gasification projects. These plastics have never entered the waste stream and have a high value in the recycle market.
- There are markets for single resin plastics in the US. DOE should support research to recover engineered plastics, e.g. carpets, textiles, and auto parts, primarily to prevent these plastics from entering the waste stream,
- Most contaminants may not cause significant issues in the gasification process. However, Polyvinyl Chloride (PVC) should not be used as a feed stock.
- A criterion to locate gasification units would be in areas where there are MRFs.
- In general, gasification of plastics as an RDF with biomass or coal is the best option and the plastic loadings are around 20% by weight.

- The feeding of plastic by itself into reactor is problematic in most common gasification systems.
- The published data on pilot/ “modular” gasification plants ranged from 50-250 lbs/hr.
- One of the largest systems that has been demonstrated in the U.S. was the Covanta CLEERGAS technology that processed approximately 330 tpd of as-received MSW in a two-stage close coupled gasification/combustion system. To date that system has not been developed commercially.
- Plastics have low thermal conductivity, so they heat slower. Plastics melt in the pre-heated regions of the reactor, so they are sticky. Tar formation is a big problem.
- The biggest plastic contamination issue would be with PET because of the large oxygen content.
- There is a large potential for end-use hydrogen production provided it is of the right purity. Importantly, there is more than just end-use; there are storage, safety, and distribution challenges. Currently a clear connection between hydrogen purification cost and the production pathways does not exist in the published literature.
- Opportunities can include improved carbon-hydrogen ratios especially for carbon utilization applications to produce value-added fuels, chemicals, and plastic monomers to promote a circular carbon economy. However, the need for clean, high-purity feedstocks can be a barrier for catalyzed carbon utilization applications.
- A considerable barrier would be to condition the syngas produced to a quality commensurate with the downstream application.
- Addition of CO<sub>2</sub> into the gasification will adjust the H<sub>2</sub>/CO ratio exiting and therefore may provide an additional ability to tune the syngas effluent for targeted applications. Depending on the plastic mix and moisture content the added CO<sub>2</sub> could increase the solid carbon yield.
- While not a gasification solution, almost all current WTE plants in US can handle an increase in plastics which generate HCl emissions (from PVC/CPVC) since all WTE plants have FGD technology. However, modifications to the APC may be needed and likely research needs on combating accelerated corrosion due to an increase in halogen content.
- Currently existing WTE facilities cannot compete on open market for generating electric power when rate goes to \$0.02/ kWh. The electrical output from new and existing WTE facilities could produce H<sub>2</sub> through electrolysis rather than exporting power to the electrical grid when power rates are less than \$.05/kWh.
- Opportunities exist for waste plastics valorization through pyrolysis of plastics followed by steam reformation.

**Interesting items:**

**Authorities Anticipate Medical Waste Crisis**

Experts in the U.S. are still predicting a rush of medical waste, similar to an influx of medical waste that hit parts of China early in the COVID-19 outbreak. State authorities and consultants are predicting that municipalities could see an increase of medical waste if cases continue to rise or as landfills fill up. [Link](#)

**Contaminated Waste Grows Following Coronavirus**

An article in Bloomberg News broke down issues worldwide from a lack of facilities capable of handling an increased load of medical waste during the COVID-19 pandemic. Cities such as Manila have seen an additional 280 daily tons of medical waste during their peak coronavirus infections. Facilities that incinerate waste at high temperatures, including some that do not recover energy, saw increased use during peak infections. Without these facilities though, including WTE, medical waste or infected materials are ending up in landfills as mixed waste or being discarded. [Link](#)

**SWANA Submits Written Statement to US Senate on Recycling Challenges in Face of COVID-19**

SWANA's indicated a decrease in recovered material from commercial customers such as schools, offices, and stores. At the same time, SWANA described how residential waste and recycling volume increased nationwide in March and April, though it has declined from the peak of about twenty percent higher than normal. Other impacts identified in SWANA's written testimony included operational changes at recycling facilities to keep workers safe, the temporary suspension of some curbside collection programs, and additional personal protective equipment provided by employers in response to concerns about exposure expressed by front-line workers. [Link](#)

**Waste to Energy & The European Green Deal**

In order to deal with our waste here in Europe in an environmentally sound way, appropriate capacity for both recycling and for treating residual waste must be made available. EWEP's Dr Ella Stengler and Agnė Razgaitytė explore the implications of Green Deal on realising this. [Link](#)

**Covanta Announces Q2 Financial Earnings**

Covanta reported revenues of \$454 million for the quarter, down from \$467 million in 2019. Waste-to-energy tip fees were up 1.3 percent with \$158 million in 2020 and \$162 million in 2019. The earnings, according to President and CEO Stephen J. Jones, demonstrates that the company is well-positioned to respond to conditions due to the ongoing COVID-19 pandemic. [Link](#)

**DOE Awards \$97 Million to Bioenergy Research and Development Projects, including WTE**

The U.S. Department of Energy (DOE) announced more \$97 million in funding for 33 projects. These projects will support high-impact technology research and development to accelerate the bioeconomy, including waste-to-energy development. [Link](#)

### **Microsoft Targets Zero Waste by 2030**

Microsoft will build sorting, reusing, and recycling centers at data centers or ‘circular centers,’ invest \$30 million in Closed Loop Partners to fund research on waste reduction and green design, eliminate single-use plastics in packaging, and make efforts to digitize information on the materials that go into products. For the circular centers initiative, Microsoft built a pilot project in Amsterdam to test the idea and is now constructing a facility in Boydton, Va. Microsoft has promised to spend up to \$1 billion to support innovation in carbon reduction and removal. [Link](#)

### **Report: Plastic Trash in Seas will Triple by 2040 Without Action**

A new report by the Pew Charitable Trusts and a London think tank, shows that the amount of plastic trash flowing in the ocean annually is expected to triple by 2040 to 29 million metric tons. The report recommends shifting to a circular economy would reduce costs by \$70 billion globally than proceeding with business-as-usual due to reducing environmental costs and producing virgin plastic. [Link](#)

---

### **Recent developments:**

#### **Brazil to Solicit WTE Plant in 2021**

Reive Barros, Brazil’s energy ministry’s planning and development secretary, announced that Brazil will solicit a waste-to-energy project in 2021. Waste-to-energy would also likely qualify for tax-exempted debentures as projects with environmental and social relevance. [Link](#)

#### **Wheelabrator Facility Allowed to Increase Output**

Kemsley WTE will increase its waste process from 550,000 tonnes to 657,000 tonnes annually, and operating hours will increase from 8,000 to 8,760 hours. Wheelabrator announced in July that the facility had entered full commercial operation. [Link](#)

#### **Veolia Awarded Norfolk, UK WTE Contract**

Veolia has been awarded a six-year, £102 waste-to-energy contract by the Norfolk County Council in the UK. The contract will begin in March 2021 and the company will process 180,000 tons per year. [Link](#)

#### **WTE Facility to Replace UK Power Station**

A new facility at Rushcliffe-on-Soar would be able to power 90,000 homes and replace a coal power station in the UK’s East Midlands. A new £330 million energy recovery facility is proposed for the site after the current power station is demolished. The overall plan is to develop the area around the WTE plant into a commercial and industrial hub. [Link](#)

#### **Macquarie Infrastructure Partners (MIP) in Talks to Sell UK Wheelabrator WTE Plants**

MIP is aiming to kickstart the sale of waste management company Wheelabrator’s power plants in the UK in September. Two of Wheelabrator’s plants for sale are in a joint venture with British renewable power generator and network operator SSE, one of which is a 300 million pound (\$391 million) facility

still under construction. The four Wheelabrator facilities in the UK are valued at more than \$600 million. [Link](#)

### **Mitsubishi Heavy Industries to Upgrade Tokyo WTE Plant**

The Minato plant currently processes 900 metric tons daily and produces 22 MW of power. The contract is for \$72.2 million and scheduled to be completed in 2023. MHI will refurbish and improve stoker type incinerators and other equipment. [Link](#)

---

### **ASME-MER Floyd Hasselriis Scholarship**

The ASME-MER Division offers the Floyd Hasselriis educational support program to stimulate the interest of students (undergraduate and graduate) in solid waste management and related fields.

### **ASME-MER 2019-20 Scholarship winners**

#### **Anna Naumova**

City College of New York, BS in Mechanical Engineering. Date of Graduation: Spring 2021.

Research subject: Processes that convert plastic materials to fuels.

#### **Komal Charania**

NC State University, MSc in Environmental Engineering. Date of Graduation: May 2021.

Research subject: Estimating the elevated temperatures of landfills.

#### **Yegor Nikitin**

City College of New York, PhD in Chemical Engineering. Date of Graduation: May 2022.

Research subject: Corrosion in Waste to Energy (WtE) processes.

### **ASME-MER 2020-2021 Scholarship Opportunity**

The 2020-2021 Floyd Hasselriis Scholarship is open and the deadline for applications is October 15, 2020. The application can be found on the ASME Materials and Energy Recover [website](#).

---

### **Executive Committee:**

Jeff Leblanc, Chair; [jeff.leblanc1@yahoo.com](mailto:jeff.leblanc1@yahoo.com)

Len Grillo, Vice Chair; [grilloeng@aol.com](mailto:grilloeng@aol.com)

Annette Scotto, Secretary; [Annette.Scotto@hrdinc.com](mailto:Annette.Scotto@hrdinc.com)

Marco Castaldi, Member-at-large; [mcastaldi@ccny.cuny.edu](mailto:mcastaldi@ccny.cuny.edu)

Newsletter edited by: Thanos Bourtsalas; [ab3129@columbia.edu](mailto:ab3129@columbia.edu).