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FROM: Enerkem, Inc. (“**Enerkem**”)

RE: Commentary on “New York Draft Scoping Plan”

Enerkem welcomes the opportunity to provide comments with the New York State Energy Research and Development Authority (NYSERDA) on the “New York State Draft Scoping Plan” recently released for stakeholder input.

Enerkem is an advanced biofuel, recycled carbon fuel (“RCF”), and circular chemicals technology company that uses a proprietary advanced gasification technology to create sustainable transportation fuels and chemicals from waste (e.g., municipal solid waste). Our products help diversify energy sources and offer a sustainable alternative to landfilling and incineration. Our business model is structured along two pathways to allow for the flexible deployment of the Enerkem technology:

1. Enerkem as technology provider - through the licensing of our proprietary thermo-chemical process technology and gasification technology and equipment/modules; and
2. Enerkem as biofuels producer - by participating in plant equity in addition to providing our technology license and equipment, as mentioned above.

The Enerkem technology is currently at the heart of several other major industrial ventures centered on the production of renewable chemicals & biofuels from different types of waste:

- In Edmonton (Alberta, Canada), Enerkem Alberta Biofuel (EAB) has demonstrated its first-generation technology to convert ultimate waste into syngas/methanol and ethanol and is continuously working on improving its commercial demonstration facility.
- In Varennes (Montreal, Quebec), the Varennes Carbon Recycling (VCR) bio-refinery is under construction and will convert a combination of forest biomass residue and municipal solid waste into 100 kilotons per year of bio & circular methanol. Enerkem and the VCR-project-entity shareholders (Shell, Suncor, Proman and Investissement Quebec) target 2024 to start production. To enhance the facility’s performance, the plant

will use green hydrogen and oxygen from a co-located 90 MW water electrolysis facility powered by renewable energy from Hydro-Quebec.

- In El Morell (Tarragona, Spain), the Ecoplanta project has recently been preselected by the European Commission Innovation Fund for its contribution to the fight against climate change. A joint venture between Repsol, Enerkem (Canada), and SUEZ Recycling & Recovery Spain, this project is one of only seven preselected among over 300 other large-scale projects submitted from all of Europe. The project will use Enerkem's technology to convert non-recyclable fractions of waste into circular chemicals and advanced biofuels, producing 237 kilotons per year of methanol in a facility on a petrochemical complex near the port of Tarragona, Spain. The Ecoplanta project will recycle over 70% of the carbon present in the residual waste materials.
- In Rotterdam (Netherlands), the Waste-to-Jet project will use a combination of Enerkem's technology and Shell's Fischer-Tropsch technology (Gas-to-Liquids) to produce Sustainable Aviation Fuel (SAF) and RCF.

Enerkem is also proud to announce that, among the four finalists it has been selected by an independent panel of international aviation experts as the winner of "The Sky's the Limit Challenge" hosted by Natural Resources Canada. This prestigious award underscores our significant achievement in producing sustainable aviation fuel (SAF) from forest biomass carbon. Enerkem served as the project leader in partnership with CRB Innovations. CRB deconstructed and fractioned the biomass into recoverable intermediaries. Enerkem and CRB conducted the research using these intermediaries, leading to the production of sustainable aviation fuel. The resulting biogenic fuel will contribute to a 93% reduction in GHGs from air transportation per unit of fossil fuel replaced by SAF.

Enerkem's experience in diverting waste and creating advanced biofuel, recycled carbon fuel ("RCF"), and circular chemicals equips our company with valuable information and insight. Again, we appreciate the opportunity to provide you with these comments and hope to serve as a resource to NYSERDA on the development of critical climate and energy policies.

Introduction

According to the International Energy Agency (IEA)¹, waste- and residue-derived fuels will be crucial to achieving global climate targets. Under its Net-Zero Scenario, the IEA projects that such biofuels will make up 45% of all biofuels consumed in 2030, a large increase from IEA's estimate of 7% given in 2020. In addition, IEA concludes that major feedstocks, such as cooking oil and waste animal feedstocks, are currently limited. Therefore, new technologies will need to be commercialized to process alternative feedstocks, including fuels derived from municipal solid waste ("MSW").

Not only does Enerkem provide a solution for expanding the supply of low-carbon fuels, but it also provides a waste-management solution. As referenced in the Draft Scoping Plan, "more than 18 million tons of municipal solid waste is generated each year, or 1,850 pounds for every person that

¹ [Bioenergy - Fuels & Technologies - IEA](#)

lives in the State.” Additionally, 78% of the emissions generated from the waste sector come from landfills. Enerkem can help align market opportunities for decarbonization in waste management, transportation, and chemicals.

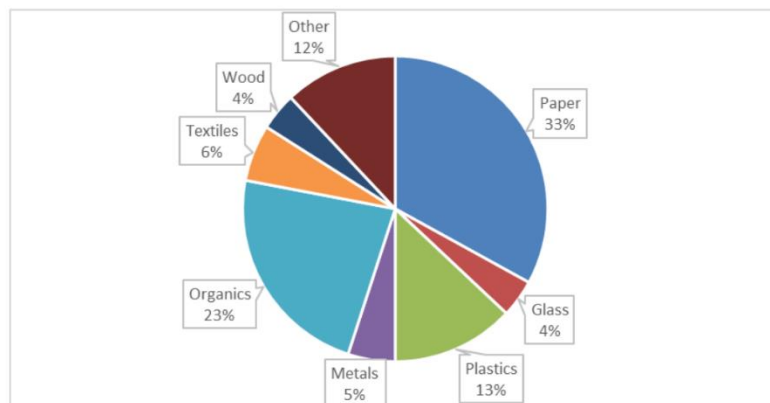
Enerkem’s Solution

Enerkem’s “advanced carbon recycling technology” diverts waste from being sent to landfills (which are often co-located with environmental justice communities) or transported for disposal across State borders. The technology can then provide added value by creating a supply of low-carbon fuel that can be used in the State.

Enerkem’s technology recycles carbon molecules contained in waste materials into added-value circular products. It transforms the solid non-recoverable and non-recyclable waste materials into an ultra-clean and usable intermediate called a synthesis gas: a building block from which the industry can build on proven industrial processes to synthesize specific molecules such as methanol, ethanol, ethylene, olefins and higher value-added chemicals. The process provides a clear, scalable solution that is largely feedstock agnostic, and capable of processing a wide range of different – and mixed – waste types. In addition, this ‘molecular’ recycling process results in the production of circular plastics that are identical to fossil-based virgin plastics without extracting new fossil-based primary resins.

Enerkem’s technology can target the reduction of different waste streams by using waste materials normally destined to landfill or incineration. Figure 27 from the “New York Scoping Draft” illustrates the material composition of New York State’s municipal solid waste and includes the materials that Enerkem aims to reduce such as textiles, non-recyclable plastics, wood residues, or soiled food containers². In addition to reducing landfilling and avoiding the creation of new landfill capacity, the use of municipal solid waste as a feedstock to produce biofuels offers important advantages such as the fact that it does not compete with food supply, nor does it have land use impact and it is already collected via the waste management industry’s existing collection, distribution, and logistics infrastructure.

Figure 27. MSW Generated – Material Composition



Enerkem’s technology is part of a family of new technology processes that complement conventional recycling options by focusing on reject fractions from conventional, mechanical recycling processes. It sits alongside these processes and addresses some of the current limitations in other closed-loop pathways related to mixing, degradation and contamination (which in the current plastics system is produced in high volumes), and unfeasibly low volume (e.g., novel materials). In simple terms: Enerkem’s process can handle waste fractions that the other processes cannot, including degraded recyclates that are no longer suitable for closed-loop pathways.

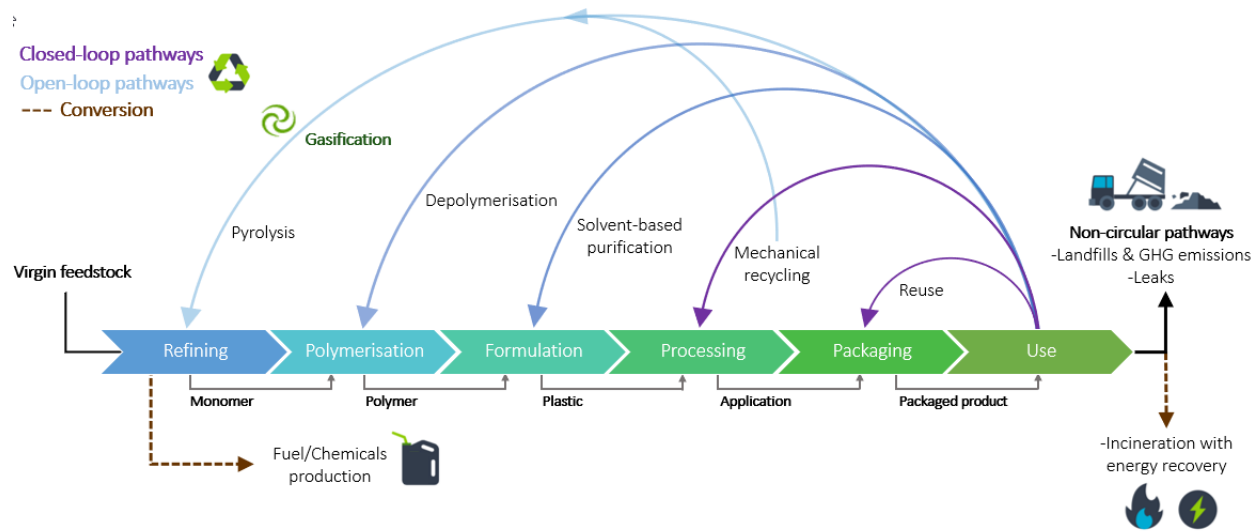


Figure 1: Advanced Recycling Technologies overview

Permitting Challenges

The benefits of the Enerkem technology and the other chemical recycling processes identified in the figure above are recognized in the Netherlands, where chemical recycling is officially recognized as Recycling in Dutch waste policy. Under U.S. permitting regulations, regulatory bodies do not recognize gasification and pyrolysis as a recycling technology. Gasification and pyrolysis are currently classified as recovery processes, and often confused with or considered as waste combustion.

Enerkem recommends that New York consider “Advanced Recycling” – processes that allow the conversion of wastes materials into new products such as circular chemicals – to be recognized as part of the recycling category within the waste hierarchy.

Addressing Environmental Justice Concerns

Enerkem greatly appreciates the work conducted by the Community Justice Working Group and recognizes there are concerns brought forth about the potential emissions from the combustion of



biofuels and biomass. Enerkem hopes to serve as a resource and provide credible sources of research to help alleviate these concerns.

Rigorous peer reviewed analyses done by the California Air Resources Board, the Department of Energy, the U.S. Department of Agriculture, and other academic researchers conclude that biofuel blending reduces lifecycles GHG emissions, including direct and indirect land use impact ^{3 4 5 6}.

Critical Importance of a NY Clean Fuel Standard:

A clean fuel standard for New York would be highly effective at displacing carbon-intensive fuels and providing a revenue source for investment in clean fuel solutions. Not only would this standard attract both domestic and international fuel producers, but it would also make New York the East Coast leader on clean fuels.

While Enerkem's technology is currently operating in Canada, strong market signals are required for the company to break into the U.S. market. A clean fuel standard contributes to investor confidence that clean fuels projects can access dependable revenues to cover debt service and other commercial necessities while simultaneously delivering decarbonization. New York has an opportunity to support an effective, efficient, and equitable energy transition and can implement a clean fuel standard to move fossil fuel facilities out of overburdened communities and create new clean energy jobs.

Conclusion

Enerkem would like to thank the Climate Action Council for considering our comments on the "New York State Draft Scoping Plan" and we look forward to working together in the future. We also welcome a conversation to provide further clarification if needed and answer any additional questions.

References

- ¹ <https://www.iea.org/fuels-and-technologies/bioenergy>
- ² <https://climate.ny.gov/Our-Climate-Act/Draft-Scoping-Plan>
- ³ Melissa J Scully *et al* 2021 *Environ. Res. Lett.* **16** 043001
- ⁴ <https://afdc.energy.gov/files/u/publication/ethanol-ghg-reduction-with-greet.pdf>
- ⁵ <https://ww2.arb.ca.gov/resources/documents/lcfs-pathway-certified-carbon-intensities>
- ⁶ Jan Lewandrowski, et al 2020 The greenhouse gas benefits of corn ethanol – assessing recent evidence, *Biofuels*, 11:3, 361-375,