Let's Talk Plastics Session 12. Plastics and Climate Change– Q&A

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Questions and Answers:

- **What is meant by CO2 equivalent? Are you referring to the product (carbon count) or the carbon impact of production?**
    - *The carbon dioxide equivalents (CO2e) we used to estimate emissions sources at each stage of the lifecycle is based on the methodology first used for the IPCC's Second Assessment. That methodology uses benchmark 1990 levels (described in Annex A to the Kyoto Protocol[1]) to describe the sum of the basket of the most dangerous anthropogenic greenhouse gases. In this basket, CO2 is the predominant greenhouse gas accounting for 76% of total anthropogenic emissions (as of 2010 and based on the calculations from the IPCC's 4th Assessment), 16% comes from methane, 6.2% from nitrous oxide and 2% from halocarbons and sulphur hexafluoride (LLGHGs or fluorinated gases). This sum is expressed as CO2e , to place emissions of varying radiative forcing agents on a common footing by accounting for their effect on climate. It describes, for a given mixture and amount of greenhouse gases, the amount of CO2 that would have the same global warming potential when measured over a specified period of time. In our report we just looked at sources of the emissions in the process of making plastics to estimate the cumulative impact. (lh)*
- **How was the carbon offset for recycling plastics (-2090) calculated? Are we measuring the carbon impact of virgin production?**
    - Yes, in carbon dioxide equivalents per metric ton of plastics packaging recycled that displaces a metric ton of plastics made from virgin raw material and energy resources. The use of energy and some raw materials for producing recycled-content plastics packaging is shown in the Material handling line under

[1] See Methodology of the Kyoto Protocol, Annex A (description available beginning PDF 31 https://unfccc.int/resource/docs/cop3/07a01.pdf#page=31).

the recycling column of Figure 13 in the CIEL report and also shown in the webinar slides for climate impacts of end-of-life methods for handling plastic packaging discards.

- **Considering the (huge) size of the Plastics/Oil industry and investments, besides EPR (somehow for remediation) what else could be suggested on a world scale?**
    - *Upstream infrastructure projects are projected to overtake downstream efforts to manage plastic waste management and pollution. Until we address the investments in new infrastructure for the production of plastics, the most ambitious efforts to institute downstream waste management strategies are not likely to achieve their intended objectives. There are a group of activists who have been working to develop a Fossil Fuel Non-Proliferation Treaty[2] that has been endorsed by several Nobel Prize laureates and scientists that would prevent the proliferation of coal, oil and gas exploration and production. This may be one way to address the crisis globally and at scale.(lh)*
- **Very small countries like the Maldives do not have recycling facilities so the only option for us is to either transport it to another country (transportation uses fuels) or burn it, we do not have land for landfills. What would be our best option to tackle the plastic problem?**
    - *This is a good example of why context is essential in developing local solutions. To say that aggressive reduction and reuse mechanisms would be effective and that the emissions impact of transportation is preferred over burning plastics, may be true but I fear it is an overly simplistic response. This question requires an analysis of country specific data to inform a comprehensive and tiered study that identifies the current and projected volume of waste and the impact of each life cycle segment with existing waste management mechanisms. (lh)*
- **How do we counter the arguments from many Plastics-To-Fuel processors that justify their operations by saying the diesel/kerosene that are produced offset their need for virgin fossil fuels?**
    - First of all, it's quite likely that the plastics-to-fuel (PTF) numbers cited by proponents leave out emissions from some of the life cycle stages required to turn plastics into fuels. This may include the energy and associated climate-changing carbon emissions used to power pyrolysis, gasification, plasma arc gasification and other technologies advocated for converting plastics to fuels.

[2] For more information about the Fossil Fuel Non-Proliferation Treaty go to https://fossilfueltreaty.org/

Also left out maybe the energy and carbon emissions associated with cleaning the fuels so that they meet emissions standards when burned, as well as the energy use and environmental impacts from managing the contaminants and residues from processing plastic into fuels.

- Then, there are the differences in carbon emissions per unit of electricity or heat energy generated by burning the fuels extracted from plastics versus the virgin energy fuels that the PTF proponents are saying are replaced by the fuel produced by processing plastic to fuels.
- All in all, one needs to have the PTF proponent provide transparent and complete data used for their LCA. It needs to be examined closely to ferret out any untenable assumptions, missing data, or claims that emissions data are proprietary.
- On the face of it, the graph on carbon footprints for electricity generation in my slides shows that burning plastics in a waste-to-energy combustion facility produces more carbon emissions than coal or natural gas. So one needs to be thermodynamically sceptical of the claim that adding more process stages (breaking down the plastic into component parts, sorting the components, purifying the fuels that result, managing the disposal of the outputs other than fuels, and quantifying/monitoring the emissions from burning the fuels extracted) will produce a lower carbon footprint per kilowatt-hour than the footprint shown on my slide for film plastic WTE.

- **Wondering if any cost-efficiency analysis done on the different treatment methods? Would be a decisive factor for many countries to choose the most suitable solutions as per the country context.**
  - *To the best of my knowledge, there are only a few and rather token sized Commitments and contributions from industry to offset the impacts of plastic. Currently, a project run by Verra is developing a Plastic Standard that provides companies with best practices to reduce their plastic footprint and a mechanism for companies to purchase plastic credits to incentivize investment in recycling projects.*[3] *Similarly, just a few days after our presentation, the Ellen MacArthur*

[3] See generally, Businesswire, "New Plastic Stewardship Initiative Creates Incentives for Companies to Reduce Plastic Waste, February 10, 2021 available at https://www.businesswire.com/news/home/20210210005604/en/New-Plastic-Stewardship-Initiative-Creates-Incentives-for-Companies-to-Reduce-Plastic-Waste.; Also see VERRA, Plastic Waste Reduction Standard available at https://verra.org/project/plastic-program/.

Foundation announced that +100 leading businesses have called for mandatory fee-based EPR for packaging as the only proven and likely way to provide ongoing and sufficient funding to make the economics of recycling work.[4] Both initiatives are in their infancy and will need time to scale up to meet and hopefully outpace the rate of virgin plastic production and current downstream waste management efforts. (lh)

- **Non-recycle plastic can be used (to burn) at Cement Factory, can you comment on its economic and CC aspects?**
    - Burning garbage in cement plants has not proven to be viable, so the plastics would need to be separated from the rest of discards at the household and business source, or else the garbage processed to separate the plastics. The latter typically has also not proven economically viable as a way to manage product and material end-of-life discards.
    - Source separated plastics are relatively easy to process to extract recyclable PET, HDPE and PP containers, which when recycled reduce carbon emissions rather than adding carbon to the atmosphere. For the processing plastic residues, landfilling is more climate friendly than burning them in a cement plant. The latter may avoid some of the carbon emissions that may be incorporated in the cement products, but not all. Whatever carbon is emitted from the cement plant will be more than would be emitted by landfilling the processing residues.

[4] See Ellen MacArthur Foundation new release, June 15, 2021 available at https://www.ellenmacarthurfoundation.org/news/100-leading-businesses-call-for-epr-for-packaging.