**Environmental Decision Analytics Branch Plastics Projects 11/5/19**

**Product 1.4**: **Spatially-explicit potential environmental impact factors for LCA**

Brief Description and Research Use: Federal, state and local governments and other partners and stakeholders are actively seeking tools to assist in minimizing the environmental impacts of materials management decisions. The USEEIO is being developed to assist in each of these assessments. Critical to the USEEIO, and in conducting any LCA, are the Life Cycle Impact Assessment (LCIA) methodologies that are utilized to characterize the potential impacts to human health and the environment. The USEEIO model currently utilizes average national potential impact factors, but recent advances in computing power and geospatial capabilities allow a more accurate representation of the spatial resolution of the fate, transport, and exposure of many of the impact categories. Smog formation is one example of an impact category which is highly dependent upon localized conditions including the background concentrations of volatile organic compounds (VOCs), the weather conditions, and the resulting air transport and reactivity of substances. Other impact types that are regionally specific and for which spatially-explicit impact factors will be developed include terrestrial and marine acidification and eutrophication of fresh and marine water bodies. Marine litter damage to marine ecosystems and human health is a potential impact for which no current factors exist. For this product, we will review and integrate the best available models and data for transport of plastics and plastics into state-specific indicators of plastic marine export in units of kg transported to a marine system per kg generated specific to plastic types.

**Product 1.5**: **WARM-USEEIO database**

Brief Description and Research Use:

This product will bring together the USEEIO model and the WARM model by combining these databases, so that USEEIO provides the background system, and the current end-of-life management processes from WARM the foreground system. The WAste Reduction Model (WARM) is an OLEM/ORCR maintained tool for estimating life cycle GHG, energy, and costs impacts of end-of-life management scenarios for MSW and CDD waste. WARM runs on a custom life cycle inventory database in the

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openLCA software. This database will have the following advantages over the current WARM database: 1) it will allow consistent life cycle impact calculations with the USEEIO model and SMM tools, 2) it will make WARM consistent with the Federal LCA Commons data conventions, 3) it will expand the boundary of the current background system to solve cutoff issues, and 4) it will enable WARM to calculate the additional indicators present in the USEEIO model related to air quality, human health. No plans are included in this deliverable to make modifications to the front-end (interface) of WARM.

Product Form: Database and documentation

Key Words: USEEIO, WARM

Interdependencies (as appropriate): SHC.7.1.2

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Milestones:

• Q1 FY2021 CDD LCI

• Q2 FY2021 MSW LCI

**Product 1.7**: **Recycling Economic Impact Analysis Model**

Brief Description and Research Use:

This product will be the development of a version of the USEEIO model based on a compatible underlying WIO structure, that can be used for supporting the Recycling Economic Impact study. EPA has produced regular studies evaluating the economic impact of recycling. The most recent study (USEPA 20162) was based on an underlying waste input-output (WIO) model, which includes an underlying input-output model supplemented by waste generation, waste processing and related economic impact data. The model will be based on open source code and follow the same development and release protocols. Along with the model, detailed guidance on will be provided on how to use it to perform recycling economic impact assessment.

**Product 2.5**:  **Modeling Plastics During Post-Consumer-Use Activities to Improve National Estimates in the Facts and Figures**

Brief Description and Research Use:  This product provides data and models describing the generation and management of plastic waste, with an emphasis on recycling processes and secondary markets. The management of plastics has been identified as a key need in SMM. While the Facts and Figures Report includes plastics, there are numerous data gaps surrounding the generation and management of plastics within the economy. This product adds more resolution to the national material balance of plastics by improving estimates for the source and tonnage of plastic waste generation, including modeling the release of plastic materials to the environment. Management pathway models for plastics will be enhanced by tracking plastics flows to landfill, conversion technologies, and specific recycling markets while trying to include first estimates of unmanaged material losses to close material balances. Process models for the management of plastic wastes will be developed to integrate the knowledge contained in this product with the Waste Input-Output research in Output 1. The final products from this work will enhance the information that can be provided in both the Facts and Figures Report and the USEEIO model underlying the SMM Tool.

**Product 4.1**:**Evaluating de-packaging technologies to remove film plastics from food waste**

Brief Description and Research Use:

This product will test the performance of de-packaging equipment available on the market in real-world settings. The U.S. is committed to reducing food waste by 50% by 2030. To divert food waste from landfills, OLEM promotes anaerobic digestion and composting of food waste; however, contamination of food waste with packaging (including film plastics) may complicate composting and anaerobic digestion operations and decrease the market desirability and safety of land application of the compost and digestate made from food waste. De-packaging technologies (beyond screens and filters) are increasingly being used by large food waste generators and treatment facilities as primary means of removing plastics. Research will characterize the plastics, including quantity and particle size, in food waste streams before and after the use of de-packaging technologies. The results from this study will be useful to OLEM, restaurant and commercial kitchen operators, food retailers, composters, and wastewater treatment facility staff across the U.S. as they seek to exclude plastics (including microplastics) from the food waste stream.