

# Biobased Feedstocks and Chemicals: What are the Opportunities for Advancing Green Chemistry?

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## Panelists

- Mikhail Davis, Interface
- Babette Petersen, BioAmber
- Michael Saltzberg, DuPont
- Martin Wolf, Seventh Generation

Seventh Generation is seeking ingredients/materials that are sourced in a sustainable way, which can be a driver for biobased chemicals that are truly sustainable. They do not assume that “biobased” means safer. “Nurturing nature” means sourcing materials sustainably, such as sustainably grown palm oil, non-petroleum carbon sources, no waste, and materials used in packaging come from a renewable source. Plastics should have 100% recycled content and oils should be plant based. A Renewable Carbon Index (RCI) helps track progress in improving their products’ sustainability. For example, their dish soap has an RCI of 97%. Preservatives continue to be a challenge.

Interface has a goal that its products be made from 100% rapidly renewable and recyclable materials by 2020. They are about halfway to that goal. Biobased can help them fill this gap. “Biobased” is not an environmental claim for Interface. They want to move away from petroleum feedstock but they need other justifications to move to biobased. However, as a brand, Interface does not fully understand how to make biobased chemicals healthy. They do not know the toxicity of these intermediates so this is impeding the uptake of biobased materials. They need biobased chemical/material manufacturers to demonstrate safety. One advantage of recycled content is the avoidance of the chemical production pathway.

Dupont is shifting from a chemical company to an advanced materials and agricultural company. It has three strategic businesses: 1.) Agriculture and Nutrition. These are crop protection chemicals. 2. Advanced Materials. Kevlar is an example. 3.) Bio-Based Industrials. This small but growing business includes enzymes, biomaterials, and biofuels. Biomaterials are central to their new strategy, but must offer performance, cost, and environmental benefits.

Dupont would like to make products from agricultural intermediates. The Sorona polymer used in carpets, apparel, automotive products grew 15% last year. It is too costly to make from a petroleum pathway. Rather, it is made with propanediol (PDO) (made from cornstarch through fermentation). The strategy is to sell farmers Dupont hybrid seeds and Dupont crop protection products and in turn, DuPont provides end-use markets for their farmers by buying their biobased feedstocks to produce biobased chemicals. Dupont is particularly interested in obtaining biobased feedstocks from its biggest customers for agricultural chemicals.

For Dupont, biobased alone is not good enough. It will not fund development of a new chemical if it is not cheaper. In developing renewable intermediates, they ask: What are new products that we can make that can bring new functionality? Half of Dupont’s new technology portfolio is the cheaper category; half is new functionality category. They have created a tool to estimate life cycle impacts/benefits to use at the design stage. It is challenging to develop new preservatives because the market is very small.

BioAmber is a five-year-old biochemical company, with its core business in biobased chemicals – bio succinic acid (Bio-SA). The major challenge is to be cost effective. It costs \$100's of millions to build a production plant. Unlike NatureWorks, BioAmber went public because they did not have a larger (parent) company to fund them. Bio-SA platform chemical can be used in a broad range of applications. In order to succeed, the company must work with partners (e.g., customers) to develop new markets for Bio-SA. Drivers for siting plants: Availability of feedstocks, price of energy, government support for scaling up, i.e., building a plant.

### **Challenges**

- Need to obtain funding for scaling up.
- The audience noted: Brands are concerned about the additives used in plastics – petro or biobased. Transparency and health and safety assessments are needed to support adoption of safer alternatives. There is a concern that there might be a greater desire to conceal the types and safety profiles of additives used with novel biobased polymer blends.

### **Helpful actions to advance green chemistry (e.g. policies, education, partnerships)**

- The biobased chemical industry needs to demonstrate to brands and consumers the green chemistry benefits of its products and technologies, beyond renewability.
- Provide assistance for moving from first-generation feedstocks, such as wheat and corn, to non-agricultural materials such as wood waste.

### **Role for the GC3 in helping to advance GC in this area**

- Promote certification program for biochemicals/biomaterials to stimulate the market
- Educate about the benefits of biochemical/biomaterials