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Quartz CHEMICALS

Five commandments for the bio revolution

Kathryn Sheridan, CEO of **Sustainability Consult**, points the way forward for the bioeconomy

The push towards the 'bioeconomy', one favouring products made from biomass and other renewable, bio-based materials, is being driven both by policymakers and the market. In the chemicals sector, the last few years have seen significant growth and interest in the bio-based sector and this shows no sign of stopping.

As sustainability communicators, we are proud to work with companies to help communicate and market bio-based products. Here are the five key take-home messages I would like to share based on this experience.

> **"Not only are bio-based chemicals and plastics able to replace their petroleum-based equivalents as drop-ins, they are making new materials possible through the creation of a whole new chemistry set"**

1. **If we can't consume less, we need to consume better**. Handled right, the bio-based sector could be a huge contributor to a new economy, helping us to produce and consume in a more sustainable way. Despite the downturn, consumption patterns are still unsustainable.

Consumers will always want to buy 'stuff'. We increasingly measure our quality of life by the status we appear to gain from all this 'stuff'. So we need to rethink how 'stuff' is produced, the energy it uses and how it is disposed of if we are to move to a more sustainable model of consumption and production.

How do biomaterials fit into this picture? If the plastics and chemicals in the products we consume are made from renewable raw materials instead of fossil fuels, it would help reduce our dependence on oil and gas. If the feedstocks are renewable and plant-based, we could reduce our carbon emissions and start to mitigate climate change. And if the packaging and products themselves are biodegradable and sustainable, we could also reduce the amount of waste.

To some, I am preaching to the choir. To others, I may sound like a tree-hugger. But the bio revolution is happening. Not only are bio-based chemicals and plastics able to replace their petroleum-based equivalents as drop-ins, they are making new materials possible through the creation of a whole new chemistry set.

2. **Just because it is 'bio' does not mean a material is sustainable.** If we are to avoid a backlash against bio-based products, we need to communicate about the sector in a responsible way. Companies should take a lifecycle approach as some bio-based products may require more land, water and energy than their petro-based alternatives.

3. **Back up your sustainability claims with data**. Life cycle analysis (LCA) is one way to measure impact in the production, use and end-of-life phases. LCA takes into account everything from raw materials to waste or recycling and goes further than a carbon footprint analysis. Cradle-to-cradle certification goes even further.

I firmly believe that the bioeconomy and particularly bio-based chemicals and plastics are the way forward. But there is no silver bullet. Every decision we take has a knock-on effect and every material choice has an impact. With bio-based chemicals and fuels, the knock-on effect can be land use or competition for food crops.

The food v. fuel conundrum is not new and was partly responsible for the policy U-turn that changed biofuel targets retroactively. Industry's most compelling argument here is that today's chemicals and plastics made from sugars from the plant protein are just the first generation. The next generation of bio-based chemicals and plastics will be made from waste or biomass.

4. **Work out where the 'waste' is coming from**. It should be more sustainable to use forestry or agricultural waste for bio-based chemicals than to compete for food crops. However, the industry needs to be realistic about the supply of waste that is available for second generation bio-based chemicals.

Forestry or agricultural waste is not just lying around waiting for industry to cart it away for free. Either it is being used on the farms and forests for silage, mulch or power generation or it is already being sold. These residues already have a value and as demand increases, so will the price. Crops grown specifically for bio-based chemicals are another option but this leads to indirect land use change.

5. **Be more transparent on GMOs**. In some circles, 'biotech' is a dirty word. The difference between White/Industrial Biotechnology and Monsanto's plants and seeds is not well understood and frankly the terminology is confusing. This is why I prefer to talk about bio-based chemicals or the bioeconomy than biotechnology. But one area where GM technology and bio-based chemicals come together does concern me.

While the industry promotes the bioeconomy as a way to replace fossil fuels and decarbonise the economy, there is little transparency on the fact that most of the catalysts for fermentation, whether bacteria or yeast, are created in a lab for optimum performance and are in fact GM. Industry believes that the final product made with GM bacteria or yeasts is not itself GM. Policymakers, consumers and environmental NGO may not.

Consumer acceptance of bio-based chemicals and bioplastics risks being negatively impacted. As far as the European public is concerned, there are no GMOs in Europe so we must engage openly and honestly for the credibility of the sector. I believe that the bioeconomy is good news - for farmers, for the environment and for the consumer. We just need to engage with stakeholders in a transparent and credible way to make sure the sector can fulfill its potential.

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