



Bio-based Views from Brussels: Sustainability, Circular Economy and Credible Communications

Bárbara Mendes-Jorge, Senior Consultant at Sustainability Consult, talks about the sustainability of bio-based chemicals, EU bioeconomy and circular economy policy and the promise of a new, online bio-based chemicals tool.

As companies such as IKEA and Lego set bold targets to boost biomaterials in their supply chain,^{1,2} demand for bio-based products continues to surge. With sales of bio-based products reaching US\$252 billion in 2012, this is expected to rise to US\$375-441 billion by 2020.³

The key benefits of investing in bio-based chemicals include contributing to a post-petroleum society, creating new jobs and reduced handling expenses compared to traditional, more hazardous chemicals. Climate change is already happening – using biomass as renewable feedstock and becoming more resource-efficient is crucial to avoid further environmental damage.

While a bio-based product is a petro-based alternative by default, it does not mean it is automatically more sustainable. It is important for companies to communicate transparently, take a life cycle approach and back up their sustainability claims with data. Resources, feedstock, energy use and recycling are all issues that need to be clearly addressed. To be credible and raise awareness of bio-based products, scientific language needs to be translated clearly.

In 2013, Sustainability Consult's CEO Kathryn Sheridan issued her 'five commandments for the bio revolution' in this magazine.⁴ Sustainability Consult remains committed to this philosophy and is proud to help companies communicate credibly on biomaterials.

Bioeconomy central to EU policy

As technology develops, the bio-based chemical industry is becoming increasingly profitable and an integral part of the bioeconomy. In the EU alone, the bioeconomy sector is estimated to employ around 22 million people and its annual turnover is €2 trillion.⁵ In Brussels, EU policymakers have acknowledged that the bioeconomy sector is a key technology enabler that could boost growth and jobs in Europe.

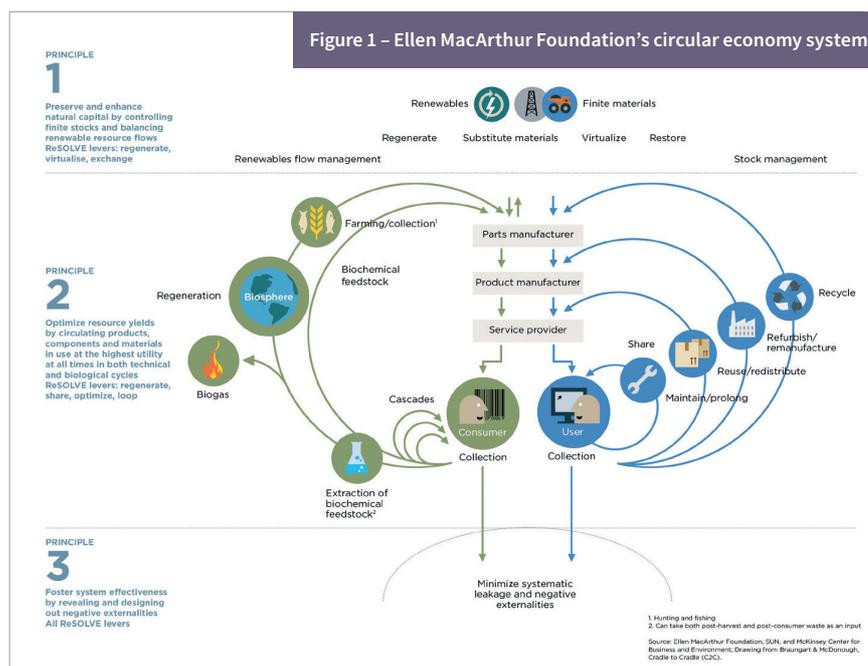
Having adopted a Bioeconomy Strategy in 2012,⁶ the EU wants a society less dependent on fossil fuels. It has called the European bioeconomy one of the "biggest and most important sectors encompassing agriculture, forestry, fisheries, food and chemicals", and the development and demonstration of biorefineries to optimize the use of biomass is crucial to boost an advanced European bioeconomy. A review of the Bioeconomy Strategy is taking place this year and, in November 2017, the EU will present its findings to stakeholders. Together they will discuss the possible need for new actions required since the Strategy was first drafted.

Undoubtedly, the bioeconomy is becoming increasingly mainstream. Nevertheless, a lack of awareness and misunderstanding of the terms 'bioeconomy' and 'bio-based' – and how they differ from 'biodegradable' – is affecting the sector. Demand for sustainable products is rising, many individuals have still never heard about the bioeconomy and its benefits, including – worryingly – those working in the environmental and climate change sectors.

Policymakers and industry need to increase efforts to communicate and educate consumers and other stakeholders on the sustainability and performance benefits of bio-based products and explain the difference between these varying terms. If this is not done successfully, uptake of bio-based products will remain limited and the sector risks backlash from stakeholders, who are more likely to see petro-based products as the only biodegradable option and therefore automatically more sustainable⁷ – or to see bioplastics as a problematic alternative due to lack of recycling and marine pollution.

Linking the bioeconomy and circular economy

Another concept gaining momentum in Brussels – and beyond – is the circular economy. Defined by WRAP UK as "an alternative. in which we keep resources in use for as long as possible, extract the maximum value from them whilst in use, then recover and regenerate products and materials at the end of each service life", a circular approach that differs from traditional, linear economical concepts and value chains (make, use, dispose).



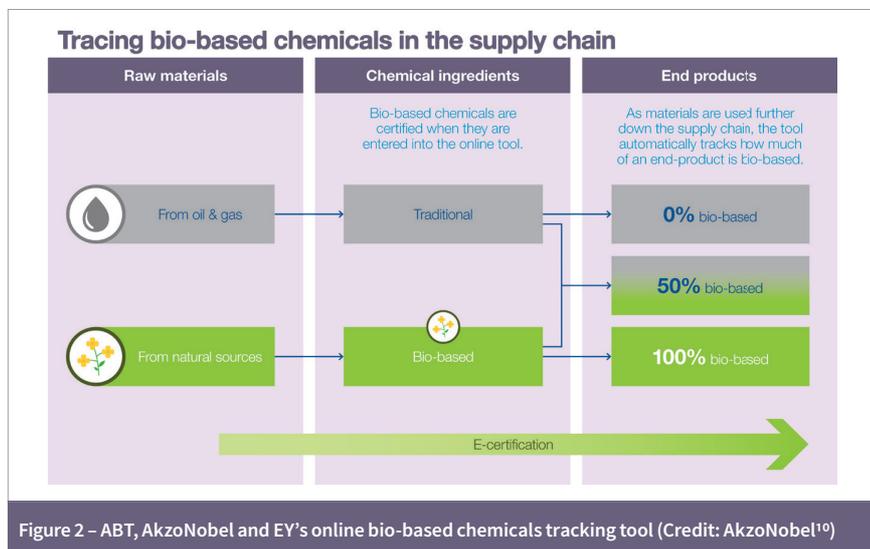


Figure 2 – ABT, AkzoNobel and EY's online bio-based chemicals tracking tool (Credit: AkzoNobel¹⁰)

Like the bioeconomy, the promise of the circular economy is that it will improve resource efficiency and decrease energy use while creating new jobs and bolstering growth. The Ellen MacArthur Foundation, a charity focused on promoting the benefits of the circular economy, believes that by rebuilding capital, the flow of goods and services will be enhanced (Figure 1).

The bioeconomy's contribution to the circular economy has often been downplayed, but this is changing. The Bio-based Industries Consortium (BIC) states that the bioeconomy is automatically circular, as it relies on renewable resources – thereby enhancing the circular economy.⁸ As the bioeconomy grows, biomaterials will contribute to an increasingly renewable circular economy – as long as future policy considers the cross-sectoral nature of the bio-based industries to maximize the EU's circular economy potential. European institutions recently committed to increasing finance in both of these sectors.⁹

The bioeconomy community is increasingly adopting a more circular mind-set. For example, two of Sustainability Consult's clients, Braskem Renewables and Reverdia, recently conducted life cycle analyses (LCA) of their main products. The results show how products such as these may help to mitigate climate change impacts.

- The LCA of Braskem's 1'm green Polyethylene (Green PE), which is made from sugarcane ethanol, found a negative carbon footprint from cradle to gate. 3.09kg of CO₂ is removed from the atmosphere for each kilogram of Green PE produced. Also, 80% of the energy consumed in the entire process comes from renewable sources.
- Reverdia's technology is renewable and has a more favourable LCA and carbon footprint than alternative processes. The analysis of Reverdia's bio-succinic acid Biosuccinium found that 0.9kg CO₂ was released per kilogram of chemical produced. Comparatively, petrochemical succinic acid releases 1.9kg CO₂/kg.

A bio-based chemicals tool to advance the circular economy

Another client, Advanced Biochemical Thailand (ABT), recently collaborated with AkzoNobel and EY to spearhead a tool linking bio-based chemicals and the circular economy (Figure 2).

While it is already possible to detect whether chemicals are made from fossil-based feedstock or bio-based raw materials, it is difficult to verify the exact amount of content of each type of chemical. A new online tool,

focused on tracking bio-based content, is hoping to change this and bring the bioeconomy and circular economy closer together. Aiming to apply e-certification to track bio-based materials along the value chain, the goal is to allow producers and consumers to choose more sustainable products.

Certified at the beginning of the supply chain, companies can transfer raw materials through an online platform which tracks the bio-based content of products made from these. The tool's creators argue that this approach means external certification further down the value chain will no longer be necessary, as the tool will already accurately inform producers of the correct bio-based content and ensure transparency and reliability by means of a robust audit trail.

The tool's partners say that they want it to be used by industry as a virtual marketplace where companies exchange different types of biomaterials certificates – from ingredients to finished products.

The tool is currently in a pilot stage and Epicerol will be the first chemical to be tracked across the supply chain. The bio-based epichlorohydrin (ECH) is produced by ABT and is already used in AkzoNobel's epoxy coatings.

Encompassing a flexible system, it is hoped the tool will be available to other supply chains across the industry and allow them to track other chemicals such as dimethylether, which is used as a propellant in deodorant cans.

Good signs – but more work to be done

So far, 2017 seems to be a positive, momentum-building year for the circular economy and bioeconomy, and policymakers are continuing to work together to align both sectors. However, more needs to be done to reduce petro-based dominance. In 2020, McKinsey only expects bio-based chemicals to make up 11% of total chemical sales, up from 9% in 2012.

Communication remains central for stakeholder acceptance and biomaterials uptake – engaging transparently with stakeholders remains a credible way for the bioeconomy sector to fulfil its potential. By embracing and communicating on a truly circular bioeconomy, stakeholders will undoubtedly help build a stronger, more sustainable economy.

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CONTACT

Bárbara Mendes-Jorge
Senior Consultant
Sustainability Consult
Brussels, Belgium
T: +32 (0) 2 347 1101
E: bmj@sustainabilityconsult.com