

**The Economy of Bio-based Products - Summary**  
**BERKELEY BIOECONOMY CONFERENCE**  
**March 2013**

**Panel Topic:** The State of the Bioeconomy – “The Economy of Bio-based Products.”

**Conference / Location:** Berkeley Bioeconomy Conference, March 27-28, 2013, University of California, Berkeley, CA.

**Session Topic Description:** This presentation addressed the global drivers for the bioeconomy; the case for biofuels for a sustainable society; how to develop bio-based solutions; and identified some of the economic opportunities in a bio-based economy.

**Moderator & Panelists:** Luuk van der Wielen, Delft University of Technology, Netherlands. BE-Basic Foundation, [www.be-basic.org](http://www.be-basic.org). Email: [info@be-basic.org](mailto:info@be-basic.org).

**Design, Methodology, Approach:** Presentation with Q&A discussion following.

**Main Discussion Points:** Luuk van der Wielen launched his presentation by identifying some of the key global drivers for transitioning to a bio-based economy. These include the need to reduce GHG and carbon dioxide emissions, a warming climate, the security of our oil and gas supplies, the rise of the middle class in developing economies and the increase in the number of wealthy people in the world (both groups using more resources), a shrinking fossil fuel supply, rising oil prices, the sustainability of the food chain, and fluctuations in product and resource prices. All of these are driving a need for our society to act now to build a bio-based economy.

What is the case for biofuels? The biofuels market is a \$40 billion per year industry (without including the food production industry) with expectations to grow significantly by 2020. Biorefining is an effective way to extract more value and turn biomass into power, which can be accomplished through innovations in biochemicals and biomaterials. The transition to this economy needs to be an international collaboration and partnership for the greatest impact. The strategy for a complex development such as a bio-based economy is to create partnerships between companies, public and private entities, industries and countries. This is the only way we can tackle the complexities of the market and the scientific and technological developments needed.

How can we develop the bio-economy through technology? One of the biggest opportunities now is in the food sector. Van der Wielen underlined the importance of using the full plant, not throwing half of the food mass away. Instead we need full economic biomass utilization, which will give full energy utilization and economic impact. Large-scale ethanol-to-ethylene or sustainable ethanol can green the plastics industry in Europe. His company is involved with a project that sustainably produces FDCA (2,5-Furandicarboxylic acid), which is a new green building block to replace terephthalic acid in the production of polyethylene terephthalate (PET). So called “BioPET” can be used for the greening of plastic bottles, creating a significantly

smaller carbon footprint. Some of the issues with using biomass are the costs of the feedstock to fully utilize it, the issue of producing waste, scaling, and the cost to produce it.

Another bio-based solution could be the use of soft soil to produce sandstone or hard rock. The Netherlands lies partly below sea level and his company is looking into a possible bio-based solution that can address flooding. Van der Wielen alleged the dirt could be turned into concrete in one week through biological action.

Van der Wielen also discussed another bio-based material, fermentable sugar for producing energy content. He suggested ranking fermentable sugars in terms of their energy content and then connecting them to energy production in terms of their mass yield. But the big question he said is in bringing together the chemical and energy sectors and replacing or substituting existing products with biorenewables that have a similar functionality.

### **Outcomes & Analysis:**

To maximize bio-based economic opportunities involves further integration of industrial sectors, such as fuel and construction and the fuel and agriculture sectors. Van der Wielen thinks that we need to rethink scaling, regulations, infrastructure, current agriculture models, and finance models in order to address the challenges and grow the bio-based economy.

To develop industrial bio-based solutions for a sustainable society, we need to build a competitive, secure, and sustainable bio-based economy through industrial biotechnology that is less dependent on fossil resources and that carries a positive global climate effect.

**Keywords:** Biofuel, biorenewables, BioPEF, bio-based economy (BBE), biomass, biotechnology, biorefinery, ethanol, bio-based technology.

**Paper type:** Review of conference speaker.

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