
Beware the bioeconomy

Just a few years ago forestry giant Weyerhaeuser, a US-based logging company, began running a series of intriguing adverts in airports and magazines. The ads depicted a northern temperate forest along with the question “What could a tree be?”. Thought bubbles hovered above the forest canopy and a paragraph of text asked “Medicine that fights cancer? Alternative fuels for our cars? Do you think a tree could be biodegradable plastic or food? or clothing?”, Forestry, it seemed to say, is no longer just about pulp and timber – a new trend seems to have started where the markets for trees just got a whole lot bigger.

It was an advert about the ‘bioeconomy’ - an industrial strategy now being aggressively promoted by the agribusiness, forestry and biotech industries. The ‘bioeconomy’ plans and roadmaps are now being drawn up by every major northern country and several southern countries as well. They envisage a new economic order where biology and biomass become the major tools and feedstock of industrial production. Examples of such documents include the US “National Bioeconomy Blueprint” or the European Union’s “Knowledge-Based BioEconomy”. (1)

Driven by this new ‘bioeconomy’ vision, a set of technologies and economic arrangements are being put in place that can literally transform woodchips, sugar cane, algae and other biomass stocks into the liquid fuels, bulk chemicals and electricity that make up our production economies. Clustered under this banner are many hundreds of biomass energy facilities that burn woodchips to generate electricity in former coal plants, next generation agrofuel producers like Mascoma, who ferments woodchips into ethanol, as well as ‘biomaterials’ companies, such as Natureworks and Metabolix, who turn corn starch into plastic bottles. Meanwhile, researchers in nanotechnology (2) are developing new ways to transform wood cellulose into conductive materials for electronics. Firms in the rapidly exploding field of synthetic biology (extreme genetic engineering) are turning cane sugar into fuels, vanilla flavoring, food sweeteners or soaps. Seen together, these ‘bioeconomy’ players could potentially change the material base of our ‘advanced’ economies. Could a tree be the casing for your smart phone, the wiring inside it and the electricity flowing through it too? Well, conceivably yes, say the ‘bioeconomy’ boosters.

To believers in this ‘bioeconomy’ one great attraction is that biomass sources, such as forests and agriculture, amount to new ‘pools of carbon’ in an age when the traditional carbon used by the chemical industry (fossil fuels) are becoming harder and more expensive to access. Worldwide, there are estimated to be around 500 gigatonnes of carbon (GTC) stored in land-based vegetation – far outweighing recoverable stocks of oil (120 GTC) and gas (75 GTC). This has led some ‘bioeconomy’ enthusiasts to refer to forests as “above ground oilfields”. Moving production from the dead fossil carbons of oil, coal and gas to the living ‘green carbon’ of biomass sounds like a green dream come true. - an industrial partnership with nature that appears to bypass the oil industry.

Indeed, the 'bioeconomy' is sometimes included as a subset of the so-called 'green economy' - the set of tools and financial mechanisms valorized by the United Nations as a cleaner greener path of neoliberal economies. The World Economic Forum guesses that the new 'bioeconomy' of bio-based energy, chemicals, plastics, fuels and associated markets could be worth about US\$300 billion by 2020.

Yet, underlying such fantasies is the massive inconvenient truth of feedstocks. Whether transforming biomass woodchips, sugar or algae, the scale of current consumption patterns means that the growth of such a 'bioeconomy' will inevitably collide and conflict with the protection of life and livelihoods. The industrial term 'biomass' itself hides the fact that what is being transformed is living biodiversity, the trees that make up the forest, the crops that provide our food and return nutrients and carbon to the soil, the algae that make our oxygen. How we harvest or grow that 'biomass' is further entangled in lives and cultures - from the forest communities whose home is destroyed to the migrant sugar workers who cut sugarcane under near slave labour conditions. In effect, this new 'bioeconomy' often preys upon older existing 'bio-economies' that already use biodiversity to make material goods or energy but in a low impact, small scale manner – peasants, forest communities and fisherfolk. The new 'bioeconomy' vision however would put under attack in particular the lands and livelihoods of peoples of the South, as land is increasingly grabbed for sugarcane, cellulose and other biomass feedstocks. Since 86% of biomass is located around the equator, any roll out of the 'bioeconomy' is inevitably a transformation of the tropics and beyond.

Moreover, while the 'bioeconomy' proponents may point to the abundant greenery of our planet as proof that biomass-based economy is there for the taking, the truth is that almost all of the planet's terrestrial biomass is already spoken for since living plants are needed to provide valuable ecological interrelated functions, such as water and carbon cycling, as well as to coexist with forest dependent populations for mutual providing and protecting. Studies on how far our current economies are already damaging natural systems reveal that industrial societies are already using one quarter of all biomass – extracting far more than the biosphere can handle and pushing past critical 'planetary boundaries'. Some 'bioeconomy' promoters dream of boosting overall 'productivity' of the earth via genetically engineering trees or algae, stepping into realm of geoengineering the planet.

Nor are the underlying technologies of the 'bioeconomy' benign. The burning of biomass for electricity has been documented to cause extensive human health problems for communities located near the burning. The adoption of agrofuels has demonstrably driven up food prices and driven land grabs around the world. Meanwhile, the new techniques of synthetic biology involve risky extreme genetic engineering techniques that no scientist nor regulator yet knows how to evaluate for safety. Synthetic biology in particular has raised strong concerns. It involves printing out DNA molecules from a computer operated machine (synthetic DNA) and then altering the genetic makeup of yeast, bacteria and algae in highly novel ways. Those microbes are 'programmed' to process biomass and other feedstocks into new valuable commodities – turning sugar into plastic and cellulose into jetfuel. Contained in large fermentation factories, synthetic biology is often regarded as the ultimate 'bioeconomy' tool – a collection of 'magical bugs' that will transform the sugar and cellulose of the south into valuable commodities for the north.

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(1) "National Bioeconomy Blueprint",
US:

http://www.whitehouse.gov/sites/default/files/microsites/ostp/national_bioeconomy_blueprint_april_2012.pdf ; and "Knowledge-Based BioEconomy", EU: <http://www.kbbe2010.be/>

(2) Nanotechnology refers to the manipulation of matter on the scale of single atoms and molecules. At present, commercial nanotechnology involves materials science (i.e. researchers have been able to make materials that are stronger and more durable by taking advantage of property changes that occur when substances are reduced to nanoscale dimensions). This involves profound risks with new nanomaterials potentially threatening lands in the south and posing new health risks to workers and the public at large. See more information: <http://www.etcgroup.org/issues/nanotechnology>