

GE Trees and Biomass Outline and Notes

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RENEWABLE ENERGY REALITIES:

A little recognized fact: [about half](#) of what is referred to as "renewable energy" is bioenergy. Burning wood for commercial and industrial scale power is rapidly escalating, especially cofiring wood in coal plants. This is in spite of a massive and expanding literature showing that burning wood releases even more CO₂ than coal per unit of power generation, and also releases harmful pollutants (See: "[Trees, Trash and Toxics: How Biomass Energy Has Become the New Coal](#),"

GE TREE DEVELOPERS ANTICIPATE BIG PROFITS IN BIOENERGY MARKET!

The traits they are engineering in poplar, eucalyptus and pine generally aim to grow "more biomass" (fast growing, freeze tolerant etc), produce wood more suitable for bioenergy processes (wood density improves burning characteristics), altered lignin assists in refining into liquid fuels). Trees are also being engineered to produce certain industrial chemicals of value.

Cofiring wood pellets with coal is the fastest growing sector within bioenergy and pellet exports, especially to the EU, are skyrocketing. [Pellet exports](#) from the southeastern USA rose from less than a million to over 7 mil tonnes between 2008 and 2015, and are projected to rise to near 17 mil tonnes by 2019. Currently about 40% of pellets imported into EU are from the US (BC also a major supplier). Korea and other Asian countries are also [increasing imports](#) of pellets, in this case targeting the PNW as source.

The UK is the largest consumer in Europe. Current projection:

Dedicated biomass plants: Max 17.7 million green tonnes of wood per year

Coal Plant Conversions (Drax 3 units plus Lynemouth): 18.2 million tonnes

Co-firing in Coal Plants: 100,000 tonnes

Total: 36 million tonnes green wood

Current total domestic UK green wood production: 11 million tonnes

(note: these forecast figures are a maximum, assuming all currently proposed facilities are commissioned and operating at 90% capacity)

IMPACT OF PELLET PRODUCTION AND EXPORT ON SOUTHEAST USA:

Many new pellet facilities, some owned by European energy companies, are opening up [throughout the southeast](#). Industry claims they only use "waste and residue", but in fact pellets are made from [whole trees](#): In fact one of the biggest pellet exporters, Enviva, was found to be [clearcutting remaining rare pockets of biodiverse forests](#) for pellets.

The European Commission announced they are [undertaking an investigation](#) into UK power company, DRAX following a complaint filed by 3 companies operating in the southeast who state that the subsidized pellet market in UK is resulting in distortion of prices and negatively impacting their own business operations. They site the price of pine pulpwood in the US South East has increased by 25% between 2011 and 2014 and the price of hardwood pulpwood by 53%.

The native forests in southeast have already been largely converted to monoculture pine plantations. Now the region is targeted for testing and planting of "[engineered high](#)

[energy crops](#)" (aka EHECS) which could include GE trees. The aim is to establish funding for rapid testing of EHECS, especially those developed by ARPA-E, which runs a program referred to as "[plants engineered to replace oil](#)" (aka PETRO).

LIQUID FUELS FROM WOOD? MASSIVE WASTE OF TAXPAYER DOLLARS

Massive amounts of funding have been directed into production of liquid biofuels from wood. This includes engineering trees to be more amenable to "deconstruction" of cells to enable access to sugars, as well as engineering microbes to secrete the enzymes that can access and convert those sugars. Yet so far there has been virtually no success at commercial scale production! Instead taxpayers have paid billions for a litany of failed projects, fraud and bankruptcies: Examples:

++ Cello Energy, Bay Minette, Alabama: cellulosic diesel via catalytic cracking (fraudulent); Cello Energy, which attracted a lot of private finance (no public subsidies, though they were instrumental in persuading the EPA to set the steep cellulosic biofuel targets in 2010), built a plant, produced nothing. They were found guilty of fraud by a court and went bankrupt.

++KiOR (formed by Khosla Ventures and BIOeCON), Columbus, Massachusetts: pyrolysis followed by catalytic cracking and hydrotreating; KiOR received a \$75m loan from the Massachusetts state government plus investment from Khosla Ventures, Bill Gates and Alberta Investment Management (who invest on behalf of the state of Alberta). They produced a small batch of biofuels once, never managed to produce anything else and went bankrupt. The Massachusetts government is suing the investors for fraud and a former board member disclosed how KiOR's management had been misleading everybody about the yields they could get and about supposed technical progress - which never happened. (And EPA used claims as a basis for RFS determination)

++ Range Fuels Inc, Soperton, Georgia: thermal conversion to syngas, followed by catalytic cracking into methanol and other products. Range Fuel was awarded a \$76m DoE grant (of which they actually got \$43.6m), half of an \$80m USDA loan and \$6.25m in state grant funding. They also raised \$160m from venture capitalists. All of that funding was used for building a 40m gallon cellulosic ethanol refinery, to be scaled up to 100m gallons. They however only built a 4 million gallons plant, which was only capable of making bio-methanol (which can be used as a fuel additive but not to replace any petrol or diesel). They produced a very small amount and the next year went bankrupt.

++Mascoma/Valero: Kinross Michigan. Received around \$120 mil in public grants (unclear how much was actually paid out). Valero withdrew support, the project was canceled. Mascoma was sold and is now providing sales of cellulose digesting engineered yeast.

++Red Rock Biofuel: Like Cello, Kior and Range, their process involves thermochemical conversion which has so far failed everywhere it has been tried. DOE is no longer supporting biomass thermochem - rather they have focussed on coal gasification. Red Rock is part of the Pacific Northwest regional push to develop aviation and military grade biofuels. Public comment on their EIS closes February 5th.

AN ENTIRE BIOECONOMY?

While turning trees into liquid fuel has so far failed, to the tune of billions, research is underway to engineer trees to produce a variety of industrial chemicals useful for bioplastics, industrial chemicals, and potentially a wide range of commercial products. For example: [poplar to produce 2-phenylethanol](#) - or [polyhydroxybutyrate](#) (for bioplastic)

An entire "[bioeconomy](#)" is envisioned, and biotechnology regulatory processes are being revised, largely "streamlined", to facilitate and hasten their path to market, including speeding the deregulation of GE trees.

Meanwhile, a vast labyrinth of programs, initiatives and supports are provided by government agencies particularly USDA, DOE and DOD, to fund biotechnology for the bioeconomy, including research on GE trees. (examples and further details provided separately)

FROM PARIS: BECCS, RE/AFFORESTATION and the MYTH OF "NEGATIVE EMISSIONS"

In the lead up to Paris COP21, the IPCC 5th assessment indicated that achieving stabilization targets of 2 degrees or lower would require not only steep abatement of emissions, but also a means to remove CO2 already in the atmosphere. The only "near term available" technology that could potentially work on the necessary scale, they proposed, was [bioenergy with carbon capture and storage](#) (aka BECCS). While they acknowledged potential problems, they set the stage for a growing chorus of support for scaling up BECCS as "negative emissions" even though there are currently no existing BECCS projects, the costs would be exorbitant, and negative emissions from BECCS are not possible.

GE TREE DEVELOPERS HAVE THEIR EYES ON THE \$\$\$ PRIZE

With so many supports for massive increased demand for wood bioenergy, the potential market is huge. GE tree developers are [counting on it](#).

IN SUM:

GE tree developers are counting on the vast and expanding market for wood bioenergy. Scaling up bioenergy, with or without GE trees, has many dire negative impacts on land, soil, water, biodiversity, climate, and human rights, which are clear even at the current scale. GE trees and the promise of "more trees on less land" will never deliver on the monumental scale that is envisioned. Sustainability standards [will not work](#), especially in the face of massive subsidies and laws demanding ever more bioenergy production and consumption. What is necessary is to remove the subsidies and mandates that are supporting bioenergy development, and to ensure that definitions of renewable energy [do not include biomass](#). We need to reduce demand for wood, not increased it.