Wood Bioenergy: Green Land Grabs For Dirty 'Renewable' Energy

McNeill biomass generating station in Burlington, Vermont. @ Chris Matera

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1. Executive Summary

As the impacts of climate change are becoming ever more clear and inescapable, the call to slow fossil fuel consumption and develop alternative "renewable" and more "secure" sources of energy are ever more strident, and increasingly reflected in policymaking. Unfortunately, the alternatives promoted are not always better. Burning wood for industrial and commercial scale electricity and heat is emerging as a favored alternative energy source that poses serious threats to forests, ecosystems, biodiversity and people. Furthermore, in many cases, biomass is used to enable ongoing coal use. In the UK, for example, coal power stations are being partly or fully converted to burn biomass in order to allow them to avoid closure otherwise required under EU regulations.

Demand for industrial and commercial wood bioenergy is especially high in European countries, and European demand has triggered an emerging international trade in wood for bioenergy (primarily as pellets). That demand currently is being met largely by imports from the USA and Canada, countries that also have their own domestic interests in expanding wood bioenergy. South Korea, China, Japan, Brazil, Australia and other countries also appear to have emerging interests in wood bioenergy, with both domestic development and in some cases, investments outside their borders to secure vast ongoing supplies of wood.

Promoted as a means to reduce greenhouse gas emissions, wood bioenergy is presented as "clean, sustainable, and renewable". Yet in reality it is a growing driver of deforestation and air pollution. Community opposition to biomass burning facilities has been based on concerns over air pollution. While burning wood releases less of some pollutants, it releases more of some others, including fine particulates linked to a variety of negative health impacts ranging from asthma, systemic inflammatory responses, cardiopulmonary disease and cancers.[1] Thus they can hardly be qualified as "clean". Meanwhile, there is extensive research demonstrating that carbon emissions measured at smokestacks from wood bioenergy facilities are up to 50% worse even than for coal (wood is less energy dense and burns inefficiently, hence more carbon is released per unit of energy generation). Add to that the further emissions from logging, transportation, soil disturbance, impacts on hydrological cycles, direct and indirect land conversion, and wood bioenergy ranks among the worst energy choices in terms of climate impacts.

Much progress has been made in raising awareness about the problems caused by transportation biofuels, supported by targets and subsidies. Escalating hunger from the disruption of agriculture commodity markets and hence food prices, worsening emissions from conversion of land, land grabs and human rights abuses have been described repeatedly and detailed in numerous reports.[2] However, even though the parallels are clear, wood bioenergy has not received the same degree of scrutiny and documentation of the real impacts of bioenergy on forests and ecosystems and communities remains sparse. Among efforts to document impacts of wood bioenergy, photographs of whole trees awaiting chipping in the stockyards at facilities have refuted the industry claims that

[1] US Congressional Briefing: Health Impacts of Biomass Burning, September 2012
http://www.saveamericasforests.org/Forests%20-%20Incinerators%20-%20Biomass/Documents/Briefing/

[2] Fuel For Thought: addressing the social impacts of EU biofuels policy. Action Aid 2012
Biofuelling Hunger: how US corn ethanol drives up food prices in Mexico. Action Aid 2012.
Land Rights and the Rush For Land: findings of the global commercial pressures on land research project. International Land Coalition, Cirad and IIED. 2012

only "wastes and residues", not whole trees, are burned.[3] One attempt was made to map the cumulative "forest footprint" of one of the oldest biomass electricity facilities in the US. McNeil Generating Station, in Burlington Vermont, a 50 MW facility that has been burning about 400,000 tons of wood annually for the past 26 years,largely cut from surrounding forests, including clearcuts up to 25 acres, from thinning operations, and tops/limbs from trees cut for other purposes, as well as some other wood materials.[4]

What is becoming increasingly clear is that different wood bioenergy technologies require different biomass characteristics, hence different kinds of trees. Recent investigations revealed that pellet manufacturer Enviva, operating in the US state of Georgia, was sourcing wood not from surrounding pine plantations, but rather from remaining rare pockets of mid Atlantic coastal wetland forest.[5] Enviva is supplying the UK Drax facility, a coal co-firing conversion. Those facilities, which represent the largest demand, can only burn pellets made from slow growing hardwoods with low bark content. Hence they present a threat to remaining hardwood forests. Fast growing plantations on the other hand, can still supply pellets for other, differently equipped wood bioenergy facilities.

A forthcoming report looks at the impacts of plantation expansion in Maranhao, Brazil, where Suzano Papel e Celulose is expanding operations to fulfill projected demand for pellets from Europe.[6] Striking in that case is the fact that Suzano's expansion is based on anticipated rather than existing markets for pellets. In other words, serious impacts result as much from speculation about future demand as from actual existing trade.

The future of wood bioenergy remains uncertain. Many proposed developments face financial difficulties, concerns over adequate wood supplies and regulatory uncertainty A large number of facilities have experienced fires and explosions[7], Recently, the largest coal to biomass conversion plan, the UK's Tilbury facility, abandoned their biomass conversion plans. However, as the impacts of climate change become increasingly evident, pressures could mount to scale up "renewable" energy including wood bioenergy, and/or to use biomass based techniques such as "BECCS" (bioenergy with carbon capture and storage) and biochar (carbon-rich charcoal added to soils). Both have been advocated as means to reduce atmospheric CO2 in spite of a lack of evidence that they could ever be effective and serious concerns that supplying vast quantities of biomass would only worsen matters.[8]

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[3] http://climate-connections.org/2013/02/12/photos-show-whole-trees-burned-for-biomass-power/
[4] http://www.counterpunch.org/2013/02/12/mapping-forest-destruction-for-clean-energy/
[5] New maps reveal Enviva's Ahoskie wood pellet facility threatens southern wetland forests. http://www.dogwoodalliance.org/2013/08/press-release-new-maps-reveal-envivas-ahoskie-wood-pellet-facility-threatens-southern-wetland-forests-surrounding-ecosystems-and-wildlife/
[6] Forthcoming: Chain of Destruction. Biofuelwatch and WRM report on impacts of UK wood bioenergy policies.
[7] Shlossberg, J. Industry Plays With Fire and Gets Burned. *The Biomass Monitor*. May 2013 http://www.energyjustice.net/content/biomass-industry-plays-fire-gets-burned-biomass-monitor
[8] BECCS: Climate Saviour or Dangerous Hype? Biofuelwatch report 2012. http://www.biofuelwatch.org.uk/2012/beccs_report/
Biochar: A Critical Review of Science and Policy. Biofuelwatch 2011 http://www.biofuelwatch.org.uk/2011/a-critical-review-of-biochar-science-andpolicy/

Ironically, even while there is much debate underway among climate policymakers about "reducing emissions from deforestation and forest degradation" (REDD and REDD+), expanding demand for wood bioenergy is being promoted, often by the very same institutions and governments who foresee advantageous synergies, such as profits from sale of carbon credits for tree plantations that will later be harvested for bioenergy.

Unsustainable demand for wood, along with agriculture,is the fundamental driver behind the loss of remaining native forests and their replacement by industrial monoculture tree plantations. Adding massive new demand for commercial and industrial electricity and heat is only escalating those pressures.

Sustainability standards, often promoted as a pathway towards environmentally friendly wood bioenergy, (or forest products, or other) are ineffective. As discussed below, they cannot change the fact that the existing demand for wood and wood products is already unsustainable and would be made even more so if wood bioenergy was scaled up further.

The global wave of resource grabs that is currently underway is of unprecedented magnitude. Oil, minerals and other resources are highly sought, but increasingly, so is access to suitable land and water for growing food, fibre and various bioenergy feedstocks, including wood. Productive lands including forests have become the target of ever more speculative investment by the wealthy, and those whose livelihoods depend on those lands are increasingly, displaced and pushed aside. Because of the large land area footprint for bioenergy – greater than for any other form of energy[9] it is a major factor behind the current wave of "green" land grabs. Currently, biofuels contribute only around 3% of global transportation fuels, yet estimates are that around 59% of land grabs between 2000 and 2010 were made with the intent of growing biofuel feedstocks.[10] Wood bioenergy is now providing new markets for industrial tree plantation growers and therefore encouraging their expansion. Some are specifically being developed for export to Europe, where the demand is particularly high and import dependent. European demand for wood pellets is currently being met largely from the southern USA and British Columbia, regions that are already experiencing serious deforestation and biodiversity losses. Other regions around the globe are already being eyed for potential future pellet supplies with investor interest.

Yet, it is precisely in those communities most threatened by land grabs, where land and livelihoods are closely interdependent, that real sustainability is most often achieved. With growing awareness, a movement towards "energy sovereignty", supporting community scaled, locally owned and operated forms of energy, to satisfy basic needs rather than fuel endless economic growth, is building. Energy sovereignty, like food sovereignty, provides a viable alternative to top down, corporate controlled, destructive forms of extraction that have already laid waste to so many landscapes and communities and become the targets of protests worldwide. In the industrialized countries of the north, many communities fighting to protect themselves from extractive energy

[9] Energy Sprawl or Energy Efficiency: Climate Policy Impacts on Natural Habitat for the United States of America, Robert I McDonald et al, PLoS ONE 4(8), 2009

[10] Land Rights and the Rush For Land: findings of the global commercial pressures on land research project. International Land Coalition, Cirad and IIED. 2012

industries, opposing mining, pipelines and even large wind farms – also find themselves moving to engage a more forward looking agenda of community self determination concerning energy, while social movements in the south have called for energy sovereignty, as a companion to food sovereignty.

2. Introduction: The growing threat from expanding wood bioenergy

Burning wood for industrial and commercial scale electricity and heat is emerging as a favored alternative energy source, supported by mandates and subsidies for renewable energy. While according to the International Energy Agency, it currently contributes only about 3.3% to total global primary energy[11], yet, because of the very large land area footprint, it poses disproportionate and very serious threats to forests, ecosystems, climate, biodiversity and human rights.

To understand the magnitude of that threat, it is necessary to fully grasp the scale of the current and anticipated demand.

Globally, world primary energy production remains overwhelmingly dominated by coal, oil and gas. According to the International Energy Agency (IEA), only around 13% of all energy used worldwide comes from energy classified as renewable. Most of that - around 10% - is from bioenergy and waste including liquid transportation fuels and combustion of municipal solid waste as well as wood bioenergy. However, around two thirds of bioenergy use involves traditional use of wood and other biomass for cooking and heating, as is practiced by much of the population in non industrial countries. Those traditional uses bear little resemblance to the commercial and industrial scale production and consumption characteristic of industrial countries like Europe and North America and energy intensive industries such as paper production and metal smelting, worldwide. Industrial or 'modern' bioenergy use accounts for around 3.3% of global energy about 18 EJ (exajoules) in total[12]. Of those, 7.8 EJ are used for industrial processes, 6.7 EJ for generating heat and electricity, and 2.2 EJ come from biofuels for transportation. In spite of the relatively minor contribution to overall energy, industrial bioenergy has a disproportionately large impact on lands and human rights.

A quarter of all biomass used in industry is used by pulp mills, with wood and black liquor (a byproduct of pulp production) being burned to provide heat and electricity for facilities. Charcoal production for the steel industry is particularly significant in some regions, for example in Brazil. The push to develop liquid transportation fuels from wood continues, but so far no commercial quantities are produced in spite of ongoing research and

[11] Large industrial users of energy biomass, IEA Bioenergy, Task 40, http://www.bioenergytrade.org/downloads/t40-large-industrial-biomass-users.pdf
[12] Large industrial users of energy biomass, IEA Bioenergy, Task 40, http://www.bioenergytrade.org/downloads/t40-large-industrial-biomass-users.pdf

investment. The most rapidly growing new frontier for wood bioenergy is as "renewable" electricity and heat generation.

3. European demand

Particularly rapid expansion of demand for wood based electricity is underway in Europe, driven by policies that mandate a 20% renewable energy share by 2020. When member states put forward their plans for meeting that target in 2010 it was revealed that 54% of the goal was to be met through bioenergy, doubling the contribution of bioenergy to EU energy use from 2010[13]. Although that included transportation fuels, the bulk consisted of burning solid biomass (mainly wood) for electricity, heating and cooling. Industry plans in some countries meanwhile exceed even those forecasts by a considerable margin. The enthusiasm of industry to build more biomass capacity derives from the fact that in many member states they can receive lucrative subsidies. In the UK for example, a biomass power station burning pellets or woodchips from 1 million tonnes of wood can attract around £68 million (80.2 million Euros) in subsidies every year.

Based on the EU member state plans, it was estimated that the EU would require an additional 100-200m3 of wood each year (80-154 million green tonnes) [14]. The more extensive industry plans including current and proposed coal plant conversions and dedicated biomass plants in the UK alone would require around 82 million green tones of wood. UK domestic wood production for all purposes is only around 10 million tones. Hence, like some other EU countries, the UK intends to burn primarily imported wood to satisfy this massive demand, which is the basis of a fast expanding international trade in wood pellets, discussed further below.

4. Wood-based bioenergy in the US

In the USA wood bioenergy is expanding, but lags considerably behind Europe. According to the Environmental Investigation Agency (EIA) projections however, biomass electricity is expected to grow rapidly, expanding at about 4.5% annually, and therefore rising from 37 to 102 billion kilowatt hours by 2040.[15] There are various projections for dramatic expansion and the industry is in considerable flux. EIA further estimate that dedicated biomass power would grow at a relatively modest rate while cofiring with coal would undergo a dramatic spike between about 2016 and 2022, during which it would grow at a much faster pace. This is based on their assessment of the impact of future emission regulations, coal prices and renewable portfolio standards.[16]

Industry analysts[17] looking at wood use by larger bioenergy facilities in the USA, (those producing electricity/heat and pellet manufacturers that use more than 50,0000 green tons per year), report 83 operating and 51 proposed pellet facilities facilities as well as 89 operating and 50 proposed bioenergy facilities. They report that currently operating

[13] The role of bioenergy in the National Renewable Energy Action Plans: a first identification of issues and uncertainties, Bogdan Atanasiu, IEEP, November 2010, http://www.ieep.eu/assets/753/bioenergy_in_NREAPs.pdf
[14] Flows of Biomass to and from the EU: an analysis of data and trends, James Hewitt, Fern, July 2011, http://www.fern.org/sites/fern.org/files/Biomass%20imports%20to%20the%20EU%20final_0.pdf
[15] Energy Outlook 2013. http://www.eia.gov/forecasts/aeo/source_renewable_all.cfm#hydropower
[16] http://www.marketwatch.com/story/biomass-power-consumption-projected-to-grow-through-2040-in-the-us-2012-12-10
[17] Fiorisk Wood Biomass Report 2013

facilities are consuming around 46 million tons of wood annually, and proposed additional facilities would consume an additional 49 million tons. In total 95 million tons of wood annually may be required just to supply these larger scale pellet and electricity facilities.[18] Meanwhile, supports for smaller scale facilities are also expanding. For example, the U.S. Department of Agriculture just formed a partnership with the Biomass Power Association, the Alliance for Green Heat, Biomass Thermal Energy Council and the Pellet Fuels Institute to promote the use of wood for energy purposes to supposedly "improve the health and safety of the nations forests" by "reducing fire risks", as well as "bolstering rural economies" and "improving air quality".[19] US agencies have funded many related initiatives and support policy initiatives that would, for example, open access to public lands for biomass.[20] As well, supports are provided for other industrial uses of wood such as the emerging market for nanocellulose materials[21].

On top of this, there is the expectation that eventually wood based liquid transportation fuels will become commercially viable, and those would require vast additional quantities of wood. In 2011 for example, the USDA provided $80 million to a consortium of researchers, industry partners including Weyerhauser, and institutions including University of Washington, Washington State and others to develop wood based aviation fuels industry in the Pacific Northwest. The aim is to develop poplar plantations in the region, and the project includes supports for research on genetically engineered poplar (long underway at Oregon State University). This is part of a larger $USD136 million, 5 year program to develop aviation biofuels from wood and other feedstocks.

While there is no federal mandate for renewables in the USA, many states do have "Renewable Portfolio Standards" that mandate and offer subsides for renewable energy. Federal level energy policies for example the American Recovery and Reinvestment Act, loan guarantees and tax credits as well as supports through the Farm Bill also provide lucrative incentives to bioenergy project developers.

Plans for conversion of coal plants have so far been less ambitious in the US than in Europe. Among those proposed or planned were plans to convert the 312 MW Ohio Burger facility, owned by First Energy which appear to have been abandoned, although it is worth noting that the facility would have required about 26 million tons of wood annually, 5 times the annual growth for all public and private forest lands in the state. Dominion Virginia Power has actually completed the first of three planned conversions of their coal-powered units to eventually generate about 50 MW each from burning wood pellets. Dominion also constructed a new 600 MW Virginia City "Hybrid Energy Center" facility to cofire waste coal and up to 537,000 tons of wood.[22] Southern Company built a 100 MW dedicated biomass facility, in Sacul, Texas (Nacogdoches), to serve the city of Austin.[23] They have also reinstated a push to convert Plant Mitchell, previously delayed pending regulations.

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[18] Fiorisk Wood Biomass Report 2013

[19] http://biomassmagazine.com/articles/9430/usda-announces-initiative-to-expand-u-s-wood-to-energy-efforts/

[20] http://insideepa.com/201308132443770/EPA-Daily-News/Daily-News/house-gop-urged-to-end-rfs-bar-on-public-land-biomass-feedstock.html

[21] http://farmfutures.com/story-usda-announces-bioenergy-initiatives-0-61884

[22] http://www.prnewswire.com/news-releases/dominion-virginia-power-begins-commercial-operations-at-virginia-city-hybrid-energy-center-162053145.html

[23] http://www.southerncompany.com/what-doing/energy-innovation/smart-energy/smart-power/nacogdoches.cshtml

5. Wood bioenergy in Canada

With over 41% of its land base covered in forest, Canada sees itself as a haven for wood bioenergy. A 2011 report by Greenpeace Canada[24] states the following: "*Canadian Provinces are diving into a biomess by opening the door to large scale clearcuts, salvage logging, and highly damaging extraction practices that could double the forest industry's footprint on already damaged forest ecosystems. Whole trees and large areas of forest are being cut to provide wood that is burnt for energy…. "Without public hearings or environmental impact assessments, new regulations in provinces such as BC, Ontario, Quebec and Nova Scotia are prematurely opening the door for biomass extraction*." The report provided the following shocking figures to consider:

- In 2008, only 3.4% of Canada's total primary energy production came from burning wood in power plants and heating systems, but this required an amount of woody biomass equivalent to all the wood cut in Manitoba, Ontario, Québec and New Brunswick for the same year (47 million m3).
- If it ran at 100% capacity, a small 30MW biomass power plant would burn more than 470 000 tonnes of wood annually, an amount equivalent to clear cutting 10 soccer fields of Canadian forest everyday.
- Providing 15% of Canada's electricity production from forest biomass would require burning more than the equivalent of all the trees that were cut nationwide in 2008 (147 million m3).
- More than 560,000 trees would need to be cut every single day to provide the biofuel (E85) needed to run all of Canada's cars. Annually, this would mean doubling the amount of wood extracted from Canadian forests.
- Wood pellet exports from Canadian forests to Europe were around 1.2 million tons in 2010, a 700% increase in less than 8 years. Canadian pellet production capacity is expected to increase ten-fold by 2020.

6. Global trade in wood pellets

The European demand for wood bioenergy in particular, has spurred a rapidly expanding international trade in wood pellets. According to IEA's 2011 review of the global pellet trade, in the four years between 2006 and 2010, production of wood pellets rose from around 6-7 million tons to over 13 million tons, a 110% increase across 4 years.[25] That pace is only hastening, with estimated global production at over 18 million tons, by 2012. They report that pellet demand is greatest from UK and Netherlands (for large coal cofiring facilities), and also from Sweden, Denmark, Belgium and elsewhere (used more for combined heat and power). Some European pellet production is underway, especially in Germany, Lithuania, Estonia Latvia, Portugal Finland, Russia and Sweden. The largest pellet production facility in the world is the Russian Vyborgskaya Cellulose facility (next to a pulp and paper facility) with 900,000 tons per year capacity.

In 2013, some estimate that the EU alone is expected to burn around 16 million tons of pellets[26]. Each ton of pellets requires 2 tons of green wood.[27] A large share of pellets

[24] Fuelling a Biomess: Why burning trees for energy will harm people the climate and forests. Greenpeace Canada 2011
[25] IEA global wood pellet market and trade. 2011, Maurizio Cocchi et al.
[26] http://biomassmagazine.com/articles/9367/annual-eu-report-projects-increased-pellet-biogas-consumption/

burned in European facilities will have to be imported. So far, they are being imported primarily from the USA, (largest share of global production, about 26%) and the Canadian province of British Columbia, (second largest share, about 10% and on par with Germany).[28]

7. Impact on pellet producing regions

The impact of European demand for wood pellets on pellet producing regions is dramatic and escalating. Most pellet production in the USA is underway in the southeastern states, though other regions are also developing facilities (northeast especially). Many new pellet production facilities are being announced, and plans shift frequently, hence an exhaustive updated list is difficult. But some examples include facilities owned by Enviva, including two pellet mills in operation in Mississippi, two in North Carolina and another currently under construction in Virginia. RWE constructed Georgia Biomass (now up for sale). Green Circle Bioenergy owns a large pellet mill in Florida, and Fram Renewable Fuels operates two pellets mills and are planning a third one, all in Georgia. Enova Energy Group are planning one pellet mill in South Carolina and two in Georgia and General Biofuels has announced plans for a pellet mill in Georgia.[29] Bluefire Renewables just announced the addition of 400,000 tons per year of pellet production to an already existing Mississippi ethanol refinery. DRAX has announced plans to build two plants, 450,000-ton capacity each, in Louisiana and Mississippi to supply their UK facility. Some pellet producers are also investing in shipping infrastructure and port facilities.

The southeastern US is already the world's largest pulp producing region, with very large areas of native forestland converted to pine plantations under intensive management and cutting regimes. These pine plantations are targeted for pellet production, but, as has recently been revealed, so are the rare remaining areas of native forest in the region. Timber production in the southeast has more than doubled in the past 50 years, while planted pine has expanded dramatically, especially in the Coastal Plains area "*from nearly none in 1952 to about 39 million acres (19 percent of total area of southern forest) by 2010, with a near doubling of planted pine acres from 1990 to 2010 alone.*" It is forecasted that the area of planted pine plantation could expand from 19% to 36% of land area by 2060. This is based in part on expectations of potential growth in market demand for bioenergy.[30]

The impacts of ongoing heavy logging and replacement of native forest with planted pine has had serious consequences for biodiversity. The Southern Forest Resource Assessment[31] reports that the region has the highest concentration of endangered species in the U.S., and has already nearly lost at least 14 biodiverse forest community types, reduced to less than 2% of their original area. Tree plantations and intensively managed areas are exposed to repeated spraying with toxic herbicides, pesticides and fertilizers, further contributing to degradation. The report states that use of synthetic fertilizers in tree plantations increased by 800% between 1990 and 2002. Serious

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[27] IEA global wood pellet market and trade. 2011, Maurizio Cocchi et al.
[28] http://www.forestbioenergyreview.com/pellets/item/35-north-american-wood-pellets-exports-reach-new-record.html
[29] http://www.dogwoodalliance.org/campaigns/bioenergy/company-profiles/
[30] Southern Forest Futures Project: http://www.forestthreats.org/news/ffaccts/wear-ffaccts-10.7.11.pdf
[31] Wear, David N.; Greis, John G., eds. 2002. Southern forest resource assessment. Gen. Tech. Rep. SRS-53. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station

decline has been reported for many species, including at least 152 terrestrial vertebrates, 81 of which are Federally listed; and more than 900 plants, 141 of which are Federally listed.

The "Southern Forest Futures Project" May 2011 Summary Report points to expanding demand for wood bioenergy as a driver of future conversion: "*Forecasts of wood use for bioenergy linked to U.S.D.A. projections suggests a 54- to 113-percent expansion of harvesting levels over current levels by 2050...lead[ing] to important changes in southern forests…Forecasted levels of woody biomass harvests could lead to a reduction of stand productivity, deterioration of biodiversity, depletion of soil fertility, and a decline in water quality… Our analysis of bioenergy futures (ch. 10) indicates that satisfying the highest level of predicted demand for woody biomass would require a combination of plantation growth, productivity enhancement, and short rotation woody crops on agricultural lands. Harvesting and management at this level could accelerate wildlife-habitat losses (ch. 14) and water stress increases (ch. 13). The focus on softwood pulpwood for bioenergy uses means that most of these harvests and their impacts would be concentrated in the Coastal Plain. The potential for structural changes and for changes in a variety of ecosystem services indicates needs for monitoring and careful management planning as this sector develops in the South (ch. 10).*"[32]

Pine plantations are not the only source of wood for pellet manufacturing in the Southeast. A recent investigation found that wood supplied to the Ahoskie Georgia pellet manufacturing facility owned by Enviva, a supplier to the UK DRAX coal cofire facility was derived from clear cutting of remaining pockets of mid Atlantic coastal forested wetlands, habitat already designated as Critical/Endangered (WWF).[33] Other pellet facilities are similarly located adjacent to remaining pockets of hardwood forest. As discussed further below, pellets derived from hardwoods, not pine, are in fact preferred for cofiring in coal conversions. Thus it appears likely that those remaining forests are under threat as much by direct cutting for pellet facilities as by the expansion of pine plantations.

8. Pellet exports from Canada

Canada is thought by many in the industry to have the largest ultimate pellet potential with vast areas of forested land. So far most exports have come from British Columbia, however large investments into pellet production and export facilities are also underway in Ontario and Nova Scotia. In British Columbia, the invasion of the mountain pine beetle, which damaged more than 18 million hectares of forest, has been used as rationale for massive salvage logging operations, including for conversion to pellets for export. Many sawmills faced a shortage of suitable high quality timber in the wake of the beetle infestation, and have turned to burning chips for electricity or producing pellets for export. Pinnacle Pellet is one of the major players exporting to the UK, and operates six facilities. According to an industry fact sheet, at least 7 companies are operating 11 pellet facilities in BC, including Pinnacle as well as Viridis (aka Okanagan), Pacific Bioenergy, Northwest Wood Preservers, Houston Pellet, Princeton CO-Generation and

[32] http://rewilding.org/rewildit/images/Southern-Forests_summary_report.pdf
[33] http://www.dogwoodalliance.org/2013/08/press-release-new-maps-reveal-envivas-ahoskie-wood-pellet-facility-threatens-southern-wetland-forests-surrounding-ecosystems-and-wildlife/

Premium Pellet.[34] A number of facilities also are producing energy to deliver to the BC grid, but over 90% of pellets are exported, mostly to Europe. The Canadian Wood Pellet Association claims that only residues are being used to produce pellets, but the location of many of the pellet plants shows that they cannot be reliant on sawmill residues. Out of Pinnacle Pellets' 6 pellet mills, only one is located next to a sawmill. In the southern US, pellet companies such as Enviva have made similar claims about only using 'residues' and 'wastes', yet investigations have shown that their definitions of those include all trees in biodiverse forests which do not provide high-quality timber for sawmills[35]. An independent analysis of the Canadian pellet industry, their wood sourcing and impacts is urgently required.

In Nova Scotia, Viridis Energy aims to export 240,000 tonnes of pellets to Europe, having entered into an agreement with the Swedish wood trading company Ekman Group. They have opened three pellet mills with another two under development[36], and in Ontario, Rentech Inc has entered into a supply agreement with Drax in the UK. They are converting two former pulp mills into pellet plants. Rentech has signed a contract with Quebec Stevedoring Company Ltd under which the Port of Quebec is to become the hub for pellet exports from Eastern Canada to Europe[37].

Very serious concerns have been raised about the impacts of salvage logging on forests, forest regeneration and climate. The Wood Pellet Association of Canada has stated that they regard sourcing from newly logged old growth ('primary') forests as being vital to the Canadian pellet industry.[38] They are concerned that they could be excluded from European markets if the EU introduced biomass sustainability standards, which prohibited support for burning wood sourced from primary forests. Logging practices in British Columbia utilize clearcuts, and clearcuts with reserves and have been criticized for destruction of highly biodiverse old growth forests.[39] Salvage operations have meanwhile resulted in an intensification both in terms of the area opened to logging and the amount of wood removed. New regulations to increase the production of pellets and woodchips for energy involve an 85% increase in annual timber harvesting.[40] While beetles are a natural part of the forest ecosystem cycle in BC forests, climate change has significantly increased the scale of beetle infestations in recent ears. The impact of beetle infestation followed by the additional damage from salvage logging activities, results in declining capacity for regeneration. Forest management policy in BC states that under an "emergency" as the beetle infestation was declared, logging plans could be approved without terrain stability assessments or pubic review. Furthermore, salvage logging under such circumstances was exempted from cutblock size and adjacency regulations, could be undertaken in old growth management areas, ungulate winter ranges, wildlife habitat areas, wildlife tree patches and riparian reserves. An article published in the Vancouver Sun reports concern about salvage logging on behalf of the Wilderness Tourism Association. Their spokesman refers to salvage logging as a "*free*

[34] http://www.pellet.org/images/WoodPelletFactsheet.pdf
[35] See for example http://www.newsobserver.com/2013/09/24/3224721/nc-trees-are-not-trash-wood-pellets.html
[36] http://www.marketwatch.com/story/viridis-energys-scotia-atlantic-biomass-commences-wood-pellet-production-2013-09-04
[37] http://www.rentechinc.com/wood-pellets.php
[38] http://library.constantcontact.com/download/get/file/1102670662980-86/2012-10-07+Quebec+Sustainability+Trip.pdf
[39] http://www.sierraclub.bc.ca/media-centre/press-clips/bc2019s-endangered-forests
[40] http://www.greenpeace.org/canada/Global/canada/report/2011/10/ForestBiomess_Eng.pdf

for all… there's no control, there's no restriction." A guest house owner describing the situation: "*It looks like World War Three, complete annihilation of everything with the odd aspen here and there or a sorry-looking spruce or fir*."[41] Assessments of the impacts of salvage logging found that many very large areas had been clearcut, over half larger than 250ha, a third were larger than 1,000 ha and some as large as 10,000 and even 100,000 ha.[42] With employment in forest products industry in BC dramatically impacted by the loss of high quality timber, there is pressure to open areas that were not damaged, but were previously not accessible due to regulations in order to increase access to timber – in addition to expanding salvage harvesting in regions where beetle damage has occurred. In sum, BC's forests are under enormous pressure from all sides. A review commissioned by IEA Bioenergy concluded: "*salvage logging operations are exempt from many regulations governing sustainable forest management, and, gaps in the sustainable management framework have failed to protect biodiversity in the face of widespread salvage logging operations*."[43]

9. Global interest in wood bioenergy

A comprehensive assessment of the global wood bioenergy industry would be useful, but is not currently possible. With rapidly changing policy and practice, there are new plans announced daily, and determining whether or not they actually are carried through requires sleuthing. We refer readers to a recent (2013) report from World Rainforest Movement that provides examples and indications of growing interest and investment in wood bioenergy – both developing wood burning facilities and investing in forested land and wood plantations, from around the world.[44] In some cases, existing tree plantation and forest products companies are extending their interests to include bioenergy alongside preexisting interests. For example, Green Resources, a Norwegian company with vast tree plantations in several African countries now refer to their plantation activities, which have had serious negative impacts on surrounding communities[45],

@iStock

[41] B,C. Ecotourism at the mercy of salvage logging free-for-all. Vancouver Sun, Dec 9th 2011.http://www.canada.com/business/Ecotourism+mercy+salvage+logging+free/5837726/story.html
[42] Biodiversity conservation during salvage logging in the central interior of BC. Forest Practices Board. http://www.fpb.gov.bc.ca/WorkArea/DownloadAsset.aspx?id=4956
[43] Lloyd, S.A. and Smith, C.T. 2012: Salvage Logging and Wood Pellet Production in British Columbia: A Sustainabiity Assessment. IEA task 43, report 2012:02
[44] Tree Plantations in the South to generate energy in the North: A new threat to communities and forests. WRM briefing paper, 2013.
[45] Karumbidza, B. and Menne, W. 2011. CDM Carbon Sink Tree Plantations: A Case Study in Tanzania. Timberwatch Report http://timberwatch.org/uploads/TW%20Tanzania%20CDM%20plantations%20report%20low%20res%20(1).pdf

as serving markets both as "carbon sinks" and also as timber and bioenergy suppliers.

According to a 2012 USDA analysis of Asian wood pellet markets,[46] China, Japan and South Korea have significant industries. Japanese and South Korean companies in particular are investing in biomass energy plantations outside their borders, (some are described in the above WRM report), while China is relying more on domestic production. The largest Asian importer, according to the USDA analysis, is Japan, where most pellets are used for cofiring in existing coal plants. China meanwhile has some domestic production, but it has been noted that any policies that encourage use of woody biomass in China would potentially have huge global consequences. For example, if China sought to replace 10% of coal with biomass, an estimated 500 million tons of pellets would be required annually, and the vast majority would have to be imported given limited domestic production potential.[47]

Brazil has pioneered sugar cane ethanol, and cane bagasse from the ethanol (and sugar) industry is burned in numerous facilities. The Brazilian steel manufacturing industry relies on charcoal production. The first large cogeneration plant Energias Renovavais do Brasil was slated to start up in July 2013 to provide power to DOW chemical facility in the northeastern state of Bahia which included 10,000 ha of tree plantations to supply the facility.[48]
These represent just a few examples of the expanding global interest in wood bioenergy. A more exhaustive country by country survey is needed in future.

10. How much wood will be needed?

In reality there is no credible way of predicting just how much wood will be used for industrial bioenergy in coming years. There are practical problems with many of the technologies used to generate bioenergy as well as with securing adequate supplies of wood. Conversions of coal power station units to biomass are the largest biomass schemes in the world, but there have been serious problems with boiler erosion and also with fire and explosion risks. Hence, in five years' time, such conversions could be major driver of forest destruction – or energy companies could opt to drop those schemes. Uncertainties over future renewable energy, climate and air pollution policies further complicate the situation.

What is becoming clear is that different technologies require different types of biomass, which has profound implications. New-build biomass power plants – whether they produce electricity, heat or both, can be designed to burn a wide range of biomass. They can burn any type of wood as well as short-rotation coppicing and crops such as willow, miscanthus or switchgrass or agricultural residues. Wood can be burned in different forms, including as woodchips, sawdust or pellets. Coal power stations, on the other hand, are not designed to burn biomass, which has quite different combustion and chemical properties than coal. Although such power stations can co-fire a small proportion of different types of biomass, co-firing larger amounts or converting entire power station units to biomass raises the risks of slagging, fouling and corrosion of the

[46] The Asian Wood Pellet Markets. JA Roos, AM Brackley. USDA 2012. http://www.fs.fed.us/pnw/pubs/pnw_gtr861.pdf
[47] http://biomassmagazine.com/articles/8837/asian-markets-for-wood-pellets
[48] http://www.bloomberg.com/news/2012-07-03/erb-to-produce-biomass-power-at-dow-factory-in-brazil-in-2013.html

boilers. According to Drax in the UK, who are implementing the most ambitious conversion scheme, only wood from slow-growing trees with a low bark content (ruling out most types of sawmill residues) can be burned.[49] Wood can only be burned in the form of pulverized wood pellets in such power stations. (In steel production, on the other hand, the only type of biomass that can be used is charcoal - not just to generate energy but to increase the carbon content of liquid iron, a precursor to steel.)

11. Using Wastes and Residues?

Tree plantations in Czech Republic. @Simone Lovera

In response to criticism about the impacts of escalating wood bioenergy on forests and climate, industry portrays itself as environmental stewards, who only seek to make good use of "wastes and residues". In a select few cases involving small-scale facilities, this may be a reasonable claim, but in most cases, it is far from accurate. Fundamentally, the scale of demand for commercial and industrial applications cannot feasibly be met by the relatively small amounts of wastes and residues, which are, in many cases, already used for other purposes. Wastes and residues are terms used to refer to leftovers from mill operations including sawdust, urban tree trimming remains, and woody debris from construction and demolition (one can argue that timber and pulp demand itself is unsustainable, rendering their wastes also unsustainable). The term also is applied to tops and branches of trees harvested for other purposes (saw logs and pulp). Many refer to using "non merchantable" timber which means standing trees that are irregular or otherwise unsuited for existing markets. For example, pellet manufacturer Enviva

[49] http://biofuelwatch.org.uk/docs/DECC%20FoI%20EIR%2013-0340%20Q1%20Documents%20Drax%20etc%209May%202013.pdf

classes all smaller trees – accounting for up to 75% of the trees in native forests where they are harvesting, as "non merchantable".[50] In other words, there is a market for virtually anything that can be removed. As Greenpeace Canada states: "*Although most promoters of bioenergy, including government agencies insist that forest bioenergy draws on forest waste, forest biomass sources from virtually everything in the forest (with the exception of stumps) that is not used to make a piece of paper, a 2 by 4 or other traditional forest products*."[51]

The practice of "whole tree removal" or 'brash removal' is increasingly favored as the most inexpensive and expedient method to maximize biomass extraction. Whole tree harvesting involves cutting whole trees and transporting them offsite to roadside staging areas where stems are shipped out for lumber and tops, branches and other material for biomass. This is particularly destructive. Under natural conditions, decaying leaves and branches return nutrients and carbon to replenish soils and support regeneration. Deadwood protects soils from exposure to sun and wind and provides critical habitat for forest biodiversity as well as being rich in carbon. When all of those materials are removed, soil nutrients are depleted, soils dry out and erode, and biodiversity disappears. The consequence in the long term is a markedly reduced potential for forest regeneration.

12. Salvage logging: beetle infestations as an excuse to cut more

In western North America, forests have been devastated by the mountain pine beetle. Many are pushing to salvage harvest damaged trees for bioenergy, arguing that they "might as well not go to waste" and using the rationale that "they will decay and release greenhouse gases anyway" hence better to harvest the wood and burn it in power stations. The British Columbia pellet industry, discussed above, sprang up on the heels of such a beetle infestation. Harvesting from beetle damaged forests, already heavily stressed, only further damages the landscape, compacting soils, constructing roadways, injuring delicate new seedlings and hindering regeneration. One study showed that forest areas where 90% of trees had been damaged by beetles quickly regain carbon if they are allowed to regenerate naturally without logging, whereas salvage logged sites were found to still be releasing carbon even ten years later.[52]

13. Thinning: wildfires as an excuse to cut more

Further expanding access to wood, wildfires in the western USA are being used to rally support for "thinning and restoration" harvests especially from federal lands. Many of those forested areas have been previously degraded by logging where bargain basement prices on logging concessions were offered to the timber industry. The claim is made that thinning of overly dense stands will reduce the risk of fire by reducing the quantity of flammable material remaining in forests. However, the intensity of fires is governed primarily by drought and wind conditions, not overburdening of fuel. In fact, removing biomass tends to speed drying conditions that often favor fires. Forest ecosystems in the western US are in fact dependent on and adapted to periodic wildfires and the suppression of fire has had profound impacts on forest ecology and biodiversity in the region.[53]

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[50] Source: Danna Smith, Executive Director of Dogwood Alliance.
[51] Fuelling a Biomess. Greenpeace Canada 2011
[52] http://www.davidsuzuki.org/publications/downloads/2010/ccpa_bc_managingforests.pdf
[53] http://www.energyjustice.net/content/ecological-importance-california's-rim-fire-biomass-monitor

People living in areas where wildfires occur are often fearful and industry is playing on that fear to win over support for thinning. Research has shown however, that careful management of vegetation in the immediate vicinity (100-200 feet) of homes is the most effective fire risk protection. Thinning tens or hundreds of miles distant has little impact on homeowner risk. With a growing market for low grade wood biomass, the promotion of thinning as "protection from wildfire" is a convenient wedge for an industry keen to secure access to biomass.

In spite of the ongoing effort by industry to represent itself as providing an environmentally friendly service by utilizing residues and wastes, and protecting the fearful public from fire risks, even leading industry analysts have discredited the claim that sufficient quantities of "waste" exist: "*The Wood Biomass Market Report today dispelled a widespread myth in regards to the availability and cost of wood fiber for wood biomass projects. The Report, published monthly by RISI, the leading information provider for the global forest products industry, reported that operators of new wood biomass projects, often industry newcomers, are finding that their wood cost projections were unrealistic and that to their surprise, existing mills are willing to fight with dollars to preserve their wood supplier loyalty. The Report also stated that these operators, hungry for large volumes of wood, and frequently armed with government subsidies, are finding that the perceived overabundance of "waste wood" in the nation's forests is simply not there. As a result, the increased demand for more traditional forms of wood fiber has already triggered wood price spikes and cross-grade competition in the tightest markets*."[54]

The massive scale of demand for the international pellet trade and large scale industrial facilities simply cannot be supplied from anything that could be reasonably considered "waste and residue". Even with the industry still in its infancy, it has already been documented that whole trees are being cut specifically for bioenergy.[55],[56],[57],[58] Whole trees stacked in the stock yards at facilities are a giveaway. Permitting applications sometimes specify that whole logs will be utilized. While regions with tree plantations are targeted, so also are biodiverse native and primary forests. Recent indications suggest that the combustion conditions and equipment for converting most coal power stations to biomass and for co-firing a high proportion of biomass in them may require pellets manufactured not from fast growing pine or other softwoods, but rather from slow growing hardwoods. In other words: it is not only the matter of large volumes, but also the type of wood that is needed that will determine the impact on forests.

14. The "carbon neutral" myth

Industry has long claimed that wood bioenergy is "carbon neutral" based on the assumption that carbon released during combustion will be reabsorbed by new tree growth. This simplistic assumption has been dangerously embraced by policymakers

[54] RISI's Wood Biomass Market Report Dispels 'Overabundant Waste Wood' Myth Oct 17, 2008 - BiobasedNews.com
[55] http://www.nrdc.org/media/2013/130827a.asp
[56] http://www.ewg.org/agmag/2010/06/did-they-really-say-that-see-for-yourself/
[57] For example, Laidlaw New Hampsire facility air permit states:*"Equipment will be installed within a new building to produce wood chips from whole logs."*
http://www.laidlawenergy.com/NH_Project
[58] http://climate-connections.org/2013/02/12/photos-show-whole-trees-burned-for-biomass-power/

and forms the basis for subsidizing wood bioenergy as "renewable" and "sustainable". Under the Kyoto Protocol, countries do not report greenhouse gas emissions from biomass combustion for energy as part of their National Greenhouse Gas Inventories, although emissions linked to land use change, logging and agro-chemical use are supposed to be reported under different sectors (but, in practice, rarely are). The International Panel on Climate Change (IPCC) advises that governments should report those emissions as an information item for their Energy Sectors, and that generating a unit of electricity from burning biomass will generally be higher than generating the same from coal.[59] However, this advice is almost universally ignored by governments, as are emissions from biomass combustion.

Under the European Emissions Trading Scheme, bioenergy emissions are also assumed to be zero[60] as they are under most US state renewable portfolios, various EPA emissions regulations, and virtually all policies that provide subsidies and supports for renewable energy worldwide. Yet, wood has a low energy density and most commercial and industrial scale boilers run at only about 25% efficiency, with converted and co-firing coal power stations achieving up to 37%. The result is that burning wood for electricity releases up to 50% more CO2 per unit of energy generated than does burning coal. This is just emissions measured out of smokestacks and does not even take into consideration the vast additional carbon emissions resulting from the rest of the wood bioenergy lifecyle, which includes harvesting activities, soil disturbance, transportation and in many cases drying and pelletizing operations as well as direct and indirect land conversion. It is worth noting that while stack emissions are indeed counted for fossil fuels (unlike for biomass), lifecycle emissions from fossil fuel extraction and processing and other energy sources are universally ignored.

The carbon neutral myth has been repeatedly and soundly refuted by numerous reports and peer reviewed scientific studies, a few of which are provided below. What is clear is that most large scale biomass facilities use wood. Carbon released when it is burned may not be reabsorbed into new tree growth for decades or even centuries, if at all.

One of the first to raise concerns about carbon emissions from bioenergy was Searchinger et al, in an article aptly titled "Fixing A Critical Climate Accounting Error". A report by Joanneum Research (2010), titled "The Upfront Carbon Debt of Bioenergy" stated: *"When the raw material is wood, the time needed to re-absorb the CO2 emitted in the atmosphere can be long, depending very much on the source of wood. This delay can create an upfront "carbon debt" that would substantially reduce the capability of bioenergy to reduce the greenhouse gas emissions (GHG) in the atmosphere in the short to medium term."* They point out that cutting trees for bioenergy can result in a carbon debt that could take 2-3 centuries to "repay" (i.e. for new trees to absorb an equivalent amount of carbon back out of the atmosphere). Greenpeace Canada offered the following figures on carbon debt from harvesting boreal forests for bioenergy for perspective:

- Time needed to burn one tonne of biomass in an average 30MW boiler: 1 min 15 sec.
- Time needed for a black spruce to grow to harvestable level after disturbance: 70-125 years.

[59] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf
[60] Zacune, J. 2012. Nothing Neutral Here:large scale biomass subsidies in the UK and the role of the EU ETS. Carbon Trade Watch report

- Time for a tree trunk to decompose entirely in the boreal forest >120 years.

Overview of Some Key Studies challenging the Carbon Neutral Myth

- A study published in Science reported results of modeling the land use impacts of a carbon tax applied to fossil carbon. If the carbon neutral assumption remained for bioenergy, incentives to switch to bioenergy would result in the conversion of virtually all remaining natural ecosystems, including natural forests and grasslands to monoculture plantations for bioenergy feedstocks by the second half of the 21st century.[1]

- In the US state of Massachusetts, a study was undertaken to assess the carbon implications of bioenergy (the Manomet Study).[1] The results showed that when biomass is used to generate electricity in utility-scale plants, the net emissions after 40 years, even taking forest regrowth into consideration, are still higher than if the power had been generated with natural gas or coal. (Even this was considered a vast underestimate of carbon emissions.)[1] The study outcome prompted legislators to revise the state's regulations on bioenergy, in particular to require much higher efficiency.[1]

- A letter to members of Congress signed by 90 prominent US scientists, states: *"Replacement of fossil fuels with bioenergy does not directly stop carbon dioxide emissions from tailpipes or smokestacks. Although fossil fuel emissions are reduced or eliminated, the combustion of biomass replaces fossil emissions with its own emissions (which may even be higher per unit of energy because of the lower energy to carbon ratio of biomass)."* [1]

- The US Environmental Protection Agency, directed to regulate CO2 emissions, developed a "tailoring rule", and then made the decision to exempt biomass facilities from regulation under that rule for a period of three years in order to further evaluate if and how to regulate CO2 emissions from biogenic sources. This exemption was challenged by a coalition of environmental groups and the court ruled the exemption unlawful.[1]

- Shulze et al 2012 conclude: "*Large scale production of bioenergy from forest biomass is neither sustainable nor greenhouse gas neutral.*"

The Scientific Committee of the EU Environment Agency warned: "*Based on the assumption that all burning of biomass would not add carbon to the air, several reports have suggested that bioenergy could or should provide 20-50% of the worlds energy in coming decades. Doing so would require doubling or tripling the total amount of plant material currently harvested from the planet's land. Such an increase in harvested material would compete with other needs such as providing food for a growing population and would place enormous pressures on the Earths land based ecosystems. Indeed current harvests while immensely valuable for human well being have already caused enormous loss of habitat by affecting perhaps 75% of the world ice and desert free land, depleting water supplies and releasing large quantities of carbon into the air.*"[61]

Industry is attempting to counter this growing body of evidence by simply repeating the carbon neutral myth over and over again along with the claim that they do not use forest

[61] European Environment Agency Scientific Committee: Opinion of the EEA Scientific Committee on Greenhouse Gas Accounting in Relation to Bioenergy. Sept 15th 2011.

biomass, but rather only "wastes and residues". However, the writing is on the wall: it is broadly agreed that cutting forests in order to burn trees for electricity is anything but carbon neutral. In Europe the debate has shifted from claiming wood bioenergy is "carbon neutral" to referring to "low carbon" biomass, reflecting growing awareness of the impacts of land conversion, although emissions from logging and smokestack emissions continue to be disregarded and unaccounted for.

Policies may well shift to reflect growing recognition of the carbon impacts of wood bioenergy. The question is, how and when?

15. Can sustainability standards solve the problems?

Industry and many policymakers and even a large cadre of environmental groups assume that the best approach to preventing harms from the expanding use of wood bioenergy use is to develop sustainability standards. The UK, with massive demand for imported wood pellets has taken a lead in developing mandatory standards, but industry has also been working on their own versions, voluntary of course. A review of standards developed for forest products, provides little basis to assume such standards, or new ones under development, can be effective. As companies find it increasingly profitable to present themselves as "green", there is an emerging certification industry whose mission is, and whose own profitability depends on providing certificates. Bureau Veritas is an example and describes itself as having "*80,000 clients in more than 100 countries, delivering over 100,000 certificates... the world's leading certification* body". Another, SGS refer to themselves as the "*world's leading inspection, verification, testing and certification company*", with over 70,000 employees and more than 1,350 offices and laboratories. In 2011, their total revenue was 4.8 billion Swiss Francs (£3.17 billion or $4.9 billion). These certification companies are normal profit-oriented industries whose prime objective is not necessarily sustainability, but rather to provide a commercial service to the timber industry. For example, SGS, at the forefront of wood certification (offering FSC, PEFC, SFI and other certificates), also "*partners the coal mining industry providing extensive analysis, sampling and superintendence to drive productivity and speed to market.*" SGS also includes investors in Alberta's tar sands industry amongst its clients. Industry can simply "shop around" to find a certification company that will best serve its interests, or develop its' own internal procedures.

Complaints against the certificates awarded by these certification companies are all too common, and in some cases have resulted in suspension or revocation of their status as accreditors. UK biomass sustainability and greenhouse gas standards, which are to be introduced from April 2014, rely on certification by existing voluntary forestry certification schemes or on companies obtaining confirmation from a consultant of their choice that the wood abides by the principles and standards of such schemes even if it is not actually certified.Additionally, biomass is supposed to result in at least 60% greenhouse gas emissions when compared to fossil fuels, however most emissions associated with bioenergy are ignored and the government's own assessment of the proposal indicated that all wood-based bioenergy would be assumed to achieve such savings, regardless of its origin.[62] The European Commission is expected to shortly announce whether or not to recommend similar or different standards for the EU.

[62] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/230482/RO_Biomass_Sustainability_Govt_Response_-_Impact_Assessment_-_19-August-2013_FINAL_for_pdf.pdf

Energy companies investing in biomass are already developing their own in-house sustainability policies. Drax, engaging the services of Terra Veritas, put forward seven "principles of sustainability". Those state that producers will be required to answer questions on a form assuring compliance with these principles. There is no indication that any sort of verification will be required. RWE procuring pellets from southeastern USA and British Columbia developed their own internal procurement sustainability principles. They worked towards having all of their pellets "independently assured" under the Green Gold Label (GGL). The independence of the Green Gold Label accreditation scheme however, is highly doubtful: The two only members of GGL's Executive Board represent RWE. E.On, with several large biomass investments including the conversion of Ironbridge coal power station to biomass in the UK, and the planned conversions of the 460 MW Langerlo power station in Belgium and of a 150 MW coal power station unit at Gardanne, France, as well as the planned construction of a 150-300 MW biomass power station in Antwerp, Belgium, has contracted with Enviva who are to supply wood pellets also from the Southeastern US. E.On, like other energy companies, has a sourcing sustainability policy, but no means of ensuring and verifying compliance with vague principles. Enviva has obtained certification for their pellets from SFI. The recent discovery that Enviva is harvesting from clear cutting remaining pockets of endangered coastal Atlantic forests illustrates how little real oversight exists.

Not wishing to appear unconcerned, and preferring to "self-regulate", the largest wood pellet investors and users in Europe are now collaborating to draw up their own standards to "inform" policy makers. The Initiative Wood Pellet Buyers (IWPB), launched by GDF Suez, includes six of Europe's largest energy companies. While the IWPB principles appear in some respects more comprehensive than some others, there is, once again, no indication they are serious about developing any robust system for verification. Proof of compliance could simply require a statement from one of several verification consultants, instructed by an energy company. No transparency rules or avenues for appealing are proposed. Such standards based upon business contracts between companies and their chosen consultancy firms, paid to provide allegedly "independent" verification, can ensure nothing other than that a company has ticked the right boxes.

The UK and Scottish Governments as well as some energy companies choose to assume that voluntary forestry certification schemes, especially the Forest Stewardship Council (FSC), the Programme for the Endorsement of Forest Certification (PEFC) and PEFC member schemes (such as the Sustainable Forestry Initiative of SFI) are considered proof of sustainability in spite of mounting evidence to the contrary. . The effectiveness of such forest certification schemes was recently questioned by the Centre for International Forestry Research: "*We need to determine whether being certified or not has any effect," said Manuel Guariguata, a CIFOR principal scientist and co-author of the paper. "From a donor's perspective, we're talking many millions if not dozens of millions of dollars that have been invested in certification, and so far there's no evidence that they have been invested efficiently*."[63] PEFC, founded by forestry industry groups, endorses a wide range of schemes, dominated by forestry industry whose primary interest is to maximize productivity in terms of wood production. For them, the term "sustainability" refers to volumes of wood, and no more. NGO evidence has shown PEFC certificates having been granted for wood associated with a wide range of

[63] http://blog.cifor.org/19163/the-multi-million-dollar-question-is-forest-certification-working?utm_source=September+2013&utm_campaign=NEWS+UPDATE+English&utm_medium=email

environmental destruction and violation of human rights[64]. FSC has enjoyed support from more NGOs, although several have resigned their membership in recent years and many concerns have been raised[65]. For example, FSC has been criticized for certifying monoculture tree plantations, including invasive species, as sustainable. FSC certificates have been granted in respect of wood despite evidence of it coming from illegal sources, destructive logging including clear cutting of old growth and other highly biodiverse forests, from plantations linked to the eviction of communities, violent human rights abuses, soil and water depletion and pollution, as well as damage to wildlife. In sum, even the most widely respected forest certification scheme cannot ensure that wood certified as sustainable complies with its own principles and criteria nor with what most people would regard as basic requirements for genuinely sustainable forestry.[66]

FSC certified logging operations in Ireland. @Wally Menne

16. The future of wood bioenergy: doubts and uncertainty

Many wood bioenergy facilities and coal conversion plans have faced serious financial difficulties, community opposition, and also a remarkable number of fires and explosions.[67] Recently the world's largest biomass facility, RWE's Tilbury B plant in the UK (750 MW), converted from coal at the end of 2011, was shut down. RWE cited

[64] See for example On the Ground: The controversies of PEFC and SFI, October 2011, http://www.greenpeace.org/international/en/publications/reports/On-The-Ground-2011-/
[65] See fsc-watch.org
[66] Ernsting, A. 2012 Sustainable Biomass: A Modern Myth. Biofuelwatch report http://www.biofuelwatch.org.uk/2012/biomass_myth_report/
[67] http://www.energyjustice.net/content/biomass-industry-plays-fire-gets-burned-biomass-monitor

financial concerns over subsidies as the official reason for closure, but their claims appear to lack credibility.[68] Tilbury B had experienced a major fire in February 2012, but RWE had spent substantial sums on the power station since then and had been operating it again since summer 2012. The reasons for their decision to close the power station remain unclear. One possibility is suggested by the results of a Freedom of Information request submitted by Biofuelwatch in regards to the DRAX facility. Technical data from tests showed that pellets from slow growing trees with low bark content were necessary. Other types of biomass, i.e. from fast growing species, were too high in alkali salts and led to corrosion in the boilers. Tilbury/RWE had constructed a large pellet manufacturing facility in Waycross, Georgia, in the heart of southeastern pine plantations. Earlier this year they announced plans to sell that facility. Meanwhile, as referred to earlier, a recent investigation of Enviva's largest pellet mill, at Ahoskie, North Carolina, published by NRDC and Dogwood Alliance shows that the pellet plant is located close to native hardwood wetland forests, high in biodiversity and rich in carbon.[69] Preliminary investigations by Dogwood Alliance suggest that other Drax suppliers in the southern US also have pellet plants located adjacent to native hardwood forests. It appears that while the pine plantations of the southeast have been most discussed as the source of pellets for European coal-to-biomass conversions, it may be that the technicalities of combustion processes require a different sort of feedstock – from temperate or boreal slow growing hardwood forests. Lower grade wood from fast growing pine or eucalyptus may well still be suited for burning in dedicated biomass only power stations or for co-firing small amounts of wood with coal.

While there are questions and doubts about the future of bioenergy industries, analysts continue to project massive scaling up, and that may be likely in spite of growing concerns about the carbon, environmental and human rights conditions. Under pressure to maintain economic growth, policy makers especially in industrialized countries are faced with few options for weaning off fossil fuels (or at least creating the impression of doing so as fears about climate change escalate) that do not involve moving towards a low-energy society and challenging the profits and interests of energy companies

Burning wood builds on energy companies' existing infrastructure and, in the case of coal-to-biomass conversions and co-firing, allows existing coal power stations to remain in operation, in some cases for longer than would otherwise be the case. Biomass electricity also allows energy companies, who are amongst the largest and most powerful corporations, to extend their portfolio by investing in land, including forests and tree plantations. In recent years, 'timberland' investments have become increasingly attractive to those with large funds to invest because they are seen as reliable, low-risk long-term investments and a way of diversifying larger investment portfolios.[70]

Biomass supporters often claim that it is one of few available options for generating consistent base load electricity as it can be done 24/7 irrespective of weather or season. However, concerns over base load, or rather the intermittency of wind, solar and tidal energy, become a self-fulfilling prophecy if they are used to justify ever more investments into combustion plants, thereby detracting from investments in other forms of renewable energy (wind, solar and tidal) and keeping those below the level at which

[68] http://peopleforestsrights.wordpress.com/2013/09/25/why-was-the-worlds-biggest-biomass-power-station-closed-down-and-what-does-this-mean-for-forests/
[69] http://www.nrdc.org/media/2013/130827a.asp
[70] See for example http://www.jpmorgan.com/tss/General/Timberland/1159351270237

intermittency would ever become a problem. This way, research, development and investment into electricity storage technologies, which could overcome such problems, are being avoided. Furthermore, if 'securing base load' was genuinely a key reason for governments to support biomass then they would be concerned to ensure that demand for biomass did not grow at a faster pace than supplies of woodchips and pellets. The opposite is the case, which means that biomass power stations tend to consistently run well below their capacity due to supply bottlenecks. In the UK, biomass plants ran at 27% capacity in 2011, and at 40% in 2012.[71] This is well below the level at which biomass would be suitable for providing base load electricity.

The potential to keep older coal plants operational by cofiring or (partly or fully) converting to biomass, which enables them to meet stricter air pollution regulations, and in many cases win subsidies for renewable energy generation as well, is another factor. Energy analysts continue to promote a vision of massive bioenergy scale-up. For example: In their "bioenergy technology roadmap",[72] IEA claims that bioenergy could provide 7.5% of global electricity and bioenergy heat could contribute 15% of industrial demand and 20% of building sector demand. Because of economy of scale efficiency considerations, they promote large-scale power plants (>50MW) and smaller scale district heating and CHP. This would require between 5 and 7 billion tons of biomass annually by 2050. The investments required for scaling up bioenergy electricity generation plants would be around 500 billion, in addition to investments in smaller scale CHP and district heating. Supplying feedstocks, they estimate, would cost between 7 and 14 trillion dollars!

Whether or not such a massive scaling up of will happen or not depends on many factors – ranging from the perpetuation of subsidies and targets, which in turn depend in part on the perpetuation of the carbon neutral or 'low carbon' myth. Regulations on air emissions also could encourage scaling up (in the case of stricter emissions limits on sulphur or mercury for example) or could discourage scale up (in the case of stricter CO2 regulations in the context of a realistic assessment of the carbon impacts of bioenergy.) The future of wood bioenergy also depends on how we respond to the increasingly dire consequences of global climate change. While in the USA and elsewhere many policymakers remain mired in obstruction and denial, some segments of the population in many areas of the world are seeking solutions, in some cases with a growing sense of desperation. The question is, what solutions are likely to be promoted and implemented?

17. The Renewable Energy Obsession

Most policymakers and the vast majority of environmentalists as well have placed the call for "more clean and renewable energy" (and energy efficiency) at the centerpiece of their approach to resolving the climate and economic crises. This dangerously inarticulate call inherently supports expanding bioenergy. Unfortunately, there has been little effort to hone and refine a definition of "renewable" to ensure that destructive forms of energy including biomass (and large hydro) in particular are excluded from supports.[73]

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[71] DUKES Renewable Energy Statistics 2013, https://www.gov.uk/government/publications/renewables-section-6-energy-trends

[72] http://www.iea.org/publications/freepublications/publication/name,27283,en.html

[73] http://www.stakeholderforum.org/sf/outreach/index.php/component/content/article/170-irena-wrap-up/1401-renewable-energy-why-the-definition-needs-to-be-revised

Further, this obsession with renewable energy rests on the assumption that business as usual will be just and sustainable and crises averted so long as we simply switch to different sources of energy. It fails to question what the energy is used for, or by whom. Do vast monocultures of soy in Argentina become socially and environmentally friendly if the machinery used is powered by biodiesel? Is bottled water suddenly benign so long as bioplastics are used and the bottles are transported by trucks running on natural gas? Will cutting down forests to export to China for manufacture of cheap furniture be good for the planet so long as the manufacturing facilities are solar powered? Clearly destruction and over consumption of resources can easily be powered by renewables. Calling for "more renewable energy" in the absence of any clear definition or any more holistic approach, will only perpetuate and even worsen our crises. A deeper analysis and real measures to secure what climate justice activists refer to as "system change" would not focus blindly on ramping up renewable energy but would engage a process of community scale empowerment, control and decision making over the means of production, including energy, discussed further below.

18. Geoengineering the climate with Bioenergy and biochar?

While large-scale commercial and industrial wood bioenergy is still only beginning to scale up, there are numerous indications that pressure to develop it further and faster could mount as climate change impacts become more serious and palatable "solutions" are supported. Especially concerning here is the promotion of bioenergy with carbon capture and storage, aka BECCS. BECCS is the application of Carbon Capture and Sequestration (CCS) to any form of bioenergy. This could mean capturing CO2 from ethanol refineries, or some types of biodiesel production facilities, from coal power stations that co-fire or co-gasify biomass and coal, or from dedicated biomass combustion or gasification power stations. Once captured, the carbon dioxide is compressed, transported via truck, ship and/or pipeline, and then pumped underground for long-term storage in underground geological formations, or as is proving far more profitable and hence likely, it used for enhanced oil recovery (EOR). This means pumping captured CO2 into depleted oil wells to provide pressure that will force remaining inaccessible oil to the surface for extraction.

Proponents claim that BECCS is one of the few currently available means of supposedly removing carbon from the atmosphere and that as such it is essential for averting climate catastrophe.[i] Some argue that achieving low(er) greenhouse gas stabilization concentrations simply cannot be achieved without carbon dioxide removal, including via BECCS.[74] Some even claim that large scale application could restore atmospheric CO2 levels to preindustrial levels.[75] Among the staunchest advocates of BECCS is the IPCC. In the 2007 Assessment Report 4, they point out that many scenarios to stabilize CO2 levels at or below 400 ppm would require negative emissions later this century.[76] Some of their models assume that as much as 90% of the reduction would be achieved by

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[74] IEA/OECD 2008. CO2 Capture and Storage- A Key Carbon Abatement Option AND Azar, C., K. Lindgren, et al. (2006). "Carbon capture and storage from fossil fuels and biomass - costs and potential role in stabilizing the atmosphere." Climatic Change 74(1): 47-79 AND Azar, C., K. Lindgren, et al. (2010). "The feasibility of low CO2 concentration targets and the role of bio-energy with carbon capture and storage (BECCS)." Climatic Change 100(1) 195-202

[75] Read, P. and Lermit, J. Bioenergy with carbon storage (BECS): a sequential decision approach to the threat of abrupt climate change. Energy (30) 2654-2671

[76] www.ipcc.ch/publications_and_data/ar4/wg3/en/tssts-ts-3-2-stabilization-scenarios.html

CCS (applied to both fossil and bio energy).[77] Their 2011 Special Report on Renewable Energy later states: "*Bioenergy technologies coupled with CCS...could substantially increase the role of biomass-based GHG mitigation if the geological technologies of CCS can be developed, demonstrated and verified to maintain the stored CO2 over time.*"[78]

BECCS is featured among "carbon dioxide removal" technologies under consideration for climate geoengineering, in for example the Royal Society report[79] along with biochar and large-scale afforestation. Similarly, BECCS is listed as a potential geoengineering technology in the US Government Accountability Office (GAO) report.[80] As some technologies proposed for geoengineering are clearly very risky (sulphur particle injection for example), those that involve "enhancing" ecosystem based carbon sequestration, such as BECCS, biochar, afforestation and deep ocean biomass burial, are presented as relatively benign in spite of their serious implications for lands and may therefore gain support.

However, the entire premise that biomass based processes (and here they generally lump all together, from ethanol refineries to coal/biomass cofiring) are carbon neutral, is grossly simplistic and dangerously flawed. It is further compounded when it is assumed that the addition of carbon capture and storage would render biomass based processes not just neutral but "carbon negative". In spite of large and growing literature refuting the carbon neutral myth, the IPCC persists in promoting BECCS.

BECCS is furthermore concerning because very high levels of uncertainty remain about the plausibility of securely storing carbon underground. Slow gradual leakage, or catastrophic releases could pose serious potential risks to human health and ecosystems. Very little real world experience with BECCS (or CCS applied to fossil fuel combustion) has been so far gained. In part this is because it has proven to be prohibitively expensive, requiring vast infrastructure for capture, compression, pipelines, and injection. All of this amounts to a vast amount of both added energy required and expenses and risks. So far most BECCS projects have involved capturing CO2 from ethanol refinery fermentation processes, which release a relatively pure stream of CO2, less difficult and costly to capture. The CO2 is then used for enhanced oil recovery. This can hardly be considered a means to "reduce emissions" or "solve the climate crisis". BECCS is not only facilitating extraction of oil through EOR, but is also serving as the "proving grounds" for the coal industry, which has high hopes that CCS will prove viable and will validate their enthusiasm for the future of "clean" coal.[81]

Biochar is another approach to geoengineering climate by "enhancing the carbon cycle" in the family of technologies that involve burning (in this case, pyrolizing) massive quantities of wood and other biomass. Biochar is essentially charcoal, which is mostly produced through pyrolysis (low oxygen combustion), which causes carbon from the

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[77] IPCC 2005: Carbon Dioxide Capture and Storage. Metz et al. 2005 (figure 8.5)
[78] IPCC Working Group 3. Special Report on Renewable Energy Sources and Climate Change Mitigation. 2011 (see Chapter 2)
http://srren.ipcc-wg3.de/
[79] Royal Society 2009. Geoengineering the Climate: Science, Governance and Uncertainty
[80] U.S. Government Accountability Office Center for Science, Technology and Engineering. Report to Congress: Climate engineering: Technical status, future directions and potetnail responses. July 2011
[81] BECCS: Climate Saviour or Dangerous Hype? Biofuelwatch 2012.
http://www.biofuelwatch.org.uk/2012/beccs_report/

burned material to be retained as a charred residue. Biochar enthusiasts argue that adding the char to soils will sequester the carbon and also improve soil quality, hence reduce demand for fertilizer and enable greater food crop yields. Yet there is little evidence to support these claims.[82] Nonetheless, advocates claim that large-scale global biochar production could offset 12% of annual CO2 emissions annually. This however, would require conversion of over 556 million hectares of land to dedicated feedstock production as well as using most forestry residues, animal manures, agriculture residues and various other materials. All would have to be harvested, transported, pyrolized, and the char transported back across the landscape to then be tilled into soils over vast areas of the surface of the planet.

Efforts to reduce atmospheric CO2 using terrestrial "carbon dioxide removal (CDR), such as large scale application of BECCS or biochar, or installing massive tree plantations (afforestation) are widely promoted as "safe". However the impacts on lands can hardly be considered so. In a recent review,[83] a scenario was envisioned wherein 1 billion tons of CO2 were captured annually (8% of global annual emissions) via tropical afforestation using eucalyptus: This would require between 6.6 and 15 million hectares of grassland and shrubland to be converted every year – that is 300 – 750 million hectares over 50 years. It would also require 10-15 million tonnes of phosphorous and 4.5-15 million tonnes of nitrogen fertilizers a year for those 300-750 million hectares (presuming plantation expansion would stop after 50 years), and 1.2 – 2.7 trillion cubic meters more water than the original grasslands, which would significantly reduce stream flow, lower water tables and decrease rainfall over much larger areas, thus affecting other ecosystems (and farmlands, though the authors do not mention those). If BECCS were used based on switchgrass the scenario predicts the following requirements: 218-990 million hectares of land to be converted to switchgrass (which is 14-65 times as much land as the US uses to grow corn for ethanol), 17-79 million tonnes of fertilizer a year – which would be 75% of all global nitrogen fertilizer used at present, and 1.6-7.4 trillion cubic meters of water a year. In sum, the impacts of even a relatively modest biological "carbon dioxide removal" program of this nature on land and water clearly would be enormous. And furthermore, assuming carbon was in fact stored, a large portion of that would be offset by the nitrous oxide emissions from fertilizer use.[84] [85]

19. Genetically Engineered Trees, Wood Bioenergy and the "bioeconomy"

Wood bioenergy is a central part of the broader push for a "bioeconomy" with plant biomass serving as a substitute for petroleum and fossil carbon sources not only for generating electricity, heat and transport fuels, but for manufacturing a much broader array of chemicals, plastics and other materials. Such a transition would require major advances in biotechnology, synthetic biology, nanotechnology, and more, in addition to unimaginable quantities of biomass. Already there is much investment being poured into research on engineered and synthetic microbes that can convert biomass into useable

[82] Biochar: A Critical Review of Science and Policy. Biofuelwatch 2011 http://www.biofuelwatch.org.uk/2011/a-critical-review-of-biochar-science-andpolicy/
[83] L.J.Torn and M.S.Smith 2013. Ecological limits to terrestrial biological carbon dioxide removal. *Climate Change*, volume 118 http://link.springer.com/article/10.1007%2Fs10584-012-0682-3#page-1
[84] L.J.Torn and M.S.Smith 2013. Ecological limits to terrestrial biological carbon dioxide removal. *Climate Change*, volume 118 http://link.springer.com/article/10.1007%2Fs10584-012-0682-3#page-1
[85] Summarized in: http://www.handsoffmotherearth.org/2013/06/beccs-and-tropical-afforestation-review/

chemical and fuel precursors as well as crop and tree varieties suited for use in refineries and other bioeconomy applications.[86]

@Orin Langelle. http://photolangelle.org/

Among these, the push for commercialization of trees genetically engineered to "produce more biomass" is gaining momentum. A long history of tree biotechnology research has focused on speeding growth as well as reducing the lignin content of wood (to more easily access sugars in cellulose for conversion to fuels and chemicals) and to expand the range of fast growing tropical species like eucalyptus. In the USA, Arborgen is currently testing engineered eucalyptus and recently submitted a request for deregulation of freeze tolerant and male-sterile eucalyptus with the aim of extending the range of eucalyptus plantations, in part to fulfill demand for bioenergy as well as pulp.

There is however, strong public opposition to genetically engineered trees.[87] Burning wood for electricity and heat does not face the same technological hurdles that some other bioeconomy applications face, and therefore represents a more immediately escalating threat.

20. The Global Green Land Grab

Wood bioenergy, along with other biofuels are contributing to mounting land and water

[86] The New Biomassters: Synthetic Biology and the Next Assault on Biodiversity and Livelihoods. ETC Group, 2010.
[87] Campaign to Stop GE Trees: http://globaljusticeecology.org/stopgetrees.php?tabs=0

grabs as investors are increasingly attracted to the potential profits and recognize the importance of land and water in the context of global pressures. The impact of expanding demand for liquid transportation biofuels, from corn, soya, palmoil, jatropha and other crops, has already fuelled land grabs around the globe, most especially in Africa. Will demand for wood to supply expanding appetites for bioenergy fuel a new wave of land grabs? An IIED report titled "Biomass Energy: Another Driver of Land Acquisitions?" posed this question and states: "*As governments in the global North look to diversify their economies away from fossil fuel and mitigate climate change, plans for biomass energy are growing fast. These are fuelling a sharp rise in the demand for wood, which, for some countries, could outstrip domestic supply capacity by as much as 600 per cent*."[88]

A EU Parliament report warned that in fact many countries regarded as potential future wood suppliers for Europe are precisely among those that have high levels of foreign private sector investment in land and little protection for communities faced with eviction, including for example, Cameroon, Ghana and Mozambique.[89]

Expanding tree plantations for pulp industry have already been marked by a history of human rights abuses and conflicts. Brazil is one country where this has been the case, and yet they have now embraced with enthusiasm the notion of serving as a source of pellets to Europe and recently announced plans to double the area under tree plantations to 15 million hectares. As mentioned above, one of the major players in Brazilian pulp industry, Suzano Papel e Celulose announced plans to invest in plantations and associated pellet manufacturing facilities for export to the UK. Suzano's existing plantations, like others, are linked to serious land conflicts and human rights abuses.[90] Now, just the expectation of future demand for pellets alone, much less actual existing trade, is adding fuel to the fire, i.e. resulting in more land conflicts and evictions.[91]

Estimates of biomass availability are grossly overestimated and references to large areas of available "marginal lands" are largely based on devaluation of the many uses of lands by indigenous peoples, peasant farmers, pastoralists, and for biodiversity, water and soil protection.[92] The potential impacts of a global "bioeconomy" substitute for the current fossil fuel economy are not lost on peasant farmers and indigenous peoples who have long experienced displacement and appropriation of their lands. . The forestry industry, unsurpringly, was prominent and present at the Rio+20 conference, where the "green economy" (largely synonomous with the bioeconomy) was placed as the core "strategy" around which debate was to be structured. In a submission to the UN Commission on Sustainable Development, in advance of the Rio Plus 20 they referred to

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[88] Biomass energy: Another driver of land acquisitions? IIED briefing 2011. http://pubs.iied.org/pdfs/17098IIED.pdf

[89] S. Wunder, T. Kaphengst, K. Timeus, and K. Berzins, "Impact of EU Bioenergy Policy on Developing Countries,"Parliamentary briefing EP/EXPO/B/DEVE/2011/FWC/2009-01/LOT 5/21, Directorate-General for External Policies of the Union, March 2012. www.europarl.europa.eu/committees/fr/studiesdownload.html?languageDocument=EN\&file=72731

[90] http://www.corporatewatch.org/?lid=4108

[91] Biomass Chain of Destruction. Forthcoming report from Biofuelwatch and WRM

[92] Agrofuels and the Myth of Marginal Lands: Gaia Foundation, African Biodiversity network, Biofuelwatch, Salva La Selva, Watch Indonesia, EcoNexus, 2008 Briefing.

forests as "the heart of the green economy".[93]

An alliance of North American Indigenous Peoples, commenting on the proposed "zero draft" outcome document for Rio wrote: "*A world-wide "bio-economy" is proposed as the solution to climate change and sustainable development. Again, as in proposals for "market based solutions" to climate change, the Earth's biological resources are the target for this new "green" economy and the markets that it will create. The very basis of life, genetic material, both plant and animal, become potential markets in this formula. The experience of Indigenous Peoples, particularly those that inhabit bio-rich environments, is that their lands, territories, waters and total environments are targets for the new technologies, industrialized agriculture and the concentration of productive l ands, their lands, in the hands of the private few, for the production of so-called "renewable" resources."*

Indigenous protest against REDD+ at Climate negotiations. @ Simone Lovera

For many indigenous peoples, the promotion of forest carbon offsets, under REDD and related mechanisms, is particularly threatening as their livelihoods are closely interdependent on forest ecosystems. While it would seem logical that measures intended to protect forest carbon would not be compatible with wood bioenergy, through bizarrely twisted logic in a number of cases, tree plantations have been promoted for "carbon sequestration", and marketed as offsets to polluters even as those plantations are in fact ultimately destined to be cut and burned, and in fact are grown with the intent of supplying wood for bioenergy.[94] In sum, those in the business of trees are prepared to supply whatever markets will buy.

21. Rights, Poverty and Justice

[93] http://www.uncsd2012.org/index.php?page=view&nr=1030&type=13&menu=27
[94] http://wrm.org.uy/articles-from-the-wrm-bulletin/section1/brazil-plantars-new-eucalyptus-projects-advance-towards-cdm-validation/

As industrialized countries in the north move to support commercial and industrial scale wood bioenergy, much of the world's population remains with virtually no access to energy, struggling to acquire fuel enough even for cooking daily meals, as well as the devastating impacts of in-door smoke caused by inefficient fuel burning technologies. The extreme over consumption of some nations and sectors of society is met with equally extreme poverty at the other end of the spectrum. What should be done to address this inequality?

The "Sustainable Energy For All Initiative", established by the UN Secretary General is an example of a top down approach. SEFA's vision is one of 'multi-stakeholder' collaborations, between governments, finance organizations and corporations. As the Action Agenda states: *"Private sector leadership is fundamental to the initiative. Governments' role is to create enabling policy and financial environments to spur private investment."* SEFA is headed by a hand-picked 'High Level Group' group led by chair of the Bank of America (and former director of DuPont) Charles Holliday and Kandeh Yumkella of UNIDO. Corporations including Statoil, Siemens and Eskom are represented as well as former Shell and BP executives. The initiative supports deeply unambitious medium-term renewable energy and energy efficiency goals and avoids altogether addressing the issue of over consumption of energy by industrialized countries. Even more troubling, it imposes no limitations on what type of energy development companies and/or governments choose to label 'sustainable', especially in developing countries – under the principle 'diversity of approaches'. Fossil fuels, especially increasing natural gas infrastructure and use, have been included in commitments already made under SEFA. SEFA has so far been cited to justify backing for large-scale hydropower (by the World Bank) and biofuel plantations and at least one government is looking at nuclear energy officially to pursue SEFA's aims. The only types of energy which SEFA explicitly defines as 'unsustainable' are 'traditional fuels', including wood, charcoal and animal waste as well as coal used for cooking and heating.[95]

22. Conclusion: Wood and Energy Sovereignty as an Alternative to the Global Green Land Grab

The antithesis to this corporate controlled top down approach is embodied in the concept of Energy Sovereignty: Friends of the Earth International (FoEI) describe what's needed to achieve energy sovereignty as:

- The right of access to a sufficient amount of energy, within ecological limits, for a dignified life.
- Decentralization of energy generation, supply, administration and management.
- Community control of technologies, avoiding privatized technological dependency.
- Protection of indigenous rights and customary law, and protection of diverse landscapes and ecosystems that will increase resilience to climate change.
- Energy sovereignty relates to and interacts with a number of other key issues in the South, e.g. food sovereignty (particularly in relation to agro- or bio-fuels), land use and ownership, corporate control of resources, privatization etc. At its heart, energy sovereignty is about securing democratic use of common natural resources.

[95] Sustainable Energy For All or Sustained Profits For a Few? (Biofuelwatch briefing) http://www.biofuelwatch.org.uk/wp-content/uploads/SEFA1.pdf

Voices of resistance: building energy sovereignty

In 2007, as resistance to industrial biofuels was mounting, a National Popular Conference in Defense of Food and Energy Sovereignty was held in Brazil, with participation of diverse representatives from social movements. This key event highlighted the disruptive role of biofuels expansion – from displacing communities, to replacing food production, to contamination of the lands. It also highlighted the important geopolitical context of biofuels expansion. The event resulted in a powerful exemplary declaration affirming the importance of the fundamental right to control over their lands, food and energy. In particular, the linkages between food sovereignty and energy sovereignty were clearly articulated and directly grounded in the broader context of political and social transformation.[1]

Food sovereignty emphasises the people's right to produce their own food, on their own territories, in accordance with their own food cultures and traditions. In the same way, the new concepts of 'energy sovereignty' which can also be extended to 'wood sovereignty' puts the control of local resources back into local hands. This is in direct contrast to the industrial approach, which demands the progressive privatization and commodification of people's land and energy resources

Locally controlled renewable energy fuels the localization process, reinvigorating and strengthening communities, allowing them to resist the corrosive impacts of the industrial model. The political nature of this challenge is fully recognized in Brazil and is being addressed in a broad-based way, with social movements actively striving to change the political agenda and thus drive a structural transformation of society.

Among them, small -scale farmers and rural workers' movements in the south of Brazil, in Rio Grande do Sul, have chosen — very deliberately — to generate their own renewable energy for their own use and for local consumption. With the support of the Coopercana, Creral and Cooperbio cooperatives, for example, they are demonstrating that fuel production, organizational management and energy policy decision-making can and should be integrated into the building of sustainability and sovereignty for local people.

For these cooperatives, the environmental and social benefits of decentralized ethanol production, at small scale for local use are evident. Aside from increased wages, the manufacture of ethanol from sugar cane produces bagasse and distiller's stillage, by-products which can be used as stock feed or fertilizer, meaning that there is no need to use agrochemicals. Thus, instead of by-products becoming pollutants, as is the case with larger plants, in micro-distilleries they are put to other productive uses. In addition the microdistilleries do not use sugar cane burning; instead the leafy tops of cane stops are also used as stock feed.

In contrast to attempts to narrow the debate on alternative energies, social movements maintain that political debate regarding the generation, control, distribution and consumption of energy is inseparable from the society that it is produced for. Instead of being restricted to the 'energy security' agenda of governments and the global economy, it is necessary to re-direct debate to the fundamental social question of constructing and affirming people's political sovereignty, which depends on the democratic use of common natural resources.

Source: Building Energy and Food Sovereignty: experiences of autonomous energy production in family-based agriculture, resisting corporate agroenergy expansion, Friends of the Earth Brazil, 2008, http://www.natbrasil.org.br/publicacoes.html

1. Food and Energy Sovereignty Now: Brazilian Grassroots Position on Agroenergy Moreno, C and Mittal, A. Oakland Institute 2008.

As such it is a profoundly powerful concept, and one whose time most certainly is overdue. Efforts to thwart harms from dirty energy developments, efforts to provide energy access to those without access, and efforts to gain and retain community, or in some cases national control over energy production and consumption are three different threads that feed into the overarching concept of "energy sovereignty".

The prominence of these different threads varies regionally. Even in the industrialized northern countries, where over-consumption is most serious problematic and entrenched, there is strong community organizing to obstruct dirty energy developments – from the opposition to mountain top removal coal mining in Appalachia to indigenous resistance to tar sands extraction in Alberta, to entire geographic regions opposed to fracking or pipeline projects. Those efforts at resistance in many cases have raised a broader awareness and in some cases set the stage for initiatives to enable greater community level self-determination. A number of towns have passed or at least penned and debated measures such as Easton New Hampshire's "Right to A Sustainable Energy Future and Community Self Government Ordinance".[96]

Unfortunately, many who embrace the concepts in theory, often find themselves at a loss when it comes to actual implementation. That is where they come up against the reality that there are serious problems with virtually all forms of energy generation, especially at the scales needed for lifestyles that people are accustomed to in the "developed" world.[97]

Ahoskie Bioenergy plant, North Carolina. @Scot Qaranda

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[96] http://www.celdf.org/downloads/Easton_NH_Community_Self_Government_Ordinance.pdf
[97] See: Ozzie Zehner 2012. Green Illusions.