



biofuelwatch

October 2013



Bimass:

The Chain of Destruction

A report by Almuth Ernsting, Sophie Bastable & Oliver Munnion

*Including: **Eucalyptus Plantations for Energy: A case study of Suzano's plantations for wood pellet exports in the Baixo Parnaíba region, Maranhão, Brazil** by Ivonete Gonçalves de Souza (CEPEDES) and Winfridus Overbeek (WRM)*

Cover photographs from left to right: Trees at Merchant's Pond, *Dogwood Alliance*; Experimental eucalyptus plantation in Pernambuco, Brazil, *Ivonete Gonçalves de Souza*; Drax Power Station, *Steve Morgan/Greenpeace*.

Report Authors: Almuth Ernsting, Sophie Bastable & Oliver Munnion

Eucalyptus plantations for Energy Authors: Ivonete Gonçalves de Souza & Winfridus Overbeek

GE Trees for Biomass Author: Rachel Smolker

Contributors: Danna Smith, Alison Davies, Donna Liley, Pete Kilvet & Duncan Law


For full references & notes please see <http://biofuelwatch.org.uk/2013/report-references/>

This publication was made possible thanks to funding from the Network for Social Change.



This work is licensed under a [Creative Commons Attribution-NonCommercial 3.0 Unported License](https://creativecommons.org/licenses/by-nc/3.0/).

Contents



1. Introduction	4
1.1 Overview of Biomass in the UK	7
1.2 Two Different Markets: Biomass burnt in coal power stations versus dedicated biomass plants	9
2. International impacts	10
2.1 Fueling Forest Destruction in the Southern US: An Interview with Danna Smith, Executive Director of the Dogwood Alliance	10
2.2 Canada's Logging "free-for-all"	14
2.3 Portugal's Booming Pellet Industry	18
2.4 Eucalyptus Plantations for Energy: A Case Study of Suzano's plantations for wood pellet exports in the Baixo Parnaíba region, Maranhão, Brazil	20
3. UK Impacts	37
3.1 How does large-scale biomass burning affect public health?	37
3.2 How do community campaigns against polluting and destructive biomass power station applications fare?	38
3.3 Testimony by Alison Davies, Save our Speyside	40
3.4 The trouble with waste wood	42
3.5 How waste wood chipping operations affect local communities	43
3.6 Interview with Donna Liley: One resident's experience of living close to one of the UK's largest wood chipping plants	44
3.7 What is the evidence on wood dust and health impacts?	47
3.8 Regulations do not protect residents exposed to wood dust	48
3.9 One community's experience of opposing a waste wood incinerator	48
3.10 Testimony by Pete Kilvert, Chairman of the Breathe Clean Air Group (BCAG)	50
3.11 Biomass power station location and deprivation	55
4. GE Trees for Biomass	58
5. Conclusion	61

For references & notes please click on reference numbers, or see:
<http://www.biofuelwatch.org.uk/2013/report-references/>

1. Introduction

In 2012 Biofuelwatch published its first substantive report about the impacts of UK biomass policies and investments, called **Sustainable Biomass: A Modern Myth**. [1] That report closely investigated the claims made by energy companies about 'biomass sustainability' as well as the government's proposed biomass sustainability and greenhouse gas standards. It looked in further detail at the climate impacts of large-scale biomass electricity and the inherent problems of trying to predict the precise greenhouse gas impacts of wood-based bioenergy and thus the unreliability of greenhouse gas standards.

This new report, **Biomass: The Chain of Destruction**, focusses on the real impacts of UK biomass policies on forests and on communities. The centrepiece of the report is an investigation into the impacts of eucalyptus plantations for wood pellet production in the Brazilian state of Maranhão, by Ivonete Gonçalves de Souza of CEPEDDES [2] and Winfridus Overbeek of the World Rainforest Movement. The plantations belong to one of

Brazil's largest pulp and paper companies, Suzano Papel e Celulose, who aim to supply wood pellets to biomass power stations owned by the UK company MGT Power. The report describes the methods which Suzano is using to take land off traditional communities, who are dependent on the natural Cerrado vegetation and its diverse fruit-bearing trees. It shows how the rich forest vegetation, home to countless plant and animal species, is being bulldozed to make way for eucalyptus monocultures. It describes how communities are experiencing the loss of their livelihoods, land and traditional way of living as a result. It looks at the differences between traditional eucalyptus plantations for pulp and paper and the much denser and shorter-rotation biomass ones. And finally, it looks at the experience of communities which have so far successfully resisted Suzano's attempts to turn their lands into plantations. To our knowledge, this is the first published case study of a land-grab and deforestation in a country of the global South, linked directly to the biomass policies and demand of an EU

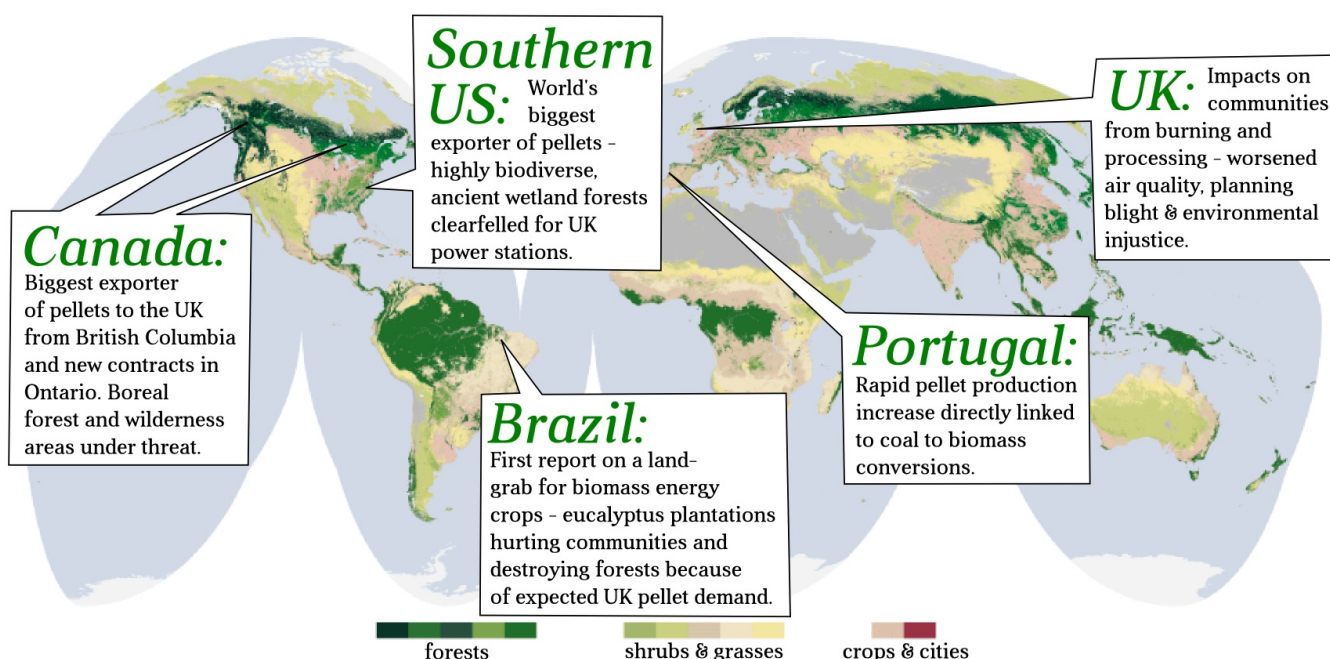


Figure 1: The Chain of Destruction - impacted forests and communities covered in this report.

member state.

MGT Power has planning permission to build a vast 295MW biomass power station at the Port of Teesside, larger than any similar biomass power station in the world. They have proposed a second one, of the same size, in Tyneside. Yet so far, neither Suzano's pellet plant nor MGT's power station appear to have attracted the funds required for construction to start – despite the fact that MGT announced a partnership with three Korean companies in October 2012.[3] The dramatic impacts experienced by communities in the Baixo Parnaíba region of Maranhão are therefore not the result of any existing demand for wood in the UK. They are the result of an expectation that future power stations will soon create a lucrative new demand for eucalyptus wood pellets. In short, they are the result of speculative investments.

At present, virtually all of the wood imported for bioenergy is being burned in coal power stations, primarily by Drax since the closure of Tibury B. Nearly all of it comes from Canada and the southern US. As we explain in the report, coal power stations are only able to burn significant quantities of biomass if it comes from wood from slow-growing trees with little bark. Danna Smith, Executive Director of the US conservation NGO, Dogwood Alliance, describes what this means for forests in the southern US, the world's foremost pellet producing and exporting region. Together with the US NGO, Natural Resources Defence Council, Dogwood Alliance has conducted a

detailed investigation into the impacts of the largest pellet mill belonging to Enviva, one of Drax's key suppliers.[4] They have documented how this plant impacts on remaining fragments of biodiverse wetland forests. As Danna Smith explains in her testimony for this report, most non-wetland forests across the southern US have already been destroyed, largely to make way for pine plantations for pulp and paper. The southern US wetland forests are the last refuge for large numbers of species – indeed they are one of the most biodiverse freshwater ecosystems in the world. Those forests are now being clearcut to make pellets, including for Drax. Unlike the impacts in Maranhão, the impacts described by Danna Smith are directly linked to Drax's actual current demand for wood pellets, boosted by UK Government subsidies and funding from the Green Investment Bank.

Yet again, the rate at which pellet plants are expanding and fuelling forest destruction across the southern US cannot be explained by current demand alone. According to a wood pellet industry spokesperson there is a “*gold rush' from utilities to US, Canada & Brazil for security of long-term high volume supplies*”.[5] Thus in the southern US, too, the scale of the impacts result from the expectation of future market expansion in the UK and elsewhere in Europe, and thus from often speculative investments. The same is likely to be true in British Columbia, the main sourcing region for wood pellets imported to the UK; however, unfortunately there is a lack of independent research into the pellet industry in that region.



Photograph 1: Image of MGT Power's approved Teesside plant



Photograph 2: New pellet storage facilities at Drax

After looking at the effects of the UK's biomass demand and policies on communities and forests overseas, the report looks at the impacts on communities affected by biomass power stations and by the operations of waste wood suppliers to such plants. The most serious local impacts from biomass electricity tend to be those on air quality and public health. Based on a series of testimonies from community activists, the report illustrates the lack of any effective regulation, planning policies and mechanisms which would protect public health from dangerous and harmful levels of pollution. Although waste wood, much of it chemically treated, is widely seen as a particularly 'sustainable' source of biomass electricity, burning it results in particularly high levels of toxic air emissions. And it is not just residents living close to power stations who are affected but also ones living close to wood recycling plants, which increasingly supply energy companies with woodchips.

The report also highlights the substantial amount of research which has shown that polluting industries often have a disproportionate impact on more deprived communities, including lower class communities and communities of colour. As a result, Biofuelwatch undertook its own investigation looking at the levels of deprivation in communities located near to biomass power stations in the UK. Our findings show that biomass power stations in England are located in areas which are relatively more deprived than other parts of England. To our knowledge this is the only study of its kind to have been attempted for biomass power stations in the UK and there is a need for more research to be done into this important area of environmental justice.

The report does not revisit the important topics discussed in *Sustainable Biomass: A modern myth*, including the impacts of biomass electricity on climate change. Since we published that previous report in 2012, more studies have been published which confirm that burning wood, especially wood from whole trees, for electricity is anything but carbon neutral, but can adversely affect the climate for decades to come, if not longer. A frequently updated list of scientific studies can be found on our



Photograph 3: Artist's impression of the new Immingham Renewable Fuels Terminal - a good visual representation of how conversions to biomass allow continued coal burning with the four new silos to store pellets dwarfed by the existing coal yard.

website. [6]

One of the key conclusions of our previous report was that sustainability and greenhouse gas standards could never make large-scale biomass electricity sustainable and climate friendly, and that it is ultimately impossible to predict the precise impacts of a particular supply chain for a particular power station on greenhouse gas emissions and forests. The real impacts illustrated in this new report reinforce this conclusion. No greenhouse gas methodology or carbon calculator and no sustainability standards can ever reflect the effects of proposed power stations which have not yet been built. Yet from the Brazilian Cerrado to the southern US, such effects on communities, on forest, and thereby on the world's climate are very real ones, arising from policies and promises as much or more than from current demand. Those are the indirect impacts of what are largely speculative investments, resulting from the EU's and UK's renewable energy policies. Only a major policy change, away from large-scale combustion (be it of fossil fuels or biomass), towards sustainable and genuinely climate-friendly renewable energy and, crucially, towards much lower levels of energy use in the UK, can prevent the impacts described in this report from escalating and

being repeated in more and more parts of the world and suffered by ever more communities in the UK.

1.1 Overview of biomass in the UK

Large-scale electricity generation from biomass is a key element in the UK Government’s renewable energy policy. Their 2012 UK Bioenergy Strategy states that bioenergy could provide between 8 and 11% of the UK’s primary energy demand in 2020 – i.e. the majority of the country’s overall renewable energy target of 15% by that date.[7] Although bioenergy includes biofuels for transport, the bulk of that figure would come from burning wood.

Biomass electricity is supported by generous subsidies – currently paid through the Renewables Obligation and in future through Contracts for Difference, which will be phased in under the Electricity Market Reform from 2014.[8] At the time of writing this report, the precise details of the Contracts for Difference

have not yet been announced, but the Government has made it clear that they will continue to support large-scale biomass electricity.[9]

Overall, energy companies have announced plans to burn over 82 million tonnes of biomass, mostly wood, in power stations.[10] This is more than eight times the UK’s total annual wood production. Already, with just a small fraction of the biomass plans implemented, the UK relies on 80% net imports for all of the wood and wood products used across the country.[11]

Out of those 82 million tonnes, over 50 million tonnes would be needed by coal power stations which have got planning consent for (partial or full) conversion to biomass. The most advanced coal-to-biomass conversion scheme in the UK is presently that by Drax. Drax have converted one of their six units to run on biomass, although by July that unit was reportedly running at just 57% of its capacity.[12] They intend to convert another two units. Running three of Drax’s units at full capacity would require burning pellets made from almost 16 million tonnes of wood a year.

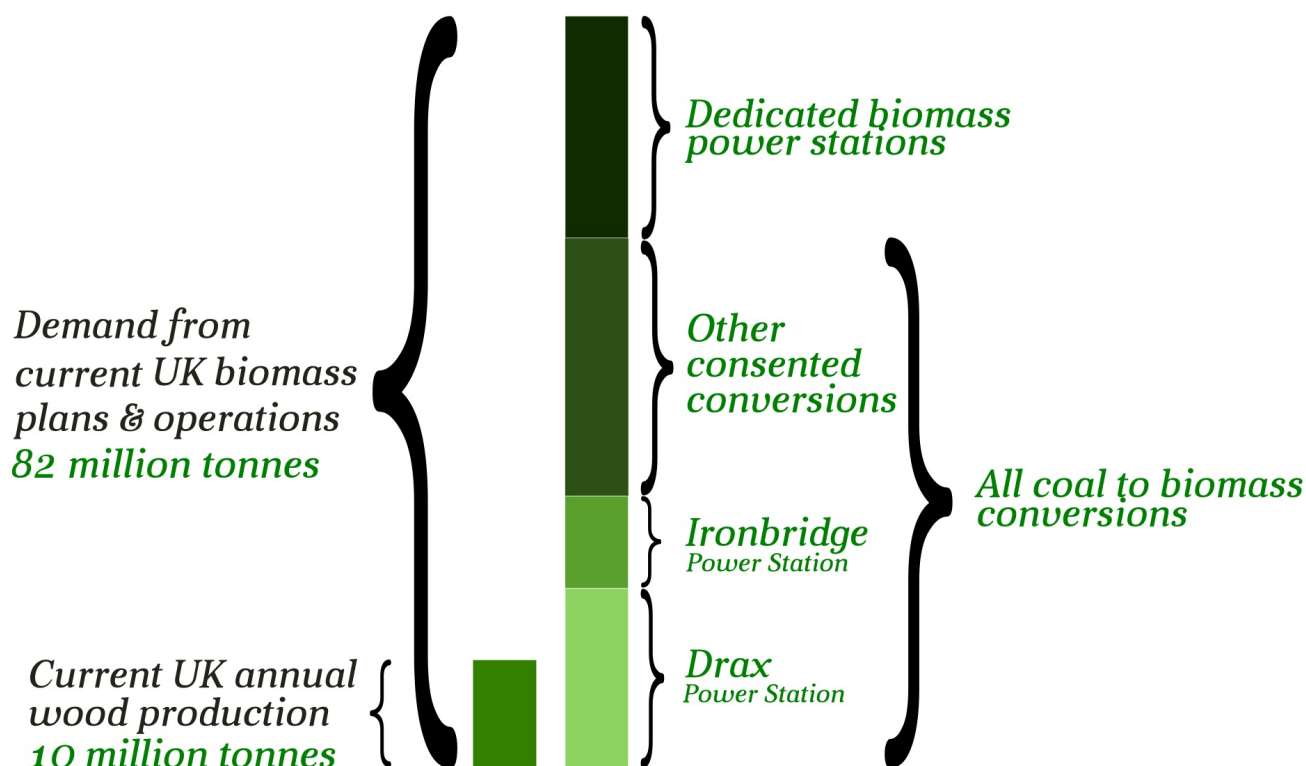


Figure 2: Comparison of UK annual wood production vs predicted annual demand from all current operating, consented and planned biomass power stations

[13] Ironbridge power station was fully converted from coal to biomass in March 2013, [14] although the operators, E.On, have not yet announced whether they will seek permission to continue operating the power station beyond 2015. At full capacity, the power station would need to burn nearly 8 million tonnes of wood, however by the end of July this year, they had only burned relatively small amounts. [15] Tilbury B was converted from coal to biomass by RWE Npower at the end of 2011, but was shut down in August 2013.

Another three conversions have been approved but it is not yet clear whether the operators of those power stations (Eggborough, Rugeley and Alcan Lynemouth) will go ahead with them. In other EU countries large amounts of wood pellets are being co-fired with coal, however in the UK subsidies favour the conversion of whole power station units to biomass and, as a result, only one coal power station is understood to co-fire significant amounts of wood. [16]

The rest of the demand is anticipated to come from dedicated biomass power stations, with several large import-reliant plants already having been granted planning consent. So far, eight biomass power stations larger than 15 MW are in operation and a further seven are either under construction or have attracted sufficient investment to be built. None of the existing biomass power stations are operating at or near full capacity. [17] Notably, none of the power stations which would run on imported wood

have reached financial closure, i.e. the investment required for construction to begin.

Nonetheless, a report published by the Department for Energy and Climate Change shows that electricity generation from biomass increased by nearly 230% between 2011 and 2012 and grew further in the first half of 2013. Virtually all of this increase was attributed to Tilbury B, Drax and, recently, Ironbridge. [18] In fact, Drax burned less biomass in 2012/13 than in 2011/12 [19] and Ironbridge burned none that year, hence all of the annual increase must have been due to the Tilbury B conversion.

Clearly, the future of large-scale biomass in the UK hangs in the balance. Despite generous subsidies and easy access to planning consent and environmental permits, actual investments into large-scale import-reliant biomass electricity are still very much limited in the UK. Drax is now both the largest burner of biomass and the most ambitious (and so far successful) UK investor, both in burning wood pellets and in developing supply chains from the southern US, British Columbia and, recently, Ontario. Technical problems and a series of fires and explosions across biomass and pellets plants worldwide [20] have undoubtedly dampened many investors' interest. And while current industry plans would see UK wood imports multiply, the rise in pellet imports has so far been smaller than the fall in wood and particularly paper demand in the UK caused by the financial crisis and recession. [21]

The CHP Loophole

There has been a series of media reports about a cap or cuts to subsidies for dedicated biomass power stations (not affecting coal-to-biomass conversions). In Scotland, dedicated electricity-only biomass power stations larger than 15 MW are no longer eligible for subsidies. The UK government has proposed a cap on the overall amount of subsidised electricity from such plants and is considering whether to exclude them from the new subsidies regime, the Contracts for Difference. However both the Scottish cap and the proposed UK measures can be easily avoided by power station operators. For subsidies purposes, biomass power stations which make use of even a very small amount of heat and which reach as little as 35% efficiency levels, can register as 'good quality combined heat and power' plants. Using some heat for example for drying woodchips would be sufficient. As such, they won't just be exempt from any subsidies cap – they will attract an even higher rate of subsidies! [22]

1.2 Two Different Markets: Biomass burnt in coal power stations versus dedicated biomass plants

The conversion of coal power station units to biomass is motivated both by subsidies and by a quest to cheaply reduce sulphur dioxide emissions in order to avoid the closure of old polluting coal power stations under EU legislation. [23] As a Biofuelwatch Freedom of Information request to the government revealed, Drax advised them in May 2012 that technical tests had shown that they could only burn wood from slow-growing trees with a low bark content, ruling out most forestry residues. [24]

The reason is that other types of biomass contain high levels of alkali salts which, over time, corrode the boilers – so only very small quantities of those could be burned. This will be true for all coal power stations in the UK. While Drax Plc. explicitly rule out pellets from eucalyptus plantations, they do not say whether they can burn softwood from pine plantations. There are strong indications that they might not be able to rely on such wood: all of their supplier's pellet mills in the US are situated close to surviving native hardwood forest. RWE, on the other hand, had invested in their own pellet mill in Georgia, in the middle of vast pine plantations, with the aim of securing long-term supplies for Tilbury B. Yet this model failed – Tilbury B has been closed down and RWE has been trying, unsuccessfully so far, to sell their pellet plant. [25] If converted coal power stations indeed rely on hardwood from native forests, the direct impacts on forests in the southern US and likely Canada will be even worse than anticipated. Demand from Drax alone could wipe out many of the remaining fragments of wetland and other biodiverse native forests in North and South Carolina and much of the southern US. And while the future of other coal-to-biomass conversions and large dedicated biomass power station plans remains uncertain in the UK, there are major investments in other European countries. Potentially, the technical constraints on biomass sourcing for

coal power station boilers could in future be overcome through the production and use of torrefied pellets. Torrefaction is a process in which biomass is exposed to temperatures of around 250–350°C with limited oxygen, which not only dries it but also changes its chemical properties. The global production of torrefied wood pellets is currently 'negligible', according to the International Energy Authority. [26] Major technical and economic hurdles to scaling up torrefied pellet production remain. [27]

Purpose-built biomass power stations can be equipped to burn a much wider range of biomass than coal power stations. They could certainly burn pellets and woodchips from eucalyptus and other fast-growing tree plantations and their operators would be particularly likely to look for cheap supplies from fast-growing tropical and subtropical plantations, such as Suzano's in Maranhão.

For full references & notes please click on reference numbers or see:

<http://www.biofuelwatch.org.uk/2013/report-references/>

2. International Impacts

2.1 Fuelling Forest Destruction in the Southern US:

An interview with Danna Smith, Executive Director of Dogwood Alliance

Dogwood Alliance is an environmental NGO that campaigns for the protection of forests and their biodiversity in the southern US. In May 2013, Dogwood Alliance, jointly with NRDC (Natural Resources Defence Council) launched a campaign called “Our Forests Aren’t Fuel”. The campaign currently focusses in particular on Enviva, the largest pellet producer in the US and on their main customers, including Drax. For more information on that campaign, see dogwoodalliance.org/campaigns/bioenergy/

1) Could you briefly describe the forests at risk from companies such as Drax and their importance for the climate and for biodiversity?

D.S: The southern US is home to the world’s most biodiverse temperate forests. There are more species of plants and animals found in these forests than anywhere in North America. The forests also contain the most biologically diverse freshwater ecosystems on the planet. There is no place in the world with a higher



Photograph 1: Merchants Pond, North Carolina. Example of a highly diverse wetland forest.
Dogwood Alliance



Photograph 2: Whole logs being loaded for Enviva in North East North Carolina. *Dogwood Alliance*



Photograph 3: Enviva's Ahoskie pellet mill in North Carolina. *Dogwood Alliance*

concentration of salamander or carnivorous plant species. So we don't have the Siberian taiga with its charismatic megafauna, but the richness of biodiversity is unmatched in many respects such as freshwater ecosystems, salamanders and certain plants. One of the most interesting is a plant that most people have heard of, the Venus flytrap. The only place where it grows in the wild is in a small region along the coastal border of South and North Carolina. That's where Enviva is planning over a million tons of new pellet production capacity [Note: 1 ton of pellets require around 2 tons of harvested wood].

There's an assumption that there's lots of regulation and forestry is therefore sustainably managed in the US. This assumption is false. In the southern US, around 90% of forests are privately owned and logging practices are not regulated at all. Industrial logging is rampant with no real legal protections for biodiversity, watersheds and local communities across the southern US.

One thing that is emerging is that Enviva is after our hardwood wetland forests. Wetland and other natural forests have been in decline for decades due to the conversion of natural forests for pine plantations. What remains of natural forests along the coast are now largely the hardwood wetland forests, which are of particularly high ecological value. Enviva is

threatening the last remnants of this immensely valuable and highly-biodiverse forest ecosystem.

2) Could you give a brief overview of the current impacts of the UK's growing demand for wood pellets on southern US forests?

The UK is driving the expansion of the pellet industry in the southern US right now – particularly the demand of the huge coal conversions, especially Drax. The projections for the volume of wood to be imported from the southern US are staggering. The industry is projecting 6 million tons of pellets from the southern US alone to go to Europe by 2016. Things are exploding so quickly that I would not be surprised if 6 million tons were produced and exported even before 2016.

Enviva is by far the biggest player in the pellet industry in terms of the total volume coming out of the south. We know that they are selling to Drax, though not the volume. Also, E.On has a purchase agreement with Enviva for 240,000 tons of pellets a year from the southern US. And exports of 480,000 a year are going to Electrabel (Belgium/Netherlands). Enviva have their flagship plant in Ahoskie with just under 500,000 tons and they have another one the same size also in NC and another in Virginia with a capacity of 400,000 tons/year. In addition they have two plants in Mississippi with a



Photograph 4: Whole logs entering Enviva's Ahoskie pellet mill in North Carolina. *Dogwood Alliance*

combined annual capacity of 240,000 tons. They have just announced two mills that will add around 1 million tons a year capacity in south eastern North Carolina. So the projected annual capacity by Enviva is now 2.5 million tons (1.8m tons of which will be from North Carolina alone.) That's more than all the pellets the US exported in 2012. That year, total export of pellets from the south was 1.7 million tons.

We know that Drax is planning to build its own pellet facilities in the southern US. Two new pellet plants in South Carolina have been announced by another pellet producer which will produce another 900,000 tons altogether.

3) Drax CEO Dorothy Thompson claims that most of the imported pellets are made from “residues, leftovers and low-value products of agriculture and forestry”. [1] According to your own evidence, is this an accurate description of where Enviva’s wood pellets, i.e. the ones sold to Drax come from? I am sure they are taking hardwood from

wherever they get it. I’m sure some of it will come from thinnings, but we have documented that they are also sourcing clearcut wetland forests. They make out that trees that grow in those wetland forests are waste – but those trees, if left standing, provide critical habitat. They are not waste. Because one can get \$30 a ton for sawn timber and just \$5.- per ton for stumpage for pellet production, Enviva argues that no landowner is driven to harvest by the existence of a wood pellet plant. The reality is that no landowner who is managing a forest for the highest value wood is going to clearcut it. Those managing forests for high value wood will leave the smaller trees behind to grow and to in future capture the higher value. The reason they are clearcutting their forest is that there is now a demand for the smaller stuff. Say, for a given area, a landowner recoups \$700 from sawn timber and \$300 from the wood pellets (Enviva’s own figures as reported to the Raleigh News and Observer). But if you calculate the volume of wood coming from that forest, only 25% of that

is sawn timber. 75% of that is what they call low value. So without the demand for pellets, landowners would be selectively logging, not clearfelling their forests. Landowners are also more likely to cut sooner rather than later to get the money now, not wait for trees to mature.

4) Could you list or describe the evidence that you have been able to obtain in relation to Drax and Enviva?

We have done flyovers, we've been on the ground, we've got an organiser on the ground in Ahsoskie just this week. We've had expert journalists in from the Wall Street Journal and the BBC. We have now published our evidence about wood sourcing for the Ahsoskie pellet mill. [2]

5) From your evidence, are wood pellets sold to Drax primarily sourced from plantations or from native forests? And is the main impact of the new demand further plantation expansion or more intense logging of native forests – or both?

The pictures we have been able to take have all shown hardwood trees being used for pellets. The evidence suggests that they are really after the hardwood, not softwoods [Note: Most conifers, including pines, are softwood and tree plantations in the southern US are generally pine plantations.]

Dogwood Alliance understands that Ahsoskie relies at least primarily on hardwood. From what we have seen during our investigations, pellets are made from wood from native forests, not from plantations. Sometimes hardwood trees will come up in pine plantations. We have no evidence to say whether or not Enviva relies on the thinning of hardwood from plantations. But we do know that Enviva has purchased wood from clearcut wetland forests. They clearly rely on the hardwood wetland forests.

6) Energy companies in Europe claim that there is a glut of wood from plantations in the southern US because of a decline of the pulp and paper industry. What is your view of this claim?

This argument has been made in particular by

RWE. RWE are operating in a region that is an ocean of pine plantations [Note: RWE currently owns the world's biggest pellet plant in Georgia]. That's not to say that there's no natural forest surrounding the Georgia Biomass facility which they are now selling off. Let's talk about the idea that there's no need to worry because of a decline in the paper industry and that pellet and energy companies are just picking up slack. It is a false idea that just because somebody else used to log a forest, and they no longer do, that now that the wood pellet companies are logging it means somehow the carbon emitted when the pellets are burned is somehow free carbon. In a way, that argument is a red herring. The reality is that they're creating a new market where there was none previously. If the pulp and paper industry and the market had been in decline and the demand for trees had been down, then they are driving an increase in the logging in this forest compared to what would have occurred otherwise in that forest. Also, the pulp and paper industry is in decline in only some areas of the south but not in others. Overall, they are still very much alive and strong in the region. According to Dr Abt from North Carolina State University: "When it comes to softwood, i.e. pine wood, there is not the sort of lower competition because of a decline in pulp production as one would expect. Pulp prices remained relatively high even during the recession."

2.2 Canada's Logging "free for all"

Canada's southern temperate forests and more northern Taiga or Boreal forests are vitally important carbon sinks, supporting large species diversity and providing life and livelihoods to many peoples and communities. Canada's Taiga is thought to be the world's largest intact forest. The area's importance in terms of ecology and climate mitigation is mirrored however by its importance to the logging industry - Canada's forests are also thought to ultimately have the biggest potential for pellet production globally. Combinations of aggressive logging practices centring around clearfelling, as well as a mountain pine beetle infestation that has affected millions of hectares and in turn provided an excuse for even more aggressive "salvage" logging operations for the pellet export market, are taking their toll.

A 2011 report by Greenpeace Canada [1] stated the following: "*Canadian Provinces are diving into a biomass 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 opened the door for biomass extraction."

2.2.1 The Drax connection

Canada is now the second largest pellet producer in the world, with 59 operational or proposed pellet plants and a production capacity of 3 million tonnes (though production has been at around 60%).[2] Around 90% of production is exported, mostly to the European market. In 2012 Canada exported 1.4 million



Photograph 1: Example of an old growth forest clearcut in British Columbia. TJ Watt

tonnes of pellets, 0.8 million tonnes of which went to the UK, making Canada the UK's largest source of pellets. [3] Most of this came from British Columbia. The Canadian Wood Pellet Association says that only residues are being used to produce pellets, but the distance between many of British Columbia's pellet plants and saw mills shows that they cannot be reliant on these residues. As we shall discuss later on in this report, pellet companies such as Enviva in the Southern US have made similar claims about using only 'residues' and 'wastes', yet evidence clearly shows that their definitions of these include all trees in biodiverse forests and only exclude those of high enough quality for use in sawmills instead.

Almost 70% of the UK's power station imports from Canada went to Drax over 2011/12, meaning that demand from Drax power station alone equates to over 35% of Canada's pellet export market. [4] Drax's major supplier in Canada is the "Pinnacle Renewable Energy Group", with 6 pellet mills in British Columbia, only one of which appears near enough to a saw mill to make use of sawmill wastes. [5]

Earlier this year, Drax signed a take-or-pay contract with Rentech, a company reinventing itself as a pellet producer, to supply 400,000 tonnes of pellets a year from two new Ontario-based operations over ten years. [6] This contract alone will double Canada's contribution to Drax's biomass fuel supply. Ontario has large areas of plantation forests, but logging of old-growth forests there is increasingly pushing northern boundaries and impacting caribou habitat and wilderness areas. [7] With our evidence that power stations like Drax can't take pellets from softwood plantations, this contract is more than likely to increase pressure on Ontario's oldgrowth forests. In their report "Fuelling a Biomess", Greenpeace state: *"Logging operations are moving rapidly northward, and the last remaining intact forests are vanishing at an increasing rate. The biomass boom, driven by dangerously lenient extraction policies and subsidies, will increase pressure on these forests. Although biomass sourcing might not occur in remote, intact areas, policies such as*

those found in Ontario, will drive logging operations farther north into the last remaining intact forests to ensure supply for lumber and pulp."

2.2.2 Beetle infestation and excuses for more logging

A massive mountain beetle infestation stretching across all of Canada's Western states has caused much damage to millions of hectares of forest. However, this damage has been compounded by salvage logging operations. With a shortage of sawlog wood being sent to timber mills and a sudden availability of infested trees, companies have increasingly turned to burning woodchip for electricity or producing pellets for export.

The "sustainability" of salvage operations in British Columbia is highly questionable. The industry currently relies on access to European markets, but it is not even clear that operations are meeting the lax standards set out in the EU's Renewable Energy Directive. Logging practices in British Columbia are characterised by clearcuts, meaning areas where forest cover is completely removed, and have been criticized for destruction of highly biodiverse old growth forests [8].

Salvage logging operations have caused an intensification both of the overall area opened up to logging, as well as the amount of wood being removed. [9] While beetle infestations are a natural part of the ecosystem cycle in British Columbia's forests (although a changing climate has significantly increased the scale of beetle infestations in recent years), the impact of the current infestation is being exacerbated by the additional damage of logging, and is resulting in a reduced capacity for regeneration.

Further still, the beetle infestation is considered an "emergency", and as such logging plans can be approved without public review. Also, salvage logging is exempted from some regulations under these emergency conditions, and is allowed in, for example, old growth management areas and wildlife habitat areas. A recent article published in the Vancouver Sun



Figure 1: Map showing productive old-growth forest left in British Columbia 2012. *Ancient Forest Alliance*

quoted Wilderness Tourism Association president Brian Gunn, who described current logging as follows: ***"The situation is a free-for-all. There's no control. There's no restriction. They have complete freedom to do what they want, when they want and nobody else has much say in that."*** [10]

Assessments documenting the impacts of salvage logging have found that many very large areas have been clearcut. Over half of logging areas were larger than 250ha, a third were larger than 1,000 ha and some as large as 10,000 and even 100,000 ha had been felled. [11] And the scale is set to continue growing. The loss of employment in the forest products industry because of reduced timber supply has led to pressure to open further areas that have not been damaged, but were previously inaccessible due to regulations, as well as additional expansion of salvage logging in regions where beetle damage has occurred.

All of these factors lead to the conclusion that British Columbia's forests are under huge pressure from many different angles. 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."*** [12]

2.2.3 Further evidence of an ecological crisis in BC

In May this year conservation groups published maps based on inventory data from the Forests Ministry that show the extent of damage to old growth forests in British Columbia. [13] Their data shows that 74% of productive old-growth forests have been logged and that much of the remaining old growth is made up of small, stunted trees. Worse still 91% logging rates were recorded on the valley bottoms, where the largest old-growth trees grow, leaving only 9% of BC's iconic forests in these areas. On top of

this, the Ancient Forest Alliance say that their analysis is based on conservative calculations and that the actual amount of logging is probably much higher than what has been recorded.

The impact of relentless logging is taking its toll on wildlife and communities, and conflicts are coming to a head. In late September this year, Members of the Tsilhqot'in First Nation set up a blockade to stop logging southwest of Williams Lake, saying they're worried about the destruction being caused, including declining moose populations in the Chilcotin. [14] This blockade comes two decades after a blockade in the same area sparked years of legal battle to save some of the Tsilhqot'in Nation's last intact traditional lands from industrial logging. The battle continues with this current blockade and, in November this year, the Supreme Court of Canada is scheduled to hear the historic appeal of the Tsilhqot'in Nation's Aboriginal title case. [15]

2.2.4 Conclusion: further investigation urgently needed

Significantly, on-the-ground research documenting the direct and indirect impacts of pellet production in Canada is clearly lacking, despite it being the second largest producer in the world and despite the evidence summarised above. Pellet production in Canada will only increase in years to come, as power companies such as Drax create increasing demand for pellets and as renewable energy policies globally turn their attention to large-scale biomass. As such, an independent analysis of the Canadian pellet industry, their wood sourcing and impacts is urgently required. As the Greenpeace report quoted at the beginning of this article predicted, Canadian Provinces are diving into a biomass, and this will be at the expense of forests and the communities that depend on them.

2.3 Portugal's Booming Pellet Industry

According to the Food and Agriculture Organisation's (FAO's) Global Forest Resources Assessment 2010, [1] 38% of Portugal's land area is 'forested' and 'forests' have been slowly increasing since 1990. However, this figure is distorted by the fact that the FAO falsely classes industrial tree plantations as 'forests'. Such plantations, according to the FAO, covered 849,000 hectares of land and have increased by 14,000 hectares since 2000. However, the FAO statistics appear to only class non-native eucalyptus as 'planted forests' whereas in reality most of the forests classed as 'native' are in fact maritime pine plantations.

Portugal's native forests do include both the "pinheiro bravo" or maritime pine forests (of which only a few remnants remain outside monoculture plantations) and the more prevalent cork oak forests, but natural or endemic forests of Portugal are dominated by other oak climax species such as the Portuguese oak and holly oak, as well as other trees such as the Portuguese laurel and Bay laurel, strawberry tree and sweet chestnut tree. Portugal's wildlife is already under stress, but there is much to lose with remaining populations of Iberian wolves confined to the far North of the country, and no

evidence that Portugal's tiny populations of critically endangered Iberian lynx in the South are reproducing.

Portugal's eucalyptus plantations have been established by pulp and paper companies in recent decades. A spokesperson of the Portuguese environmental NGO, Quercus, describes the reality of the plantations: "*Our fauna can't feed on it; they can't find refuge in it. Our insects can't eat eucalyptus, so there are no birds... In a native oak forest you'd find, in one hectare of woodland, at least 70 or 80 species of plant. In a eucalyptus forest, you would hardly find more than 15.*" [2] According to Quercus, there have been protests against eucalyptus plantations since the 1970s, not least because of their devastating impacts on groundwater and freshwater in a country increasingly affected by droughts. There are serious concerns that eucalyptus plantations could expand further in response to a new demand for woodchips and pellets for dedicated biomass power stations.

However, so far pellets appear to have been made largely or exclusively from plantation pines. Pellet production in Portugal has jumped since 2005 from a small-scale industry to



Photograph 1: Large clear-cut of a maritime pine plantation in Portugal's interior taken in January 2013 - an increasingly common sight.

around 20 plants with a total production capacity of around 850,000 tonnes a year, and producing around 650,000 tonnes a year. Almost all of this production is exported elsewhere in Europe, with only 9% of production remaining in Portugal and being burned in small-scale biomass burners. [3]

Portugal has a relatively small installed biomass power station capacity of 117MW. This is expected to grow but despite there being a number of plants with planning permission, investment has so far been lacking. None of the domestic biomass plants burn pellets however. [4]

Large pellet plants producing around 100,000 tonnes a year have been exporting almost all of their pellets to large European coal power plants owned by companies including E.ON, Electrabel, Dong Energy, and Drax. [5]

Smaller producers of pellets have started to complain that their raw materials are becoming scarce because of the demand from power stations, and this in turn has driven prices up. Increasing quantities of pine roundwood are being sought across the timber industry to meet demand by large pellet mills, whereas smaller pellet producers in the past would have used only sawdust and residues.

According to João Baetas, CEO of Pinewells in Arganil and a pellet producer for the domestic heating market, his industry is facing severe competition from suppliers of biomass for export to foreign power generators. In his opinion "these plants are also using roundwood and are really driving up prices... Over 70% of our raw material is pine roundwood, although we do use some eucalyptus sawdust and woodchip. In the medium term we could [look to] Africa to find alternatives, as paper mills currently do by importing eucalyptus woodchip from Brazil or Africa." [6]

The manager of a pellet plant in Alcobaça has been quoted as saying that he doubts that regeneration of forests alone [by regeneration we have to assume that re-planting of plantations is included as "regeneration"] can meet the demands of Portugal's timber industries: "*in Portugal there are several of the largest paper mills in Europe, 15 approved*

biomass power plants, we're the world leader in MDF boards and now, out of nowhere, we have huge pellet factories. Where will all the raw material come from?" [6]

There is direct evidence that coal to biomass conversions as well as increased co-firing in several European countries, are driving this increase in demand, with 100,000 tonne a year producer Bioenergy Portugal's website claiming: "Coal stations in Europe and the UK will benefit from a reliable supply of the essential fuels needed to support their investment in power station conversion. Their use of European supplies can help offset the risk of economically precarious and currently dominant dependence on distant supply chains from the US and Canada as well as Russia." [7] In 2011/12 the UK imported just over 68,000 tonnes of pellets from Portugal, most of which went to Drax, when they were still co-firing biomass with coal, before starting their current conversion project. This made Portugal the 3rd largest exporter to the UK. [8] Whilst this is a relatively small amount compared to imports from other places, the expectation is that this will grow substantially in line with demand from European biomass burners, both for co-firing and for new import-reliant dedicated biomass power stations. And while eucalyptus pellets may not be suitable for converted power station unit(s), they could be an ideal feedstock if companies such as Forth Energy were to attract enough investment to build their large planned biomass power stations.

What is not clear is how suitable Portugal's pine pellets are for UK coal to biomass conversions, being softwood and not hardwood trees. Despite this uncertainty though, prices are already being driven up and other industries are looking to South America and Africa for raw materials, undoubtedly a sign of things to come.

So far, there has been no independent study into the impacts of Portugal's rapidly developing pellet industry. Environmental groups are primarily concerned with the massive proliferation of eucalyptus plantations and the devastating impacts that they have, as well as Portugal's forest fire problems.

2.4 Eucalyptus Plantations for Energy: A Case Study of Suzano's plantations for wood pellet exports in the Baixo Parnaíba region, Maranhão, Brazil

by Ivonete Gonçalves de Souza (CEPEDES, Center for Study and Research for the Development of the Southern Bahia Region) and Winnie Overbeek (WRM, World Rainforest Movement)



Clockwise from top left: Community of Coceria; Cerrado forest in São Raimundo; Community meeting in São Raimundo; Buruti trees in Urbano Santos, *Ivonete Gonçalves de Souza*. Pequi tree fenced by eucalyptus, municipality of Santa Quitéria, *Winnie Overbeek*. Suzano eucalyptus plantation for biomass, Suzano airstrip in Urbano Santos, *Ivonete Gonçalves de Souza*.

“By buying their products, they are causing us misery.”

Response from a community leader in Santa Quitéria, Baixo Parnaíba, Maranhão, when asked what their message to the European buyers of Suzano's eucalyptus is.

2.4.1 Introduction

During a time when polluters are re-branding themselves as “green”, and when energy companies pursuing business-as-usual are calling themselves “renewable energy businesses”, it is of utmost importance to expose the reality behind these statements and to gain a better understand of supposedly “renewable” and “green” projects.

Good examples of this are the “innovative” [1] projects being developed by Brazilian pulp and paper company Suzano Papel e Celulose in the Baixo Parnaíba region in the state of Maranhão in northeastern Brazil. In this region, Suzano plans to produce wood pellets for “renewable energy” from extensive monoculture eucalyptus plantations which they call “energy forests.” Those wood pellets are to be sold to European energy companies currently trying to meet European Union renewable energy targets, with the declared purpose of curbing climate change. The UK energy company MGT Power Ltd has emerged as a potential buyer of Suzano's pellets, after having signed a non-binding 'memorandum of understanding' with Suzano in August 2010. [2] An MGT spokesperson confirmed that they are comfortable doing business with Suzano who, they claim, are one of the world's largest producers of paper and pulp, are well-established and meet sustainability criteria. [3]

The aim of this report is to illustrate the impact of Suzano's monoculture eucalyptus plantations on the Baixo Parnaíba region. These impacts are both environmental and social ones. The Cerrado, a vast and abundant tropical savannah eco-region in Brazil, which sustains much of the region's population, is increasingly being cleared to make way for plantations. This is destroying the livelihoods of rural

communities, who are increasingly outraged by the injustices they suffer. A 51-year old community leader, who represents 100 families dependent on the land, told us:

“Suzano is destroying our livelihoods. We depend on the Bacuri tree [Photograph 1], and harvest at least 100 tonnes [of fruit from different trees] at a time here. That's how we live. As well as Bacuri, this area also has Pacas [a species of rodent], armadillos, deer, Jacu birds, as well as other birds and species important to us. The plateau provides us with medicine, fruit, flowers, beauty and space for us to rear some cattle.”

This report is dedicated to the communities [4] that have bravely resisted the attempts by Suzano to appropriate their lands and destroy extensive areas of Cerrado-covered highlands.



Photograph 1: Bacuri tree in the community of Santana. *Ivonete Gonçalves de Souza*

2.4.2 A brief history of the traditional communities of the Baixo Parnaíba

The vast majority of land in the state of Maranhão, including in the Baixo Parnaíba region [5] has never been properly registered by the state. It therefore legally belongs to the state of Maranhão, whose duty is to administer it for those who occupy it, as required by Brazil's 1988 Constitution.

Most of this land, like much of the land across Brazil, is inhabited and used by small-scale farming communities who grow rice, beans, corn and cassava and rear small numbers of animals [6]. They live within the Cerrado ecosystem, inhabiting lower-lying areas which are crisscrossed with streams and rivers and are abundant in Moriche palms, whose fruits are used for food. Vast plateau areas cover much of the Cerrado. Those are less mountainous lands, used as a common resource for gathering food, building materials for homes, tools, fuel, medicines and much more. The traditional communities of the area are characterised by this particular way of life, one where the collective use of much of the land and harmonious co-existence with the environment are paramount.

The majority of the families making up the communities of the Baixo Parnaíba region were technically squatters when they arrived, lacking ownership or legal right to live on the land, but they built lives that were strongly linked to it and to the Cerrado ecosystems. Most of the families arrived in the 19th century fleeing drought from neighbouring states of Piauí and Ceará. In addition, the traditional, rural communities include 14 Quilombola communities, [7] also established in the 19th century when the region was an escape route for black enslaved people. There are thousands of Quilombola communities all over Brazil and the inhabitants of these communities, are descendants of these enslaved people that founded free communities in often isolated forest areas, called quilombos. The Quilombola and other aforementioned communities are now

considered the traditional occupants of the land [8] given the number of generations that have resided in the area.

The selling off of land occupied by traditional communities in recent decades in Maranhão has been aided by the state government and its enactment of the State Law on Lands no. 2,979 of 1969. This law, which has not been repealed, has resulted in a series of conflicts between big land owners and squatter communities over the ownership of and access to land, and in the expulsion of many families and communities. [9]

2.4.3 A history of eucalyptus monocultures in the Baixo Parnaíba region

In the 1980's, a company called Maranhão Gusa S/A (MARGUSA) was set up to produce charcoal. Charcoal production was driven by the opening of an iron-ore mine in Carajás, operated by a company called VALE in the neighbouring state of Pará. The iron-ore mine led to the opening of dozens of pig iron works which in turn increased the demand for charcoal as their energy source. Initially MARGUSA didn't buy land – instead they paid people to extract wood from the Cerrado highlands, causing much devastation to the landscape. Later, they created a timber company called Maranhão Floresta S/A (MARFLORA) to plant eucalyptus. Another company, ITAPAGÉ Papéis, Celulose e Artefatos (ITAPAGÉ Paper, Pulp and Artefacts), which belonged to the Grupo Industrial João Santos (Industrial Group of João Santos), of Pernambuco, also began to establish eucalyptus monocultures.

Suzano arrived in the region in the 1980's under the name of Comercial e Agrícola Paineiras S/A (Paineiras Commercial and Agricultural) and acquired MARGUSA's eucalyptus plantations when that company hit financial difficulties. At the same time, Paineiras leased new areas of land to MARGUSA who tried to establish new eucalyptus plantations in 2003.

That same year, MARGUSA was bought by another company, GERDAU. [10] However, MARGUSA's plantation plans in Maranhão never materialised as the company which they contracted to carry out their Environmental Impact Assessment for a planned 100,000 hectare eucalyptus plantation, STCP [11], never completed it. As a result, GERDAU eventually withdrew from MARGUSA in 2007, though that company still exists.

From 2008 onwards, Suzano rapidly expanded its eucalyptus plantations in Baixo Parnaíba, on land that Paineiras had previously taken over. Suzano also acquired additional land itself with the intention of producing more wood for its pulp mill project in the neighbouring state of Piauí. Suzano intended to plant 160,000 hectares of eucalyptus in Piauí, and 400,000 hectares across the state of Maranhão, with a view to establishing a second pulp mill in Imperatriz, in the southern part of the state. [12]

From 2005 onwards, the expansion of eucalyptus in the Baixo Parnaíba caused an explosion of conflicts with communities who started to lose their land in the highlands - the flat, agricultural lands that Suzano was interested in.

During 2008 and 2009, the pulp mill in Piauí [13] became less viable economically, at least temporarily, due to a temporary fall in global paper demand and prices as a result of the financial crisis. In response, Suzano shifted the focus of their eucalyptus production away from pulping for paper production to wood pellets for export, keeping a close watch on the emerging European market for woody biomass. When the state government headed by Governor Jackson Lago was ousted in 2009, Suzano was granted a licence to plant and operate monoculture eucalyptus plantations in the region. It received permission to clearcut around 40,000 hectares of Cerrado in the municipal areas of Santa Quitéria, Urbano Santos and Anapurus. [14] The Fórum Carajás (Carajás Forum)[15] estimates that there are now around 30–40,000 hectares of eucalyptus plantation in Baixo Parnaíba, concentrated in the areas listed above. The plantations directly impact the lives of more than 50 traditional and other rural communities.

Cheap land was and continues to be a

principal motivation for Suzano's continued presence and expansion in the North East of Brazil, even though it is a family-owned company with its headquarters in the state of São Paulo, far away in the South East. A similar pattern of migration to the North and North East has been observed for other Brazilian agribusinesses, such as those investing in sugar cane and soya plantations. Residents of Baixo Parnaíba say that in the year 2000 land could be bought for around 80 Reais per hectare – a mere £24. Today's prices are higher, at around 500 Reais (£150) per hectare, but still considerably lower than average land prices in Brazil and much lower than current prices in the South East, where the biggest area of eucalyptus plantations is found. The average price of land for agriculture, livestock rearing and "reforestation" – i.e. eucalyptus monoculture – across Brazil jumped from 2,280 Reais (£684) per hectare in 2003 to 7,470 (£2,241) in 2012. In the state São Paulo it reached 32,000 (£9,600). [16]

The other significant development in Baixo Parnaíba was the arrival of soybean farmers from Rio Grande do Sul in the late 1990's called *gaúchos* (a loose equivalent of the term cowboys and another name for the inhabitants of this traditionally cattle grazing state), who were also responsible for the destruction of large areas of Cerrado. The *gaúchos* intended to plant 500,000 hectares of soya in the region, but although they were unable to complete their ambitious plans, they still



Photograph 2: Burnt remains of the Cerrado between eucalyptus plantations, Urbano Santos. *Ivonete Gonçalves de Souza*

managed to destroy almost 40,000 hectares of Cerrado and turn it into soya monocultures.

2.4.4 The Conflicts between communities and Suzano for land and for the Cerrado

“We are fighting for what is ours...”

Resident of São Raimundo, municipality of Urbano Santos, Baixo Parnaíba, Maranhão

The appropriation of land in Baixo Parnaíba has been characterised by the exploitation of the traditional communities that have occupied it for generations, and by the violation of their legitimate rights to use and access the land.

The illegality of these land-grabs is evident from the methods used by companies such as Suzano. According to the Carajás Forum, illegal land deals are common in the region. For example, families who are part of the local elite will often inflate the size of the land which they are purchasing when registering the sale. One example of this is described by Antenor Ferreira in an article about Suzano's land-grabbing in the Baixo Parnaíba. [17] This document shows a land ownership certificate for 3,741.3294 hectares in the name of Comercial Agrícola Paineiras, a Suzano subsidiary, in the municipality of Anapurus. It was legally registered in the local registry office under reference number 869, but when Ferreira compared it to the actual area of purchased land, he found that the actual land title was for only 1,877.73 hectares of private land. The other 1,863.6264 hectares were publicly owned lands. According to Ferreira “it is estimated that around 70% of land acquisitions by Paineiras in Maranhão were done illegally”. Ferreira describes other illegal practices, such as falsely using names of people who never owned or inhabited lands but who allegedly sold it to Paineiras. One example was Leudson da Costa Viana, a farmer who lives in Santa Quitéria. Although his name appears on a land sale document, he insists that he had never owned it.



Photograph 3: Stream with reduced flow due to the impact of a eucalyptus plantation, community of Coceira. *Winnie Overbeek*

According to the registry office however, he sold land to Paineiras in 2010 valued at R\$ 2,005.44, meaning that the document must have been falsified.

Land appropriations are opportunities for landowners, including soybean farmers and other businesses, to either immediately convert and use the land they have acquired and evict the families who live on it, or to initially exploit the communities. Former residents of affected communities describe how new land owners, including Paineiras (Suzano), took a proportion of their harvests as payment for the use of their land, even before the company started planting eucalyptus. The residents found themselves as tenants. One resident of Pólo de Coceira describes how rigid Paineiras was in taxing harvests, to the extent that representatives of the company would visit farmers' fields and mark out which proportion of the produce “belonged to them”.

Resistance to Suzano's advancing eucalyptus plantations started to grow in Pólo de Coceira (Pólo meaning hub of communities), in the municipality of Santa Quitéria and a micro-region encompassing seven communities and around 7,000 hectares in the lowlands and highlands. Few families formally owned the land that they lived on, with most being classed as squatters. Four communities including Coceira



Photograph 4: Cattle in the community of Coceira. *Winnie Overbeek*



Photograph 5: Community fenced by eucalyptus plantation, village of Mundé. *Ivonete Gonçalves de Souza*



Photograph 6: One of Suzano's Legal Reserve areas, municipality of Urbano Santos. *Ivonete Gonçalves de Souza*

and Baixão da Croceira, which encompass more than 300 families, began a resistance struggle against Suzano and their plantations. [18] Resistance grew after the company had planted around 1,400 hectares of eucalyptus and destroyed many stands of Bacuri [19] and Pequi (souari nut) trees. Eucalyptus quickly caused negative impacts such as a reduction in the volume of water flowing through the streams and rivers (Photograph 3). Suzano was granted a licence by the Environment Department of Maranhão (Secretaria do Meio Ambiente de Maranhão, SEMA) to extract water directly from

the rivers Preguiça, Munim and Buriti which further reduced their water levels. The licence was revoked in June 2013 [20] and deemed illegal after a decision that SEMA had not been the appropriate body to issue it in the first place. [21] On top of this, local residents learned that the company was also covering springs and streams to build roads for their heavy machinery to use, further impacting the water courses. Another impact was that cattle (Photograph 4) left to graze on the highland plateau were returning in poor health and with skin irritations caused by agro-toxins sprayed on the plantations. Agrochemicals have also contaminated the water courses.

The dramatic impacts of the eucalyptus plantations were quickly felt in Mundé (Photograph 5), Pólo de Coceira. Suzano planted eucalyptus next to the community and stopped people from grazing their cattle. Worse still, the remaining areas of highland plateau were turned into “Reserva Legal” areas (meaning “Legal Reserves”, a designation supposed to protect an area from “unsustainable” management) (Photograph 6), preventing the community from continuing to cultivate these areas. Religious scholar and member of the Carajás Forum wrote about Suzano's “Legal Reserve” in Coceira:

“Between the [eucalyptus] plantations, they've created a “Legal Reserve”. These areas are for the most part sparsely vegetated Cerrado. The more significant parts of the Cerrado have been cleared for the plantations by company tractors dragging chains. It is likely that this destruction of the native vegetation has cleared the way for more than 5,000 hectares of eucalyptus”. [22]

The community of Tabocas, near Mundé in Pólo de Coceira, is also surrounded by eucalyptus (Photograph 7). The company left the community just 12 hectares to cultivate and harvest. Most of the Bacuri, Pequi and other important species of trees have already been lost. The resident interviewed regretted that he could not get the support of the community in time “to stop the deforestation”.

In May 2009 Suzano tried to move into an area of highland plateau close to the communities of Coceira and Baixão da Coceira, where there was a high level of resistance against eucalyptus plantations. It was nine o'clock in the evening when a resident noticed company tractors on the plateau. Slowly, near-by communities were told what was happening and the next morning residents stood in front of the tractors to stop the forest from being cleared until the machine operators left. Later on, a Suzano manager called Sr. Demerval tried to meet with a community leader outside of the area to resolve the situation, but the community leader insisted that the meeting take place in the community. Many families in the area arrived to



Photograph 7: Village of Tabocas fenced in by eucalyptus. Ivonete Gonçalves de Souza

meet Sr. Demerval as they had also been invited to the meeting by the community leader. Sr. Demerval said that Suzano would give 500 hectares to each community as well as establishing “campo agrícola” (“mechanised farm”, see Box 2) projects if they allowed the plantations to go ahead. The communities refused to accept the deal.

The next time the company tried to clear the land with tractors, they were again met by the communities, but this time they said that they would only remove their tractors with a court order. However, the communities were able to mobilise so quickly that the company had no choice but to stop once more. Suzano then went to court and obtained a repossession order, which was delivered to the community of Baixão da Coceira by a court official accompanied by company representatives and police. The judge granted possession of the land to Suzano, but that did not deter the communities from mobilising for a third time to stop the deforestation which by then was very close to their homes. One resident said at the time: “They'll have to drive over us to deforest this land!” The residents called for re-enforcements, and by the time a larger group had arrived on the plateau Suzano had already cleared 100 hectares (Photograph 8). There were 15 police officers present to protect the company, but around 300 people had been mobilised from the communities. The police presence made the atmosphere even tenser and the company was determined to finish the job. The police chief eventually decided to stop the operations and remove the machinery when one resident, disgusted at the disrespect being shown to their community, threatened to set fire to the tractors.

So far Suzano has made no further attempts to clear that area, but in the meantime communities have begun another struggle. This time their aims are to win back appropriated community lands and to create protected reserves for the benefit of the traditional communities, through the Land Institute of Maranhão (Instituto de Terras de Maranhão, ITERMA). For example, in Baixo da Coceira, the proposal is to create a 1,500 hectare land reserve that will guarantee the use and cultivation of the land for generations to come.



Photograph 8: Area where Suzano started clearing, community of Coceira. *Winnie Overbeek*

Residents of the community of Bracinho, Pólo de São Raimundo, in the municipality of Urbano Santos, have a similar story to tell: Dozens of families who are regarded as squatters united to defend their right to the land. One resident said: “Suzano wants to remove us from here, and leave us with fewer possessions.” On 17th May 2011 the company tried to clear an area of Cerrado close to the community, on land that formed part of an Area of Environmental Protection (Área de Proteção

Ambiental, APA) called Upaon Açu. [23] The community told the tractor operators to stop their work: “We stayed in front of the tractors from half past two in the afternoon to half past six at night.” According to the residents, one of the four security guards present fired a shot, but the residents fearlessly forced back the guards’ car. Suzano manager Sr. Demerval said that the community was acting outside of what he described as their “rights”, but the residents remained defiant and told him to pack up and leave. After four unsuccessful attempts the company had failed to clear the area and had not planted a single eucalyptus tree.

In December 2011 the community was granted an injunction against Suzano, declaring that Suzano “should refrain from acting threateningly towards the Traditional Community of Bracinho, in the municipality of Santa Quitéria, or from entering the rural property in question, under penalty of a fine of 2,000 Reais (£600) per day (...)”. [24] An important factor in the Judge’s decision to grant the injunction was the fact that the community had already started a process of legally protecting the communities’ lands when Suzano had tried to invade it. Six years earlier, the community of Bracinho had formed an association and began the process of creating a

The productivity of the Cerrado

Communities who are seeking land reserves through INCRA or ITERMA complain about the methods used by these institutions in their surveys designed to assess productivity. The people doing the surveys are usually agronomists, and often consider the Cerrado “unproductive”. They disregard the thousands of Bacuri and Pequi trees laden with fruit, the Babassu nut trees, which provide excellent cooking oil, the Moriche palms, whose fruit makes valuable sweet food, or the small gardens in the valleys where the residents plant a mixture of plants such as rice, cassava, beans, corn, pumpkin and melon. According to the surveyors, productivity comes from big monocultures and high inputs of fertilizers and pesticides. But residents of the area cannot eat eucalyptus, and soya is not part of their diet either. These institutions are ignorant of the complex biodiversity and the values that are fundamental to the way of life of the people who live there. They are also ignorant of the careful management of farming and agro-extractivist practices by communities, which generate income and increases people’s quality of life. These official attitudes aid the destruction of the cultural practices which characterise the traditional peoples and their deep understanding of the ecosystem they live in. Their way of life is what could honestly be referred to as “sustainable”, if the word had not been abused to the extent that it has been rendered devoid of meaning by companies such as Suzano.

3,400 hectare land reserve, corresponding to the area already in use and occupied by the community, which included highland plateau areas. Local residents were sure that the lands Suzano was trying to clear were public lands and therefore belonged to them as their families have lived there for many generations. They asked Suzano to show them the land document that the company said it had and to show them that the land was Suzano's, but the company did not do so. Suzano then offered the community an area of 400 hectares for their use on the condition that they signed an agreement to allow the plantations.

The community of Bracinho says that it is against eucalyptus plantations because of the experiences of other communities in the region which had not reacted when Suzano arrived. Those communities now find themselves isolated, surrounded by plantations and living in difficult conditions. Residents speak of how those communities were seduced by the many promises made by the company such as building a school, a health clinic, a paved road and "campo agrícola" (mechanised farm) - promises which were never kept. One Bracinho resident says that people were "bought" by various means to accept the plantations.

Currently, Suzano is prohibited from entering the community of Bracinho but nonetheless this still continues to try, only without their tractors. Recently the company sent a "social assistant" called Fernanda on the



Photographs 9 & 10: Community of Santa Rosa (*Ivontete Gonçalves de Souza*) and house in Santa Rosa (*Winnie Overbeek*)

pretence that she was there to work with the children. The community refused to let her in saying that Suzano would not be allowed access "whether to do harm or good".

Another community facing the problem

Suzano's "modern" agriculture

After deceiving communities and successfully clearing the highlands for their eucalyptus plantations, Suzano often proposes "campo agrícola" projects, which have already been introduced into some communities. These projects involve introducing mechanisation to relatively small areas of land – so-called "modern" agriculture, alien to the vast majority of families. An example of a "campo agrícola" is in Santana, in the municipality of Urbano Santos. One resident explained that there are 120 hectares for 23 families, and that the project was a form of compensation for the many Bacuri, Pequi and Moriche palm trees as well as the cultivated crops destroyed by Suzano. The resident also explained that in these areas, the company allowed the community to harvest their crops before eucalyptus was planted. Families have planted coconuts, rice and cassava amongst other things in the "campo agrícolas", but their productivity has turned out to be low and not what families had hoped for. On top of this, there are concerns over the future of the projects as Suzano's commitment to supply tractors and chemical fertilisers is only for four years, after which funding will be withdrawn.

of Suzano's eucalyptus expansion is Santa Rosa (Photographs 9 & 10), also in the municipality of Urbano Santos. They too have formed an association and begun a process with the National Institute for Colonisation and Agrarian Reform (INCRA), a federal government agency. Their aim is to create their own agrarian settlement. Initially, the supposed landowner of the area was willing to sell to INCRA so that the community could be granted legal rights to the land. When INCRA and a delegation from the community tried to complete the sale, the landowner refused to sell, and instead prioritised Suzano's interests and their plans for the land. Today the community is both anxious and angry as the landowner has subsequently sent a representative to the community with the instruction to expel the families from the land by means of threats and intimidation. Some residents have been frightened into wanting to leave the area, but the majority insist that they will stay. The example of Santa Rosa shows that even when communities stand together in defence of their land, the pressure from Suzano together with the interests of landowners can nonetheless succeed in dividing residents and making communities vulnerable.

The neighbouring community of São Raimundo is not presently affected directly by Suzano, but will not allow the company to put up notices in its territory or in nearby highland areas. A resident commented that they had already removed the company's notices because leaving them would make it look as if the residents had accepted that the land was Suzano's and the community could not allow that.

The residents of São Raimundo say that the main threat to them currently comes from a "gaúcho" called Evandro Loez, who is trying to appropriate around 3,000 hectares of the highlands. [25] When the tractors arrived to clear the Cerrado, the community mobilised and stopped the deforestation, sent the operators home, and told them not to come back. Following that, the "owner" of the land tried to come to an agreement with the community association that had been founded in the year 2000 in order to defend the interests of the community, and

which had begun the process of having 1,600 hectares of land returned by petitioning INCRA.

One resident commented that they had nothing good to say about Suzano and emphasised that they would never accept the company's operations on their territory since they could "never agree that destruction was good". Another resident, age 71, added: "Suzano has already made many people homeless. They come with attractive promises and deceive people, and some sell them their lands for anything they are offered." The first resident continued: "but we in São Raimundo, we are united, we are a community that fights for the land and for the things that we need to survive". They will not give in.

2.4.5 The rich ecological diversity of the Cerrado versus the ecological poverty of monoculture eucalyptus plantations

"The green that I know is the nature that God left us; to them it is worth nothing, and is only there to be cleared."

Resident of Raimundo, municipality of Urbano Santos, talking about the soya and eucalyptus companies present in Baixo Parnaíba, Maranhão

"A tree like the Bacuri tree, native to the Amazon basin, the Cerrado and the transitional ecosystems, is of much greater value than a species like eucalyptus in terms of ecological, environmental, social, economic and historical importance. This truth is so plain and simple that one day someone will ask how anyone could have the courage to replace one with the other."

Mayron Régis, in "As Chapadas e os Bacuris" (The highland plateaus and the Bacuri trees), Carajás Forum, 2011, p.27

If one was to look for a symbol for the traditional communities of Baixo Parnaíba, that

symbol should without doubt be the Bacuri tree. All of its fruit is useful (Photograph 11): the pulp is made into delicious and nutritious juice, and also forms an important part of the local economy since it is sold in urban areas of the state. The skin and seeds can be turned into a sweet or jelly, and the seeds are also used to produce an oil used in the treatment of skin conditions. The fruit can be used medicinally, for example, as an anti-inflammatory. It is an interesting and important tree, but as yet poorly researched. This is the case with most of the biodiversity of Baixo Parnaíba, which is a region of transition between the Cerrado and the Amazon rainforest. The Cerrado and its biodiversity set the pace of life for people living in the area, who benefit from its abundance. For example, local people wait until the ripe fruit of the Bacuri tree has fallen before harvesting it, as picking it early would result in less pulp being produced and stop the tree from fruiting the following year. It is through relationships such



Photograph 11: Bacuri fruit cut in half, village of Tabocas. *Ivonete Gonçalves de Souza*

as this one that people have learned to respect and to live within the limits of their environment. Sadly, with the advance of monoculture eucalyptus plantations, people have increasingly had to harvest the fruit of the

FSC Certification for Suzano

The recent cancellation of its licences (see below) has also not stopped Suzano from pursuing the “green” certification of its products in Maranhão through the FSC (Forest Stewardship Council). [35] Suzano has already obtained FSC certification in the southeast of Brazil, despite the negative impacts it has caused and the protests these have sparked, (Photograph 12) and the company is on-track to be certified in Maranhão too. Residents of the Baixão of Coceira region described how a short time ago they received a visit from a representative of a certification company, with Suzano representatives in-tow. The presence of Suzano representatives meant that local people were immediately distrustful of the person’s intentions, even though the Suzano representatives were not present during the conversations. It was unclear to the residents whether the intention of the visit was to certify Suzano’s operations in the Baixo Parnaíba, or whether the visit was in relation to certification elsewhere in the state.

The minimum that should be expected from the FSC is a refusal to certify Suzano’s operations given the social and environmental impacts they are responsible for in the state of Maranhão and elsewhere. Suzano is neither a “socially just” nor an “environmentally responsible” company - two terms used by the FSC to describe Suzano when they irresponsibly certified some of their plantations.



Photograph 12: Protest against Suzano in Teixeira de Freitas, Bahia. Banner reads: “Suzano buys certifications”. *CEPEDES*



Photograph 13: Cemetery fenced by eucalyptus plantation, municipality of Urbano Santos. *Ivonete Gonçalves de Souza*

Bacuri early, signalling that that the end of an old and rich culture may be approaching.

The symbol which best describes Suzano would undoubtedly be the eucalyptus tree, with row upon row of identical trees spreading for mile after mile, a monotonous monoculture with which other plants and animals cannot coexist. The people and animals in the area have no use for the vast tracts of monoculture plantations, which provide no fruit or other kind of sustenance. The eucalyptus tree has nothing to teach us about the secrets of the Cerrado of Baixo Parnaíba or the native people who form part of its diversity. Native people enrich and



fertilise the land throughout their entire lives, from the day they are born until their bodies are returned to their place of origin, in cemeteries that are now regularly covered by eucalyptus trees (Photographs 13). Baixo Parnaíba is a sacred place for hundreds of families – and land in which their ancestors, history, love, ritual and life are grounded. Eucalyptus plantations are responsible for the merciless destruction of the Cerrado and its thousands of Bacuri and other native trees. The eucalyptus tree, in contrast to the Bacuri tree or any other plant native to the Brazilian Cerrado, has been extensively researched and studied so that its productivity and growth rate can be continuously increased, and with them the profits generated by the companies growing it.

2.4.6 Planting “supertrees”

Eucalyptus plantations designed for biomass production are different to those for producing pulp and paper: they are denser. In most existing plantations, trees are planted 3 x 3 metre apart (1,108 trees per hectare) or 3 x 2 metre apart (1,665 trees per hectare). However, in the municipality of Urbano Santos there are plantations with trees spaced 2.5 x 0.5 metres apart, resulting in some 8,000 trees per hectare (Photograph 14 & 15). Professor Saulo Guerra co-ordinates Suzano’s research programme with the University Estadual Paulista (UNESP) and in



Photographs 14 & 15: Suzano’s dense eucalyptus plantations specifically for biomass, municipality of Urbano Santos. *Ivonete Gonçalves de Souza*

partnership with other timber and agribusiness companies such as Fibria and Duratex. He has said: “We use different spacing between saplings, with up to five times more trees per hectare”. Competition for light forces the trees to grow taller and thinner (Photograph 16). Parallel to this research, New Holland, a company belonging to multinational American CNH and also a partner in the research, is trying to develop a machine capable of felling 6 to 8 trees at once and chipping them in situ. Pellets for export can then be made from these woodchips. [26]

The environmental impacts of this new type of plantation are set to be even greater than those of conventional eucalyptus plantations. Professor Guerra explained that the conventional plantations produce 45m³ of wood per hectare, but the lesser spacing would greatly increase this amount. Clearly, increased production means increased water and nutrient consumption and therefore greater impacts. Communities have already complained that river headwaters close to plantations have dried up and that the volume of water flowing nearby streams in Baixo Parnaíba has reduced significantly. This situation will get worse.

This new plantation business model is based on tens of thousands of hectares of monoculture plantation on the inter-continental transport of wood pellets to power stations thousands of miles away. For this model to be economically viable, yields must be optimised and production costs reduced as far as possible. Reducing costs in this case means transferring them on to communities who ultimately pay the highest price for the destruction caused by the industry. When these costs are factored in it is abundantly clear that generating energy in this way is a long way from what the term renewable energy should mean.

The imperative to reduce costs also explains Suzano's keenness to invest in the development of genetically engineered (GE) eucalyptus trees, or “supertrees” with even higher productivity. This involves increasing the amount of lignin in the wood and decreasing the amount of cellulose. Lignin and cellulose are the two basic components of wood and lignin has a higher calorific value, i.e. burning wood



Photograph 16: Suzano's saplings at experimental eucalyptus plantation at the State Institute in Pernambuco. *Ivonete Gonçalves de Souza*

with more lignin generates more energy. Genetic engineering could also make eucalyptus resistant to glyphosate, a widely-used herbicide on plantations. This would accelerate production cycles further, which are already much shorter for biomass eucalyptus plantations (18-24 months) compared to pulp and paper eucalyptus plantations (5-7 years).

It should come as no surprise that in 2010 Suzano bought UK-based company FuturaGene, one of the companies at the forefront of research into GE eucalyptus. They expect to be granted a licence to plant commercial GE eucalyptus in Brazil in 2015 and are already carrying out experimental trial plantations. According to company director Stanley Hirsch, GE eucalyptus can grow 5 metres per year producing 20-30% more biomass than non-GM eucalyptus. He believes that with GE eucalyptus, energy producers will be able to “...replace the entire fossil fuel industry...” FuturaGene claims that its GE eucalyptus can increase productivity to 104m³ per hectare, compared with a current average of 80m³ per hectare for biomass eucalyptus plantations. [27]

But the risks of genetic engineering are great, because of the potential for contamination of native, non-GE trees and the increased use of agrottoxins. Perhaps the greatest danger is that the scientific claims

made by Suzano and other companies who are seeking permission to plant GM trees commercially are unreliable. It would be better to apply the precautionary principle and prohibit this technology for decades, until it is much better studied and understood. [28]

2.4.7 A company in Crisis

“Everything that Suzano has done has harmed our region.”

Resident of the Pólo de Coceira, municipality of Santa Quitéria

Recent news about Suzano will not be in the least encouraging for their shareholders, with the media reporting that the company is in financial crisis. Suzano plans to open a new pulp mill in Imperatriz, Maranhão, by the end of the year, but the estimated US\$3 billion required to finance the plant has left the company in debt and has forced it to drastically reduce spending. [29] In March 2013 Suzano decided to suspend the construction of a pellet plant that would process eucalyptus planted in Baixo Parnaíba. The plant was to be built by its subsidiary “Suzano Energia Renovável” (Suzano Renewable Energy) in the municipality of Chapadinha. [30] The plan had been to open the plant in 2014 but currently there is no anticipated time-scale for completion and construction has not yet started. There are also plans for new port facilities in the



Photograph 17: Area where Suzano wants to build new port facilities for exporting wood pellets, São Luis. *Winnie Overbeek*

area, in a beautiful coastal region of Maranhão (Photograph 17), but hundreds of families are opposed to the idea because they would have to leave their land for it. On top of this, company workers in the municipality of Urbano Santos have been protesting against delays in the payment of their wages. [31] Outside Maranhão, Suzano has had to deal with other problems such as two occupations by the MST (Movimento Sem Terra/Landless Peoples' Movement) in Bahia in March [32], as well as other protests in the state (Photograph 1).

Suzano was hit with more bad news when Federal Prosecutor Alexandre Soares successfully appealed the granting of an environmental licence for a pulp mill and eucalyptus plantations awarded to Suzano by the State Government of Maranhão. After deliberating for some time, in 2012 the Regional Federal Court (Tribunal Regional Federal (TRF) da 1ª Região) granted the Federal Public Ministry (Ministério Público Federal) an injunction to revoke Suzano's environmental licence. It argued that the Maranhão State Department of the Environment was not the competent authority to issue it in the first place, and that competency instead lay with the Brazilian Institute for the Environment and Renewable Natural Resources (Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis, IBAMA) at the federal level. The State Government of Maranhão appealed the ruling to the High Court of Justice, but High



Photograph 18: Protest against Suzano in Teixeira de Freitas, Bahia.



Photograph 19: Outsourced Suzano (ACM) worker doing weed control in plantation area, municipality of Urbano Santos. *Ivonete Gonçalves de Souza*



Photograph 20: Plane inside a Suzano plantation doing aerial spraying, municipality of Urbano Santos. *Ivonete Gonçalves de Souza*

Court Judge Ari Pargendler upheld the original ruling. [33] Because of this, Suzano is prohibited from operating in Maranhão at this point in time.

Events in Piauí, where Suzano has another pulp mill project and further eucalyptus plantations, have mirrored those in Maranhão. Using similar arguments, the Federal Court in Piauí revoked the company's preliminary environmental licence and more recently, on the 3rd May 2013, the Secretary of the Environment and Water Resources announced the cancellation of Suzano's licence to go ahead with its pulp mill project. [34]

However, the cancellation of Suzano's licence in Maranhão by the courts has not stopped their subsidiaries from operating illegally. ACM of Maranhão, a Suzano subsidiary, were found to be fertilising plantations as usual (Photograph 19) and a plane was seen landing after spraying what was supposedly "fertiliser", but what residents believed was an agrototoxin (Photograph 20). The company has not provided local residents with information about the aerial spraying programme which it is carrying out, nor confirmed what is being sprayed. Most frustrating though, is the fact that the decision by the courts to revoke Suzano's licence is simply not being enforced.

In some areas, the deforestation caused by the expansion of eucalyptus and soya

plantations and other impacts associated with monocultures have led to bylaws being declared specifically to prevent these impacts. In the municipalities of Mata Roma, Água Bela, São Benedito do Rio Preto and Barreirinha, eucalyptus and soya monocultures are banned, as is deforestation in the Cerrado in the latter three municipalities. However, in São Bernardo, Suzano succeeded in overturning a similar bylaw in pursuit of a 15,000 hectare plantation in highland areas that are of vital importance to the survival of the Enxú community.

A tactic frequently used by Suzano and other big companies in Brazil in order to procure political allies is to donate to electoral campaigns at all levels of government, from the municipal to the state and to the federal levels, and for all elected positions, donating funds especially to candidates with realistic election chances. [36] In Baixo Parnaíba for example, during the last municipal election Suzano donated R\$ 34.811,04 (£10,443.31) to the mayoral candidate for São Benedito do Rio Preto, Odilon Araujo Frazão, member of the Party of the Republic (Partido da República - PR). [37] As it happens, he lost by a small margin to Dr. Mauricio, of the Brazilian Democratic Movement Party (PMDB), the political party of former President Sarney and also the most influential in the state. Suzano also donated R\$ 440.000 (£132,000) to the PMDB. [38]

2.4.8 Conclusion

In spite of everything they are faced with, communities in Baixo Parnaíba continue to resist Suzano's invasion of their lands and patiently wait for INCRA and ITERMA to regularise their collective land titles, creating formal land settlements. The slow pace of this process is in stark contrast to the speed with which companies are able to obtain licences to operate. None of the communities cited in this report and involved in struggles against Suzano have so far had their applications for agrarian land settlements granted.

Communities are increasingly becoming more organised and their resistance more effective through their determination. They are also helped by the support of civil society groups on a regional level, such as the Forum for the Defence of the Baixo Parnaíba (Fórum em Defesa do Baixo Parnaíba). This alliance includes catholic organisations and rural workers in municipalities affected by eucalyptus and soya, as well as the Carajás Forum and the Maranhão Society for Human Rights (Sociedade Maranhense de Direitos Humanos). Examples of this are initiatives to celebrate the value of the Cerrado and the communities that depend on it, through management projects around the Bacuri tree and livestock, (Photograph 21) and the development of agro-extractive practices. These have the support of the Carajás Forum as well as other groups, and show the rest of society and the world that it is possible to live comfortably off what the Cerrado has to offer, while at the same time protecting it.

“...out of the apparent inevitability of the situation, those who are supposed to disappear instead react and fight back. They pick themselves up and assert their existence, their rights and their will to continue to be what is principally an inconvenience to them [Suzano]. They change the course of the inevitable. Staying connected to their roots, like old Moriche palms, they reach for the sky, challenge the ways of the world, and confront the supposedly unquestionable logic of development and progress and say: “here we



Photograph 21: Community agricultural project in São Raimundo. Winnie Overbeek

stand and here we'll stay – we are not backwards but we can be the future. We don't destroy the environment, we respect its cycles, know its workings and can help to build new ways of relating to it. We have a “science”, a knowledge that doesn't destroy, doesn't privatise the riches of the world but that teaches us to care and protect.” [39]

Listening to the stories that communities struggling against Suzano have to tell, shows that there is no place for such a nefarious model for energy generation and failed development, one that is leading humanity to an unprecedented disaster. Planting eucalyptus in Baixo Parnaíba to be able to sell wood to the UK and other European countries is perpetuating colonialism, as well as being a substantially irrational thing to do. We have to think of more intelligent, genuinely renewable means of generating energy as well as reducing current excessive levels of consumption. To fuel all of the UK's energy requirements through eucalyptus-based biomass would require some 55 million hectares of plantation in Brazil, an unthinkable amount of land, but an attractive prospect for companies like Suzano and their shareholders. [40] The conflicts, harm and damage that this would cause are also unthinkable – no people, whether Brazillians or otherwise, deserve this fate.

It is time to change history, to shift paradigms and to learn to value the communities

of the Cerrado, the Atlantic Forest (Mata Atlântica), the Caatinga (another eco-region in northeastern Brazil), and Amazonia and the diversity they represent. As a resident of Santa Quitéria said at the start of this report, the time has come to stop the misery being imposed on the lives of the traditional communities of Baixo Parnaíba and on other peoples. It is time to address the needs of today without forgetting to preserve the reserves of the future that generations to come will depend on.

For references & notes please click on reference numbers, or see:
<http://www.biofuelwatch.org.uk/2013/report-references/>

3. UK Impacts

3.1 How does large-scale biomass burning affect public health?

Burning biomass in power stations causes similar levels of pollution as burning coal, though biomass emits less of some pollutants (especially sulphur dioxide and mercury) and more of others (such as very small particulates, called PM2.5, and Volatile Organic Compounds). [1]

However, if energy companies' biomass plans are realised, significantly more people will be affected by emissions from biomass burning, compared to those from coal combustion. There are 14 coal power stations across the UK, 3 of which are being closed down. On the other hand, 9 power stations with a capacity greater than 15 MW are currently run on biomass and a further 45 are proposed.

In the US, the Environment Protection Agency recorded 79 different pollutants from a biomass power station that only burns virgin wood. [2] Those include nitrogen oxides (linked to respiratory illness), small particulates (linked



Photograph 1: The McNiel Plant in Burlington - hugely polluting despite burning only virgin wood. It is half the size of each of the 3 Forth Energy plants proposed in Scotland.

to respiratory and heart disease and strokes), heavy metals and dioxins and furans (linked to cancer and birth defects). Power stations that burn even a small proportion of treated waste wood will emit more different toxins as well as greater quantities of, for example, dioxins and furans and heavy metals. We discuss some of these impacts in the 'waste wood' chapter below, focusing on the Trafford community and its fight against plans for a power station that planned to burn a high proportion of chemically treated wood.

In December 2009, the Environment Minister at the time, Jim Fitzpatrick stated that according to government commissioned research, up to 1.75 million life years could be lost in 2020 as a result of small particulate emissions from increased biomass burning for energy in the UK. [3] Potential mortality and illness from all the different pollutants emitted by biomass plants has not been estimated.

However difficult it is for communities to fight power station proposals on air quality grounds today, under current government (Defra) proposals, it could soon become far harder still. As part of the so-called "red tape review", Defra is proposing to abolish the requirement for local authorities to monitor and report on air quality. Under these proposals, only government maintained monitoring stations would be retained, however these account for a small minority of all monitors, most of which are managed by local authorities. Furthermore, local authorities would no longer have to declare "Air Quality Management Areas" (AQMAs). These are areas where legal air pollution limits are being exceeded and where priority action to reduce pollution should be taken. Unfortunately, enforcement of such measures is lacking at the national level. However, the only air quality consideration explicitly contained in the National Planning Policy Framework for England states: "Planning

decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan.” Hence, without a requirement for AQMAs, there would be no explicit grounds in planning policy for refusing planning applications on air quality grounds. [4]

What this proposal would mean for communities concerned about biomass power stations and other polluting developments can be gauged by looking at the situation in Southampton. Southampton residents, through the local group No Southampton Biomass, are opposing a 100 MW proposed biomass power station. [5] Based to a large part on well-researched air quality evidence, campaigners have succeeded in delaying a full planning application since 2011. Southampton has 10 AQMAs, i.e. 10 areas where either legal levels of nitrogen dioxide or small particulates or both exceed EU and UK standards. The local authority maintains 5 automatic monitoring stations and 55 less costly and less precise diffusion tubes which measure nitrogen dioxide levels. There is just one monitoring station funded by Defra. Altogether 23 monitors have been recording breaches of legal air quality standards. However the Defra-maintained monitor is at a slightly less polluted location and has not shown up any such breaches. If Defra’s proposals became law, no breaches of air quality standards would be measured anywhere in Southampton and residents, planners and the Environment Agency would have no way of knowing how high



Photograph 2: This image shows how close to houses the proposed plant will be. *No Southampton Biomass*

pollution levels were at different sites and thus whether a new power station would cause or exacerbate violations of the EU Air Quality Directive. Effective community campaigning to protect or improve air quality would be rendered virtually impossible.

3.2 How do community campaigns against polluting and destructive biomass power station applications fare?

Since 2008, Biofuelwatch has been working with community groups and local organisations to oppose planning applications for biofuel and biomass power stations, usually on grounds related to (un)sustainability and air pollution. Overall, planning applications for at least 28 such power stations have faced significant local opposition. Ten of these ended up being either rejected by planning authorities or withdrawn by developers. Only one of these contested developments – Ironbridge’s conversion to biomass – has actually been implemented to date.

Nobody can predict how many of those power stations would have been built without active opposition, although in some cases it seems very clear that power stations were rejected or withdrawn in response to opposition. Most dedicated biomass power stations with planning approval have not so far attracted investments, indeed not a single new-build power station that would rely on imported wood has so far reached financial closure. On the other hand, we are aware of just one biofuel power station proposal that was not opposed by local residents, and that is now the only such power station that has been built in the UK. [6]

Nonetheless, the odds of winning local campaigns against biofuel or biomass power stations are stacked against community groups – even if investors and developers may eventually be deterred by public opposition.

We are unaware of any power station considered under ‘Major Infrastructure

Development' planning procedures (i.e. 50 MW or larger) to have been refused planning permission. Out of seven local authority decisions to reject biofuel or biomass power stations that were appealed by developers, only two were upheld by the Secretary of State.

What those figures cannot show is how local residents committed to opposing destructive and polluting biomass power stations experience the planning process. Pete Kilvert's account of the Breathe Clean Air Groups' campaign and experience in Trafford, has been included in the chapter on waste wood below. In it, he gives a good account of the scale of the work and effort expended by local residents trying to build a successful campaign against a planning application. Here is a summary of some of the key hurdles they faced:

· In February 2011, the Secretary of State granted an Appeal by biofuel company W4B, who had been refused planning permission for a 50 MW palm oil power station by Bristol City Council. The Council had refused the application because burning palm oil contradicted their local planning policy on sustainability and climate change. **The Secretary of State ruled that planning**

authorities could not take sustainability and climate impacts of biofuels and biomass into account, except for setting planning conditions that developers must comply with the government's own extremely weak 'sustainability standards'. The same 'logic' was followed after a Public Local Inquiry about a contested 100 MW biomass power station in Grangemouth in Scotland, although no such case has been challenged through Judicial Review as yet. [7] This means that in most cases, only local impacts are being considered. [8]

· Power station applications are normally expected to include a detailed Environmental Statement, possibly a full Environmental Impact Assessment. For example, for their consent application for a biomass power station in Grangemouth, Forth Energy submitted a main Environmental Statement with 19 sections as well as another 17 text documents and 69 additional figures. [9] **All of those reports are written by technical consultants and require detailed technical knowledge to be "credibly" criticised – knowledge that few residents have.** This is a fairly typical example of a power station planning application. In most cases public consultation periods run for four weeks,

Campaign victory at a high cost

In 2007, a startup UK energy company, Prenergy, submitted an application for the largest new-build biomass power station proposed anywhere in the world, one that was to burn around 3.5 million tonnes of wood a year. Residents formed a very active campaign group, Port Talbot Residents Against Power Stations or PT-RAPS. One of their main concerns was air pollution and they had good grounds to be worried. Port Talbot is considered an 'air pollution hotspot' in Wales [10] – it is one of the very few places in which English and Welsh legal limits for small particulates (PM10) are being exceeded – legal limit which themselves are far higher than what the World Health Organisation recommends. To the east of Port Talbot lies a chain of hills which traps more pollution in the town than would happen in many other locations. PT-RAPS held public meetings, demonstrations and actively opposed the application at all stages of the planning process. Nonetheless, the local authority refused to object and the Government granted planning permission, regardless of the evidence about air pollution impacts. [11] PT-RAPS submitted an unsuccessful application for Judicial Review. Legal costs were awarded against the residents, who had to raise £46,000 to pay them off. [12] Even this did not deter local residents from continuing to resist the plans, including Prenergy's subsequent applications for having their planning conditions amended so as to make it easier for them to attract investment or a potential buyer of the scheme, with greater success. [13] Finally, PT-RAPS declared success after Prenergy told the National Grid that they were no longer pursuing their plans. [14] Today the company is in voluntary liquidation. [15]

though residents and concerned local groups often find out very late on. This makes it even less possible for them to submit a detailed critique to planners;

· Planning departments are expected to critically assess all of the technical information submitted by developers, including impacts on air quality, local ecosystems and compatibility with local and national planning policies. Some applications for smaller plants may be decided by the planning officer alone. Where decisions are made by elected members of a planning committee, the planning officer's report and recommendation are of crucial importance. If Councillors vote against those recommendations, this may be used as an argument against them by a developer at Appeal. **Yet planning departments are amongst those hit hardest by local authority budget cuts** – and with ever greater cuts, the situation is expected to get far worse. According to the Local Government Association, local authority

planning departments face 90% cuts to their budgets by 2020; [16]

· **If a local authority rejects an application, the developer can appeal but objectors have no such right of appeal if an application is approved.** Their only recourse is an application for Judicial Review, which is only possible on procedural/administrative grounds. The costs of a full Judicial Review are generally well above £30,000. Obtaining Legal Aid for a Judicial Review is difficult and will become even more so soon under Government proposals. [17] Protective Cost Orders may be awarded and limit the potential costs awarded against those seeking Judicial Review to £5,000 for individuals and £10,000 for groups. Yet those figures are still prohibitive for many community campaigners. [18] Furthermore, they do not cover the cost of instructing a solicitor and barrister.

3.3 Testimony by Alison Davies, Save our Speyside

Alison is a founding member of local campaign SOS against a biomass power stations in Craigellachie, Speyside in Scotland

Craigellachie is a village of around 400 people in Moray, near the river Spey, surrounded by forests, tree plantations and agricultural fields. When residents first learned that a

biomass company was planning to build a 15 MW biomass combined heat and power plant in a local woodland – home to red squirrels, badgers and other wildlife – many residents

became concerned and formed a local campaign group, Save our Speyside. [19] As Alison Davies, who helped found the group, explains, their efforts to convince the majority of the Councillors on the local Planning Committee to take their concerns seriously were ultimately unsuccessful. Although the company, Estover, presented the application as one for an efficient small CHP plant, the reality is different: Despite supplying heat to a whisky distillery, the plant would be no more than 38% efficient – far less than the 70-90% that efficient CHP plants can achieve. It would burn 150,000 tonnes of wood – far



Photograph 3: Craigellachie area with power station superimposed. *Save Our Speyside*

more than could be sourced from residues nearby. And it is one of a series of biomass power station proposals which would cumulatively demand a new demand for wood which is anything but small. In March 2013, the Planning Committee voted 7:6 in favour of the application.

1) When did you first hear about Estover's proposal for a biomass plant in Speyside and what did you think when you first found out about the plans?

A. I came across a very small advert in the back of the local weekly newspaper saying that a meeting was being held about a Biomass CHP in Craigellachie Woods. I had never heard of Biomass CHP and asked a few neighbours if they knew about it, which no-one did. I telephoned the company to ask a lot of questions after reading the content on their website. I was extremely concerned at what the company were proposing and having spoken with others in the immediate neighbourhood we decide to deliver a notice about the meeting to all local residents and put a few posters up. That generated a big turnout at the meeting which the proposing company did not expect and were not prepared for, given that there was lot of negativity towards the proposal.

2) Did your views about the proposal change over time and, if, so how and why did they change?

My views didn't change in that I



Photograph 4: Similar sized biomass plant in Germany

was always against the scheme however the more research the team did the more convinced I was that this was the wrong type of scheme in the wrong location.

3) Can you describe how Save our Speyside came together, how much local support it has had and give a summary of its work since it was formed?

After the first public exhibition held by Estover several of my neighbours and I agreed that we needed to fight this proposal and felt that as a constituted group we might have more influence than simply sending our own individual objections when the planning application was made. We petitioned the area and gathered a database of people who wanted to be kept informed of developments. We started our research and set up a website to share the facts and figures we were unearthing. We spoke with many major organisations such as the Forestry Commission and the James Hutton Institute along with of course Biofuelwatch and Friends of the Earth.

The local support was very strong but of course we are only a tiny community and we were fighting not only against Estover but also The Macallan, a renowned local distillery who were to be the CHP partner for the scheme. We worked very hard in keeping the local community engaged, made presentations to local community councils, kept leafleting the area with updates and engaged local shops and businesses in poster campaigns and petitions.

4) What was your personal experience of the planning process leading up to Moray Council's vote to approve the proposal? Did you feel the process was fair and allowed for genuine participation by local residents? Did you feel Councillors and/or the Planning Officer listened to Save our Speyside's concerns, even if in the end they did not agree with them?

We found the whole process extremely frustrating. Our local ward councillors would not engage with us as a group, or as individuals, because all three of them were on the planning

committee and felt that they could jeopardise their position. This meant that we had to fight on alone.

Meetings with the planning officer were helpful up to a point, but then the developer started changing elements of their application both during and after the closing date for public consultation, which showed very clearly how skewed the whole planning process is in favour of the applicant. Despite

so many objections being lodged with the council and SOS making its own representations, we were not asked to participate in any way in the planning hearing and had to sit in silence while misleading information and absolute lies were proliferated to the councillors.

5) What are your main personal concerns about the planned biomass plant?

Living so close to the plant,

personally I am concerned about the noise and emissions along with the increased heavy goods vehicles on our country roads. I am also worried about the local wildlife which we have in abundance, red squirrels, deer, badgers, rare birds and I worry about the escalation in deforestation in Moray should the fuel for this plant actually be sourced within the radius the developer has promised it will be.

3.4 The trouble with waste wood

Of the 14 larger dedicated biomass power stations that are currently operating or that have reached financial closure, at least some waste wood is being burned – or expected to be burned – in at least six. By waste wood, we are referring to recovered wood, commonly including chemically treated wood, for example demolition wood. The term waste wood does not include sawmill or other forestry residues of virgin wood. Burning even a small proportion of chemically treated waste wood has significant implications for air pollution [20] which are discussed below.

Waste wood is often regarded as a particularly sustainable source of bioenergy. Surely it is better for the climate if waste wood that would otherwise be landfilled is burned for electricity instead? In reality, the majority of waste wood used or coveted for bioenergy would not otherwise be landfilled. Recovered waste wood is used to make wood panel board, animal bedding, mulches for soils, for covering pathways and some of it is composted. Until recently, the wood panel industry was the biggest user of recovered waste wood, but this changed in 2012, when, for the first time, they were overtaken by the bioenergy sector. [21]

True, a proportion of UK waste wood

(around 1.2 out of 4.1 million tonnes in 2011 [22]) is still being landfilled, which is clearly unsustainable. However, existing biomass power stations with a permit to burn waste wood have been running well below their capacity and were doing so in 2011 too [23] and virgin wood accounts for the greatest share of wood burnt in power stations. Clearly, waste wood has been landfilled despite unmet national demand for it, not because of a lack of demand. According to a study by John Clegg Consulting, demand for recovered wood from biomass power plants could exceed the UK's entire supply of waste wood by 2015, thus leaving no waste wood for



Photograph 5: Waste wood at Plevin chipping plant, Mossley. Dust emissions from this contain heavy metals, glass shards, paint flakes, textile fibres. MEAG

panel board production or any other uses. [24] This means that other industries have to increasingly rely on virgin wood, i.e. on increased logging or land conversion to tree plantations, or face being displaced to other countries.

The focus of this chapter, however, is not on indirect impacts of burning waste wood on forests and climate, but on the very direct impacts on local communities. And while the direct (though probably not the indirect) impacts of burning recovered waste wood may appear more benign for climate and forests, the impacts on air quality and on local people's health are particularly severe.

Waste wood may have been treated with Copper Chromium Arsenic, Copper Organics, Creosote, Light Organic Solvent Preservatives, Micro-emulsion, paint/stain or varnish and thus contain a wide range of toxic particles. [25] It may also contain traces of toxic solvents, fungicides and insecticides. [26] Those toxins will be released in wood dust, when recovered wood is chipped and before it is burned, and as air emissions from power plants burning such woodchips. They are in addition to toxins contained in virgin wood dust (discussed below) and in emissions from power stations which only burn virgin wood (discussed in the previous chapter). Burning treated waste wood has been shown to significantly increase emissions of arsenic, chromium, copper, lead, mercury, dioxins and furans and potentially pentachlorophenol (a toxic biocide used as wood treatment.) [27]

Furthermore, a monitoring report of a biomass power station in Margam, Wales submitted to the Environment Agency, indicated that burning waste wood could be worse for nitrogen dioxide levels (associated with respiratory and heart disease) than burning virgin wood. [28]

3.5 How waste wood chipping operations affect local communities

Before wood can be burnt for electricity, it first

needs to be processed into either woodchips or pellets. Converted coal power station units can only burn pulverised wood pellets (in practice almost always imported ones), whereas purpose-built biomass power stations so far mainly burn woodchips. Both virgin wood and chemically treated waste wood are being chipped in processing plants and then transported to power stations.

Residents living close to such processing plants are increasingly reporting concerns about ill health which they believe is due to the wood dust emitted during the chipping process.

Donna Liley is secretary of a residents' action group in Mossley, a town of around 10,000 people in Tameside, Greater Manchester. Mossley is home to a wood processing plant owned by R Plevin & Sons Ltd, who describe themselves as "one of the UK's leading wood processing and recycling companies". According to Plevin's website, they currently process a total of 600,000 tonnes of wood a year.[29] Some of this is processed in Mossley, the remainder at a second site in Nottinghamshire. They process both waste wood, including chemically treated wood, and virgin roundwood.

As Donna Liley says in her interview below, wood dust complaints in Mossley date back 17 years, i.e. they started at a time when Plevin's woodchip production was entirely for animal bedding, before biomass power stations were built in the UK.[30] Health concerns about wood chipping are thus not confined to the biomass industry. However the major increase in biomass electricity, and thus in demand for woodchips currently underway, causes wood chipping operations to be greatly expanded and causes more communities to be affected. Plevin is one of the wood processing companies rapidly expanding their operations, having announced plans to build the UK's largest 'wood recycling' plant at Hazlehead in South Yorkshire. [31] They have entered into a 25-year supply contract with E.On to produce woodchips for a 30 MW biomass power station currently under construction at Blackburn Meadow, Sheffield. [32]

3.6 Interview with Donna Liley: One resident's experience of living close to one of the UK's largest wood chipping plants



Photograph 6: Stockpile at Plevin plant 7th May 2010. MEAG

Q: When did you move to Mossley and when and how did you first become concerned about Plevin's plant?

A: I moved to Mossley in March 2007. At first, there was a lot of do getting the house and huge garden to our liking, we were very busy and didn't pay too much attention to anything else. It was a bit noisy in the morning but I was out at work all day and it wasn't too intrusive. However come the summer, Plevins were working until 8 and 9 o'clock at night, and the first I really noticed a problem was I was spending much of my time outdoors. That's when I started to notice the dust, and to smell and taste it. And the noise was horrendous, especially in the late summer evenings. Sitting outside in my beautiful garden began to be a problem and still is.

Q: When and how did you become involved in the Mossley Environmental

Action Group and could you give a brief description of that group and its work?

A: I started asking around the neighbourhood and discovered there had been a Residents Association up until 2006, but it had tailed off somewhat as people had been battling against the dust and noise since Plevins had moved into the town in 1995. As no action had been taken, they had become disheartened. Incidentally there had also been complaints of dust and noise at Plevins previous site in Tameside.

Come the next summer in 2008 when complaints to the local council were falling on deaf ears, several of us got together and decided to 're-boot' the Residents group. I became the new Secretary and to make life easy, my partner Trevor became the Chairman. We also started complaining to the EA once they took over the noise and dust monitoring, following change of waste licence.

About the history of the

association: A Residents Association was formed in Mossley in 1999 to address complaints of dust and noise at R. Plevin & Sons Ltd, a wood recycling company and producer of animal bedding who had moved to the town in 1995. The Association was dormant from 2006 to 2008, becoming known as the Mossley Environmental Action Group in 2010. Hundreds of complaints stretch back over 17 years in Mossley - two residents who live back to back with the Plevins site kept a diary for seven years.

The Environment Agency became Plevins regulators in 2008/9 under a Waste management permit .

Discussions began to take place between 2008 - 2010 amongst old and new group members with similar health issues. The greatest concern at the time was Mrs D. who had been diagnosed with nasal erosion in the summer of 2010. In addition she and several of her children were experiencing nosebleeds. Other residents complained of regular chest infections, headaches and migraines, nausea and hay fever type symptoms even in the winter. Sore and stinging eyes, itchy and runny nose and other respiratory problems were also common. Action members began to ask whether this was attributable to the dramatic increase of waste wood in the rear yard at Plevins. Furthermore, internet research

quickly highlighted that many symptoms being experienced by residents can be associated to wood dust exposure and allergic reactions to contaminants found in waste wood, prompting extensive research and investigation into the industry, nosebleeds being listed on the HSE website under symptoms for wood dust exposure.

By suggestion from a local councillor in January 2011, the group undertook a door to door survey of approximately 600 homes during April and May. 92 people responded positively, including 16 reports of nosebleeds, sometimes with more than one person in the same family, and within close proximity to the waste wood site. (a9) The report was presented to the Mossley District Assembly in June 2011, which led to a multi-agency meeting at Tameside Council in July. Following media coverage, the action group was contacted by other Mossley residents with reports of nosebleeds rising to 27, the youngest at the time under ten years old. Media coverage over the coming months attracted communities and individuals from across the country experiencing similar health issues from living alongside waste wood recycling and processing. It has resulted in continued collaboration with several communities and action groups via social networking and regular correspondence. It has also resulted in an 'en-masse' undertaking of independent dust samples to



Photograph 7: Protest march in March 2011. MEAG

assess if similar exposures could be causing similar health issues across the country from pollutants known to be in the waste wood stream.

Q: You have been campaigning against Plevin's plant because of health concerns over wood dust. Could you describe your personal experience of wood dust from the plant and whether you feel that your own health has been affected since you moved to Mossley?

A: The first winter in Mossley in 2007, I had my first chest infection. I remember having ten people for Xmas dinner and feeling quite ill. Come Boxing Day I was worse, and by the afternoon I had to go to bed and didn't get up for a week. Since then I have had 6 chest infections in total, one was last August, and that was by far the worst one I've had. It started with a sore throat and went on my chest, and I couldn't swallow for days. Since January 2009 I have had repeat prescriptions for Migraine tablets and nasal spray for Rhinitis. I have the embarrassment of my nose

often running without me realising. I also had a long spell feeling nauseous every morning in 2010/11. But I guess the most debilitating aspect is that I have depression, which I would say is 'in check' at the moment, following treatment.

On top of all this is chronic fatigue, which comes and goes, some days I struggle to 'get going', and have 'lost' days in a fog, that's the best way I can describe it. About 6 months ago I went to the doctors having had a migraine for 3 days and was feeling unwell, I asked the doctor to check my blood pressure which was 156/99... now 118/98 which is not good. And all this from someone who is neither overweight, doesn't smoke, doesn't drink too much, and been a keen sportswoman all my life... well in my opinion until moving here. The change in me and my health I would say has been dramatic since moving to Mossley.

As far as I can remember I have never had a chest infection before. I have had frequent ones for the last 4

years. The chronic fatigue comes and goes. It is hard to say how much is stress and how much is air pollution related.

Being exposed to mixed pollutants is an unknown, so how can the authorities say that no connection is concerning, when what they really need to do is investigate using the precautionary principle?

Finally when I am on holiday my symptoms improve and so I have informed my GP that in my opinion this must be related to my home environment. Her most recent advice has been to move.

Q: Have you got information about health concerns expressed by other Mossley residents?

A: We undertook a door-to-door survey in 2011. Residents reported symptoms including nasal erosion, hay fever/ flu type symptoms, runny or irritated nose, sore or stinging eyes, nosebleeds, chest infections, headaches, fatigue and respiratory problems. Since the survey, there have been several deaths from cancer and high incidence of Alzheimer's in a cluster on one street back to back with the site. We have undertaken dust sampling in some of the houses and exteriors to test for heavy metals and other contaminants known to be hazardous to health, and the results will be presented in our forthcoming report.

Q: You and the Mossley

Environmental Action Group have been raising those concerns with the Environment Agency. What has their response been and do you feel they have appropriately addressed the concerns?

A: We are now at the stage where the Environment Agency will not answer our queries or questions directly. We are waiting for them to come and test dust samples following complaints in Sept 2012 and May 2013 in respect of separate addresses. The EA has also been asked to place a dust monitor at the rear of a street within a cancer cluster, following recent complaints during the warm weather spell, when the dust was pretty bad. We are still waiting for anything to happen. The EA in my opinion have failed in their duty of care to protect me and my community from carcinogenic dust emissions that cover our homes and gardens etc. on an almost daily basis. They have failed to act effectively in dealing with noise nuisance. We now call them the Evading Agency.

Q: Do you feel the ongoing concerns have been due to problems related to enforcement or due to the regulations/legislation related to air quality and wood dust control?

A: Both. I believe that another obstacle to regulating the waste wood recycling industry is its importance to the biomass energy sector. I believe the EA has no intention of affecting

Plevin's operations in any way. On the other hand, many of the regulations and clauses in their waste management licence are arbitrary and problematic, in particular regarding noise nuisance. With regards to dust, we are challenging the current regulations. If community health in different parts of the country is being affected by dust emissions from waste wood recycling, which it appears to be, then clearly the current guidelines are totally inadequate. Since 1995, the International Agency for Research on Cancer has classed wood dust as a Group 1 carcinogen, the same group that lists asbestos. Group 1 means that carcinogenic effects have been established. I question why DEFRA classes a Group 1 carcinogen the same as asbestos, as a nuisance. And why are they still using guidelines from 1983 relating to 'controlling dusty ports'. Lastly the EA is inadequate at dust monitoring. For example, their monitoring report refers to a "large quantity of fine particles", yet the EA uses a method which destroys the sample after testing. They will thus never know what is in the dust using this technique. They and DEFRA know that there is a need to fully differentiate between different types of dust in order to truly assess the effects of local residents. This will be a major recommendation of our report.

3.7 What is the evidence on wood dust and health impacts?

As Donna Liley says in her interview, she cannot be certain to what extent her different health problems are related to wood dust, or to the stress caused by years of unsuccessful attempts to gain support from statutory agencies and have her questions answered. Identifying precise triggers for individual health problems (other than infections) is rarely possible.

However, several of the symptoms described have been reported by many other residents both in Mossley and in other locations affected by wood dust from wood chipping or woodchip handling. The Mossley Environmental Action Group's survey suggests a high incidence of symptoms related to respiratory and nasal problems as well as fatigue. In March 2012, the Bristol Post reported complaints of frequent colds, chest infections, sore throats and coughs which residents of Avonmouth, near Bristol, associated with wood dust. There, the Environment Agency took out court action for a breach of permit over wood dust emissions. This action failed because the judge held that it had not been established as to how far the emissions came from woodchip handling by the company at the centre of the prosecution, EGNi Ltd (later acquired by Stobart Biomass) or from a wood processing plant by Boomeco. [33] Residents of Shoreham-by-Sea and Portslade (Brighton) have also reported health problems, including



Photograph 8: Mossley residents and campaign supporters beside Environment Agency dust monitors, March 2013. *Alan Bishop*

respiratory problems and sore throats, which they associate with wood dust from woodchips stored and handled by Stobart Biomass at Shoreham Port. [34]

Furthermore, a peer-reviewed study of health effects on nearby residents of a wood treatment plant in the US identified a higher incident of comparable symptoms. [35] More scientific studies have looked at the impacts of wood dust on workers' health. The International Agency for Research on Cancer (IARC) conducted a detailed review of studies into associations between cancer and wood dust [36] and concluded that long-term occupational exposure to wood dust has been proven to cause cancers in the nasal and sinus region. Based on the strength of this evidence, IARC classes wood dust as a 'Group 1', i.e. a proven carcinogen. [37] IARC's review found the evidence of an association with other types of cancer inconclusive, but regrettably the review did not distinguish between virgin wood dust and dust from chemically treated wood. As well as being carcinogenic, occupational wood dust exposure is an accepted cause of asthma and dermatitis [38] and has been linked to allergic and non-allergic respiratory effects and various nasal problems. [39]

Nonetheless, the government and statutory agencies have shown no inclination to commission or support much needed comprehensive research into the health effects of wood chipping and wood dust on nearby residents.

The situation of local residents exposed to wood dust is not identical to that of industry workers: On the one hand, dust concentrations in areas surrounding wood processing plants and other sites handling woodchips are expected to be much lower than they are inside plants. On the other hand, residents, unlike workers, cannot use respiratory protection from dust. Residents may be exposed to wood dust for a far greater number of hours a year than workers. And residents include vulnerable groups less commonly found amongst workers in the industry, if at all: Young children, elderly people, people with existing chronic health problems and pregnant women (with women being under-represented amongst wood processing workers.)

[40] Regulations of Wood dust levels based solely on findings of occupational health studies, especially ones that do not distinguish between virgin and chemically treated wood, may therefore not protect residents. Yet, as we will show next, there are no wood dust regulations in the first place and the guidance used by the Environment Agency is not based on insufficient medical evidence – it is based on no evidence at all.

3.8 Regulations do not protect residents exposed to wood dust

When Donna Liley wrote to Defra in December 2012, she received an interesting reply. [41] Defra on the one hand stated: *“The results of that [Environment Agency] monitoring show that Plevins is not emitting dusts from its activities at levels which exceed the guidance level for annoyance of 200 mg/m²/day. Environment Agency monitoring also shows there has been no breach of the Air Quality Standards in the locality in which the monitoring has taken place.”* But on the other hand, they conceded: *“This [200 mg/m²/day] figure is not intended to reflect the health hazards presented by wood dust.”*

In other words, the guidance which companies such as Plevin are expected to comply with are not actually intended to address health concerns about wood dust.

In fact, there are neither regulations nor guidance specific to wood dust exposure at all.

Air quality targets and objectives do not cover dust, let alone wood dust – only particulates smaller than 10 micrometres (PM₁₀), regardless of their origin. [42] Under the Environmental Protection Act 1990, dust emissions from industrial premises which are ‘prejudicial to health or a nuisance’ constitute a statutory nuisance, yet permitted dust levels (let alone levels of different types of dust) are not set out in regulation. [43] Instead, the Environment Agency relies on a “custom and practice” limit of 200 mg/m²/day to measure dust concentrations on surfaces. They admit

that “the original source data from which this guideline is drawn are not particularly robust”.

[44] The only guidance that exists to protect communities from any type of dust is thus not based on any evidence about health impacts at all.

The situation in which worried, and in many cases unwell, residents in Mossley, Shoreham, Avonmouth and elsewhere find themselves, can be summed up as follows: Many are experiencing health problems which they have good reason to suspect being linked to wood dust exposure. Yet when they look for help from statutory agencies, they find that no regulation or even guidance has ever been drawn up with the aim of protecting their health from wood dust exposure. And even if the arbitrary dust limits used by the Environment Agency are being exceeded and the Agency actually decides to prosecute an operator, their efforts may fail if there is more than one potential source of wood dust and they cannot prove exactly how much of the dust stems from one particular activity (e.g. if, as in Avonmouth, there are two companies handling woodchips).

3.9 One community’s experience of opposing a waste wood incinerator [45]

In July 2010, Peel Energy, a subsidiary of Peel Holdings Ltd, announced plans to build a 20 MW biomass power station which would burn predominantly waste wood as well as some virgin wood in Davyhulme, Trafford. Residents, concerned about the impacts on air quality and on their health, formed the Breathe Clean Air Group which continues to actively oppose the plans. Their experience illustrates how the planning system is fundamentally failing to protect public health, and how it conflicts with the UK’s legal duty to ensure that EU and UK objectives and standards for air quality are being met.

Indeed the air quality arguments against this particular development appear so overwhelming that its approval by the Secretary of State has

deeply worrying implications for communities affected by polluting development proposals elsewhere.

Here is a brief summary of the planning case: The site is next to an Air Quality Management Area, a place where legal UK and EU limits of nitrogen dioxide (NO₂) are being exceeded. The National Planning Policy Framework for England (as well as relevant policies in Wales and Scotland) states that breaches of air quality objectives or EU limit values are material planning considerations and that planning policies should help ensure that legal air pollution limits are not being breached. Trafford is part of a region that the UK Government is in breach of in its legal duty to meet legal EU NO₂ limits and thus to protect people's health, according to a 2013 Supreme Court judgement.

Usually, a developer who proposes a power plant or incinerator in or next to an Air Quality Management Area would propose a high chimney stack, so that pollutants are dispersed over a wide area rather than being concentrated nearby. That way, more people will be affected but each of them to a smaller extent and developers will try to argue that the additional pollution will not be 'significant' at any one location. The Davyhulme site, however, is too close to Manchester City Airport to make this possible and the stack would have to be just over half the size of other plants the same size, including one planned by Peel Energy in Cheshire. The combination of unlawfully high existing pollution levels and a small chimney that will concentrate emissions close by, should have made this one of the most clear cut cases for refusing a biomass power station proposal on air quality grounds.

Residents' fears and objections were not confined to NO₂. A power plant such as that proposed by Peel Energy will emit significant quantities not just of NO₂ but also of small particulates (PM₁₀, including the very finest particulates, PM_{2.5}), carbon monoxide, sulphur dioxide, as well as a large range of toxins which are associated with cancer and birth defects. Toxins emitted include lead, mercury, arsenic, copper chromium, dioxins and furans, styrene, acrolein, and formaldehyde, hydrofluoric acid

and hydrochloric acid and PCPs (pentachlorophenol). [46] Until 2012, national planning policy stressed that the precautionary principle should be followed with regards to pollution and public health and that "any consideration of the quality of land, air or water and potential impacts arising from development, possibly leading to an impact to health, is capable of being a material planning consideration." [47] In 2012, however, the new Government introduced its new National Planning Policy Framework which has far less to say on health and air pollution. The new policy merely states that planning decisions should ensure "that any new development in Air Quality Management Areas is consistent with the local air quality action plan" and that compliance with legal EU and UK air quality standards should be ensured. Yet for the majority of the pollutants from a power station such as that proposed by Peel Energy, no such pollution standards exist, [48] hence they are basically ignored entirely by the planning system. The only concerns about air quality clearly covered by national planning policy were those about NO₂ – but, as shown above, those should have been quite sufficient for rejecting the application.

Indeed, when the application went before the planning committee, Councillors voted unanimously to reject it, expressing serious concerns about the impacts on air quality. Yet when Peel Energy appealed, the Secretary of State, on the Planning Inspector's recommendation, overturned this decision and approved the application. We will discuss below how this seemingly absurd decision was made and what the wider implications are.

First, however, Pete Kilvert, Chairman of the residents' group, gives an overview of his experiences.



BCAG campaign logo

3.10 Testimony by Pete Kilvert, Chairman of the Breathe Clean Air Group (BCAG)

BCAG is a residents association campaigning against a 20 MW biomass power station proposed by Peel Energy at Davyhulme, Trafford

Q: When did you first hear about Peel Energy's proposal for a biomass power station in Trafford and what have been your main personal concerns about it?

A: Our founder member Jo Burgess heard about BREP [Barton Renewable Energy Plant, the official name of the proposed power station] from Peel's public consultation in July 2010. She spoke with her daughter and a neighbour and they decided to hold a public meeting. I wasn't aware of the meeting, but a friend of mine attended and suggested I lend a hand. I am a retired Health and Safety Officer and knew about the dangers of incinerators. I was invited to the first meeting of a core group and was appointed Chairman.

Q: Can you describe how the Breathe Clean Air Group (BCAG) came together, how much local support it has had

and give a summary of its work since it was formed?

A: The first activities were to print some leaflets and to hold a street stall in the local shopping centre, Urmston. Then we got up a petition and set up a website. We held other activities such as a "Balloon Release" (at a site near to where BREP was to be located, about 50 people released about 100 balloons which showed the direction of where the pollution would go). We got press coverage and decided to do press releases as often as possible (this became one per week, now going out to about 50 media outlets local, national and related magazines. I always take photos of events to use with the press release). We held another Public Meeting (we had to close the doors when we reached a capacity of 400 people) and a Demonstration and Rally in January 2011, attended by over 500 people. We commissioned an ambient air pollution report which highlighted high levels of pollution already existing. Our street stalls continued in Urmston and other local town

centres and we held a few "Flash Mob Freeze" events. I had contacts with the local MP and Labour Councillors and got them on board and they put pressure on the ruling Conservative Councillors. The Planning Committee meeting (November 2011) was unanimously opposed to BREP and another 12 Councillors who were not members of the Planning Committee also spoke against it at that meeting.

We lobbied the Environment Agency to stop the Environmental Permit (unsuccessful as a permit was issued Oct 2012) and attended neighbouring Salford Council planning Committee meeting and got them to oppose the scheme. We tried contacts with schools with limited success and had a meeting with a large local employer (Kelloggs), but got no support there. We had a fundraising/communication stall at a lot of local events and even a float in the local Carnival Parade. We've held a few tree-planting events at schools and a local park. We developed a support group and sent out a Newsletter (held a launch event for the Newsletter attended by Councillors). We made contact with other groups like UKWIN, GAIA [Global Alliance for Incineration Alternatives] and Biofuelwatch and on our second demo were joined by a GAIA member from Barcelona. BCAG members attended a Biofuelwatch lobby of DECC in London and



Photograph 9: BCAG at DECC offices. BCAG

recently we visited our MPs in London. We also held several fundraising events to support our Public Inquiry fund.

It's hard to judge local support, but we believe the majority of people in Urmston support us. We have the support of the three main political Parties, the MP and MEPs and the local business community.

Q: What was your personal experience of the planning process leading up to Trafford Council's vote against the proposal? Did you feel the process was fair and allowed for genuine participation by local residents?

A: At first the Council's officers and the consultants engaged by Trafford Council, AEA consultants, recommended acceptance of the BREP proposal. AEA's adviser Dr Mark Broomfield has boasted about the number of planning permissions which his consultancy has helped companies obtain, so our impression was that AEA's advice was biased in favour of the developer. So initially we had to fight the Local Council, i.e. Council officers. We lobbied the Councillors hard. I knew we had the support of the (minority) Labour Councillors, but we did not know how the Conservative Councillors felt. At the planning meeting we were overjoyed when all Councillors spoke and voted against BREP.

I personally think that

the public does not have much of a say in the planning process. I think the public consultation process is not good enough. I also think that Councillors, at least in Trafford, are not given all the facts by the Officers. There was no hint of health impacts at first. But when Councillors heard from BCAG and the public that there were real health issues, they voted against it. At the meeting BCAG was given two 5 minute slots to state our case. Fortunately for us all Councillors who spoke (12 on the Committee and 12 other Councillors) supported us. (The Labour Group had requested the Committee meeting to be held at a bigger venue, which was agreed, and we had over 100 supporters at the meeting and another 100 outside).

Q: What was your personal experience of the Public Inquiry process (including the stages before and after the actual hearing)?

A: The Public Inquiry was very interesting, but exhausting (I attended every day). A lot of preparation was done. Trafford Council had "signed away" many points that should have been contested because they had agreed a "Statement of Common Ground" prepared by Peel Energy. The legal process can only judge the law, and aspects like ill-health impacts that aren't legislated for are not relevant. Some 50 or so people had an opportunity to speak about their fears, but were completely ignored. In my view,

the legal process is biased toward the Developer.

Q: What impact has the Secretary of State's decision to approve the power station – albeit subject to Judicial Review – had on yourself, BCAG as a group and other local residents you know?

A: I personally was prepared for the worst, but still felt very disappointed. Some BCAG members who only attended the Public Inquiry when the public had their say felt very angry and completely deflated. Some of our members seem to be resting at the moment, but fortunately, one active member has got together a new group of supporters that we call the "Action Group". We've held core group meetings to discuss whether we will mount our own challenge in the High Court (in addition to the Council's challenge), but we have decided NOT to because of a few reasons. The High Court challenge will be on planning grounds and the Council is much more competent to cover those angles. We don't have the finance to go to the High Court. Our leading members are no longer able to take on the mammoth task of feeding Solicitors and Barristers. However, we have decided to attack the Environment Agency and the HPA (Health Protection Agency) for their incompetent role in (not) protecting the public. So Press releases continue and we are planning a summer/autumn campaign strategy.

3.10.1 How could Peel Energy win the planning case on air quality grounds and what does the Secretary of State's decision mean for communities elsewhere?

At the time of writing this report, the High Court is still to decide on Trafford Council's legal challenge to the Secretary of State's decision to grant Peel Energy's appeal and application. Yet the Council's challenge focusses entirely on planning issues related to waste policies and strategy, not on air quality – a decision based undoubtedly on the legal advice Trafford Council had received. Whatever the outcome regarding the proposed power station will be, the decision that it does not contravene planning policy on air quality grounds will therefore stand.

How could such a decision have been made when planning policy clearly states that breaches of national and EU air quality standards and compliance with local air quality action plans should have been considered?

To understand what happened, we need to first look at the concept of 'dual responsibilities' between planners and the Environment Agency.

Any plant that burns waste wood requires an environmental permit under the Waste Incineration Directive. Larger biomass power stations burning virgin wood will require a different permit, also from the Environment Agency. An environment permit sets out a maximum rate at which different pollutants may be emitted from chimneys (with the overall amount of emissions dependent on both the rate of emissions and the size of a plant). When granting a permit, the Environment Agency should consider whether local air pollution limits are being, or may be, breached. An environmental permit can be granted before or after planning permission has been obtained (or for that matter refused by planners).

The planning authority, in this case Trafford Council, on the other hand, is

supposed to consider whether legal air pollution limits would be breached by a new development or whether existing breaches would be made worse. New polluting developments can still be approved if the level of additional pollution is deemed insignificant. In a planning case such as this one, the debate centres on how significant the new pollution will be.

When making their decision, however, the planning authority must take account of the Environment Agency's position and they must assume that if the Environment Agency grants or has already granted a permit, all the conditions in it will be fully met and enforced. This would make perfect sense if the Environment Agency applied a stringent test before granting a permit and, above all, if all permitting conditions were promptly and strictly enforced. Yet this is far from the case.

Rather than carefully assessing the merits of every permit application, the Environment Agency has so far never refused a single application for a permit under the Waste Incineration Directive, regardless of the design and circumstances. [49] Not all emissions are regularly monitored – some are only recorded 'periodically', some not at all. And most seriously, enforcement of permitting conditions tends to be so lax that companies can be confident of not having a plant that cannot meet them shut down.

When Peel Energy first applied for planning permission in Davyhulme, the Council's Environmental Health Officer advised



Photograph 10: Impression of the Barton Renewable Energy Plant – aesthetic designs can't hide air pollution impacts.

What does it take for an environmental permit to be withdrawn?

On 27th August, the Scottish Environment Protection Agency (SEPA) gave a month's notice of withdrawing an environmental permit under the Waste Incineration Directive, in this case for a waste gasifier (not a biomass plant, but one with the same type of permit as any biomass plant burning waste wood). [50] The plant in question, operated by Scotgen, started gasifying municipal solid waste in December 2009. Since then, although the plant was shut down for significant periods between 2009 and 2013, there have been hundreds of breaches of air emission limits, dozens of noise complaints and at least 88 by-pass stack activations [51] – i.e. incidents in which polluted gases were vented straight into the atmosphere, bypassing the scrubbers/filters, in order to prevent an explosion. The notice to withdraw the permit was issued after an explosion and a major fire in July 2013 and after the company then failed to comply with a request to remove partially burned waste from the site. [52] If the company was to appeal against the notice to withdraw the permit, they would be allowed to keep operating throughout the appeal. If this is the level of permit breaches required to trigger a decision to close down a plant operating as a waste incinerator, communities have little ground to hope that such a permit will protect them. There are no reasons to think that the Environment Agency in England and Wales would have acted differently from their Scottish counterparts.



Photograph 11: Fire at Scotgen's Dargavel plant

that the power station would significantly worsen the already unlawfully high NO₂ levels nearby, unless the rate of stack emissions could be kept far below what any similar power station or incinerator would normally emit. This conclusion has never been disputed, neither by Peel Energy or the Environment Agency. Yet soon after this advice was given, Peel Energy submitted a deeply flawed document in which they claimed that they could guarantee such an unlikely low rate of emissions. As Biofuelwatch pointed out to planners and the Environment Agency, Peel's 'evidence' included 'emission figures' from other plants which had not even built and contradicted emission figures from ones already in operation. [53]

While the members of the Planning Committee shared the concerns about air quality impacts and refused the application, the Environment Agency did not. After the application was refused and before an Appeal

was heard, they proceeded to grant a permit, setting the very stringent nitrogen oxide (NO_x) limit identified as necessary by the Council's Environmental Health Officer. [54]

Essentially, this Environment Agency permit allowed Peel Energy to have the Council's planning refusal on air quality grounds overturned on Appeal. The Planning Inspector further stressed that objectors had not challenged the permitting decision through the courts, an option the Breathe Clean Air Group was unaware of and could not have afforded.

Peel Energy could even, at a later stage, apply for a change of the permit so as to emit more NO_x, without the local authority having any say in the matter. After all, another biomass power station developer, Prenergy, obtained planning permission and an environmental permit and subsequently persuaded the Environment Agency to change the permit and allow them to pollute even more than they were

originally allowed to. [55]

So here is a summary of the bizarre reasoning for approving a highly polluting power station in a heavily polluted area: Peel Energy applied for a permit with the promise that they could emit less NO_x than any other power plant of this type. The Environment Agency, which never refuses such a permit application, duly approved it. Planners are forced to assume that those conditions will be fully met and enforced. Yet all of the evidence from other biomass power stations, particularly ones burning treated waste wood, indicates that Peel Energy will be unable to meet those permitting conditions. Experience elsewhere in the UK suggests that the Environment Agency will be highly unlikely to shut down the plant if it emits far more NO_x. Yet under planning policy, planners are forced to ignore all of this evidence.

This is just one of many different ways in which developers have been able to obtain planning permits for highly polluting developments, regardless of legal air quality limits and threats to people's health.

For references & notes please click on reference numbers, or see:
<http://www.biofuelwatch.org.uk/2013/report-references/>

3.11 Is There a Link Between Biomass Power Station Location and Deprivation?

There has been a substantial amount of research into whether there is a relationship between where polluting industries are located and the make up of the communities who live near to them and suffer their impacts. This is an issue of environmental justice, which can be defined as *a human right to equal access to a clean environment and equal protection from possible environmental harm irrespective of race, income, class, or any other differentiating feature of socio-economic status* [1].

Studies from the United States have found evidence to suggest that polluting industries often have a disproportionate impact on more deprived communities, including lower class communities and communities of colour [2]. While not as much research has been conducted on this topic in the UK, in recent years notable studies have emerged that have found a geographic relationship between factory location, levels of air pollution and poverty [3].

As a result of this evidence, Biofuelwatch undertook its own investigation looking at the levels of deprivation in communities located near to biomass power stations in England and Scotland.

3.11.1 The Indices of Multiple Deprivation

In order to assess the deprivation of communities living near to biomass power stations we used the *Indices of Multiple Deprivation (IMD)*, a qualitative study of deprivation across the UK. Separate indices have been developed for Scotland, England, Wales and Northern Ireland and the results are available online [4]. Use of the IMD in this way, has been used in similar studies [5].

The indices are based on the concept that *deprivation* consists of more than just poverty. Poverty usually refers to a lack of money, whereas deprivation refers to a general lack of

resources and opportunities. As such the index is a composite measurement which takes into account: income, employment, health deprivation and disability, education skills and training, barriers to housing and services, crime and living environment.

Each country is broken down into small areas of roughly 1,500 people which are then ranked from the *least deprived* to the *most deprived*, relative to one another. Because different indices exist for England and Scotland it has not been possible to do a statistical analysis for both in combination, and so the situation is discussed for each separately.

3.11.2 Biomass Power Station Location

This investigation took into account all areas which fall within a 1km radius of any proposed and/or approved biomass power station developments as well as any existing operating biomass power stations in England and Scotland with a minimum of 15 MW capacity [6]. These are collectively referred to as 'power stations' throughout the text, although they are at different stages of development.

Please note that power stations which have been closed down or for which plans have been refused or withdrawn were not included in the data set. Neither were coal power stations which are either co-firing biomass or being partially or fully converted to biomass. This is due to the fact that these are long-standing existing power stations, with coal combustion resulting in similar levels of air pollution as biomass combustion.

The deprivation ranks were collected for all the individual areas that fell within this 1km geographical boundary and the combined ranks were then averaged and population weighted to give a final **Biomass Power Station Index of Multiple Deprivation (IMD) rank**. While biomass power station pollutants will impact people beyond this 1km boundary, the effects

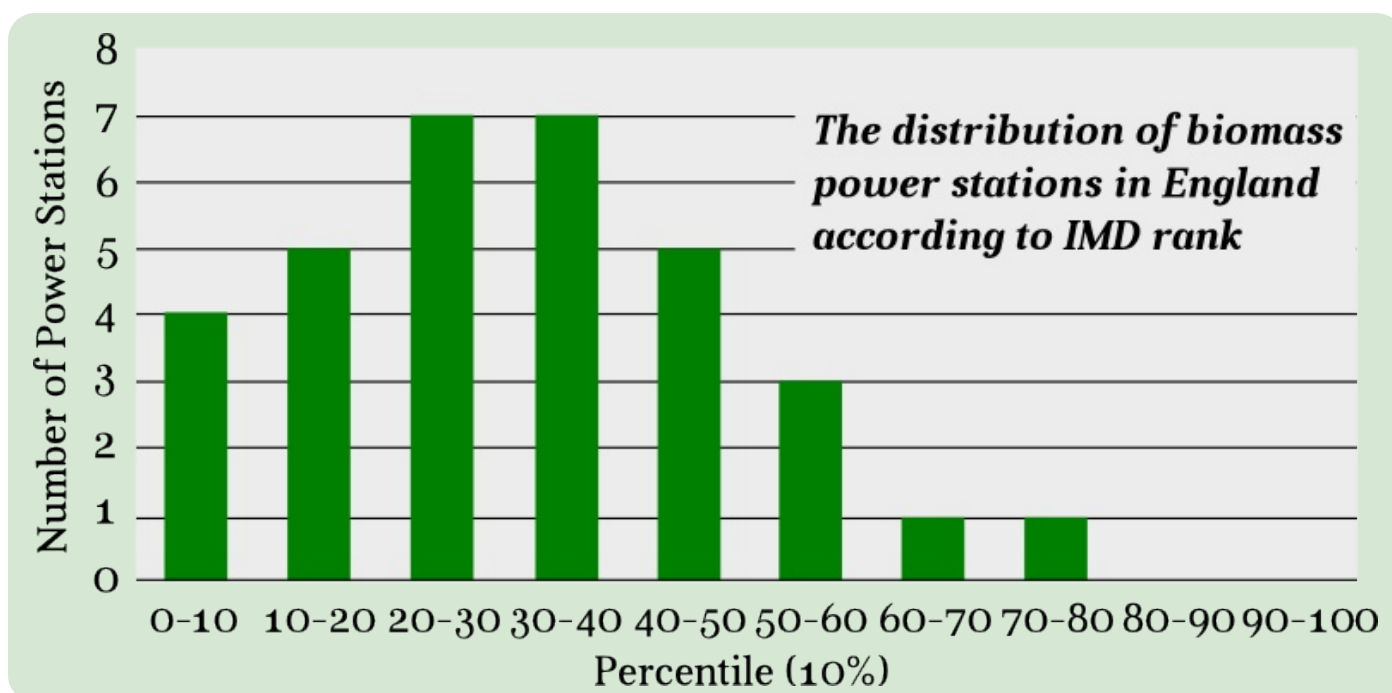


Figure 1: This graph describes the distribution of power stations in England according to their IMD rank: 0 – 10 contains power stations that fall within the 10% lowest (most deprived) IMD rank range and 90 – 100 contains power stations that fall within the 10% highest (least deprived) IMD rank range

will be most severe on those living closest and the scope of this particular study had to be kept necessarily narrow.

For more information on the methodology employed in this investigation and for the full data set, please see:

<http://biofuelwatch.org.uk/2013/chain-of-destruction/>

3.11.3 Biomass Power Stations in England

We have identified **33 dedicated biomass power stations** either proposed, already approved, or currently operating in England.

In England the IMD ranges from **rank 1** (the most deprived) to **rank 32,482** (the least deprived.)

The graph below describes the distribution of biomass power stations across the Index of Multiple Deprivation range. This range has been broken up into 10% segments called “percentiles” and power stations have been grouped into these percentiles depending on their individual ranking, in order to be able to see where the majority of power stations fall.

For example, percentile 0 – 10 covers the IMD ranks from 0 to 3248.2 and percentile 90 – 100 covers the IMD ranks from 29233.8 to 32482.

By arranging the data in this way, we can see that although the graph follows a normal (bell-shaped) distribution, it is skewed to the lower (more deprived) end of the range, with no biomass power stations found in the least deprived areas and the vast majority found in areas with above-average deprivation (i.e. below the 50th percentile). The greatest number of power stations (7) fall within the 20 – 30 percentile (IMD rank: 6496.4 – 9744.6) and (7) in the 30 – 40 percentile (IMD rank: 9744.6 – 12992.8).

This shows that biomass power stations in England are located in areas with a **lower** IMD rank and are therefore in places which are relatively **more deprived** than other parts of England.

3.11.4 Biomass Power Stations in Scotland

We have identified **11 dedicated biomass power stations** either proposed, already approved, or currently operating throughout Scotland (summarised in Table 1 opposite).

In Scotland the IMD ranges from **rank 1** (the most deprived) to **rank 6,505** (the least deprived).

While this data set is not large enough from which to gain any conclusive evidence, it is interesting to note that 6 of the 11 power stations in Scotland have IMD ranks which fall within the lower half (50%) of the deprivation range, and that no power stations have an IMD rank which falls above the 60 – 70 percentile.

This could suggest a slight skew towards locations with mid - lower deprivation indices, however it is not as pronounced as in the case of England and would need further investigation to prove a relationship. We note, however, that all proposed power stations with more than 50 MW capacity (Dundee, Rosyth, Markinch and Grangemouth) are in more deprived areas.

3.11.5 Conclusions, limitations and suggestions for further research

The data reveals an indication that biomass power stations in England are located in more deprived areas. However, discovering whether such a relationship exists in Scotland, must be a subject of further study, as the smaller data set available for analysis have been a limiting factor here. Nonetheless the limited data suggest a possible trend towards the lower end of the deprivation range. This should be enough reason to investigate this further.

We have chosen not to investigate a possible relationship between power station size, location and deprivation in any depth. This is because power station size is only one factor that affects air emissions, together with power station and mitigation technologies and type of feedstock (e.g. virgin or treated waste wood).

<i>Biomass Power Station</i>	<i>IMD Rank</i>
Dundee	1921.6
Calachem Grangemouth biomass CHP plant	2109.13
Rosyth	2723.03
Tullis Paper Mill, Markinch	2794.44
Steven's Croft	3019
Grangemouth	3196.74
Fort William Biomass Plant	3296.9
Stoneywood Mill Biomass Plant	3547.13
Craigellachie Wood, Moray	3899
Kincardine Biomass Power Station	3900
Irvine Paper Mill CHP Plant	4014.89

Table 1: Biomass power stations in Scotland and their IMD Ranks

This study was also limited in that, unfortunately, the ranks for the English Indices of Deprivation cannot be compared with the indices produced in Scotland. Although based on the same concept and general methodology, there are differences in the domains and indicators, the spatial scale at which the indices are presented and the time points on which they are based.

To our knowledge this is the only study of its kind to have been thus far attempted for biomass power stations in England and Scotland. We strongly recommend that further investigation should be undertaken into this important area of study. Additional investigations could focus on extending the geographical border beyond 1km to take into account the fact that people living beyond this range will most certainly be affected by pollutants from biomass power stations.

The fact that a wealth of research quite clearly points to the conclusion that hazardous sites are disproportionately located in areas with high levels of deprivation, is enough to warrant a careful look at the location of biomass power stations. Environmental justice has yet to feature prominently on the UK political agenda, but it is high time that it did.

4. GE Trees for Biomass

by Rachel Smolker

Tree species have been subjected to genetic modification for various purposes ranging from resistance to disease, insects and herbicides, to bioremediation, to “improved” wood characteristics. A 2008 review from World Rainforest Movement reported research and testing underway around the world, including the USA, Canada, several European countries, Brazil, Chile, Uruguay, China, Japan, Indonesia, Thailand, New Zealand and Israel. [1]

With subsidies and supports for bioenergy expanding and projections for massive future expansion, there is growing incentive for biotechnology companies to genetically engineer trees specifically to meet the potentially huge new demand. Pine, eucalyptus and poplar especially have been subjected to ongoing research aimed to make them easier and faster to grow, (“more biomass”) and to render their wood more easily converted into fuels and chemicals via fermentation (usually by reducing lignin or increasing cellulose content in the wood).

Much investment and testing of engineered tree species is underway in the USA, where the federal government recently (in 2010) permitted very extensive field testing of an engineered eucalyptus variety developed by the company ArborGen. ArborGen emerged from a joint forest biotechnology venture between Monsanto, International Paper, Westvaco and New Zealand based Fletcher Forests. Monsanto quickly dropped out, Fletcher Forests

became Rubicon and Westvaco became MeadWestvaco. ArborGen has operations in the US, Brazil, New Zealand and Australasia and see emerging markets for bioenergy as a huge profit potential, stating: “ArborGen is uniquely poised and ready to meet the growing demand for woody biomass for wood, fiber and energy. We are focused on improving the productivity of trees to meet the country’s renewable biomass needs through the application of several technologies.” [2] They regard bioenergy markets as a rising potential for profits: ArborGen has applied for deregulation to allow them to commercially plant genetically engineered eucalyptus that is freeze tolerant, i.e. able to grow in cooler climates, and has male sterility traits, although they have also worked on other traits, including changes to lignin content. Freeze resistance could allow fast-growing eucalyptus plantations to be established across subtropical and temperate regions, a boon for pellet companies (particularly ones supplying dedicated biomass power stations).

In spite of a legal challenge to prevent the



Photograph 1: Eucalyptus clones at nursery - these aren't GE as locations of these are kept secret. *Petermann/ Global Justice Ecology Project*

testing, approval was granted to plant over 200,000 genetically engineered trees in 7 US states as a so-called 'test'. [3] The legal challenge did, however, prevent ArborGen from going public on the NASDAQ stock market due to investor fears over lengthy litigation battles.

ArborGen is now seeking deregulation for this engineered eucalyptus.

[4] They have strategically placed key representatives inside two federal government departments, the US Department of Agriculture (USDA) and the US Department of Energy (DOE) and have representation in the Joint Bioenergy Institute, (run by Lawrence Berkeley National Laboratory, Lawrence Livermore Laboratories and others). With an overall push by the Obama administration to make deregulation of GMOs much hastier and more "streamlined" in the USA, (with far less public oversight), there is a strong possibility that ArborGen's eucalyptus could be deregulated soon. This would be the first commercial release of a GE tree in North America. Right now the USDA is preparing a draft Environmental Impact Statement on the deregulation of ArborGen's tested GE eucalyptus trees, which is the first step toward legalizing them.

ArborGen also has operations in South America, especially in Brazil, which has a very large forestry sector, already with millions of hectares of non GMO eucalyptus.

As mentioned in the case report about Suzano Papel e Celulose earlier in the report, Suzano's subsidiary company Futuragen is testing genetically engineered eucalyptus in Brazil and seeking deregulation. [5] They have received significant funding specifically related to research bioenergy applications.

The only widespread uncontrolled release



Photograph 2: Protest at the International Tree Biotechnology 2013 conerence in Asheville, North Carolina, which took place from 25th May to 1st June. *Langelle Photography*

of genetically engineered trees so far involved a poplar engineered to resist pests that was planted widely across China, which has a long history of involvement with tree biotechnology. [6] Since then, it was reported that due to lack of oversight, there is no longer any means to track where those engineered trees were planted. [7] In 2004 the Nanjing Institute of Environmental Science reported that the GE poplars in China were already contaminating native poplars. [8]

Field trials of engineered poplar and other species have been carried out in several European countries: Researchers from the University of Ghent (Belgium) and Flanders Institute of Biotechnology, in collaboration with Great Lakes Bioenergy Research Center and Bio Pilot Plant Base Europe are developing what they refer to as "Energy Poplar" – engineered to facilitate conversion into ethanol. [9] In Poland, scientists at the Warsaw University of Life Sciences are also working to engineer poplar for bioenergy. [10] And in Sweden, the company Swetree is researching poplar, eucalyptus and spruce and testing an aspen [11] for biomass production. In the UK, attempts to test GE poplar (by AstraZeneca) were thwarted when protesters destroyed the plots. [12] Not all genetic engineering of trees for bioenergy relates to biomass combustion: Some is aimed at facilitating the conversion of wood to liquid biofuels and different traits would be required

for this compared to pellet production for power stations.

Again in the US, in 2011 a USDA/DOE grant totaling over \$ 136 million (£63 million) was made to a consortium of industry and academic institutions in the Pacific Northwest (University of Washington, Washington State, Oregon State, Weyerhaeuser and others) to develop wood based biofuels. This included support for GMO poplar development. [13] Public opposition to engineered trees is very strong and growing. Field trials of engineered trees, in a number of sites, have been deliberately destroyed in protest. [14] A global campaign of resistance including more than 245 organizations from 49 countries is working to raise awareness and build opposition using tactics ranging from calling for a ban under international treaties to legal challenges against permits, to protests and arrests, as occurred at the recent “Tree Biotechnology 2013” industry conference held in the US state of North Carolina. [15]

Experience with GMO food crops has clearly shown that containment is simply not possible, and that there are inevitable and unpredictable negative impacts. Engineered versions of native trees, which are long lived, spread their seeds and pollen very widely and have numerous wild relatives are even more likely to cross contaminate and could present other risks to ecosystems where they are grown. [16] In addition, growing vast monocultures of fast-growing GE trees, whether native or not, have dangerous social and ecological impacts, including soil and water depletion and increased risk of fire.

ArborGen’s motto is “more wood, less land”. However, demand for wood continues to expand – now for bioenergy on top of already unsustainable demand for pulp and timber. So long as the demand continues to grow, so will the amount of land converted to industrial monocultures to satisfy that demand, including, potentially, engineered trees.

For references & notes please click on reference numbers, or see:
<http://www.biofuelwatch.org.uk/2013/report-references/>

5. Conclusion

The impacts described in this report - from the forests of the Americas to the communities living in the shadow of biomass infrastructure in the UK - reinforce our argument that large-scale biomass as a means of generating energy can never be "sustainable", "renewable" or "green". The impacts of this industry, the policies which govern it, the support mechanisms that promote it, and the speculative investments that result from it, are real and substantial. Further still, they allow us to glimpse what the consequences are for places like the Cerrado of the Baixo Parnaíba, North Carolina's ancient wetland forests and British Columbia's old growth trees, if current biomass plans are allowed to be realised.

A major shift in policy away from large-scale combustion and towards sustainable and genuinely climate-friendly renewable energy, coupled with much lower levels of energy use in the UK, is necessary to prevent the impacts described in this report from escalating. For this to happen, governments, industry, and the public must remove large-scale biomass from definitions of renewable energy and call it what it really is: polluting, destructive and unsustainable energy.

Key findings of this report:

1. UK support for industrial-scale biomass for electricity is having measurable impacts on forests internationally. In particular, demand from UK coal to biomass conversions, and especially Drax, is resulting in the increased destruction of highly diverse forests in the southern US. While in Canada, forests are coming under increasing pressure from the logging industry and the growth of the pellet industry. Pellet exports to the UK from these areas are set to increase substantially.

2. Land-grabs in North Eastern Brazil, for eucalyptus plantations destined for biomass power stations, have led to the destruction of forest ecosystems and communities losing access to their land and water resources. UK-based MGT Power are driving this demand.

3. UK-based communities living near biomass power infrastructure are experiencing worsening air quality and are not being protected by planning legislation. The legislative system is making it extremely hard for communities to play a part in decision-making, and is biased in favour of the developer.

4. More deprived communities in England are bearing a disproportionate burden of the impacts of the UK's current biomass boom.

5. With increasing demand for greater volumes of faster growing trees, biomass producers are turning to genetic engineering to increase yields.

We are calling for:

1. Large-scale industrial bioenergy to be removed from definitions of "renewable energy". The term "renewable" must be formalized to reflect the real costs to the environment and public health.
2. An end to subsidies, including targets and other state incentives, for industrial bioenergy.
3. A major policy shift away from large-scale energy generation through combustion, towards our energy needs being satisfied through a combination of genuinely climate-friendly renewable energy and a substantial reduction in both energy generation and use.

Biomass: The Chain of Destruction

October 2013

Report Authors: Almuth Ernsting, Sophie Bastable & Oliver Munnion

Eucalyptus plantations for Energy Authors: Ivonete Gonçalves de Souza & Winnie Overbeek

GE Trees for Biomass Author: Rachel Smolker

Contributors: Danna Smith, Alison Davies, Donna Liley, Pete Kilvert & Duncan Law

For full references & notes please see <http://biofuelwatch.org.uk/2013/report-references/>

Thanks to the Network for Social Change for funding this report

Printed on 100% recycled paper

<http://biofuelwatch.org.uk/>



This work is licensed under a [Creative Commons Attribution-NonCommercial 3.0 Unported License](https://creativecommons.org/licenses/by-nc/3.0/).