SUSTAINABLE BIOMASS:

A Modern Myth

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A review of standards, criteria, and schemes certifying industrial biomass as "sustainable", with particular emphasis on UK biomass electricity developments

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biofuelwatch

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Abbreviations: *Asia Pulp and Paper, (APP); Clean Development Mechanism, (CDM); Consumer Goods Forum, (CGF); Centre for International Forestry Research, (CIFOR); Central Point of Expertise on Timber Procurement, (CPET); Canadian Standards Association, (CSA); Control Union Certificates, (CUC); Department of Energy and Climate Change, (DECC); Department for Environment, Food and Rural Affairs, (Defra); Forest Law Enforcement, Governance and Trade, (FLEGT); Forestry Stewardship Council, (FSC); Global Forest Coalition, (GFC); Global Forest Cover Loss, (GFCL); Green Gold Label, (GGL); Hans Merensky Holdings, (HMH); International Panel on Climate Change, (IPCC); Initiative Wood Pellet Buyers, (IWPB); Programme for the Endorsement of Forest Certification, (PEFC); Medicines and Healthcare Products Regulatory Authority, (MHPRA); Renewable Obligation Certificates, (ROCs); Sustainable Forestry Initiative, (SFI); Scottish Southern Electric, (SSE); UN Framework Convention on Climate Change, (UNFCCC); United Nations Industrial Development Organisation, (UNIDO); Underwriters Laboratories (UL); World Health Organisation,(WHO); Whole Tree Harvesting, (WTH).*

1 Introduction

The UK is at the forefront of large-scale industrial bioenergy expansion—mostly wood burning for electricity. Industry plans, if realised, will result in nine times as much wood being burnt for electricity every year as the UK produces annually. From October 2013, the UK is also set to become the first country in the EU, and indeed worldwide,[1] to introduce mandatory biomass sustainability standards for all subsidised bioenergy.

This report starts with a brief overview of the UK's policies and industry plans in the global context, and of the main impacts of and concerns about large-scale industrial bioenergy. The main focus, however, is on the nature, effectiveness and feasibility of biomass sustainability standards—both those proposed by the Government and those which are already being developed by industry. This analysis starts with an overview of how certification/verification of wood supply chains actually works. Regardless of which standards or criteria are implemented, energy companies will have to employ the services of a group of specialist consultancy firms which provide inspection, verification and certification services. In general, the same consultancy firms certify according to a range of roundtable and industry certification schemes, and also provide individual verification of whichever standard a company wants or needs to meet. After looking in detail at some of the companies providing such services, we will discuss some of the main industry-led initiatives, including biomass sustainability policies and claims put forward by four of the UK's largest bioenergy investors. We will then look at the two main forestry certification schemes, since they play an increasingly important role in biomass sustainability certification: these are the Programme for the Endorsement of Forest Certification (PEFC) and the Forestry Stewardship Council (FSC).

This overview will be followed by an in-depth analysis of the sustainability standards that are being developed by the UK Government. We will then discuss whether or not better, more science-based greenhouse gas standards for bioenergy, would offer a credible solution.

Finally, we will look briefly at some of the concrete "myths" put forward by the biomass industry and their supporters regarding "sustainable biomass", namely, the claims that:

1. Ample and spare biomass from beetle-infested forests in the North America is plentifully available for bioenergy and should be used for that purpose, (justifying highly damaging "salvage logging"),
2. Forests require thinning to reduce fire risks, justifying increased logging for bioenergy, and,
3. Large areas of marginal, abandoned or waste lands are available worldwide for new biomass tree plantations.

The analysis reveals and critiques a series of assumptions about "biomass sustainability," including the fundamental assumption that biomass standards, as proposed by the UK Government, can in fact effectively prevent the worst direct and indirect impact on forests, climate and communities. Similarly, we uncover the assumptions that energy companies' policies or forest certification schemes provide reliable assurance that a given shipment of woodchips or pellets is not linked to biodiversity destruction, destructive clearcutting, forest and grassland conversion to plantations, land-grabbing or other abuses. We also examine the assumption that "independent verification" of companies' sustainability claims is genuinely independent and trustworthy.

The report focuses entirely on large-scale industrial bioenergy, specifically on biomass electricity, the key sector for bioenergy expansion in the UK and in several other countries. Many people believe that there is a potential for sustainable local small-scale biomass production and use, for example from traditional coppicing in the UK. However

[1] Although no other country has as yet approved mandatory sustainability standards, the state of Massachusetts has done so. We have not considered the Massachusetts rules in this report and the context differs insofar as biomass imports are not expected to play any significant role for US bioenergy.

important this may be, it is not the subject of this report. The sustainability myths exposed relate entirely to claims made about large-scale industrial bioenergy—not small-scale local biomass production and use.

2 The UK's biomass boom in the global context

Industrial wood-based bioenergy is expanding rapidly, particularly in Europe and North America. Developments can be compared with those in biofuel markets in 2005. Rapid demand expansion is expected, fuelled by public subsidies and targets, yet the time-lag in building the infrastructure (power stations, pellet plants, new shipping facilities, etc.) means that the full consequences on forests, land-use and communities have yet to be felt.

In the EU, a 20% renewable energy target by 2020 represents a keystone of the EU's greenhouse gas reduction target. Most of that target will be met from burning biomass. When EU Member States put forward their renewable energy plans in 2010, they envisioned 54.5% of renewable energy to come from bioenergy, including biofuels, but with the majority to come from burning wood for heat and electricity.[1] This will require an additional 100-200 m^3 of wood for bioenergy per year by 2020,[2] which converts to around 80-154 million green tonnes.[2]

However, industry plans announced to date far exceed even Member States' ambitions: we project that in the UK alone, the biomass industry plans to burn more than 90 million green tonnes of wood for electricity a year (not including projected expansion of biomass for heat) which is nine times as much as the UK's total annual wood production (see Figure 1). [3] Generous subsidies, paid as Renewable Obligation Certificates, are the main driver for fast-growing industry investments in biomass electricity: industry plans announced so far will, if realised, attract around £4 billion in subsidies every year. Energy companies are investing in and proposing a fast-growing number of dedicated biomass power stations. The largest of these (proposed at Port Talbot), with a 350 MW capacity, would require around 3.5 million green tonnes of wood a year.

While generous subsidies have been guaranteed long-term for purpose-built biomass power stations,[3] the Government's Bioenergy Strategy particularly encourages the conversion of coal power stations to biomass, claiming that this will "replace coal."[4] In reality, however, the two most advanced UK biomass conversion schemes, RWE Npower's Tilbury B and E.On's Ironbridge, are for power stations which would otherwise have to close by the end of 2015 at the latest because their sulphur dioxide emissions exceed legal EU standards.[4] Tilbury B's biomass capacity of 750 MW is substantially larger than that of any other biomass-burning power stations in the world and will require 7.5 million green tonnes of wood a year. So far, however, it has only operated for a short period of time and at much reduced capacity due to a major fire in February 2012. The biggest user of biomass for energy in the UK to date has been Drax, which is co-firing biomass with coal. It it is looking to convert half its capacity entirely to burn solely biomass.

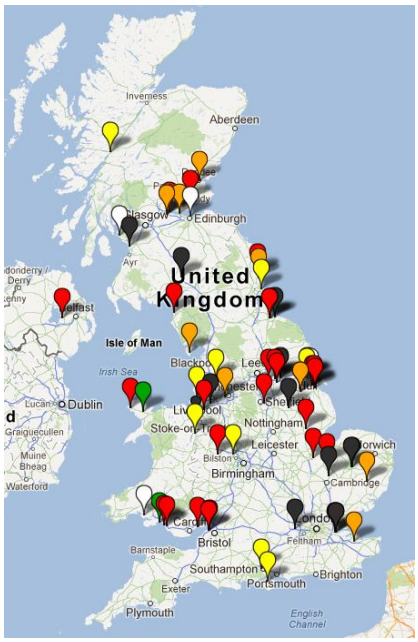

Figure 1 – **Biofuelwatch map of approved (red), proposed (orange, yellow) and operating (black) biomass power stations in the UK as of September 2012.**

Bioenergy policy and subsidies are devolved in Scotland. The Scottish Government has acknowledged serious problems with large-scale industrial biomass electricity and with the expansion policy pursued by the UK Government.[5] However, at the time of writing, a major Scottish decision about the future of the biomass electricity subsidy is overdue and remains outstanding.

The scale of the fast-growing demand for bioenergy in the UK and other European countries means that the EU is increasingly reliant on biomass imports. Most of these imports currently come from Canada, the southern US, East-

[2] Green tonnes include the amount of moisture which wood has when it is taken from a forest or plantation.

[3] This figure has been calculated based on regularly updated published information compiled at `www.biofuelwatch.org.uk/wp-content/maps/uk-biomass.html`

[4] Although biomass combustion results in similar levels of air pollution as coal burning overall, it emits significantly less sulphur dioxide.

ern Europe and Russia. However, according to both the European biomass industry and to a 2012 report commissioned by the European Parliament's Directorate General for External Policies of the Union, future growth in imports will primarily come from South America (especially Brazil) and Central & West Africa.[6]

According to industry estimates, Mozambique, Indonesia, and countries in South America and Central & West Africa have a particularly great potential for increased 'wood harvesting' for biomass,[7] even though these are regions with high existing rates of forest destruction and degradation.

While there is much talk about using "residues", traditional residues from sawmills and pulp mills tend to be fully used in Europe and elsewhere. Additional "residues" are generally ones that come from more harmful logging methods, such as stump, brash and deadwood removal, with serious consequences for soil fertility, soil carbon, biodiversity and future tree growth.[8] In any case, across Europe and North America, bioenergy power stations are increasingly relying on burning wood from whole trees cut for this purpose. This is already resulting in more intensive and destructive logging, and in further expansion of monoculture tree plantations at the expense of forests and other biodiverse ecosystems. Examples have been documented from the southern US, Canada, Germany, Sweden and other parts of Europe. A Greenpeace Canada report describes some of the impacts being felt in parts of Canada:

"New biomass policies in provinces like Québec and Ontario encourage whole-tree harvesting (WTH), a technique that has been criticized by the scientific community for decades because of the ecological damage it causes through impacts on nutrient cycling. Because it is cheaper, faster and more convenient to cut an entire tree, remove its branches at the roadside, use the stem for lumber and the rest (top, branches) for bioenergy, the biomass boom encourages this destructive technique...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."[9]

In addition to the issues of Whole Tree Harvesting, European industry analysis forecasts that most of the global increase in bioenergy will in fact come from new and expanded industrial plantations, increasingly in southern countries.[10] Plantation expansion is also likely as an *indirect* impact if wood from existing plantations currently used for pulp and paper is diverted to bioenergy.

3 Growing concerns

Scientists, NGOs, and affected communities are becoming increasingly alarmed by the UK and EU bioenergy policies and their effects on climate, forests and people.

A detailed discussion of these impacts can be found elsewhere,[5] however, here is a very brief overview:

3.1 Impacts on forests and climate

Unsustainable demand for wood and wood products is already a key driver of the destruction of forests worldwide.[11] The creation of a large new global market for wood, this time for bioenergy, can be expected to greatly increase overall pressures on forests as well as on other ecosystems, such as grasslands, which are increasingly being converted to new monoculture tree plantations. The demand for bioenergy is already resulting in more aggressive logging practices, including more clearcutting, stump and other residue removal, and the expansion of monoculture tree plantations in Brazil, Ghana and elsewhere.

Figure 2 – **Eucalyptus plantations in Brazil such as this one in Bahia are set to increase due to new demand for biomass from Europe and the UK. Photo courtesy of Rainforest Rescue**

A growing number of scientific studies show that burning wood for energy generally results in a carbon debt of decades or even centuries compared with fossil fuels which might otherwise have been burnt. Several of these studies are discussed in more detail in Chapter 8 below. The Scientific Committee of the European Environment Agency has warned of the consequences of the mistaken assumption that bioenergy is carbon neutral: *"Based on the assumption that all burning of biomass would not add carbon to the air, several reports have suggested that bioenergy could or should provide 20% to 50% of the world's energy needs in coming decades. Doing so would require doubling or tripling the total amount of plant material currently*

[5] See resources at the Biofuelwatch or Energy Justice websites, `www.biofuelwatch.org.uk/category/reports/biomass/` or `http://www.energyjustice.net/biomass/`

harvested from the planet's land. Such an increase in harvested material would compete with other needs, such as providing food for a growing population, and would place enormous pressures on the Earth's land-based ecosystems. Indeed, current harvests, while immensely valuable for human well-being, have already caused enormous loss of habitat by affecting perhaps 75% of the world's ice- and desert-free land, depleting water supplies, and releasing large quantities of carbon into the air."[12]

3.2 Land-grabbing

Across the global South, industrial tree plantations are expanding at the expense of grasslands, farmlands and forests, and leading to land-grabs, threatening the livelihoods and rights of pastoralists, small farmers, rural communities, and forest-dependent peoples. A 2012 report commissioned by the European Parliament warns that many of the countries regarded by industry as future wood pellet suppliers to Europe are ones with high levels of foreign private sector investment in land and little legal/state protection of communities from land-grabbing, such as Cameroon, Ghana or Mozambique. The report further warns of increased competition for water and "water rights grabs" by plantation companies, loss of land used for growing food for local communities and loss of forests and other lands used by communities to meet a wide range of needs, including their need for woodfuel for cooking.[13]

Brazil aims to become a major exporter of wood pellets to Europe, and plantation expansion for this purpose has already commenced. In 2011, the Brazilian government released plans to more than double the tree plantation area to 15 million hectares, both for paper and bioenergy. This will more than triple the role of Brazilian tree plantation wood in international markets to $25 billion.[14] Brazilian plantation company Suzano Papel e Celulose has announced plans to invest $1.3 billion in biomass plantations and five pellet plants. It has entered into a Memorandum of Understanding to supply wood pellets to UK energy company MGT Power. Suzano's existing plantations in the Northeast of Brazil are linked to serious land conflicts with traditional Quilombola communities.[15]

3.3 Impacts on communities living near biomass power stations

Biomass power stations in the UK and several other countries are increasingly opposed by communities, largely because of local impacts. Air quality and public health are of particular concern. These concerns are broadly similar to those related to coal combustion.

According to figures from the US Environmental Protection Agency, burning "clean"— i.e. not chemically treated—wood emits 79 different pollutants.[16] These include nitrogen oxides, sulphur dioxide and small particulates, dioxins and furans, formaldehyde, benzene, cadmium, arsenic and chromium and lead. Some of these are linked to respiratory and heart disease, others to cancer, birth defects and other health problems. Burning chemically treated wood emits even more different pollutants, as well as higher rates of dioxins and furans, heavy metals and some other toxins.

Figure 3 – **Drax power station, the UK's largest coal-burning power station, has so far been the UK's largest burner of biomass. Both biomass and coal are heavy polluters - yet air quality impacts of biomass are not addressed by any sustainability standards in the UK. IStock Photos**

Former UK Energy Minister Jim Fitzpatrick cited Government-commissioned research to the House of Commons in 2009 which showed that "ambitious" scaling up of biomass in the UK will lead to between 340,000 and 1.75 million life years being lost in 2020 due to the impacts of such pollution.[17]

Air quality impacts are not addressed by any biomass sustainability standards or related policies. Like many other governments, the UK government argues that air pollution threats to communities are addressed through existing planning policies and environmental permitting rules enforced by the Environment Agency. Yet both have been widely criticised as grossly inadequate. In England and Wales, legal limits for average annual concentrations of small particulates (PM10) are twice as high as those recommended by the World Health Organisation (WHO). Across the UK, legal limits for sulphur dioxide are substantially higher than WHO recommendations.[18, 19] Furthermore, the smallest and most dangerous particulates (PM 2.5) will not be subject to any nationwide legal limit until 2020, when the limit to be achieved in England and Wales will be two and a half times the WHO guideline. This, however, is not a safe limit, given that the WHO and the EU both state that there is no safe level of PM 2.5 emissions.[20] Finally, in a recent court action, the UK Government admitted to being

in breach of EU regulations to limit nitrogen dioxide concentrations. Under published government plans, in 17 out of 43 UK regions, legal nitrogen dioxide limits will not be met until after 2015, and generally not until 2020.[21] Instead of addressing unlawfully high nitrogen dioxide rates in these regions, the UK Government has pledged to work towards weakening legal EU standards.[22] Communities can thus have little confidence that their health will be protected in the rush to build new power stations, including those burning biomass.

4 The certification industry: Inspection, verification and certification companies

Sustainability certification is big business. It is set to become bigger still as there is growing interest in, and profitability from industry selling itself as "green" and "sustainable." This was evident at the recent Rio+20 Earth Summit which (though it delivered few results through its official process), saw the launch and promotion of a wide range of public-private partnerships and other industry initiatives. Those events took place outside the official process, but in many cases were supported by different UN organisations, including by the Green Industry Platform, launched by the United Nations Industrial Development Organisation (UNIDO). The Green Industry Platform seeks to bring together companies, governments and civil society leaders with the aim of *"greening the manufacturing process and creating green industries for production of goods and services for domestic use or export"*.[23] According to its key policy document, eco-labels, certification, life cycle analysis and green supply chains are to play key roles in this endeavour.[24]

The US Government announced a Partnership Dialogue between interested governments, civil society groups and the global Consumer Goods Forum (CGF). The CGF, founded in 2009, is an industry network of more than 400 retailers and manufacturers across 70 countries, representing combined sales of $3.1 trillion (£835 billion) a year.[25]

Sustainability is one of this forum's five strategic priorities, with a particular aim to *"mobilise resources within our respective businesses to help achieve zero net deforestation by 2020".* Note that the term "zero net deforestation" means that biodiverse forests can be destroyed as long as the overall area of land covered in trees, *including industrial monocultures,* remains unchanged. This terminology provides cover for the destructive practice of converting biodiverse forests to monoculture tree plantations for pulp and paper, bioenergy and possibly even palm oil and jatropha plantations, as if this were "preventing deforestation".

Voluntary certification takes centre stage. The CGF has identified four initial "action areas," or industry sectors: palm oil, soya, beef, and paper and board. Within these sectors, members are encouraged to commit to procuring certified products. This includes purchasing forest products certified by either the Forest Stewardship Council (FSC) or the Programme for the Endorsement of Forest Certification (PEFC). These are the two largest wood certification schemes which, as we shall see in Chapter 6 below, play a major role in certifying bioenergy as "sustainable".

Another recent large private-public partnership, also with high-level events held in Rio, is the Sustainable Energy for All Initiative. This brings together energy and other corporations with governments and a limited number of NGOs to boost investment in all types of energy, including bioenergy (alongside fossil fuels, nuclear, big hydro dams, etc).[26] Wood certifiers, especially the PEFC, view the initiative as another opportunity to widen the reach of sustainability certification for wood. [27]

Meanwhile, EU policies are also creating new "certification markets". When a mandatory 10% effective biofuel target was adopted as part of the EU's Renewable Energy Directive,[6] this was linked to mandatory environmental sustainability and greenhouse gas reduction standards which make access to EU biofuel markets dependent on verification that these standards have been met.[7] Companies can either obtain their individual verification, or rely, at least partly, on an accredited certification scheme. Voluntary sustainability claims are extending to the fast-growing new market for biomass for electricity and heat. In the UK, such standards are set to become mandatory from October 2013.

All of the above means booming business for what is a small group of specialist consultancy firms which verify, inspect and certify adherence to whichever sustainability standard a company has chosen or is required to meet in order to attract biofuel or biomass subsidies. Whether a timber, energy or other company chooses its own label, a national or less known industry standard, or a recognised

[6] The 10% target adopted relates to renewable energy in transport (excluding shipping and aviation) and can be met by biofuels as well as electric vehicles where electricity comes from from renewable energy. However, National Renewable Energy Action Plans submitted by EU Member States show that nearly 90% of the target are expected to be met through biofuels (see L.W.M. Beurskens *et al.*, European Research Centre of the Netherlands, 'Renewable Energy Projections as Published in the National Renewable Energy Action Plans of the European Member States' (2011)).

[7] Biofuels which fail the criteria can still be legally sold in the EU, but not count towards the target nor attract any subsidies, which means that they would be of little commercial interest.

global certification scheme such as the FSC or PEFC, chances are that it will turn to a firm belonging to the same group of private "inspection, verification and certification" companies. These businesses profit most directly from sustainability certification, labels and standards of all types. Many of them are the same companies which profit from carbon trading, as accredited verifiers for the Clean Development Mechanism and/or other schemes.

Amongst forest campaigners, there has been much debate and analysis about the respective merits or otherwise of different certification schemes, especially the FSC and PEFC. A broad overview is provided in Chapter 6 below. But what is often forgotten in this debate is that in many cases the very same services companies are responsible for certifying for FSC, PEFC and for an array of lesser known schemes and labels. These companies are not contracted by the FSC, PEFC or any other certification scheme, but are instead hired directly by the companies seeking certification under these schemes.

In order to assess the credibility and merits of biomass (and other) sustainability verification and certification, one needs to look closely at the role played by this group of services companies.

Leading certification companies include SGS, Bureau Veritas, TÜV SÜD and TÜV NORD. Each has an annual revenue of more than a billion dollars (though from a broader portfolio than sustainability verification and certification alone). Other important certifiers include Peterson Control Union (and their subsidiary, Control Union Certifications), and Scientific Information Systems.

What follows is an overview of four of these companies, including their role in biomass certification and also their past track records. What business strategies do these companies follow, whom do they serve, in whose interest do they certify, and how reliable are their findings?

4.1 Bureau Veritas

Bureau Veritas describes itself as *"a world leading, professional services company."* It offers *"bespoke solutions to help organisations achieve, maintain and demonstrate compliance with quality, health, safety, environmental and social accountability obligations."* [28]

Bureau Veritas was founded in 1828 under a different name, to provide accurate shipping information. Today, it has 48,000 employees in 1230 offices and laboratories in 140 countries, with annual revenues of 2.9 billion Euros (£2.3 billion or $3.56 billion) in 2010. It works across eight different sectors/divisions. Its clients include companies in the onshore and offshore gas & oil, aviation, nuclear power, waste incineration and mining industries.[29] Certification forms a major part of Bureau Veritas' portfolio and this includes wood certification for all purposes, including biomass:

"With 80,000 clients in more than 100 countries, delivering over 100,000 certificates, Bureau Veritas Certification is the world's leading certification body", it claims.[30] It is an accredited certifier for the FSC and PEFC globally and for a host of certification schemes in different countries, including the Brazilian forest certification scheme Cerflor, the Canadian Standards Agency and the Sustainable Forestry Initiative. It also verifies compliance with the Renewable Energy Directive standards for biofuels as well as compliance with ISO and other specific standards.

In February 2007, Bureau Veritas Certifications was suspended as accreditor of FSC certificates in Cameroon. Cameroon-based NGO Centre for Development and Environment, Greenpeace and Friends of the Earth France had raised a complaint against an FSC certificate held by Dutch timber company Wijma in Cameroon, approved by a company belonging to Bureau Veritas.[8] Bureau Veritas was asked to re-examine the certificate and found no reason to withdraw it. It claimed that Wijma's breaches of FSC standards and national forest law were not deliberate, even though one of those breaches would have been punishable by up to three years in prison in Cameroon.[31] The FSC's Accreditation Service subsequently decided that Bureau Veritas had failed to prove that Wijma was compliant with all standards and suspended it in Cameroon.[32] Wijma subsequently lost the certificate. Bureau Veritas was accredited for FSC certification in Cameroon again.[33]

Two years later, in January 2009, Bureau Veritas became temporarily suspended from certifying for the Spanish organic certification standard ENAC.[34]

4.2 SGS

4.2.1 SGS: A wide portfolio of services

SGS describes itself as the "world's leading inspection, verification, testing and certification company", with over 70,000 employees and more than 1,350 offices and laboratories. In 2011, its total revenue was 4.8 billion Swiss Francs (£3.17 billion or $4.9 billion) and its net profits were 534 million Swiss Francs (£353 million or $547 million).[35]

SGS was founded as a grain inspection company in 1878. Today, it works across a broad range of sectors and industries, with 10 divisions and 10 geographic regions.

SGS' testing, inspection and certification services cover not only sustainability standards but also a wide range of technical specifications. This offers a special advantage for example to airlines who are seeking to use bio-

[8] The original certificate was awarded by Eurocertifor, a company acquired by Bureau Veritas in 2005.

fuels, and are who are looking not just for a sustainability label but also for assurance that these fuels are technically suitable and do not jeopardise flight safety.[36] Services are offered to meet whichever relevant requirements a company might have. For example, SGS provides testing for importers seeking to comply with EU requirements that rapeseed oil imports be free from GMOs. At the same time, it offers to conduct GM field trials and provides other assistance to biotech and agribusiness companies investing in GMOs,[37] including Monsanto.[38]

"Sustainability services" form a growing part of the SGS portfolio, yet the company's 2011 Business Highlights report also lists work areas which many would see as synonymous with climate and environmental destruction.[39] These include its assistance to Australian coal companies seeking to expand their exports to Asia:

"SGS partners the coal mining industry providing extensive analysis, sampling and superintendence to drive productivity and speed to market."

Its services also extend to Alberta's tar sands industry, to which SGS promises: *"By evaluating environmental protection, SGS provides the transparency the oil sands industry needs to generate trust."*

4.2.2 SGS and bioenergy certification

SGS is at the forefront of wood certification in general, as well as bioenergy certification: *"We are pioneers in the development of verification and certification systems that recognize biomass sustainability...Our biomass verification and certification services allow you to take advantage of international markets recognizing your biofuel as sustainable. Our final verification statement can help you to meet relevant renewable energy targets and eligibility towards any financial support and investment available for your industry."* [40]

SGS certifies for the FSC, PEFC, the Sustainable Forestry Initiative (SFI)[9] and the two leading German certification systems for sustainable bioenergy, REDCert and ISCC. It is also a founding member of the Initiative Wood Pellet Buyers which is currently drawing up its own sustainability standard, discussed below in Chapter 5.7.

4.2.3 SGS' past controversies

SGS might be seen as an opportunistic company offering its services to whoever will pay, but how reliable is it in ensuring that its certificates actually guarantee what is on paper, i.e. that they are only awarded when adopted standards have actually been met?

Serious concerns related to wood certification (as well as SGS' accreditation of carbon offsets under the Clean Development Mechanism (CDM)) have been reported. SGS has been the biggest accreditor of CDM offsets for several years. In 2009, the CDM Executive Board suspended it for three months over concerns that it had failed to properly vet several projects it had approved for the CDM. The company was reinstated after it pledged to take corrective action.[41, 42]

Repeat concerns over SGS wood certificates suggest that this was more than a one-off failing. Here is a small selection of particularly controversial wood certificates approved by SGS:

- SGS issued the FSC's largest certificate for tropical forest management to Barama, a subsidiary of the Malaysian logging company Samling in 2006. In 2007, the Guyana Forestry Commission fined Samling $500,000 for illegal rainforest logging and for breach of at least four regulations under the Forests Act.[43] In the same year, FSC suspended the certificate, having found that a *"lack of appropriate evaluation against FSC certification requirements has resulted in systematic major nonconformities which had not been addressed".* The decision was described as *"a major embarrassment for the Switzerland-based SGS group whose assessment of Barama was condemned by the auditors for not having adequately addressed various FSC certification requirements."*[44] Barama's FSC certification was not reinstated, however, SGS was not suspended for having vertified Barama.

- In March 2008, SGS issued an FSC certificate to Veracel Celulose, a joint venture between the world's largest pulp and paper companies, Brazilian Aracruz Celulose and Swedish-Finnish Stora Enso (see Figures 4 and 8).

  The certificate covered eucalyptus plantations in the Brazilian state of Bahia and was awarded despite an Open Letter by 347 organisations denouncing violations by Veracel and opposing its FSC application. Just three months later, a federal court in Brazil fined Veracel and ordered it to cut and remove eucalyptus on 96,000 hectares and reforest it with trees native to the Atlantic Forest, which had covered the land until it was cleared for the plantations in the early 1990s.[45] This was not the only lawsuit against Veracel's plantations. According to a Finnish researcher, *"based on the publicly available lawsuits in the courts, prosecutor of-*

[9] The SFI is a North American forest certification scheme accredited internationally by the PEFC. Most wood pellets imported into Europe from the US are believed to be SFI-certified. The SFI is discussed in more detail in Chapter 6.

fices and attorney general's offices in the region, Veracel had almost 900 legal cases against it in the courts in 29th November 2010", including several criminal suits.[46] In 2011, SGS South Africa was suspended from certifying forest management in Brazil for the FSC for a period of six months, after the FSC's Accreditation Services International had found major and minor breaches of FSC standards in connection with the Veracel certificate.[47] SGS failed to correct those breaches during this period and decided to withdraw from forest mangement certification in Brazil. The Veracel certificate, however, remains in place and is in the process of being taken over by another certifying company, Imaflora-SmartWood.[10]

- In September 2011, Oxfam released a widely reported account of the eviction of around 22,500 people in Uganda by the UK-based New Forest Company, to make way for eucalyptus plantations.[48] Two of New Forest Company's plantations in Uganda have been certified by SGS for the FSC. Oxfam's report strongly criticised the certificate as violating FSC Principles and Criteria. The FSC responded by asking SGS to investigate the certificate that it itself had approved. Oxfam's reply to the SGS investigation findings states: *"Oxfam...has reached the conclusion that the SGS report is deeply flawed, not fit for purpose and a wholly insufficient response to the serious allegations raised by Oxfam's research."* [49] The certificate remains in place.[50]

Figure 4 – **This Veracel Celulose plantation received an FSC certificate of "sustainability", issued to it by SGS. Photo courtesy of Chris Lang**

- One of the most controversial certificates ever awarded has been Asia Pulp and Paper's Chain of Custody certification for four pulp mills in Sumatra by the PEFC, approved by SGS. Asia Pulp and Paper (APP) is a subsidiary of the large Indonesian conglomerate Sinar Mas. The Rainforest Action Network describes APP as one of *"Indonesia's most destructive corporations...[APP's pulp and paper] comes from clear cutting rainforests and replacing them with monoculture acacia pulp wood plantations grown on these cleared rainforest and peatlands."* [51] Rainforest and peatland destruction, as well as violations of land rights and social conflicts resulting from APP's practices have been exposed by a wide range of NGOs.[52] According to a 2009 report written by a coalition of 25 environmental organisations working in Sumatra, including WWF Indonesia and Walhi (Friends of the Earth) Riau, *"APP is responsible for more natural forest clearance in Sumatra—the only habitat for the Sumatran tiger—than any other company."* [53] A 2010 Greenpeace investigation provided further detailed evidence of the destruction caused by APP.[54] This evidence convinced a large number of companies to drop APP from their list of suppliers.[55] However, SGS, who was asked by the PEFC to review the certificate in light of Greenpeace's evidence, dismissed the evidence, stating that all of APP's wood came from "legal sources". The certificate remains valid.[56]

4.3 RWE's biomass certifier: Control Union Certification

4.3.1 CUC: The one-stop-shop for certification

RWE is amongst some of the biggest investors in wood pellet production for (largely its own) power stations. In 2011 it anticipated burning 3 million tonnes of pellets in 2012, half of them at Tilbury B in Essex, the biggest biomass-burning power station in the world.[57] As a result of a massive fire at that power station, the actual amount burnt this year is likely to be far lower. It stated that, in 2010, 92% of its pellets were certified through the Green Gold Label (discussed below in Chapter 5.3) and its aim is for 100% certification by 2013. All Green Gold Label certificates are approved by a single company: Control Union Certificates (CUC).

CUC is a subsidiary of the Peterson Control Union Group, which was founded as a private grain inspection company in 1920. Today it is a network of service companies which provide testing, inspection, verification and certification of food, animal feed, textiles, minerals, forest products, biomass, biofuels, and oil & gas related equipment. Peterson Control Union Group employs over 2,000

[10] SmartWood was founded by the US-based Rainforest Alliance in 1989.

staff in over 50 countries:

"Control Union offers you a one-stop-shop for a wide range of certification programs. We enjoy global recognition and accreditation, and the certificates we issue are accepted by authorities in almost every country in the world...Certification guarantees that a product meets certain criteria, giving licensees distinction and thereby market advantage."[58]

CUC certifies wood, including for bioenergy and biofuels for a wide range of labels, including FSC, PEFC, Roundtable on Responsible Soy, Roundtable on Sustainable Palm Oil, ISCC and REDCert (two German bioenergy certification schemes) and NTA8080 (a Dutch bioenergy certification scheme). As well as being the only certifier for RWE's Green Gold Label it is one of the founding members of the Initiative Wood Pellet Buyers (discussed in Chapter 5.7) and thus set to certify according to their standards once agreed.

4.3.2 CUC's controversies

In 2010, CUC attracted attention as a consultant for Sinar Mas, the Indonesian conglomerate referred to above in connection to its pulp and paper subsidiary's PEFC certificate (approved by SGS). CUC was one of two consultants engaged by the firm to counter evidence contained in another Greenpeace report—this time about the destruction of primary forest habitat of Sumatran tigers and orangutans for palm oil, by a subsidiary of Sinar Mas, PT Smart. The other company employed was verification and certification firm BSI. When the BSI-CUC report in response to Greenpeace was published,[59] Sinar Mas reported to the media that the report vindicated them and demonstrated that *"the allegations made [by Greenpeace] were largely unfounded and that SMART was not responsible for deforestation of primary forests and the destruction of orangutan habitats"* and, furthermore, that they had complied with Indonesian law.[60]

Yet this was not the end of the story. BSI, without CUC, published a clarification, stating *"there have been elements of the report that have been misreported as it has been published and presented"*.[61] PT Smart/Sinar Mas, it turned out, had not been vindicated quite so completely by the report as it had held out. For example, according to the report it had indeed breached Indonesian law: for example, in all its concessions inspected by BSI and CUC in Central Kalimantan, the company had cleared forest without a required Environmental Impact Assessment. And 21% of its concessions in West and Central Kalimantan were cleared before any independent assessment of possible High Conservation Value areas could be conducted.

Nonetheless, on closer inspection, the report appears to have been written with a strong bias in favour of PT Smart. For example, the report concluded that, because most peat fires in or near the company's concessions occurred *"before land compensation and preparation",* the fires *"were likely to have been caused by traditional slash-and-burn practices of the local community",* even though no evidence of local communities having set the fires was reported and fire is widely used to clear land for oil palms before the land is prepared for planting. Although the BSI Group was happy to accept a contract from one of the most notorious forest-destroying companies in Indonesia and to contribute to a report clearly biased in favour of that company, it was not prepared to allow Sinar Mas to misrepresent its findings. CUC, on the other hand, maintained public silence following the report's publication.

4.4 Drax's biomass certifiers: TerraVeritas, TerraChoice and Underwriters Laboratories

In October 2008, Drax—operators of the UK's biggest coal power station and currently the company burning the largest volume of biomass for energy in the country—appointed TerraVeritas for "global verification of sustainable biomass supply".[62]

TerraVeritas, which describes itself as *"a science company dedicated to investigating environmental and sustainability claims,"*[63] was founded as a subsidiary of the TerraChoice Group, which has its headquarters in Ottawa. In October 2010, TerraChoice was acquired by a much larger Illinois-based company, Underwriters Laboratories (UL). UL was founded in 1894 and initially focused on fire safety. It expanded exclusively as a "product specifications" company until 2007 when it set up its subsidiary, UL Environment, and expanded into the business of sustainability certification. Product testing continues to account for the greatest share of the business. According to its website, UL currently has 160 satellite and inspection centres in service as well as 95 laboratories, testing and certification facilities. It employs nearly 9,000 staff in 46 countries.[64] UL works across a large number of economic sectors and industries. Within the energy sector, it offers services to companies investing in ethanol, hydrogen, fuel cells, oil and gas and power generation.

Within UL, TerraChoice has retained its own profile, describing itself as *"a sustainability and marketing consultancy working to create sustainability-driven business for our clients."* [65] TerraVeritas/TerraChoice/UL are not accredited verifiers for any of the larger forestry or forest certification schemes and we could find no record of them having been actively involved in wood certification.

4.4.1 Greenwashing experts

TerraChoice describes itself as an "expert on greenwashing",[66] i.e., an expert in identifying labels and standards being misused for greenwashing and in advising companies and customers how to avoid such practices. It periodically publishes "Sins of Greenwashing" reports which set out to assess a large range of environmental claims and labels against a list of seven malpractices or "seven sins of greenwashing", such as "lack of proof", "vagueness" or "fibbing". The reports appear hard-hitting, concluding that *"greenwashing is still rampant, with over 98% of "green" products committing at least one of the Sins".* [67] Advising companies on how to avoid greenwashing and ensure that sustainability claims are genuine forms an important part of TerraChoice's portfolio. This makes TerraChoice appear, at least on paper, a particularly scrupulous and thorough firm, keen to ensure that companies do not make unfounded sustainability claims. Yet, on closer scrutiny, TerraChoice's claims appear perhaps less credible.

With regards to wood certification, TerraChoice assures readers of its "Seven Sins" reports that FSC, PEFC and the SFI are all "legitimate certification" schemes which can be trusted. This, as shown in Chapters 4.2.3 and 6, is a highly dubious claim, given the large volume of evidence that different certificates have been awarded under each of these schemes despite the fact that the endorsed schemes cannot ensure that their own standards are being met—one of the "seven sins" TerraChoice set out to expose. Yet the claim that FSC, PEFC and SFI are fully trustworthy is hardly an unusual one for a certification company to make. More remarkable is TerraChoice's endorsement of the EcoLogo programme, presented as the outcome of independent evaluation. The 2020 report recommends: *"Choose EcoLogo or other reliable standards and certifications when you see them, and choose more information over less information."* Yet nowhere in this report do TerraChoice indicate that it itself has been managing the EcoLogo Programme in Canada since 1995[68] and that it is thus recommending its own services. Lack of transparency and failure to disclose conflicts of interest do not appear on its list of "seven sins".

5 A market place of standards and labels

UK and any future EU biomass "sustainability and greenhouse gas standards" are set to largely mirror those that currently apply to biofuels under the Renewable Energy Directive, though in the UK additional "Sustainable Forest Management" clauses are to be introduced within the same framework.

A summary of EU biofuel standards is therefore necessary to understand what is proposed with regards to biomass. An in-depth critique of the scope of the standards is available elsewhere.[69] The key features of the scheme are as follows:

1. Minimum environmental (land-use) and greenhouse gas standards are mandatory for companies wanting to receive subsidies for biofuels or wanting their biofuels counted towards the EU's renewable energy targets. Although biofuels which are not confirmed to meet the standards can still be sold within the EU, these would thus gain little or no market access.

2. While the standards are mandatory, their enforcement has essentially been privatised. No genuine public budget has been set aside for verifying companies' claims that they are meeting the standards, nor even for spot-checks about possible fraud. Instead, verification relies on private contracts between companies which blend biofuels or burn them in power stations and specialist service companies, which generally fall within the group of inspection, verification and certification companies (discussed in Chapter 4). If such a verification company refuses to verify the sustainability of a biofuel firm's supplies, that firm is free to "shop around" to try and find another one which will provide such verification. The same already happens within voluntary certification schemes.

3. Biofuel companies can either pay for individual compliance documents of their biofuel supplies, or, alternatively, if their produce is certified by one of several accredited voluntary certification schemes, they can rely on this as evidence for full compliance with the standards. So far, the European Commission has accredited nine voluntary certification schemes for this purpose.[70, 71] Three of these are in-house

[11] The three companies with accredited biofuel sustainability certification schemes are Abengoa, Greenergy and Ensus. Out of those, only Greenergy has published details as to who has verified compliance with its own scheme. Abengoa's report to the European Commission states that those details will be available on its website, however a detailed search of its website has produced no such information. Ensus has not published details of its auditors, however, it has had to suspend ethanol production since its certification scheme was accredited.

certification schemes run by three individual biofuel companies each. Two of these have published no information as to which company audits/verifies biofuels on their websites.[11]

4. Biofuel standards are restricted to land-use/land-conversion and greenhouse gas criteria. No mandatory human rights or other social standards exist. There are no standards relating to water and/or soil protection. No standards aim to protect biodiversity except on land designated as having "high biodiversity value." According to the Renewable Energy Directive, this should include "high biodiversity grasslands," however, this is not yet the case as the European Commission has so far failed to publish relevant criteria and guidance. As such, biofuel feedstock produced on plantations where human rights are being violated and/or where agro-chemicals pollute water, soil, wildlife and people all qualify as "sustainable." In the Aguan Valley of Honduras, for example, over 60 people, nearly all of them peasants, have been killed in land conflicts over large oil palm plantations.[72] Palm oil from these plantations meets the EU's sustainability criteria, simply because it is produced largely at the expense of communities' farmland, not forests, and because biogas digesters reduce methane emissions from palm oil processing. Evictions, murders and abduction all fail to undermine their classification as "sustainable" under the EU definition.

5. Despite overwhelming scientific evidence that the most serious negative climate impacts of biofuels are *indirect* ones, all indirect impacts are ignored when assessing sustainability and supposed "greenhouse gas savings". Indirect impacts include displacement of food production to other areas. For example, as two-thirds of the EU's rapeseed oil has been diverted to produce biodiesel, the food industry is increasingly relying on palm oil imports, thus causing more and more rainforests to be cut down. This indirect deforestation is entirely ignored under EU rules. According to one recent study,[73] this means that millions of hectares of highly biodiverse areas could "legitimately" be destroyed and 95 million tonnes more CO_2 could be emitted as a result of EU biofuel targets even if all biofuels met the full EU standards (assuming these were independently audited and enforced which, as we have seen, is highly doubtful).

This then is the model of standards which the UK Government intends to apply to biomass with the sole likely addition of "Sustainable Forest Management" standards. If the European Commission decides in favour of mandatory biomass standards, it, too, is expected to follow the biofuel standards model.

In the meantime, energy companies investing in biomass are already developing their own sustainability policies and standards. Many of these are expected to be put forward for accreditation to whichever UK and or EU-wide biomass standards may be adopted and which are already influencing planning decisions, as we shall see in the following sections. In developing a host of certification schemes and labels, companies are generally drawing on, rather than replacing existing voluntary wood certification schemes. Below are four examples of energy companies' policies and schemes, followed by an introduction to sustainability standards which the Initiative Wood Pellet Buyers is developing. Voluntary forestry certification schemes are discussed in more detail in Chapter 6.

5.1 Drax's biomass use and sustainability policy

At the time of writing, Drax is burning by far the most biomass for electricity of any company in the UK, all of it through co-firing at the Drax coal power station, the biggest in the UK. During 2011/12, its actual co-firing capacity[12] amounted to 270 MW,[74] requiring an estimated 2.7 million green (i.e. undried and unprocessed) tonnes of biomass.[75] Since 2006, Drax has been increasing its level of co-firing year on year. In July 2012, it announced plans to convert 3 of its 6 units near Selby from coal to biomass burning, starting in 2013, with a long-term aim of converting the others, too. 50% conversion would translate into a globally unprecedented 2000 MW biomass capacity.[76] Furthermore, Drax has planning permission to build two dedicated biomass power stations of 299 MW capacity each, although the company has suspended these plans while focusing its investment on increasing co-firing capacity to 500 MW in the near term. In February 2012, the company announced that it was looking to invest in three to five pellet plants, in North and South America and/or Africa.[77, 78]

Drax not only pledges to comply with future UK and possibly EU biomass standards, but it has further produced an additional sourcing policy with seven sustainability principles.[79] Or rather, it appears that it commissioned TerraVeritas[13] to draft these principles for it and then com-

[12] By *actual capacity* we are referring to the amount of electricity produced from biomass in 2011/12, not the *technical co-firing capacity*, which may be larger.

[13] TerraVeritas and its parent companies, TerraChoice and Underwriters Laboratories have been discussed in the previous chapter.

missioned it as the sole auditor/verifier of all its biomass supplies. While one of the principles (to *"significantly reduce greenhouse gas emissions compared with coal-fired generation and give preference to biomass sources that maximise this benefit"*) will be superseded by the more specific greenhouse gas reduction requirement contained in the proposed mandatory UK biomass standards, other principles go further. Three of them relate to social standards and one to protecting and/or improving soil, water and air quality.[14] Drax's website contains no information as to how its sourcing policy operates in practice, however a 2010 presentation by Drax[80] states that it is largely based on suppliers answering yes/no questions and supplying different types of required evidence. It does not say what type of evidence that would be, though some type of auditing data is to be provided by suppliers. Existing standards and certificates, including FSC, SFI, Canadian Standards Agency, PEFC or corporate social responsibility programmes, can be used as evidence that principles have been met, but they are not required. TerraVeritas will then analyse and audit all the information from the suppliers and advise Drax. It will not be involved in visiting forests and plantations where the biomass comes from, nor is there any indication that the suppliers' own auditors will have to do so. There will be verification that forms have been completed and that the information given on these complies with Drax's sourcing policy, but there is no indication that anybody will check whether the information on the forms is true. Furthermore, Drax participates in the Initiative Wood Pellet Buyers, outlined below.

Drax published its biomass sourcing policy in 2008. However, the only publication of individual companies' biomass sustainability reporting for power stations so far by the Office of the Gas and Electricity Markets Authority (Ofgem), in 2010 showed a remarkable lack of information from Drax, given its detailed policy.[81] Out of the 1.04 million tonnes of biomass burned by Drax in 2009/10, 139,005 tonnes were virgin wood from trees cut down for bioenergy, mixed with an unspecified amount of *Miscanthus*. Another 31,007 tonnes were classed as wood "by-products," all of which are, from 2013, supposed to meet UK biomass standards. Eight different large consignments, all of them from within the UK were not certified by any existing standard. For several others, Drax gave vague information such as "FSC, rest managed woodland" or "FSC, rest sustainable forestry," with "managed woodland" and "sustainable forestry" being arbitrary and entirely meaningless terms in this context. Large quantities of wood were imported from Canada and these were certified by the Canadian Standards Agency, a highly controversial forestry certification scheme which belongs to the PEFC, discussed in Chapter 6.1 below. Remarkably, for two UK consignments, Drax could not even provide information as to the previous use of the land, even though its own policy should have prevented it for using any biomass without verified information related to land conversion.

These problems have not stopped Drax from stating that it *"hope(s) to foster environmental leadership...[and] participate with applicable regulatory and policy initiatives to share experience,"*[82] i.e. that it intends to influence future biomass standards in the UK, EU and elsewhere. Its relationship with TerraVeritas/TerraChoice appears to go beyond sourcing advice and auditing. According to TerraChoice's 2009 report, the company also worked with Drax to deliver *"a comprehensive research study assessing the socio-economic benefits of biomass production"*.[83] No such document can be found on TerraChoice's website, nor TerraVeritas' name on any report by Drax. However, around that time, Drax published a briefing called "Biomass: the Fourth Energy Source" which *"sets out the many benefits from biomass for electricity generation,"* including alleged socio-economic ones.[84] The briefing contains a list of recommendations to policy makers, thus serving lobbying purposes. If this or any other briefing used by Drax for lobbying purposes was indeed written with the help of TerraVeritas then this would raise further questions about its independence and impartiality as an auditor. In any case, the fact that a report TerraVeritas claims to have produced a report about biomass benefits with Drax which cannot be traced through web searches raises even more doubts about its commitment to transparency, already put into question by the fact that another of its reports fails to disclose that it manages a certification scheme which it commends to readers, as discussed in Chapter 4.4.

5.2 Forth Energy: Sustainability promises by Scotland's most ambitious bioenergy company

Forth Energy is a Joint Venture between Scottish Southern Electric (SSE) and Forth Ports Ltd. In 2010, it submitted applications for three biomass power stations of 100 MW electricity capacity each, in Rosyth, Dundee and Grangemouth, and one twice that size in Leith (Edinburgh). Following a strong community-led campaign against the Leith power station (see Figure 5) , this proposal was withdrawn in February 2012. The remaining three, if approved and built, would burn 3.5 million tonnes of (largely imported) wood between them.

At the time of writing, none of the proposals has been

[14] Note that Drax's biomass principles relate to the production and delivery of the feedstock only – the air quality requirement for example does not relate to the local impacts of biomass power stations or co-firing.

determined, however, the Grangemouth plans have been the subject of a public inquiry—the first time that arguments about biomass sustainability have been allowed to be heard at any planning inquiry in the UK.

In 2010, Forth Energy promised that it would develop a comprehensive biomass sourcing policy which would address minimum greenhouse gas savings, including direct and indirect land use change impacts (something no other UK-based energy company has, to our knowledge, committed to), address wider environmental and social impacts and be independently audited and verified.[85] Yet despite the fact that its sustainability claims having been subject to a higher level of scrutiny within the planning system than those of companies with bioenergy developments in England and Wales, it has not so far produced such a policy, nor specified who would audit its supplies or where they would come from.

Figure 5 – **The No Leith Biomass Campaign presented its concerns about Forth Energy's proposed 200MW power station to the Scottish Parliament in Feb. 2011. Following a hard-fought campaign, the planning application was withdrawn in early 2012. Forth Energy's three other applications remain in place. Photo courtesy of the No Leith Biomass Campaign.**

Instead, its has relied on commissioning reports from consultancy firms SISTech and Pöyry to "prove" that high levels of greenhouse gas savings would be reached by the proposed power stations and that sufficient sustainable supplies would be available worldwide.[86] The "carbon footprint" study forms a major part of its planning case, including that presented at the Grangemouth public inquiry. However, there is an obvious contradiction between SISTech claiming that the study is based on a detailed life-cycle assessment that accounts for direct land use change, fossil fuels used during logging, processing, shipping, etc, because no details as to where the biomass will be imported from have ever been published.[15] Without knowing what type of biomass will be sourced from where under what conditions, a life-cycle greenhouse gas assessment is clearly absurd. Moreover, contrary to Forth Energy's promise of a sourcing policy which would consider the all-important indirect land use change emissions, SISTech ignored these.[87] Forth Energy's only sourcing commitment is that all wood which it will burn will be *"certified by internationally accepted sustainability certification schemes, such as the FSC and PEFC."*

Forth Energy's decision to engage Pöyry, the world's largest forestry consulting firm, in "proving" the large-scale availability of imported wood for bioenergy is particularly troubling, given Pöyry's long and controversial history of providing similar "assessments" to the pulp and paper industry. A 2008 report about Europe's role in the expansion of the pulp and paper industry in the global South by Chris Lang, published by the World Rainforest Movement sums up Pöyry's portfolio:

"Whether it is hydropower in Laos, roads in Austria, a railway in Venezuela, a biomass power station in Thailand, a power plant for a Nestlé baby milk factory in the Philippines, a nuclear power plant in Finland, a styrene monomer and propylene oxide wastes oxidation plant in Spain, developing software to manage electrical project documents, rewriting water policies in Egypt, Ethiopia and Sudan, or a massive plantation project and pulp mill in Indonesia, Pöyry will provide services, from pre-feasibility studies to design and construction supervision."[88]

According to the World Rainforest Movement report, Pöyry has provided assessments for pulp and paper companies, including in South-East Asia, since the 1970s, and it was instrumental in brokering the sale of paper-making technology in that region. In the early 1980s, it worked on a Master Plan for the Indonesian Pulp and Paper Industry, paid for by the World Bank. This sparked interest and investment from two big industry groups, Sinar Mas and the Royal Golden Eagle Group which set up subsidiaries APP and APRIL, the two companies described by the Rainforest Action Network as *"Indonesia's leaders in climate and rainforest destruction"*.[89] Pöyry won contracts to build several of their pulp mills as well as providing consultancy services for APP and APRIL. Optimistic assessments by Pöyry helped both companies to obtain funding for several of their pulp mills.

[15] While the original planning applications contained statements about the sourcing regions, Forth Energy later stated that it was not actually committing itself to such sourcing – the regions had merely been listed for the academic purpose of drawing up a carbon footprint study (Letter from Calum Wilson to Friends of the Earth USA and others, 6 April 2011).

5.3 RWE's biomass investments and the Green Gold Label

Figure 6 – **Southern US forests are coming under increasing pressure from competing demands from the paper and emerging bioenergy industries. Photo courtesy of Dogwood Alliance**

RWE is a leading investor in wood pellets and biomass worldwide. In early 2012, RWE Npower converted its Tilbury B coal power station to a 750 MW biomass power station—by far the biggest worldwide if run at full capacity. Just weeks after the conversion, in February 2012, a major fire closed the power station down for several months. As of July 2012, only one third has been recommissioned. Tilbury B was supposed to close down by the end of 2015 at the latest, due to inability to comply with EU air emissions regulations, however, biomass conversion offers RWE the possibility of getting permission to keep it running long-term[16] This is because burning biomass results in lower sulphur dioxide emissions than coal burning. This is despite the fact that biomass combustion is associated with similar overall levels of air emissions as coal combustion including higher upfront emissions of carbon dioxide per unit of electricity, as well as a carbon debt which can take decades if not centuries to repay.[90] RWE states that 90% of the wood pellets for Tilbury will be sourced from Georgia in the southern US and from Canada, specifically British Columbia.[91]

RWE has made smaller investments in biomass power stations in Scotland (Markinch), Germany and the Czech Republic and it also holds planning permission for a sizeable biomass power station in Stallingborough, Lincolnshire. Yet apart from Tilbury, its main biomass investments are in the Netherlands, through its subsidiary Essent. According to its website, *"Essent's Amercentrale [coal power station] now burns more biomass than any other power plant in Europe",* though this may have been written before the Tilbury B conversion and before Drax reached its current level of biomass co-firing.[92] Essent is planning to increase co-firing at Amercentrale and another Dutch coal power station to 50%.[93] Furthermore, it is constructing a highly contested 1.6 GW new coal power station in Eemshaven, with a technical capacity to co-fire up to 50% biomass.[94] Worldwide, RWE plans to increase its use of wood pellets for energy from 3 to 6 million tonnes a year, thus increasing its demand for harvested wood for pellets from 6 to 12 million tonnes annually.[95] To help supply these wood pellets, RWE has built the world's biggest pellet plant at Waycross, in the southern US state of Georgia.

5.4 Green Gold Label: Independent certifiers?

RWE not only has its own biomass procurement policy with seven general and six additional sustainability principles,[96] but it also undertakes to ensure that all of its wood pellets are *"independently assured under accredited schemes"*,[97] mainly the Green Gold Label (GGL). Yet the independence of the Green Gold Label accreditation scheme is questionable. The scheme was set up by Essent, now an RWE subsidiary, together with Skall, now Control Union Certifications, in 2002. Although it is officially owned by an "independent" Green Gold Label Foundation, that foundation's Executive Board consists of two RWE representatives and no other members. Control Union Certifications are the only accredited certifier. GGL offers companies accreditation according to nine different standards. Its Forestry Management Standard accepts all types of FSC certification (including those not involving any direct assessment of plantations or forests), as well as PEFC, SFI and the Canadian Standards Association and others as evidence of sustainability.[98]

5.5 Sustainable wood pellets from Georgia?

RWE set up their fully-owned subsidiary, Georgia Biomass LLC, which operates the Waycross pellet plant. Its sustainability claims are impressive: its biomass, it claims, is not only *"carbon neutral",* but offers *"tremendous ecological benefits"*. It says *"The proper use of forests as an*

[16] Under the EU's Large Combustion Plant Directive and forthcoming Industrial Emissions Directive, several UK coal and oil power stations are to close because they do not meet sulphur dioxide emissions standards. Biomass is lower in sulphur than coal hence partial or total conversion of coal power stations to biomass reduces SO_2 emissions, even though it may not reduce overall air pollution. Several energy companies are looking at such conversions as a possible means to keep power stations running long term without having to invest in costly SO_2 mitigation technology.

energy crop fosters the planting of more trees, which in turn creates crucial ecosystem services". The plantations from which it sources the biomass, it states, support clean air, clean water, soil conservation, wildlife habitat, green space, recreational opportunities and aesthetics. Georgia Biomass LLC assures readers that Georgia's forestry sector is highly sustainable because more pine is grown than harvested. Indeed, during a meeting between two members of Biofuelwatch and two representatives with Npower, we were told that the carbon debt from wood in Georgia is only two years—a remarkable claim, given that a scientific report had just been published which showed that the average carbon debt from bioenergy from the Southeastern US is around 35 years, i.e. that for 35 years, the climate impact from burning such biomass for electricity will be worse than that of generating equivalent amounts of electricity from coal.[99] If the "sustainability" of forestry is defined solely in terms of timber volume being replaced and increased, then Georgia's timber sector is indeed "sustainable": pine plantations have been rapidly expanded, a trend which is continuing if not accelerating with the new demand for bioenergy. Yet the reality of such pine plantations across the southern US has little to do with most people's understanding of environmental sustainability. An article published by Mother Jones in 2000 described these realities:

"Before planting their superseedlings, the companies clearcut and bulldoze the site to get rid of all native trees, shrubs, vines, ferns, mosses, fungi, grasses, sedges, and wildflowers. Woody debris is burned off. Then they plant loblolly [pines]. As the pines mature, they are thinned and pruned. Native trees that return from roots or seeds are cut or killed with herbicides. Frequently the plantation is bombed with fertilizer pellets. Then, 15 to 20 years after they were planted, the pines are clearcut, and the process begins anew...There is no genuine forest in sight, save a relict scrap to the north that contains hardwoods: oak, beech, dogwood, ash, sweet gum, magnolia, yellow poplar, hickory, cherry, and maple. It is a reservoir for wildlife, but also for what companies like Champion seek to correct: deadwood, decadence, and disorder."[100]

Back in 2000, these destructive practices were driven by the pulp and paper industry. Now, companies supplying woodchips and wood pellets for power stations in the US and Europe are driving their continuation and extension.

Georgia Biomass will have little problems with meeting any sustainability standards in the UK and Europe. It contracted Bureau Veritas who accredited its pellets for the SFI, PEFC and FSC (based on a similar basic risk assessment procedure as that under which Enviva's pellets, which will be burned by E.On, were also certified—one which does not involve any inspection of logging operations). It also had its pellets certified by Control Union Certification for the Green Gold Label.

Figure 7 – **Wood pellets: IStock photos**

5.6 E.On's biomass use and sustainability policy

E.On has been running a 44 MW biomass power station near Lockerbie in Scotland since 2009, and its second biomass plant, with a 30 MW capacity, is under construction near Sheffield. These are or will be entirely reliant on UK-sourced biomass. However, the company has much bigger plans which will rely primarily on imported wood. In March 2012, E.On obtained planning consent for a 150 MW biomass power station near Bristol.[101] Its biggest and most advanced, import-reliant, biomass scheme, however, is the partial or full conversion (up to 750 MW) of Ironbridge Power Station to biomass, for which it obtained planning consent in April 2012. This is a 1000 MW coal power station scheduled for closure by the end of 2015, because it does not comply with EU regulations for sulphur dioxide (SO_2) emissions, much like RWE's Tilbury B coal to biomass conversion. Burning significant amounts of biomass with or without coal would be likely to allow E.On to keep Ironbridge Power Station running long-term as a result of decreased SO_2 emissions. At full biomass capacity, Ironbridge would require pellets made from around 7.5 million green tonnes of wood.

In February 2012, E.On entered into a multi-year biomass supply contract with Enviva for 240,000 tonnes of wood pellets a year, starting in 2013. All pellets are to come from the Southeastern US. Enviva owns three pellet plants there, and is building two new ones in that region. E.On is a member of the Initiative Wood Pellet Buyers, discussed in Section 5.7.

E.On published a biomass sourcing policy in 2009, as part of its general Responsible Procurement Policy.[102] The policy contains ten different principles, related to carbon, environmental and social impacts. Several of the principles are highly general and open to interpretation. For example, the policy states: *"Biomass production shall be*

undertaken in such a way as to contribute to the social and economic development of local, rural and indigenous peoples and communities", yet it is entirely unclear how compliance with this principle could or would be measured. There is no criterion to even seek the opinions of affected communities, let alone to ensure their free, prior and informed consent. Another criterion states: *"Animal feed, crops grown for energy use and agricultural residual products, can only be used as a biomass fuel if...local and global food prices and security will not be distorted from utilising such biomass."* Again, no information is provided as to how compliance could or would be assessed, given the complexity of global and local food markets and price developments. Furthermore, all crops, whether grown for food or fuel, grow best on fertile land with regular water, hence it is impossible to rule out competition between energy crops and food and thus impacts on food prices and food security.

In relation to Genetically Engineered trees, E.On's policy states: *"We will only use biomass grown from Genetically Modified seeds when the risks for spread of GM material to the surrounding environment during transportation or at our energy generation facilities can be mitigated. GM material can only be used if it complies with applicable laws and regulations".* In short, it permits use of wood from GE trees.

E.On's biomass procurement policy allows for internal and external audits as well as site visits to be undertaken by E.On staff, that is, without any external verification/auditor at all. As an energy company, E.On has no experience or qualification related to forest management or verification of wood supply chains, nor of land rights, biodiversity and water protection or food markets, all of which are mentioned in its sourcing principles. Of the four company policies discussed here, E.On's is thus the only one that would fail the very low-level verification requirement expected to be set by UK and possible EU mandatory biomass standards if they are to mirror current EU biofuel standards, since E.On requires no verification by any outside company at all. All of the others—those by Drax, RWE and Forth Energy, for all their serious flaws, will almost certainly meet UK biomass standards when they become mandatory in October 2013.

When the planning application allowing for Ironbridge conversion to biomass was approved, a planning condition was agreed which obliges E.On to supply the Council with reports to show that its sustainability policy has been adhered to. In the absence of any outside auditing or verification, this requirement appears especially meaningless.

Enviva,[103] which will supply a significant proportion of the wood pellets for Ironbridge, meantime, has obtained Chain of Custody certification for its pellets from the SFI, PEFC and FSC. Of these three certification schemes, only the FSC publishes the assessment reports, in this case undertaken by Bureau Veritas.[17] The FSC certificate is based not on any site investigations but merely on a web-based "risk assessment."[104] The assessment relies on the assumption that breaches of any FSC principles and criteria in the US and especially in the region from which Enviva procures wood are very unlikely. Scientifically corroborated evidence of accelerated loss of natural forests and biodiversity destruction across the region has been ignored. For example, Bureau Veritas' report states: *"The growth of the forests in the States where Enviva LP procures wood generally exceeds withdrawals, thus indicating that there is 'no net loss' and no significant rate of loss of forests across the company's fiber supply area. North American forest (U.S. and Canada) cover expanded nearly 10 million acres (4 million hectares) over the last decade. Thus, there is low risk that forested ecosystems in the U.S. are experiencing loss".* Yet according to authors of a 2009 peer-reviewed study, published in the Proceedings of the National Academy of Science, *"rates of GFCL [Global Forest Cover Loss] in regions such as the southeast United States are among the highest globally",* with large-scale logging operations identified as the main cause of forest loss in the region.[105] Their study was based on satellite evidence of actual loss of forest cover[18] between 2000 and 2005. It only considered actual tree cover, thus excluding clearcuts from the definition, and it did not consider new tree plantations to "offset" forest loss elsewhere. Furthermore, the 2011 Southern Forest Future Report, commissioned by the US government, shows that, although overall tree cover in the southern US has only slightly declined since 1970, large areas of native pine and oak-pine forests continue to be lost—converted to industrial pine plantations.[106] This report classes both clearcut areas and industrial tree plantations as "forests."

5.7 New Sustainability Standards by the Initiative Wood Pellet Buyers

While the European Commission is still considering whether or not to introduce mandatory EU-wide biomass standards and, if so, what these should be, the largest wood pellet investors in Europe have got together to "assist" the debate by drawing up their own standards and "informing" policy makers.

The Initiative Wood Pellet Buyers (IWPB) was launched by GDF Suez in early 2010. GDF Suez, which describes itself as *"the largest utilities company worldwide"*,[107] is a major investor in biomass in Europe, albeit not so far in the UK. It invests both in co-firing

[17] Bureau Veritas is discussed above in Chapter 4.1.

[18] In the study, forest cover was defined as at least 25% canopy cover of trees at least 5 metres in height.

biomass with coal and in the conversion of coal to biomass power stations, in Belgium, the Netherlands and Poland. Overall, it generates 815 MW of electricity from burning 3.6 million tonnes of biomass a year and purchases 10% of all wood pellets produced globally every year (1.7 million tonnes) from 50 suppliers worldwide, in the US, Europe, Russia, Canada and South Africa.[108]

Vattenfall, Dong, Drax, RWE/Essent and E.On have joined the IWPB, together with four large verification and certification companies—Control Union, Bureau Veritas, Inspectorate and SGS—and three wood pellet associations. The IWPB thus includes six of Europe's largest energy companies, including the EU's three biggest carbon emitters from fossil fuel burning (RWE, Vattenfall and E.On).[109]

The IWPB's key goal is to *"to enable the trading of industrial wood pellets among the partnering companies"*[110] and thus to contribute to the creation of a global wood pellet market for bioenergy. To create such a market, technical specifications for pellets have to be standardised and industry-wide sustainability standards are being drawn up to overcome potential barriers to trading between companies or in any particular EU markets. Technical specifications have already been agreed and a draft sustainability statement with nine different principles has been produced and is under discussion. According to IWBP: *"In the longer term, it is anticipated that these principles will be recognised and adopted by the wider market"*.[111] Sustainability principles include: 60% greenhouse gas savings (based on the European Commission's methodology and thus ignoring both the carbon debt from cutting down trees which will take decades to regrow, and emissions from indirect land use change), protection of *"significant carbon reservoirs"* and high conservation value biodiversity areas, protection of soil quality, water resources and air quality,[19] compliance with laws and regulations, no endangerment of food, water supplies or subsistence means of communities, contribution to local prosperity and welfare and respect for property rights as well as health and safety.

These principles are based on a previous proposal by the European industry association for power station operators, EURELECTRIC, the Green Gold Label (linked to RWE), biomass procurement policies by Drax and Vattenfall and a verification procedure developed by GDF Suez and SGS for obtaining renewable energy subsidies in Belgium.

While these criteria contain many loopholes—such as no protection of biodiversity outside areas categorised as "high conservation value", no protection from land-grabbing where communities do not hold legal land titles, no protection of biodiverse forests not classed as "primary forests" and above all, indirect impacts being ignored—they are nonetheless broader than the voluntary criteria proposed by the European Commission[112] and the mandatory criteria proposed by the UK government. However, although the criteria might sound ambitious compared to some other standards, there is no indication that IWPB is serious about developing any robust system for verifying compliance across supply chains. Cross-compliance with forestry certification schemes is proposed, which means that any FSC, PEFC, SFI or other certificates, however flawed, would suffice to "prove" that principles have been adhered to. Even without such certification, verifiers could evaluate practices *"against international acknowledged sustainable forest or agriculture management schemes or against well established environmental guidelines"*—vague wording that is wide open to interpretation. Like the corporate sustainability policies detailed above, the proposed IWPB standard appears little more than a declaration of general principles. In essence, "proof" of compliance will, it appears, merely require a statement from one of several verification consultants instructed by an energy company. No transparency rules or avenues for appealing against certificates have been proposed.

6 Tried and tested? Voluntary forestry certification

There are two main international forestry certification schemes: the Programme for the Endorsement of Forest Certification (PEFC), which has certified around 243 million hectares of forests and plantations as "sustainably managed", and the Forest Stewardship Council which has certified 159 million hectares.

PEFC membership includes just one environmental NGO amongst its "international stakeholders" (Earth Focus Foundation) and most NGOs concerned with forestry certification are united in rejecting the scheme.[113] NGO opinion about the FSC, on the other hand, is far more divided. A larger number of NGOs are FSC members, though some of these have publicly criticised various FSC certified plantations and logging operations.[114, 115] Other environmental NGOs have denounced key FSC policies and ways of operating, especially the certification of monoculture tree plantations.[116] Some have publicly resigned their membership.[117, 118]

As far as biomass sustainability standards and industry policies are concerned, the debate of whether FSC is preferable to PEFC certification is of little direct relevance: All of the industry policies and proposals we have looked at treat FSC and PEFC certification as equivalent assurances

[19] Note this does not relate to biomass combustion.

of "sustainable forest management". So does UK policy on government procurement and thus the definition of "legal and sustainable timber",[119] so does the UK Government's proposal for biomass sustainability standards,[120] and so did the European Commission's 2010 report on sustainability requirements for biomass.[121]

Nonetheless, an overview of both certification schemes is important for judging whether promises of biomass being sourced from "sustainable forest management" are at all meaningful.

6.1 PEFC

The PEFC was founded by forestry industry groups in several European countries in 1998/99, as an "alternative" to the FSC, which those groups considered inadequate for meeting the needs of small private forest owners and managers and too dominated by NGOs.[122] It was initially called the Pan European Forest Certification Scheme, though it has since become an international certification scheme represented on four continents.

The PEFC endorses national and regional certification schemes—32 so far—which are supposed to observe the PEFC's international Sustainability Benchmarks and Standards. Certificates granted by any PEFC member scheme are treated as equivalent proof of sustainable forest management. Its members and recognised certification schemes include the Sustainable Forestry Initiative (SFI, which certifies mainly in the US and to a smaller extent in Canada), the Canadian Standards Association (CSA), the Australian Forestry Standard and the Malaysian Timber Certification Council. Most PEFC-approved certification schemes are dominated by forestry industry, whose primary interest is to maximise productivity which means maximising wood production. All decisions are made by a General Assembly. According to an analysis of the PEFC by Sierra Club, timber producers have two-thirds of the voting power—and voting power is based on how much timber different members cut.[123] NGO criticism relates both to the PEFC's weak standards and to the implementation of these standards, itself linked to the PEFC's structure and weak auditing requirements. As a recent report by nine NGOs cites from another 2007 research report, *"PEFC has no minimum requirements on such critical issues as the rights of indigenous peoples, protection of high conservation value forests, and chain of custody processes, and provides no limits on the size of clear cuts, the use of GMO trees, or the use of pesticides and other chemicals."*[124] In response to criticism, the PEFC has recently amended its International Standard.[125] Indigenous peoples' rights, including the right to free prior and informed consent, are now mentioned, and GMOs now contravene the standard. The scope for certifying the conversion of forests to tree plantations is restricted, although many loopholes are offered to companies and the conversion of biodiverse grasslands, community lands, and farmland to tree plantations is not even mentioned as a concern. Clearcutting is not addressed and no toxic chemicals are ruled out.

Moreover, although the new PEFC standard should by now apply to all PEFC certificates, national certification schemes such as the SFI appear to have ignored them. The SFI still offers certification of Genetically Engineered trees and it does not mention conversion of forests to tree plantations as a concern. Forest owners and logging companies do not have to protect primary forests from their own logging activities: they just have to support and participate in unspecified programmes to conserve them somewhere in their region.[126]

Yet, as the joint NGO report points out, even if international PEFC standards are improved, there are few grounds for optimism that this will be reflected in actual future PEFC certification:

"Areas that remain weak or that are not covered in the new standards include weaknesses in or a lack of a requirement for: accreditation and certification field visits; fulfilling non-conformity (corrective action) requests to a given deadline; transparency in decision making and public reporting; stakeholder consultation; universal accessibility and voluntary participation; and equitable and balanced participation of social, environmental and economic interests in governance, standard development and certification decisions."[127]

In other words, enforcement of the standards is so lax and non-transparent that it is hard to see how adherence to them can be guaranteed. The same NGO report presents 14 different examples of PEFC-certified forests and plantations. In 12 of these, practices which caused biodiversity and habitat destruction were certified. In 3 cases, the rights of Indigenous Peoples were violated. In 8 cases, forests had been converted to tree plantations. In seven cases, harmful impacts to soil and water were documented. In four cases, concerns over toxic chemicals were identified. In only 2 out of the 14 cases did the NGOs find evidence of any positive changes at all. The list of examples does not include the particularly notorious one of APP's pulp and paper plantations having been certified by the PEFC, discussed in Section 4.2.3 above.

In short, the PEFC has certified wood from the conversion of forests (including Sumatra's highly biodiverse rainforests) to industrial tree plantations, biodiversity and habitat destruction, violation of communities, including Indigenous Peoples' rights, toxic chemical use, water and soil contamination and degradation—all as "sustainable".

6.2 FSC

The FSC pre-dates the PEFC: it was founded in 1993/94 with participation from timber companies, traders and NGOs, led by WWF. Its mission statement is to *"promote environmentally appropriate, socially beneficial, and economically viable management of the world's forests,"*[128] through setting global Principles and Criteria for Sustainable Forest Management and allowing for the certification of wood from forestry practices which adhere to them.[20] Other, largely industry-led motives included ending a large European NGO campaign to boycott the use of tropical timber, and, during the Earth Summit 1992, avoiding any regulations which would require radical changes to the production and consumption of wood products, by developing voluntary certification instead.[129]

The FSC has developed international Principles and Criteria as well as additional national/regional ones, which vary considerably.

Various NGO reports have been published which compare the FSC with the PEFC, many of them concluding that the former's standards and structures are more credible.[130, 131] Acording to several such reports, FSC membership is broader and each member, whether an NGO or company, has equal voting rights; audits carried out by certifying companies tend to be more comprehensive and more detailed summary reports are published; where companies are found by certifying companies not to comply with some of the standards, action plans with deadlines are issued, there is a procedure for assessing complaints against certification bodies (though not certified companies) through an agency, originally set up by the FSC Secretariat but operating as an independent company, Accreditation Services International. Standards tend to be more detailed and concrete and make more reference to actual practices rather than just management plans and programmes, though national FSC standards vary greatly. [21]

Nonetheless, FSC standards remain highly controversial, not least because they permit certification of monoculture tree plantations, logging of biodiverse, (including old-growth) forests[22] and large-scale clearcuts, at least in some of the FSC's national/regional standards. Complaints against a particular certificate are always passed to the certifying company which has a vital interest to defend its own decision. Furthermore, several of the mechanisms identified by NGOs and listed above are not being consistently applied: for example, several serious complaints against certificates have not resulted in a referral of the certification body to Accreditation Services International. And while all FSC members have an equal vote at the FSC's General Assembly, there have been serious concerns about the implementation of General Assembly decisions. For example, a critical 2002 decision to revise the FSC's plantation policy was delayed by many years, during and after which the area of plantations certified nearly trebled.[132]

It is true that on paper, FSC standards are stricter than those of the PEFC, and certainly more so than those standards being developed by industry and Governments, which lack all but the most rudimentary auditing rules and fail to provide any reasonable mechanisms for transparency, any complaints procedures, and so on. There is no evidence that any existing forestry certification or wood standard is any more credible than the FSC. Sadly, this does not provide any basis for confidence that FSC-certified wood for bioenergy will not to be associated with particularly destructive practices. Above, in the discussion of certification companies (Chapter 4), we have already listed various examples of FSC certificates having been awarded in apparent breach of FSC Principles and Criteria, and in clear breach of what most people would regard as sustainable practices. The website `www.fsc-watch.org` provides the most comprehensive list of concerns regarding FSC practices and different certificates. Here are four further examples which illustrate concerns to do with the FSC as a whole:

- In January 2011, the South African NGO GeaSphere submitted a formal complaint to the FSC Secretariat over the large-scale killing of baboons on FSC-certified tree plantations in Mpumalanga Province.[133] GeaSphere listed a number of FSC Principles and Criteria which appeared to be violated by the companies which order the killing of primates—possibly just under 2,000 in two years. The complaint was dismissed. GeaSphere and other

[20] Note that this vision itself differs little from the PEFC's mission statement which states: *PEFC works throughout the entire forest supply chain to promote good practice in the forest and to ensure that timber and non-timber forest products are produced with respect for the highest ecological, social and ethical standards."* (PEFC Website, 'Who we Are', `http://www.pefc.org/index.php/about-pefc/who-we-are`)

[21] Note that by Standards, Forestry Management Standards are referred to. Under the FSC's Controlled Wood policy, non-certified wood can get a Controlled Wood FSC logo based on a very limited desk-based 'risk assessment'. Wood pellets produced by Georgia Biomass LLC (RWE) and by Enviva (who will supply E.On) have been certified that way.

[22] Note that the terms primary forest and old-growth forests exclude highly biodiverse forests. In Indonesia and Malaysia, few rainforests would come under that definition – even orangutan and Sumatran tiger habitat would now commonly be found in forests classed as 'secondary forests'. In the US, only a very small portion of biodiverse forests is classed as old-growth

NGOs have since issued an Open Letter, pointing out that the way the complaint was dealt with itself breached FSC rules: the Complaints Panel which should have been independent and impartial, was neither, and crucial evidence appeared to have been withheld by the FSC Secretariat.[134] Baboons continue to be shot on FSC-certified plantations.

- A 2011 investigation by the Swedish NGOs Protect the Forest and Friends of the Earth Sweden together with the Russian NGO SPOK documented the clearcutting of forests with high biodiversity value and ancient trees, up to 600 years old, in Russian Karelia, certified by the FSC. The forests are small remnants of the once extensive Fennoscandian old-growth forests. The logging is being carried out by Swedwood, a subsidiary of IKEA. A documentary confirming the NGOs' findings was shown by the German TV station ARD.[135] In response, the FSC Secretariat asked the company which had certified Swedwood's activity (Smartwood) to consider the complaint. Just as in the case of large-scale evictions on behalf of the New Forest Company in Uganda, mentioned above, no independent complaints/oversight procedure has been invoked.

  In response to an email alert launched by Rettet den Regenwald in Germany against FSC certification of Swedwood's activities in Karelia, the FSC Secretariat argued that the "democratic" FSC structure meant that *"under the FSC, forest management methods will be certified which our Western culture regards as questionable, such as clearcutting. We know that with our structures we cannot always meet one culture's requirements"* and referred to *"democratic respect for stakeholders in Russia"*.[136] In other words, clearcutting of remnants of highly biodiverse oldgrowth forests and of ancient trees were treated as a mere "cultural" issue, not a practice the FSC should have prevented from being certified in its name.
- In 2011, the Centre for International Forestry Research (CIFOR) published its findings about forestry certification in Cameroon. It concluded: *"A FSC certificate today does not necessarily mean that the timber has been sustainably harvested and that future harvests, and the forests from which they come, will be maintained tomorrow"*.[137] Around 800,000 hectares in Cameroon are FSC-certified. Seven out of ten FSC-certified forests in Cameroon were being over-exploited and depleted.
- A 2008 investigation by the South African Timberwatch Coalition, published by the Global Forest Coalition, looked at FSC certified monoculture tree plantations by Hans Merensky Holdings (HMH) and its subsidiaries, Northern Timbers and Singisi Forest Products Pty in Limpopo Province and southern KwaZulu-Natal Province.[138] The plantations had been certified for the FSC (by certification company SGS) since 2000 and 2003 respectively. Timberwatch identified serious social, economic and environmental impacts. These included shrinking employment as small timber operators were displaced, communities seeing their land security and livelihoods eroded and losing their freedom of choice as to what to grow on their land, food sovereignty being undermined as plantations were expanded onto communal land previously used for food, and increased water stress as tree plantations competed with food for water. The plantations remain FSC-certified.

Figure 8 – **This Veracel Celulose plantation received an FSC certificate of 'sustainability', issued to it by SGS. Photo courtesy of Chris Lang**

In summary, while FSC standards and procedures on paper appear stronger than the PEFC's or any proposed biomass sustainability standards, in practice, the FSC thus does not guarantee that certified wood is not associated with some of the worst practices, ranging from land-grabbing (New Forest Company, Uganda), to illegal conversion of forests to plantations (Veracel, Brazil), plantation expansion at the expense of communities, local employment, water and food sovereignty (HMH, South Africa), clear-cutting of ancient highly biodiverse forests (Swedwood, Russia) or over-exploitation and degradation of tropical rainforests (Cameroon). And, as we have seen above, the same range of verification and certification companies certify for the FSC and for the PEFC, generally treating both of them as "equivalent" proof of "sustainable forest management".

If, after 19 years and considerable sustained NGO involvement, the FSC has not succeeded in guaranteeing

that all of the wood it certifies conforms with most peoples' understanding of "sustainability", nor with its own Principles and Criteria, then what are the prospects that far more general industry standards developed by energy companies and biomass standards proposed by the UK Government will be able to offer such guarantees?

7 Proposed UK biomass sustainability standards

In 2010, The UK and Scottish Governments announced their intention to introduce mandatory biomass sustainability standards for all biomass electricity subsidised through Renewable Obligation Certificates. The Department of Energy and Climate Change (DECC) has since announced that these are to apply to bioenergy subsidised through the Renewable Heat Incentive, too.[139, 140]

Some of final criteria, which will apply until at least 2020 unless superseded by EU legislation, are still to be consulted on,[23] however the overall scheme has already been announced and builds on existing sustainability reporting requirements. Here is a summary of these standards:

7.1 Land use standards

EU land use standards for biofuels will be applied to biomass and there is no indication that they will be consulted on further. These are supposed to prevent biomass (other than biomass from waste and certain residues) from being subsidised if it comes from land which was:

- primary forest on 1^{st} January 2008;
- designated for nature protection purposes on 1st January 2008, unless biomass production or removal did not interfere with this status;
- peatland in January 2008, unless biomass production or removal involved no drainage of previously undrained soil;
- continuously forested in January 2008 and has lost that status;
- a wetland in January 2008 and no longer is so;
- lightly forested in January 2008 and no longer is so, unless the greenhouse gas emissions from generating fuel from biomass sourced from such land did not exceed 79.2 g MJ^{-1}.

EU biofuel criteria also state that highly biodiverse grasslands would be treated the same as land designated for nature protection purposes and that the European Commission is to define criteria as to which grasslands fall into this category. In the meantime, biofuels can be sourced from such grasslands. It seems likely that any possible future European Commission decision on grasslands would be applied to biomass by the UK Government.

Both the land use and greenhouse gas criteria have been widely criticised as highly inadequate in the context of European biofuel standards.[141] Yet when the same criteria are applied to biomass, they become even less meaningful. A key policy purpose of the EU biofuel criteria has been to prevent biofuels from (directly) leading to the conversion of forests to plantations. If any forest[24] is converted to a plantation to produce biofuels, then those biofuels are not classed as sustainable although, as we have seen above, lack of credible verification undermines this aim.

The European Commission has clarified that oil palm plantations do not meet the "forest" definition, so cutting down a forest and planting oil palms would contravene the standards.[142] Yet industrial tree plantations, including ones dedicated to bioenergy production, clearly will meet the forest definition. Hence when biodiverse secondary rainforest in, say, Indonesia is cut down for oil palms, biofuels from that palm oil would not qualify under the Renewable Energy Directive.[25] Yet if the same rainforest is cut down for acacia or other plantations for woodchips or pellets, that biomass qualifies as sustainable under the land use criteria.

7.2 Sustainable Forest Management Criteria

These criteria will still be consulted on, however the UK's former Energy Minister responsible for the Renewables Obligation, Charles Hendry, has stated: *"It is likely that [these] will be based on the approach adopted by the Central Point of Expertise on Timber Procurement (CPET)".*[143] CPET was set up by the the UK's Department for Environment, Food and Rural Affairs (Defra) in response to a government-commissioned study in 2002

[23] As this report went to press, the Department of Energy and Climate Change launched a new consultation on sustainability standards for biomass. Whilst the timing prevents us from including a discussion of this, we have so far seen nothing to contradict anything stated in this report.

[24] Forest is being defined as having at least 30% tree cover and a height of at least 5 metres, or having the potential to reach those thresholds.

[25] For a description of the importance of secondary rainforests in Indonesia, see the ZSL London Zoo Website, at `http://www.zsl.org/zsl-london-zoo/animals/mammals/sumatran-tiger,26,AN.html`

to inform and advise the Government on the implementation of its timber and timber products procurement policy. Such a policy was first approved in 2000 and has also been adopted by the Scottish Government. Under this procurement policy, all wood purchased by government departments and their agencies must come from "independently verifiable legal and sustainable sources or FLEGT-licensed[26] timber or equivalent sources".[144] Any FSC or PEFC (including SFI and CSA) certificate is accepted as proof that wood meets these criteria, as long as at least 70% of the wood comes from certified forests and tree plantations. Thus 30% can be non-certified and subject to a simple desk-based risk assessment. Even if wood is not certified by either scheme, it can pass the criteria based on other evidence, i.e. a report directly commissioned from a certification/auditing company. Additionally, any wood traded under a bilateral Forest Law Enforcement, Governance and Trade (FLEGT) agreement between the EU and a third country would in future be classed as "legal and sustainable" as is any recycled wood. Yet, as we have seen above, FSC, PEFC and individual auditing provide no assurance that even minimal sustainability standards are met, nor even that all wood comes from legal sources. PEFC and FSC risk assessments, which can apply to up to 30% of wood approved under CPET rule, involve no field inspections and no independent checks and verifications at all. In 2009, Gibson Guitar instruments made from wood certified under the FSC's Controlled Wood procedures were seized by US officials for suspected violation of the Lacey Act, which prohibits the import of illegal wood into the US.[145]

7.3 Greenhouse gas standards

From 2013 until 2020, subsidised biomass electricity will have to have a maximum carbon intensity of 285.12 g CO_2e kWh^{-1} in the case of co-firing and coal-to-biomass conversion and 240 g CO_2e kWh^{-1} in the case of dedicated biomass power stations. The Government proposes that, from 2020 until 2025, the 240 g limit should apply to all subsidised biomass electricity, however, that figure will be subject to further consultation. By comparison, the National Grid reported an average carbon intensity of 500 g CO_2e kWh^{-1} in 2010 and predicted a carbon intensity of 222 g by 2020,[146] i.e. lower than the permitted greenhouse gas standard for subsidised biomass electricity. There is no indication from the Government that the crucial methodology for calculating greenhouse gas emissions from biomass electricity will be consulted on later in 2012.[147]

There are two ways in which companies are allowed to assess the greenhouse gas/carbon intensity of bioenergy under government rules: they can either use default values for different types of biomass (combined with the power station's conversion efficiency), provided there are no direct net emissions from land use change, or they can submit individual calculations according to a set methodology.[148, 149]

There are three particularly major problems with this approach:

Firstly, as discussed in detail above, there will be no genuinely independent auditing and verification. Energy companies can choose and pay any of a range of auditing/certification companies to confirm greenhouse gas figures, without any need for on the ground assessments of logging or plantation activities.

Secondly, the carbon debt or lag from biomass is ignored entirely. The carbon debt refers to the time lag between CO_2 being emitted from burning biomass and the same amount of CO_2 being absorbed again by new plant growth, usually trees. Because biomass is less energy dense than coal, generating one unit of electricity from burning wood results in around 50% more upfront CO_2 emissions than generating the same from burning coal.[150] In theory, new trees or other plants will eventually re-absorb all of that carbon again, however, even if this were to happen (which is highly uncertain), trees take years or—outside the tropics—decades to grow, yet only minutes to burn. And forests take even longer to re-sequester all of the carbon emitted not just from burning wood but from depleting soils and destroying plant communities as a result of logging. Yet this increase in CO_2 over the next years, decades or centuries is ignored entirely in the Government's methodology.

Finally, all emissions from indirect land use change are ignored. These relate to land conversion to plantations. If community land and/or farmland is converted to new tree plantations for biomass, the agricultural frontier will commonly be pushed further into remaining forests yet the climate impacts of the resultant deforestation are not taken into account.

The debate about greenhouse gas emissions from bioenergy is discussed further in Chapter 8 below. First, however, we shall briefly look at the role of Ofgem in enforcing future biomass standards.

[26] FLEGT – Forest Law Enforcement, Governance and Trade – is an EU Action Plan, which involves bilateral Voluntary Partnership Agreements between the EU and wood-exporting third countries. The longer-term plan is that under such Partnership Agreements, only FLEGT- licensed timber will be allowed to be imported into the EU.

7.4 Ofgem's role: Leaving companies to police themselves

The Renewables Obligation is administered by the Office of the Gas and Electricity Markets Authority (Ofgem). The funding comes not from a government budget but from payments which energy companies make under the Renewables Obligation if they do not meet the annual quota of renewable energy, called the buy-out fund. Since 2009, Ofgem has been responsible for administering sustainability reporting requirements for bioliquids and biomass, including issuing guidance. Since 2011, it has administered mandatory bioliquid sustainability standards for the purpose of renewable electricity subsidies (Renewable Obligation Certificates or ROCs).

During the first year of the existing biomass sustainability reporting requirement, Ofgem published the main details contained in company reports relating to biomass or bioliquid sourcing, sustainability and greenhouse gas emissions, however, it has not done so since. It now publishes only general Annual Sustainability Reports[151] in which it summarises companies' reports without identifying specific generators or biomass sources. In the most recent 2010-11 report, Ofgem states: *"Whilst Ofgem has reviewed this data to ensure the questions were answered as intended by legislation, we have not verified the information".* Ofgem thus takes no responsibility for ensuring that the information provided by companies is correct. Nor are NGOs able to scrutinise company information provided to Ofgem, since this is not published.

Indeed, Ofgem does not appear to have a budget for verifying information, carrying out any spot-checks for potential fraud or misinformation, etc. Its limited additional budget for administering sustainability standards for bioliquids and sustainability reporting for biomass is earmarked primarily for IT development, guidance documents and technical consultations.[152]

As far as fraud prevention is concerned, Ofgem's guidance in relation to bioliquid sustainability standards simply states that companies must "confirm that measures have been taken to protect these systems against fraud and ensure the information produced by these systems is accurate and reliable", with operators and their auditors being free to decide how this will be done.[153]

These arrangements, which appear to be in line with Government legislation and policy, seem feeble even by comparison with various "light-touch" regulations which have resulted in widely reported scandals in the UK and internationally.

By way of comparison, care homes scandals, two of them uncovered by the BBC's Panorama programme, were linked to badly under-resourced, infrequent and lax checks by the UK's Care Quality Commission. That commission is empowered to carry out spot-checks rather than solely relying on information from companies and other providers. In the UK, the Medicines and Healthcare Products Regulatory Authority (MHPRA) has been blamed for allowing the breast implant scandal which remained unchallenged, until disclosed by French authorities.[154] Crucially, the MHPRA appears to have relied on company reporting which, in the case of PIP implants turned out to have been fraudulent.

In the case of "biomass sustainability", the overseer, Ofgem, has neither the intention nor the budget to carry out any spot-checks into company reports, even though the content of these reports determines whether these companies will be eligible for potentially hundreds of millions of pounds in annual subsidies. Nor is there any requirement for investigations into the veracity of information given to energy companies by their biomass suppliers.

In short, companies are free to "police" themselves.

8 The problems with biomass carbon accounting

We have seen in the previous chapter that the greenhouse gas accounting rules proposed by the UK Government—based on European Commission recommendations from 2010[155]—are deeply flawed and further rendered meaningless by a lack of credible auditing and verification of companies' claims.

In theory, accounting rules could be strengthened, indirect land use change emissions and the carbon debt associated with logging and burning trees could be accounted for and a well-funded regulatory body conducting on-site checks could be set up, although none of this is envisioned by the UK Government or the European Commission. Yet even in such a theoretical scenario, there are serious problems with the concept of biomass greenhouse gas standards in the context of large-scale industrial bioenergy. Before exploring these, however, we shall briefly look at the international context and the concepts of biomass "carbon neutrality" and "life cycle assessments".

8.1 From carbon neutrality to life-cycle assessments

According to reporting rules under the UN Framework Convention on Climate Change (UNFCCC), emissions from fossil fuel burning are measured and reported as stack

[27] Note that while stack-emissions from bioenergy are ignored, life-cycle emissions from fossil fuel combustion are ignored within the energy sector – such as the very significant emissions associated with coal mining or methane leakage

or tailpipe emissions. Thus when coal or gas are burned in a power station, the amount of carbon dioxide emitted through smokestacks is accounted for.[27]

If biomass electricity were accounted for in the same way then it would not be considered low-carbon but in fact more carbon intensive than coal. Because biomass is less energy-dense than fossil fuels, a larger mass of material needs to be burned per unit of electricity generation, resulting in higher CO_2 stack emissions. According to the International Panel on Climate Change (IPCC), CO_2 emissions from burning wood are higher than those from burning most types of coal, though similar to those from burning lignite (brown coal).[156] In reality, stack emissions from biomass combustion are around 50% higher than those from coal burning for the same amount of electricity produced, due to the fact that biomass combustion is less efficient than coal combustion using the same technology.[157]

However, while the IPCC recommends that these emissions are reported “for information purposes”, countries are not required to include them in their overall greenhouse gas emissions reports.

Instead, burning biomass is, internationally, treated as “carbon neutral” on the assumption that all wood and other biomass is “renewable” and that new trees and other vegetation will re-absorb the carbon emitted from burning previous harvest. In other words, the CO_2 coming out of biomass combustion chimneys is completely ignored.

Figure 9 – **The idea that biomass is "carbon neutral" has been called a "serious accounting error" by the European Environment Agency. Photo from IStock Photos**

Other emissions associated with bioenergy, such as those from fossil fuel burning for harvest, transport, drying, processing into pellets, and also from depleting soils, logging and converting land to plantations, are supposed to be reported in the countries and sectors (land use, transport etc) where they occur. The problems with this approach—and with relying on it for national energy policies—are increasingly recognised, and are one of the reasons why the UK Government is planning to introduce greenhouse gas standards for biomass.

Firstly, by ignoring all emissions associated with bioenergy in the energy sector, biomass power stations are falsely classed as "carbon neutral" or "low carbon" and in many countries, such as in the UK, subsidised as a result. Secondly, when biomass is imported, all or most of the life-cycle greenhouse gas emissions associated with it are outsourced to other countries. Thirdly, even when biomass is sourced from within the EU, rules for accounting for emissions from logging and land conversion under the Kyoto Protocol have been widely condemned: under accounting rules agreed at the 2011 UNFCC conference in Durban, countries can make up their own “baselines”[28] when reporting increases or decreases in their emissions from “forestry management” and they do not have to account for emissions from fires or other “natural disasters” even if these are actually caused by logging activities or land conversions to plantations.[158]

Biomass greenhouse gas accounting and standards, as discussed by the European Commission and announced by the UK Government, would in theory begin to address this major loophole, i.e. the fact that UK energy companies are not currently held responsible for any associated emissions, although under UN greenhouse gas accounting rules, the UK and EU would still not report any bioenergy emissions as part of their own greenhouse gas emissions from the energy sector. Energy companies would, in future, be given some responsibility not for the CO_2 stack emissions of biomass burning but for the life-cycle emissions, that is, the emissions associated from logging, land conversion, transport and processing of biomass. As we have seen above, by ignoring all emissions from indirect land use change and all of the carbon debt associated with logging, (that is, the long time-lag between cutting and burning a tree and a new tree growing back and re-absorbing as much carbon as had been released) most of the real life-cycle emissions of bioenergy will still be ignored. Yet would truly scientific life-cycle assessments even be possible?

during gas drilling and transport.

[28] Making up their baselines means that countries do not have to compare emissions from forest and other ecosystem destruction with historic levels – they can instead compare them to completely ficticious assumptions about future logging and argue they have ’saved’ emissions by, say, doubling their rate of forest destruction because their fictitious assumption had been tripling them.

8.2 What might a science-based life-cycle assessment for bioenergy look like?

While stack emissions of CO_2 are easy to measure, life-cycle greenhouse gas assessments are complex, controversial and often rely on assumptions about what might happen to a forest or plantation in decades to come. The easiest part of the assessment relates to fossil fuel emissions from transport, wood processing and drying, though in practice, all of the concerns over lack of genuinely independent verification still apply.

Far harder to assess are emissions associated from logging, possible soil depletion and land conversion, while indirect impacts are still harder to estimate.

An example is changes to soil carbon which are supposed to be accounted for under the UK government's methodology for reporting biomass emissions. Removal of forestry residues, of brash, stumps and deadwood all deplete soil nutrients and soil carbon according to one study from Finland. This alone can result in bioenergy emissions being as high as those from fossil fuels.[159] Boreal forest soils are particularly carbon rich. According to one study, boreal forests store 703 billion tonnes of carbon, compared with 496 billion tonnes in all other forests.[160] This is the equivalent of more than 77 years of annual fossil fuel emissions, at the 2010 rate. The potential for substantial soil carbon emissions from increased logging and "residue removal" in boreal forests for bioenergy is therefore very high.

Soil compaction has been shown to increase CO_2 emissions from soilsand heavy machinery used for logging causes forest soils to compact.[161] Opening up canopy exposes soils to drying, oxidation and potentially erosion, and it can also increase fire risk. The scale of these resulting emissions will vary greatly according to logging methods, climate, soil types and remaining biodiversity. Estimating and even directly measuring soil carbon and soil carbon changes is difficult and would have to be customised for each individual site.[162] It is neither expected of, nor realistic, for energy companies to commission such soil carbon assessments.

The fact that logging for bioenergy leads to a ***carbon debt***, albeit ignored by the UK government, is widely accepted by scientists, with the debate focusing on how long that carbon lasts in different scenarios. A study by the Manomet Center for Conservation Sciences,commissioned by the government of Massachusetts, concluded that electricity from wood removed from forests in Massachusetts would result in higher carbon emissions than an equivalent amount of electricity from coal for a period of 40 years, and that it would be worse for the climate than electricity from gas for 90 years.[163] These figures were based on some optimistic assumptions, for example, that no wood would be taken from forests that were not already being logged for other purposes, that a large proportion of the logging emissions could be ascribed to these other purposes and that soil carbon losses would be minimal.

Another study, by scientists working at the Joanneum Research Institute in Austria, concluded that additional fellings from a "sustainably managed European forest" can result in such high carbon emissions that the carbon balance will be worse than that of fossil fuels for a period of 2-3 centuries.[164]

A further study, by Canadian scientists, estimated that replacing coal with wood pellets made from forestry residues results in a net increase of CO_2 emissions for the first 16 years and that using wood from trees cut down for bioenergy results in a carbon debt of 38 years compared with coal.[165]

Yet another study, looking at biomass electricity from trees cut down in forests in the Southeastern US, concluded that carbon emissions will be worse than those from fossil fuels (per unit of energy) for a period of 35-50 years.[166]

What these and other studies show, despite the different scenarios considered and different time-scales suggested for biomass electricity from trees cut down for this purpose—and possibly from the removal of forestry residues which would otherwise have remained in the forest—is that biomass electricity will worsen climate change for several decades if not centuries. Higher stack emissions of CO_2 from biomass compared with coal power station creates an immediate carbon spike which will only gradually reduce over time. Climate scientists have shown that avoiding the worst impacts of climate change requires global CO_2 emissions to peak and decline as rapidly as possible, not with a delay of several more decades or centuries. High near-term CO_2 rates and warming increase the risk of irreversible and self-reinforcing climate change. Hence biomass carbon debt studies should play an important role in informing policy-makers that large-scale wood-based bioenergy will not mitigate climate change. A carbon spike for several decades in the hope that new trees will eventually re-absorb all that carbon is clearly highly dangerous in the face of escalating climate change. Using carbon debt studies to try and predict carbon emissions from different scenarios—as some energy companies are already trying to do in their favour[29]—is, however, highly questionable. This is because all carbon debt studies rely on assumptions about long-term future forest (or plantation) regrowth which are ultimately highly speculative.

[29] See the discussion of Forth Energy's sustainability claims above.

[30] According to a recent study co-authored by James Hansen, the global land area experiencing extreme heat has in-

Current levels of climate change, including the observed major increase in extreme weather events,[30] are already putting forests and other ecosystems under extreme stress, making wildfires more frequent and severe and causing beetle and other infestations to spread rapidly beyond their normal range. A recent study of the 2000-2004 drought in Western North America found that it cut carbon sequestration by vegetation in the region by 51%. The authors concluded that such conditions can be expected to become far more common and severe throughout the course of this century and that they will cause ecosystem damage, forest mortality and turn forests into grasslands or shrub.[167] It thus cannot be assumed that forests will survive, grow and re-grow at historic rates in coming decades, and thus that the "carbon debt" will indeed be repaid as anticipated.

Furthermore, the fast-growing demand for bioenergy itself means that the survival and re-growth of logged forests is doubtful. According to a study published in *Science,* global policies that encourage substituting fossil fuels with bioenergy, such as a carbon tax on fossil carbon emissions, which meanwhile ignore emissions from bioenergy, could result in the destruction of all remaining forests, grasslands and most other ecosystems by 2065.[168] Even if such a drastic scenario was avoided, it cannot be assumed that a forest logged once for bioenergy will then be allowed to recover. It is more likely that it will be logged again as soon as is profitable, or cut down to make way for a faster growing tree plantation, to keep meeting the on-going demand created by biomass power stations as well as for other markets.

Finally, scientific life-cycle assessments for bioenergy which include carbon debt often ignore the crucial interactions between biodiversity, ecosystem health and climate. As a recent peer-reviewed article about the wider climate and environmental impacts of large-scale bioenergy argues, increased logging for bioenergy can result in homogeneous young stands of trees which offer no habitat to the many species that depend on complex, diverse forests, which are more susceptible to disease (and thus die-off), and to soil erosion and which store far less carbon overall.[169] Forest-degradation and forest conversion to plantations as a long-term result of the increased demand for bioenergy are rarely captured by carbon debt studies.

In short, scientific studies looking at bioenergy carbon debt play a vital role in proving that industrial large-scale bioenergy will have a negative impact on the climate during the crucial near term years and decades when emissions must be brought down to prevent the worst impacts of climate change. Relying on such an approach for life-cycle assessments carried out for particular wood supplies or power stations, on the other hand, is far less convincing.

Regardless of the arguments above about the future potential for inclusive science-based bioenergy life-cycle assessments for biomass, clearly, the complex interactions between forests and logging, plantations and land conversion and the climate can never be summed up with a simplistic formula like this:

$$\frac{E}{\eta_{el}}\left(\frac{\eta_{el}}{\eta_{el}+C_h\times\eta_h}\right)$$ [170]

9 Three special "sustainable biomass" myths

In response to the growing evidence of the serious negative impacts of large-scale bioenergy, energy companies and their supporters commonly claim that particular sources of "sustainable" biomass are available on a large scale. It would be impossible to address each of these claims and new ones emerge over time. In the biofuels sector, companies frequently claim to be sourcing biofuels from particular schemes which allegedly provide benefits to communities in Africa or elsewhere, including local energy, income and livelihoods, while avoiding environmental destruction. For example, UK firm SunBiofuels was able to convince a large environmental and development NGO (IIED) of the merits of their investment in Tanzania: *"Sun Biofuels, a British company, is addressing local energy supply through planned provision of biodiesel and multi-function platforms to local communities, though this service is philanthropic rather than a revenue-generating component of the business model."*[171] Yet when ActionAid subsequently investigated SunBiofuel's Tanzania plantations, they discovered a very different reality. SunBiofuels had taken over 8,000 hectares of land from 11 villages, promising full compensation and badly needed social services and community investments, yet did not deliver on these commitments. Having lost such a large area of land, many villagers became unable to feed their children an adequate diet, pay school bills or buy medicines. [31] [172] It is likely that similar optimistic claims about specific tree plantations, which have al-

creased from 1% of the world's surface in 1950-1980 to 10% in 1981-2010 – see J Hansen *et al*, 'Perception of Climate Change' 6 Aug 2012, Proceedings of the National Academy of Sciences in the USA

[31] The company went into administration in August 2011 and was taken over by Lions Head Global Partners. After months of pressure by the community and by ActionAid, the villagers were granted access to ancestral graves and existing wells which had formerly been denied. Some compensation, but by no means all the compensation promised, has also now been paid, but promised jobs and investments such as clinics and schools have yet to come to fruition and remain unlikely.

ready been made about plantations for pulp and paper and carbon offsets, will in future be made to support biomass investments. Investigating them will require time and money, with NGOs able to do only a very limited number of case investigations.

Figure 10 – **Seleman Pazi, a village elder from Kisarawe, Tanzania, told ActionAid that Sun Biofuels had not delivered on its promises to bring jobs and clean water to the region when they developed a jatropha plantation on the village’s land. Photo Courtesy of ActionAid**

Here, we shall examine three of the most common and general claims about “sustainable sourcing”: firstly, the claim that large amounts of wood can be safely removed from beetle-infested forests in North America, secondly, the claim that greatly increased logging can reduce the risk of catastrophic wildfires, providing a safe and beneficial large source of bioenergy, and finally, the claim that large areas of abandoned, marginal or waste lands are available for bioenergy production worldwide.

9.1 Wood from beetle-infested forests

Wood-boring and other insects regarded as pests by timber companies have evolved over millions of years as part of forest ecosystems. Large-scale insect outbreaks have long been part of forest ecology, particularly in temperate and boreal regions, and they can play an important role in maintaining forest health and resilience: recycling nutrients, providing food for birds and mammals, increasing the growth rate of surviving trees, contributing to the development of more complex stands of trees, and increasing overall biodiversity.[173]

However, the scale of beetle infestations has in recent decades and years increased at an unprecedented rate and over large regions this spread has been shown to correlate with climate change. Across Western North America, a shift towards a warmer and drier climate is extending the geographical reach of bark beetles and allowing them to reproduce faster.[174] Between 1997 and 2007, mountain pine beetles affected 13million hectares across Western Canada, an outbreak an order of magnitude larger than any other within human memory.[175] In Europe, too, climate change has been linked to more severe beetle outbreaks, for example of spruce bark beetle in Alpine forests, favoured by a drier and warmer climate.[176]

Yet blaming each of the escalating spread of beetle infestations on climate change alone would be too simplistic. As one peer-reviewed scientific review of the pine beetle outbreak in North America explains: *"Extensive host abundance and susceptibility, concentrated beetle density, favourable weather, optimal symbiotic associations, and escape from natural enemies must occur jointly for beetles to surpass a series of thresholds and exert widespread disturbance"*.[177] The review identifies a wide range of causes. Habitat fragmentation can make trees more susceptible to beetle attack and reduce local predators which would keep beetles in check. Forestry practices which reduce the genetic diversity of trees and result in single-age trees (as monoculture tree plantations and clear-cutting do) remove one of the main protections against large-scale beetle attacks. Transport of infested wood can spread beetles to non-adapted trees and forests—the cause for example of Dutch elm disease in the UK. The review states: *“Climate changes and forest management activities can have combined or other interacting effects, so it is often difficult to separate their individual contributions to outbreaks.”*

Companies investing in bioenergy regard trees damaged by insect infestations as a cheap, large-scale resource. This attitude is reflected in a biomass industry article, which states: *“The millions of acres of dead, downed and diseased timber infected by pine beetles in Colorado and the Western U.S. could be put to beneficial use by the biomass industry, and also help with forest fire mitigation and suppression.”[178]* Clearcutting beetle-infested forests promises high short-term profits and is the preferred strategy of governments, for example, in British Columbia. For the future of forests, however, it is a disastrous strategy:

- Insect infestations rarely kill all trees in a forest. Even in the most severely infected areas, seedlings and saplings tend to survive, allow for forest regeneration and maintain the genetic diversity of the forest. Naturally, forests tend to become more rather than less diverse and complex after an outbreak, thus increasing resilience against future infestations. On the other hand, “salvage logging" (i.e. clearcuts) decimate the potential for natural regeneration and the diversity of future trees and thus increase future vulnerability to insects and other disturbances.[179]
- Salvage logging of beetle-infested forests destroys biodiversity. In the interior of British Columbia, it is believed to have decimated moose popula-

tions by up to 70%. [180] In Oregon, salvage logging after beetle infestations and wildfires has brought the Black-backed Woodpecker to the brink of extinction.[181]

- Salvage logging after beetle infestations is bad for the climate. A recent study shows that forest sites in British Columbia where up to 90% of trees have been killed by beetles quickly regain carbon, sequestering it in new growth that is favoured by extra light (due to tree mortality). On the other hand, a site that was salvage-logged was found to still be releasing rather than sequestering CO_2 ten years later.[182]
- It is often claimed that logging beetle-infested forests helps to reduce the risk of severe wildfires. Yet a recent study by NASA scientists shows that this is not the case. Beetle-infested forests are not more susceptible to fire than healthy ones: they can in fact be less susceptible because they have lost many or most of their needles which act as kindling for fires.[183]

Trading biomass chips or pellets made from infested wood may carry a risk of infestations being spread into new areas where trees have so far been unaffected and thus lack any defence mechanisms. According to a 2010 Report by Alterra Wageningen University, commissioned by the Dutch government: *"Currently there are no science-based mechanisms taken by practice to eradicate potentially harmful organisms that may be present in the woodchips or to prevent their spread."*[184] Chipping wood kills larger beetles but will not entirely rule out the survival of all beetles at all developmental stages, heat treatment is expensive and the heat tolerance of various beetles, including those responsible for serious infestations in North America, is unknown and fumigation of chips is expected by the authors to be outlawed.

9.2 Biomass, logging, and fire risks

Fires are a key feature of various forest ecosystems, including those found throughout much of Western North America. However, more frequent and severe droughts and heatwaves, likely already the result of climate change have been linked to far more intense and larger fires in recent years than those recorded in past decades. One of those has been the extreme wildfire season in Colorado and New Mexico in the summer of 2012, coinciding with record-breaking heat and drought across most of the US. A single fire in Colorado in June burned over 17,000 acres, destroyed around 350 homes, forced the evacuation of at least 32,000 residents and killed at least two people.[185] Another example was the extreme heatwave across southern Europe and the Balkans in the summer of 2007, which triggered the worst forest fires in at least fifty years on the Peleponnes in southern Greece. Over 670,000 hectares of forests, olive groves and farmland were destroyed and 84 people died.[186] There is less of a consensus about the role which "fuel load buildup" plays in forest fires. According to ecologist George Wuerthner, in western North America, the link between smaller fires having been suppressed over recent decades (thus causing biomass "fuel" to build up) and the severity and extent of recent wildfires may not be as strong and clear as many believe:

"There undoubtedly has been some fuel build up in a few ecosystems due to fire suppression, particularly low elevation forests such as those dominated by ponderosa pine that burned at frequent intervals. However, most of the acreage burned in recent years has been either range fires influenced largely by the presence of the exotic and highly flammable cheat grass and/or higher elevation plant communities dominated by lodgepole pine, and various fir species...These forests types have suffered no fuel build up due to fire suppression because successful fire control hasn't existed long enough to have affected the interval between blazes that typically dominates these forests."[187] Whatever the impacts of suppressing smaller fires may have been, industrial logging does not mimic natural small fires, and there is growing evidence suggesting that it does not help prevent disastrous fires but may even aggravate them, for reasons discussed below.

Reducing fire risk is particularly of concern for residents living in areas prone to wildfires. Clearing vegetation immediately around buildings and settlements can protect homes and lives,[188] but logging miles away from homes has not been shown to protect homes from fire.

In general, forest thinning can decrease shade, cause foliage and small trees to dry out, reduce soil nutrients, and expose trees to more wind, causing them to break and fall. Preliminary findings of a US Department of Agriculture Forest Service assessment of a 2010 forest fire in Colorado suggest that "thinning" operations to reduce fuel load had been ineffective in reducing the severity and spread of the fire.

"In some cases, treated stands burned more intensely than adjacent untreated stands, perhaps because of additional surface fuels present as a result of the thinning and higher wind speeds that can occur in open forests compared with those with denser canopies."[189]

Thinning often involves logging the largest trees. A 2009 peer-reviewed study looked at a fire in a beetle- and drought-affected forest in California in 2003. It found that stands dominated by very large trees—ones commonly logged for "fire suppression", burned less intensely

than stands dominated by smaller trees, rendering logging operations ineffective or counter-productive for reducing fire intensity.[190] Monoculture tree plantations, especially highly flammable eucalyptus plantations, are particularly prone to fires. In Spain for example, eucalyptus plantations cover around half a million hectares of land and burn particularly severely, with plantation fires spreading into nearby forests and other vegetation. Bioenergy expansion is encouraging plantation expansion in this region, too.[191]

9.3 Marginal, degraded, unused, abandoned or waste lands for biomass

The UK Government’s Bioenergy Strategy assumes that the UK will burn 10% of all globally traded biomass for energy between now and 2020.[192] It states:*"The feedstock availability estimates used in this strategy recognise these [indirect land use change] issues by limiting supply to land that may became available through better farming practices and increased land productivity of abandoned or “spare land” (i.e. land that would not be used for food/feed production), rather than re-allocation of land use from current economic or environmental activities. Production on unused land or land of low ecosystem service value is key to ensuring that growth in use of bioenergy is achieved without adverse carbon, biodiversity and water impacts."* Those government assumptions about biomass as well as biofuel supplies are based on a consultancy assessment by AEA according to which biomass plantations will all be established on abandoned and unused land, although they acknowledge that land conversions are already happening on lands which are anything but "abandoned”.

Scientific studies about the global potential for bioenergy in many cases pre-date EU and UK bioenergy, including biofuel policies. We have argued elsewhere that optimistic assumptions contained in such studies played a vital role in shaping EU biofuel and bioenergy policies which have since been heavily criticised by a growing number of scientists.[193] Some of the “global potential” studies assume that global cropland area could be “sustainably” doubled to accommodate expanded demand for bioenergy feedstocks. Others, however, restrict their choice of suitable land for bioenergy to lands they classify as abandoned cropland, a term which companies and policy makers often use interchangeably with “marginal”, “degraded”, “unused” or “waste” land. The impact of such a designation being used to convert lands to biofuel production has been discussed in other reports.[194]

One of the least optimistic bioenergy potential studies, considered in the UK Bioenergy Strategy, is a 2008 study by Chris Field *et al*.[195] The authors consider that energy crops will result in adverse direct or indirect land use change unless they are grown on “abandoned cropland” and that only 5% of current global primary energy consumption could be met that way—a far lower figure than many other estimates. To achieve this apparently modest figure for energy crop potential, the authors consider that all abandoned cropland worldwide—an estimated 386 million hectares in total—would need to be converted. Their definition of “abandoned cropland” includes land which has been farmed or used for pasture at some stage in the last three hundred years but which is no longer farmed and which is neither an urban development nor a forest today, although it may have been converted from cropland to pasture. Yet how did they conclude that such large areas of land are indeed abandoned? According to the article, they used an existing database compiled by the Dutch Environmental Assessment Agency with gridded estimates of global crop and pasture area for each decade since 1700. They calculated abandoned crop area as the difference between maximum crop area during those three centuries and crop area in 2000 and then repeated the process for pasture. They then used satellite data to exclude urban areas and forests. Broad estimates of historic land use change are clearly useful for understanding wider environmental trends, yet the claim that detailed historic land use data for the entire planet for the past 300 years is available and can be used to make decisions about the availability of land for bioenergy or any other purpose appears presumptuous. Notably none of the authors of the article, nor the researcher who compiled the database on which they relied, has a background in history or social science. Yet as the UK Bioenergy Strategy shows, such a statement made in a peer-reviewed article is easily translated into government policies like the UK Bioenergy Strategy, followed by investments which, as has been the case with biofuels, can then result in large-scale land-grabbing, evictions, increased hunger and malnutrition.[196]

It is worth remembering that there is a long history of land, often land held by communities and/or small farmers, being classed as ’unproductive’ or ’wastelands’ whenever policy makers of interest covet grabbing and converting such land to whatever they deem more ’productive’ or ’useful’. For example, the designation of small farmers’ communal lands as “wastes” was used to justify and facilitate the English Enclosures, while similar arguments, though with slightly different terminology, were used to justify the Highland Clearances in Scotland. Land-grabbing for bioenergy in the global South, justified by land being described as “waste”, “unused” or “abandoned” is not all that different from the situation in England described by 18th/19th century farmer and journalist William Cobbett: *"Those who are so eager for the new enclosure seem to argue as if the wasteland in its present state produced nothing at all. But is*

this the fact? Can anyone point out a single inch of it which does not produce something and the produce of which is made use of? It goes to the feeding of sheep, of cows of all descriptions . . . and it helps to rear, in health and vigour, numerous families of the children of the labourers."[197]

10 Conclusion

Proposed UK biomass sustainability standards are the key focus of this report but the analysis of these is relevant beyond the UK. The UK Government's proposed standards are closely modelled on EU biofuel standards and on those recommended by the European Commission (albeit not as yet on a mandatory EU-wide basis). Mandatory biomass standards are strongly informed by voluntary standards for biomass which are being developed by energy companies and industry associations and which in turn draw on existing voluntary forestry certification schemes. We have looked in detail at several of these policies and schemes and also at several of the specific "sustainability" claims being made by bioenergy investors. Furthermore, we have discussed the principle of greenhouse gas standards for bioenergy.

Here is a summary of our key findings:

1. Biomass sustainability standards—mandatory ones which are proposed in the UK and discussed in the EU, and voluntary ones being drawn up by industry—are being developed simultaneously with the creation of a large new global market in wood pellets and woodchips for energy. Just as EU biofuel standards were part of the same legislation which ensured massive biofuel expansion through mandatory targets, UK biomass standards will be directly linked to generous biomass subsidies, ones which are set to turn the UK into an importer of wood for energy on a scale which is globally unprecedented. And just as the global biofuel market is an artificial market, heavily dependent on mandates, targets and subsidies, the emerging biomass industry also strongly depends on subsidies. Industry, too, is linking sustainability policies to large-scale investments into bioenergy supply chains and power stations. The Initiative Wood Pellet Buyers explicitly states that harmonised biomass standards are essential for the creation of a global wood pellet trade. It is therefore vital to consider standards in this wider context.

2. Sustainability standards by their nature cannot address the wider, largely indirect, impacts of creating a fast-growing new market for wood at a time when existing demand for wood, including for paper, is already unsustainable and a major driver of global deforestation and forest degradation.

3. Although some of the details of the UK biomass standards will still be consulted on, Government announcements to date indicate that they will not be comprehensive nor in line with scientific findings on the wider climate impacts of bioenergy. Human rights, land rights, impacts on food security and food sovereignty, many serious biodiversity impacts, soil and water depletion and erosion are not addressed by proposed standards. Applying biofuel land-use standards to biomass will not even prohibit the conversion of forests to industrial tree plantations since the latter, too, are falsely classed as forests. Indirect land use change and the large carbon debt (i.e. upfront carbon spike) associated with bioenergy are to be ignored despite warnings from a growing number of scientists that policies based on such "false accounting" risks further worsening climate change.

4. Scientific studies about the carbon debt associated with biomass should inform energy policies. Carbon debt is the length of time that bioenergy will lead to a "carbon spike" due to its high upfront carbon emissions compared with the length of time which new trees and other vegetation will need to reabsorb this carbon. The urgency of the climate crisis requires immediate reductions in emissions, whereas studies suggest that biomass electricity will increase them for decades or even centuries to come. These findings should inform governments' energy policies. At the same time, as we have shown, precise, feedstock-specific carbon debt forecasts are highly questionable. Firstly, they generally do not account for indirect impacts (i.e. destructive logging and plantation expansion as a result of other demands for wood being displaced). Secondly, carbon debt forecasts rely on assumptions about future tree/forest regrowth which are highly uncertain, particularly in the context of climate change and fast-growing pressures on forests worldwide. These uncertainties put the credibility of future science-based greenhouse gas standards for different biomass feedstock into doubt.

5. The credibility of any regulatory regime depends on its enforcement at least as much as on the content of the regulations. Most of the high-profile failures of regulations (whether the English "care homes scandal", the breast implant scandal or Libor fixing) have been the result not of inadequate rules but of a lack of independent oversight and enforcement. Biomass (as well as biofuel) standards aim to regulate often lengthy and complex wood supply chains

yet lack any credible regulatory mechanism. Ofgem has neither the budget nor mandate for evaluating and verifying companies' reports about biomass sourcing, reports which may well remain outwith the public domain. Instead, standards will rely entirely on business contracts between companies and their chosen consultancy firms, paid to provide allegedly "independent" verification. Yet the fact that these consultancies are chosen and paid by energy companies undermines their independence. All that proposed biomass sustainability standards can ensure is that a company has ticked the right boxes.

6. The same group of inspection, verification and certification companies offer energy and timber companies a wide range of verification and certification services. Commonly, the same companies will certify according to different voluntary forestry standards, including the FSC and PEFC and to existing and new bioenergy standards or even to energy and other companies' own "sustainability policies". The contractual relationship between certifier and certified companies observed above also applies to the FSC and PEFC. ***Conflicts of interest and lack of independent regulatory oversight*** are thus inherent in voluntary as well as mandatory certification and standards.

7. No international forest certification scheme, including the FSC and PEFC, can guarantee that the wood it certifies does not come from the destruction of highly biodiverse, including oldgrowth forests, is not linked to human rights abuses, including evictions of communities, does not come from monoculture tree plantations for which biodiverse forests or grassland may have been cleared, nor even that all of it comes from legal sources. Yet despite this evidence, both FSC and PEFC certification are expected to be accepted as "proof" of "sustainable forest management" for bioenergy in the UK and both are accepted by all of the energy companies with biomass sustainability policies which we have looked at.

Biomass standards are thus not a credible means to address the serious adverse impacts of bioenergy, which are the direct result of government policies, namely subsidies, in the UK paid primarily in the form of Renewable Obligation Certificates. Instead, renewable energy policies and subsidies need to be fundamentally reformed, to ensure that support goes to those forms of energy which are genuinely renewable, sustainable and climate friendly—not to large-scale industrial biomass.

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