Dear GCF Board Members and Advisors,

The GCF Governing Instrument urges the Fund to promote, in the context of sustainable development, a paradigm shift towards low-emission and climate-resilient development pathways by striving to maximize the impact of its funding. The GCF civil society biomass working group feels that this mission is undermined by devoting the GCF's limited resources to funding large-scale biomass energy projects.

There has been a sea-change in our scientific understanding of the real carbon impacts of biomass energy over the last decade. We as a group of CSOs actively engaged in the GCF therefore urge you to adopt a proposed set of policy precautions in your present and future consideration of GCF projects pertaining to any proposed use of biomass for energy.

We suggest specifically that the GCF Board considers the following:

- ***Biomass burning is not low-emission***. On a per-megawatt basis, burning woody biomass causes more greenhouse gas (GHG) emissions than the equivalent amount of energy from coal. Biomass is not 'low-emission' at the point of combustion, and it is hard to see how it meets the IEA's definition of renewable energy, which is "energy derived from natural processes (e.g. sunlight and wind) that are replenished at a faster rate than they are consumed."[1] Recent peer-reviewed papers make it abundantly clear that "the immediate impact of substituting wood for coal is an increase in atmospheric CO2 relative to coal" (see Sterman et al 2018). This is true even when so-called "wastes and residues" are fired (Booth 2018).
- ***Biomass energy has high likelihood of leading to human rights violations and low likelihood of improving climate resilience, due to its very high land footprint.*** Deforestation, forest degradation, or plantation development associated with mobilizing and commercializing biomass feedstocks does not assist with climate resilience. Quite the contrary, it frequently leads to new vulnerabilities and pollution pressures. It is also frequently associated with land grabs and other human rights violations. The GCF should never support projects that can *increase* vulnerabilities for people and communities in developing countries.

Based on these two factors alone – that biomass energy is not low-emission, and that it rarely (if ever) contributes to climate resilience –support for large-scale biomass energy is *contrary to the GCF's mission* to help countries with "low-emission, climate-resilient" development in a way that is sustained and provides multiple benefits. It should also be highlighted that traditional bioenergy use is a leading cause of respiratory diseases and mortality, especially amongst women in rural areas in developing countries. Therefore, as a matter of institutional policy and practice, the GCF should make clear that large-scale biomass burning especially for thermal power is *not* a "low-emission, climate-resilient" technology, and support for large-scale biomass burning for energy is *never* an appropriate use of its public climate-finance resources.

A set of GCF policy guidelines on biomass for energy should further clarify that the GCF will not support *any* biomass-related projects that:

- Support the expansion of either large-scale or traditional bioenergy use.

[1] https://www.iea.org/about/faqs/renewableenergy/

- Include support for exporting wood, including normal or torrefied pellets or wood chips, for burning because export-oriented infrastructure will inevitably be large-scale.
- Replace native ecosystems, including forests – even degraded ecosystems – with plantations. Numerous studies show that on a per-hectare basis, allowing forests and other ecosystems to regenerate, or pursuing active restoration of degraded areas, leads to substantially higher levels of carbon sequestration than any type of biomass scheme (see Kurz et al 2016). Furthermore, the conversion of native biodiverse grasslands to tree plantations is associated with high levels of biodiversity loss, for example in Brazil and South Africa.
- Promote plantations at the expense of food production and other existing land uses by local communities.
- Fail to develop and prioritise alternative renewable energy scenarios to address the demand for electricity. For example, numerous peer-reviewed studies have shown that PV solar installations can generate 100 times more power per hectare than biomass (see Searchinger et al 2017).
- Are not primarily targeted towards improved health of bioenergy users, energy efficiency, and reducing the demand for biomass.
- Exacerbate imbalances in energy access domestically and/or fail to specifically address and improve energy poverty in recipient countries.

As the Board considers numerous projects that involve biomass at its upcoming 19th Board Meeting, with a significant number of additional biomass for energy related projects/ programmes either in the pipeline or under review (such as FP079 proposed by the Korean Development Bank (KDB)), it needs to avoid setting bad precedent and creating potential reputational risks for the Fund. In carefully weighing the GCF's mandate and the investment criteria with biomass burning's contribution to CO2 emissions, its potential for significant negative health impacts and other human rights violations, and the low likelihood of improving climate resilience, the Board should conclude that large-scale biomass energy projects are inappropriate for GCF financing.

Sincerely,

The GCF Civil Society Biomass Working Group

Member groups contributing to this document include:
ActionAid USA
Asia Pacific Forum on Women, Law and Development
Asian-Pacific Resource and Research Centre for Women
BiofuelWatch
Center for International Environmental Law
Heinrich Böll Stiftung North America
Global Forest Coalition
Partnership for Policy Integrity
Pivot Point

Biomass Energy and the Green Climate Fund

Introduction

Biomass energy[2], as used in this memo, refers to burning biomass in boilers to generate heat and power, or using biomass to make liquid fuels. Use of biomass energy is increasing swiftly, spurred by renewable energy subsidies and the treatment of biomass burning as "carbon neutral." That generally means that biomass power plants are treated as if they do not have emissions and are not held responsible for purchasing emission allowances under carbon trading programs. Biomass for energy has long been a controversial technology in renewable energy discussions because, despite the frequent assumption of zero emissions, the net emissions from bioenergy can be significant. Additionally, most new bioenergy capacity is fueled with wood, thus biomass harvesting for fuel can represent a threat to forests.

While burning biomass that is fully compensated by feedstock regrowth for energy is assumed to fit the most narrow understanding of renewables, it falls short in meeting the clean, zero-emissions, community friendly energy being demanded by communities around the world. Substantial-sized biomass for energy projects are currently being considered by the Green Climate Fund (GCF), with more biomass projects likely to be proposed. GCF funding for these biomass energy projects is concerning, as many biomass for energy projects fall short of mitigating climate change and enhancing climate resilience. Most are not even good for the communities they're supposed to benefit, especially when their health impacts are taken into consideration. The GCF's limited resources should not be used to fund biomass projects given the high potential for adverse impacts on the climate, the environment, health, and human rights.

Many of the concerns around bioenergy can be traced back to potential impacts on the land sector. Biomass and biofuels have by far the greatest land footprint of all sources of energy - commonly up to or over 100 times greater than that of wind and solar power. Although wastes and residues are often proposed as bioenergy feedstocks, there are often important competing demands for them, and removing them from ecosystems in significant quantities can cause significant soil deterioration and associated soil carbon loss. Furthermore, there is no universal definition of "forest residues," and nothing to prevent companies from classifying the majority of the wood from a clearcut forest as "residue." The land sector - encompassing both forests and agriculture - is too often overlooked in climate discussions, but it plays an important potential role in reaching the goals of the Paris Agreement. Not only is bringing down agriculture emissions and halting deforestation by 2020, in line with the Sustainable Development Goals (SDGs), and critical to reaching net-zero emissions, but also participatory, rights-based forms of forest and other ecosystem restoration are the only proven, affordable, and broadly accepted negative emissions options currently available. Considering this and that most climate scenarios involve some kind of increase in negative emissions, the land sector is central to addressing climate change and meeting the Paris Agreement goal of limiting warming to 1.5□ "on the basis

[2] Throughout this memo "biomass energy," "biomass for energy," and "bioenergy" are used interchangeably.

of equity, and in the context of sustainable development."[3] Similarly, achieving the SDGs related to agriculture, food security, and water is impossible without good policies related to land. However, the land sector could also be easily misused, putting development, human rights, and climate goals at risk.

The following explains what biomass energy is, including different types of feedstocks, and highlights some of the critical questions the GCF should consider when evaluating a proposed biomass related project. Additional information on the financial concerns with biomass for energy is also available.

What is Biomass Energy?

Biomass energy comes in many forms, but, to put it simply, it is organic material that is converted into energy. Generally, there are three types of conversion. The biomass is burned to heat buildings or generate electricity, converted into some form of liquid fuel (such as ethanol), or converted into biogas which can also be burned as a fuel. While many older biomass power plants burn wastes from papermaking, new bioenergy fuels are mostly feedstocks from forest wood and sawmill residues, although the latter are in short supply. Other fuels and feedstocks include agricultural crops, agricultural residues, garbage, and animal manure and human sewage. The different feedstocks and types of energy produced matters when evaluating a project, because the climate, environmental, and social impacts vary widely. For example, the production of biomass from agricultural crops requires land, water, and sometimes fertilizer inputs, and thus creates a different set of emissions and environmental and social impacts than capturing methane from decomposing garbage that might have been emitted anyway. Harvesting trees for biomass fuel likewise has different carbon and ecosystem impacts than collecting sawmill residues. All projects require scrutiny. Even the benefits of producing bioenergy from waste should be balanced against the benefits of potential alternative scenarios such as increased waste recycling and waste prevention.

CO2 emissions from Biomass

Regardless of the feedstock, biomass is not a zero carbon source of energy and is often not even low-carbon. In all cases, biomass involves burning some type of biomass or processed biomass product, which results in CO2 emissions. Per unit of energy, burning biomass, especially for electricity, emits even more CO2 than burning fossil fuels.[4]

Two main arguments are used to justify the treatment of bioenergy as having zero emissions: first, that biomass fuels are sourced from residues and wastes that would decompose or be incinerated even if not burned for energy, thus net emissions from use for energy are zero; and second, that where biomass is sourced from trees or crops, plant regrowth will subsequently sequester an equivalent amount of carbon as initially emitted, netting out to zero emissions.

There are several problems with these assumptions. First, burning emits carbon instantaneously, whereas decomposition of residues and plant and tree regrowth require years

[3] Paris Agreement, Article 4.
[4] This is in no way a justification for continued fossil fuel energy usage, which needs to be rapidly phased out in a just and equitable manner.

to decades; therefore, burning biomass produces an immediate net increase in emissions.[5] Regrowth may not happen for any number of reasons (i.e. natural disasters, development) and even if there is some regrowth, natural forests carry far more carbon than the monoculture tree plantations that often replace them. Soil carbon lost during logging and associated removal of forestry residues can take decades or centuries to build up again. And even a perfect scenario where all assumptions were met and full regrowth does happen, it would be many decades before net zero is reached, potentially after 2100. For some of those years, net emissions from biomass would be higher than from coal, as shown by peer-reviewed studies and scientific reports.[6] Finally, using land or cutting down trees for bioenergy reduces the amount of CO2 that forests and other natural ecosystems would have sequestered otherwise, and foregone CO2 sequestration has the same impact on the climate as increased CO2 emissions.[7] Considering the very tight carbon budget and the goal of the Paris Agreement being focused on this century, biomass energy cannot be assumed to be a helpful technology to meet the world's climate goals.

Biomass impact on Human Rights

Food security

Biomass production negatively impacts food security at both the global and local levels. Globally, huge increases in demand for biomass for energy can increase food prices directly, by driving up the demand of the feedstock, or indirectly, by driving up the price of various inputs such as land. These price spikes, seen in both 2007/2008 and 2011/2012, are especially challenging for poor people in developing countries who already spend most of their income on food and cannot stretch their budget to accommodate increased prices.

Even if food price impacts are not always felt, biomass for energy also has local impacts that harm vulnerable communities. Biomass production for non-food purposes competes with food production for the limited arable land and water sources available.[8] Access to land is especially important for food security, as most people in developing countries are fed by smallholder farmers. Production of biomass for energy can also put water quality at risk, as runoff from pesticides and other chemicals used in the production of biomass energy pollute local water sources.

Food and water insecurity affects women and girls more than men due to their role in sourcing and preparing food. Also, women often eat less to ensure that their husbands and children have more food, which leaves women at a higher risk of nutrition deficiencies than men.[96]

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[5] Letter from Scientists to the EU Parliament Regarding Forest Biomass, updated January 2018, dropbox.com/s/l8sx5bl0h02x395/UPDATE%20800%20signatures_Scientist%20Letter%20on%20EU%20Forest%20Biomass.pdf?dl=0

[6] John D Sterman et al. 2018 Environ. Res. Lett. **13** 015007

[7] Brack, Duncan. The Impacts of the Demand for Woody Biomass for Power and Heat on Climate and Forests. Chatham House. February 2017. chathamhouse.org/publication/impacts-demand-woody-biomass-power-and-heat-climate-and-forests

[8] Virchow D. et. al., 2014. Biomass-based Value-webs - A New Perspective for Emerging Bioeconomies in Developing Countries. Rural. 21, 48 (3): 16-18.

[9] Uraguchi Z.B., 2010. Food Price Hikes, Food Security, and Gender Equality: Assessing the Roles and Vulnerability of Women in Households of Bangladesh and Ethiopia. Gender and Deve. 18(3):491-501.

Given the large scale of land needed, biomass production contributes to food insecurity among local communities, including indigenous peoples, and exacerbates poverty.

Air quality

Biomass burning is a well-known source of air pollution with exceptionally serious health consequences. Biomass burning at the household level is one of the main causes of death amongst women in developing countries due to respiratory diseases.

The use of wood for power generation can reduce sulfur dioxide (SO2) and mercury emissions compared to the use of coal, but produces higher emissions of small particulates, which pose particularly large health risks.[10]

Key biomass burning pollutants are small particulates, as well as NOx and VOCs. These pollutants have adverse impacts on human health, for instance, lung cancer[11] and various respiratory diseases (chronic obstructive pulmonary diseases (COPD), asthma, and respiratory allergies).[12] Additionally, women are more at risk of suffering from COPD compared to men.

Land Rights

Increasing demand for biomass for energy also puts land rights at risk. Biomass production increases demand for large areas of land available for monocropping feedstock. This significantly raises the risk of land grabs, where farmers and communities are forced off their land to make way for these plantations. Those who are already vulnerable and lack access to mechanisms to protect their rights, including small and medium-scale farmers and especially women, risk being displaced. Loss of land significantly affects a household's food security as "land is an important factor to secure access to and the availability of food through own production."[13] Similarly, indigenous peoples, whose land often is targeted because their customary land rights are not adequately recognised and protected under national laws[14]—may have their traditional land taken away from them for biomass production. For indigenous communities, loss of land not only means loss of places to produce food, but possibly losing access to religious sites and ancestral burial grounds.

Human rights are under serious threat from climate change, which is why support for adaptation and climate resilience are so crucial. Climate mitigation projects must not further undermine human rights, but there is a significant risk that biomass for energy projects would do so.

Biodiversity

Biomass production will always have impact on biodiversity, and the negative impacts of biomass use on biodiversity are strongly related to the quantity of biomass demand. Significantly increased biomass use will lead to significantly increased biodiversity loss, since that biomass must be produced or harvested from somewhere and ecosystems are disrupted or

[10] S. Rafael, L. Tarelho, A. Monteiro, E. Sa, A.I. Miranda, C. Borrego, M. Lopes, 2015. Impact of Forest Biomass Residues to the Energy Supply Chain on Regional Air Quality. Sci. Total Environ. 505: 640-648.
[11] Beeson, W.L., David, E.A, Knutsen, F. 1998. Long-term Concentrations of Ambient Air Pollutants and Incident Lung Cancer in California Adults: Results from AHSMOG Study. Environ. Health Perspect. 106(12):813-823
[12] World Health Organization, Air pollution and health: Summary, http://www.who.int/airpollution/ambient/about/en/.
[13] Ibid.
[14] Hunsberger C. et. al., 2014. Livelihood Impacts of Biofuel Crop Production: Implications for Governance. Geoforum. 54:248-260.

destroyed. The Conference of the Parties to the Convention on Biological Diversity (CBD) has explicitly acknowledged "concerns that deployment of biofuel technologies, may result in increased demand for biomass and aggravate drivers of biodiversity loss, such as land use change, introduction of invasive alien species."[15] The CBD has frequently called upon countries to take into account ecosystem integrity and avoid negative impacts on biodiversity when implementing climate change mitigation measures in this respect.[16] It has also agreed on a target to eliminate, phase out, or reform incentives harmful to biodiversity by 2020.[17] As the majority of countries have ratified or acceded to this legally binding agreement, the GCF Board must respect the CBD's decisions and avoid support or other forms of incentives that might lead to the depletion of biodiversity, including forest degradation or the replacement of natural ecosystems by monoculture plantations of trees or other crops.

Box 1: Feedstock Types

Feedstock Type	
Wood	● Burning wood is carbon intensive and can incentivize deforestation. Raw feedstocks (green wood) biomass emit about one tonne of CO2 per tonne of material burned ● Wood and other biomass-burning power plants emit more CO2

[15] CBD COP Decision X/37.
[16] See, e.g. CBD COP Decisions XIII/4, XI/21, X/33.
[17] Target 3 of the Strategic Plan for Biodiversity 2011- 2020.

	per unit energy than coal and gas plants. Even if promises are kept to re-sequester that carbon, it will be many decades before that carbon debt is paid. During that time, biomass emissions will contribute to the warming of the planet. ● Tree plantations for woody biomass production often use short-rotation often invasive tree crops that are terrible for biodiversity. They can also increase demand for land, which has human rights and food security implications.
Wood Waste and Residues	● Sourcing only wood waste and residues may not be enough for plant operations and hence may lead to illegal logging, monoculture, and land conversion adverse to the environment. And burning residues still has a large net carbon emission impact. ● Wood waste is important for the health and biodiversity of forest soils. Removing wood waste for bioenergy production will trigger long-term deterioration of forest soils with associated carbon loss, depletion of nutrients, and soil biodiversity loss.
Agricultural Products	● Agricultural production for biomass often requires large amounts of land, water, and fertilizers. Associated land-use change and fertilizers can result in considerable GHG emissions. ● Food-based bioenergy impacts the price of food, which can increase hunger. ● Land requirements can incentivize land-grabs. ● Heavy water use or run-off can negatively impact local communities' access to clean water.
Agricultural Residues	● Overharvesting of residues can lead to soil degradation. Loss of soil carbon can be significant and can counteract any carbon "benefit" of burning agricultural residues for fuel.
Garbage or Municipal Solid Waste	● Biomass power plants can produce more than a tonne of contaminated ash per hour. No method specified for safe disposal of ash from biomass burning, as well as from plants operation, which might contaminate soil and groundwater, and release toxic emissions.

<u>What to Consider When Evaluating Biomass Related Projects</u>

<u>Issue</u>	**<u>Concerns</u>**
Emissions	All biomass energy has emissions, as discussed above, so all proposed projects should include estimated emissions that can be compared to emissions from other forms of energy. Some questions to consider: ○ What are the emissions at the stack? ○ How are the emissions from land-use change captured in

	this estimate? ○ How long is the "payback period" until biomass regrowth supposedly brings emissions back to net-zero? ○ What kind of monitoring is in place to ensure that the required regrowth is happening, including the type of regrowth (what kind of plants? Risk of invasive plants?)?
Feedstock Type and Source	The type of feedstock and where its being produced significantly impacts the emissions and social risks of the project (please see Box 1 on Feedstocks). ○ What type of feedstock is being used? ○ Where is the feedstock coming from? How is it being harvested? ○ What monitoring is in place to ensure the plans are followed?
Type of the Facility	There are three main types of biomass plants that burn biomass for energy: Heat-only, electricity-only, and combined heat and power. Electricity-only plants are far less efficient than combined heat and power or heat-only plants.
Facility Size	The size of the biomass facility determines both fuel demand and energy output. ● What is the plant's capacity? ● How much of that energy is actually available to consumers (meaning after the plant has met its own power needs)? ● Who are the intended consumers? Would the plant serve energy-poor households?
Land-Use	The land-use impacts require careful attention, as bioenergy production has been linked to concerns about food security and land tenure rights. Land grabs, particularly customary land belonging to indigenous peoples, driven by bioenergy production are of particular concern. Key questions to consider are: ○ How much land will be required? ○ How is this land currently used? What was it used for 20 years ago? ○ Who owns and/or uses the land? ○ What are the local communities' needs related to land? ○ What are the yield assumptions for the feedstock production? ○ Is there another better use for this land, taking into account competing demands for land for food security, as a forest to sequester carbon, or for renewable energy sources like solar panels?

	○ What are the risks that additional land, beyond what is anticipated for the specific project, could be grabbed?
Air Quality	Types of fuels burned; availability of technologies to mitigate emissions; and proximity of other sources of pollution should all be considered.
Health impacts	As biomass burning is a major source of small particulates, which have adverse, and often gender-differentiated impacts on people's health (including workers at the facility and within the households surrounding communities), data on black carbon emissions is essential. A risk assessment approach is useful. For example, it is helpful to assess: ● extent of exposure, ● concentration of toxicants during exposure, ● the toxicity, ● Route of exposure (e.g., via inhalation, ingestion, or skin contact) ● Pre-existing health conditions ● Age ● Gender
Food Security	● An impact assessment on food security and the right to food of the affected communities within its operating area and its surrounding areas should be conducted. ● The food security situation of the above mentioned communities must be monitored through a gender-responsive and rights-oriented food security screening. ● For communities resettled based on FPIC, their food security situation must also be monitored through a food security screening and continuous dialogues. ● Need to ensure that the availability, access, quality, and stability of food among the communities mentioned above must not be reduced due to biomass production, etc. ● The biomass project/programme must not create or exacerbate local or national food insecurity. Note: The Right to Adequate Food is based on Article 25 of the Universal Declaration of Human Rights; International Covenant on Economic, Social and Cultural Rights (ICESCR); and Article 11 and General Comment 12 of the UN Committee on ICESCR.
Biodiversity	If the biomass is sourced from invasive or exotic species, the Convention on Biological Diversity's criteria and risk assessment tools must be integrated in the Environment Assessment. Where biomass is sourced from wood, impacts of forest harvesting on biodiversity, including soil biodiversity, should be considered.
Water Impacts	● Both biomass power plants and biofuels manufacturing facilities can require large amounts of water. High extraction of natural water resources for plant operations can further increase water scarcity in areas and changing weather patterns may not compensate/recharge, with increased dry spells becoming a concern in most of Asia, the Pacific, and Africa. ● Water scarcity can further lead to gender discrimination and violence, and worsen the power relations through the existing

	social structures like patriarchy, poverty that impacts the well being of the most vulnerable. ○ Water management plan and monitoring system must be developed. ○ If the local communities or indigenous peoples rely on the same water sources, the water management plan must be agreed through a process to obtain their free, prior, and informed consent and may not be under dispute. ● Pollution from processing plants and from biomass development can also affect the quality of water. ● The right to clean water for local communities and indigenous peoples must not be impacted. Continuous monitoring should be required.

Conclusion

The GCF was created to help drive the financing and innovation needed to create the transformation necessary to achieve the climate goals set out in the UN Framework Convention on Climate Change and now the Paris Agreement. It is unlikely that biomass energy could actually support these goals, since even under the best of circumstances it cannot reach net zero carbon emissions until many decades from now and instead contributes to overshooting the carbon budget for meeting the 1.5 degree goal. Biomass for energy is a threat to forests, which are crucial to meeting the world's climate change goals, as well as being a major risk to biodiversity. Additionally, the environmental and human rights risks are significant. Biomass for energy production creates risks for food security, land grabs, and has negative health impacts for local communities, undermining climate resilience. The serious concerns and environmental and social risks inherent in the GCF funding biomass must not be overlooked. Considering those risks and the negligible to non-existent climate mitigation benefits, the GCF should not be funding any projects that would increase the use of biomass as an energy source.