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Negative Development Impacts of CDM Executive Board Adjustments to Methodology AMS IIG –"Energy efficiency measures in thermal applications of non-renewable biomass" concerning Improved Cookstove Interventions in rural areas

Overview

In the Kyoto era through 2012, many of us worked hard to bring Programs of Activity (PoAs) into reality in the hope that carbon finance could finally serve the needs of distributed clean energy efficient household appliances and small-scale sustainable energy supply, and in particular the sustainable energy needs of the rural poor. In the end, PoAs took so long to be developed and approved that they did not materially contribute to the participation of LDCs and poorer developing countries to the supply of CERs before collapse of the European Trading Scheme (ETS) prices and of access of CERs to the European compliance market.

Even so, a large number of PoAs were designed, validated and registered before the end of 2012 in a hectic rush to secure access to the prospective European market for non-LDCs and even into the 2013/2014 period given market access was held open for LDCs in the post 2012 Europe compliance market. This large investment of time and resources for registration employed DoEs, but did little else as the collapse of ETS demand for CERs laid waste to the plans of developers to get returns on their investment in the novel and practicable vehicle of PoAs to generate emissions reductions form distributed energy supply and demand management activities. As witness to the collapse, at last count, 311 PoAs have been registered. Of these, only 55 PoAs have had at least one issuance, 23 have had only one, and only 5 had five or more issuances. In fact, 82% of all registered PoAs have had no issuances of CERs. Of the five[1] PoAs that had more than 5 issuances, they have issued 26% of all CERs. In effect, the promise of PoAs as a vehicle to bring much needed private investment to the poorer countries and communities through energy efficient appliances was stillborn.

Perhaps the most important climate and wider development impact opportunities of the PoA vehicle is to support cleaner more efficient cooking and sustainable cooking fuel supply to the rural and peri-urban poor in the Least Developed Countries (LDCs) and lower middle-income countries, and in Sub-Saharan Africa, in particular. In fact, PoAs using the CDM small-scale methodology for efficient cookstoves are numerous and have been responsible for much of the residual PoA activity in the post-2013 period, kept alive by recognition by several European sovereigns, and some large corporate voluntary

[1] PoAs 9181, 5342, 5962, 8142 and 3223.

carbon neutrality seekers, of the wide development impacts of cleaner more efficient cooking as documented later in this paper.

The hard reality is that the only source of funding at scale for financing more efficient cleaner cooking in rural areas of the poorer developing countries and LDCs is carbon finance. These communities have seasonal access to cash at best, and most live almost entirely outside the cash economy. Households in these communities use three stone open fires (TSF) or the equivalent with crude metal tripods and clay or metal support structure for cooking over an open fire. Their investment in more efficient, durable efficient cooking is difficult and often unthinkable given their disposable income. Investment in such cleaner cooking using carbon finance provides high integrity atmospheric benefits as, without carbon finance, these improved cookstove interventions would simply not happen.

Efforts post ETS market collapse in 2012 to monetize health and welfare co-benefits of clean cooking have not resulted in alternative markets and funding for cleaner healthier cooking. This despite the latent promise of monetized co-benefits of cleaner cooking and cleaner household air [2], and initiatives to quantify and verify black and brown carbon amongst other short-lived climate forcers arising form products of incomplete combustion of biomass[3].

Understandably then, there has been huge anticipation that the Paris Agreement and Post-Paris agreement carbon markets would breathe new life into clean cooking: a flush of new private risk capital to rural areas and upgrading the living conditions for the poorest households otherwise condemned to live with smoky stoves and toxic household air.

These hopes were dashed when on 1 November 2017, the CDM Executive Board approved version 9 of AMS IIG, decimating the potential for carbon finance to serve this vital and unique climate and sustainable development financing opportunity.

Development Context

Purportedly, about 3 billion people in the developing countries use solid fuels to cook on smoky polluting fires and cooking devices. Certainly the predominant form of cooking in rural Sub-Saharan Africa is three-stone-fires (TSF). TSFs, or similarly crude smoky cooking fires, are used and in much of the rural areas of LDCs and poorer regions of more industrialized developing countries in Asia. This form of cooking has much wider implications for sustainable development than climate change, and the climate change implications go well beyond emissions of carbon dioxide. Improving the efficiency of

[2] Gold Standard Methodology to quantify and verify Averted Disability Adjusted Life Years (ADALs) and avoided premature deaths from cleaner household/cooking space air, published in February 2017 and proposed methodology of the VERRA SDVista Standard on Drudgery Reduction for women and children by reducing them spent cutting and gathering firewood.
[3] Gold Standard Black Carbon Methodology published in 2016.

woody biomass combustion, improving kitchen and cooking space ventilation or switching to higher quality cleaner cooking fuels such as LPG and electricity are the most discussed implications of cleaner cooking, but they are not the only ones. Most of the development impacts are discussed below.

Health and Well-Being Impacts

Chronic Illness: Inhalation of fine particulate matter from cooking on smoky open fires is amongst the leading causes of death and disability in the developing countries, exceeding deaths from malaria, tuberculosis and HIV/AIDS. According to the Global Burden of Disease Assessments by the Institute of Health Metrics and Evaluation, household air pollution (HAP) ranks between first and fourth amongst risk factors contributing to death and disease across Sub-Saharan African countries where almost all rural households cook on crude three-stone fires. Globally, WHO estimates that about 4 million premature deaths annually stem from inhaling PM 2.5 from smoky cooking fires[4]. An infant on her mother's back while she is cooking is inhaling the equivalent of two packs of cigarettes per day. HAP is linked through long term epidemiological studies to pneumonia and other acute lower respiratory illness, chronic obstructive pulmonary disease, ischemic heart disease, cataracts and blindness, premature and underweight births and associated depleted health performance. By contrast with these other major causes of death and disability, there is no vaccine or drug serving as a magic bullet to address household air pollution. Cleaner cookstoves and improved kitchen ventilation, such as airy kitchen spaces and stoves with chimneys adapted to local cooking practices are the only short to medium term solution. The rural areas of Sub-Saharan Africa (SSA) will not have ready access to LPG or electricity for cooking for generations. For the foreseeable future the only source of funding for cleaner cooking and cleaner households air to help reduce this disease burden is carbon finance.

Drudgery, Hard Labor and Risk of Abuse of Women and Girls: In SSA, the task of firewood gathering falls to women and girls. The time and labor burden of gathering fuel for household cooking is well documented and varies from hours per week to hours per day across Africa as documented by the IEA and others[5]. What is less well understood and poorly documented is the physical abuse the women and girls suffer in moving outside of their own communities to gather cooking fuel kilometers away. Nor is there an adequate appreciation of the gender discrimination inherent in keeping girls out of school so they can gather firewood, or of the devastating impact of sexual abuse and early pregnancy arising from rape while gathering fuel. Also, underreported and poorly understood is the caloric burden[6] in times of food scarcity or of the debilitating effect of physiological damage from women and girls carrying loads of 25-40kg of firewood over

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[4] World Health Organization, WHO indoor air quality guidelines: household fuel combustion; 2014, Geneva.

[5] World Energy Outlook, 2006, p 428-431, International Energy Agency

[6] 15-20% of the minimum food energy needs of women and girls for good nourishment can be used in gathering firewood, creating critical food stress in times of food shortage

long distances[7]. The burden of reduced health and well-being, and reduced productivity in essential functions of family care and food production from daily firewood gathering falls disproportionally on women and girls. The only immediately available and practical remedy in most communities is to reduce the amount of firewood needed through higher efficiency cookstoves and through fuel switching to readily available small diameter wood, twigs and crop residues nearer at hand that well design improved stoves enable. Only carbon finance can support this transition at scale.

Severe Burns: burns caused by falling into open fires or pulling hot pots off unstable three-stone fires and other crude pot supports are common but, like child pneumonia, under-reported[8]. WHO estimates that 250,000 people die of burns each year and 90% of these are in low and middle income countries and from younger children and infants arising from exposure to open cooking fires, and such burns contribute 18 million Disability Adjusted Life Years (DALYs) annually[9]. Most improved cookstoves reduce if not eliminate the incidence of child burns. Carbon finance driven improved cookstoves can systematically reduce the incidence of burns across rural communities.

Land Degradation

Deforestation: Many NGOs and academics not exposed to the realities of rural life and landscapes in SSA blindly assert that firewood gathering is not a cause of deforestation; that firewood comes only from dead wood lying around for the picking in abundance and does not involve cutting of live trees. On the basis of this sweeping and naïve assumption, the legitimacy of carbon emissions reductions arising from distribution of more efficient cookstoves is discredited. The truth is that deforestation and land degradation occurs from many sources and cutting of live trees in firewood scarce regions is one of them. The romantic conception of these commentators is that forests are sufficiently healthy and accessible on a such a large scale in SSA and LDCs generally that natural tree death and damage supplies dead wood in balance to the needs of communities, even with rural population growth of 2-3% per annum. All that women and girls need to do is go and pick it up. In fact, deforestation is occurring at a critical rate across all of SSA; forests are not in some state of perfect balance, but in retreat under

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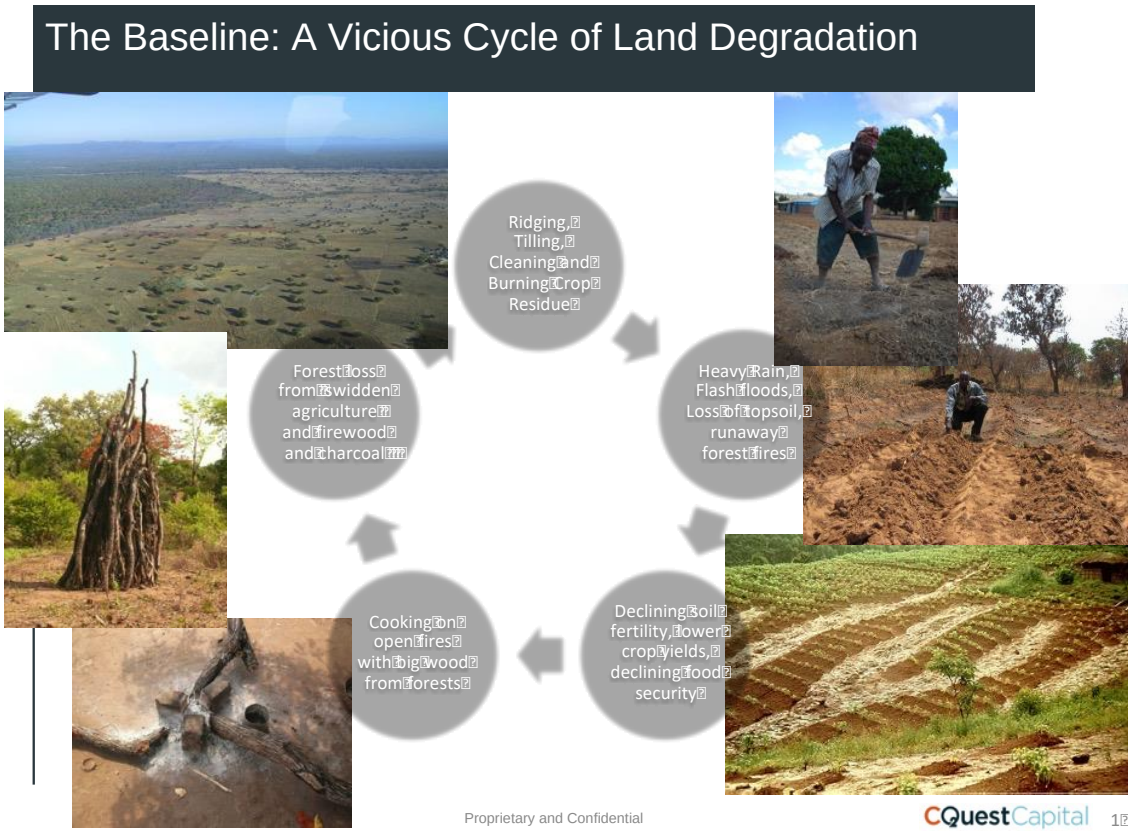
7 HELPS International, an NGO based in Guatemala routinely fields teams of surgeons to repair hernias in women arising, inter alia, from the hard labor of carrying heavy loads of wood over long distances.

8 An evaluation of a biomass stove safety protocol used for testing household cookstoves, in low and middle-income countries; Michael Gallagher, Maria Beard, Mike J. Clifford a, Michael Craig Watson; Energy for Sustainable Development 33 (2016) 14–25. Note, too, that in the early years of HELPS Internationals provision of surgical service to rural Guatemalans, plastic surgery for skin grafts burns from children falling in to or on open fires planchas was a large portion of the service provided, leading HELPs to design the burn safe, durable and efficient ONIL chimney stove.

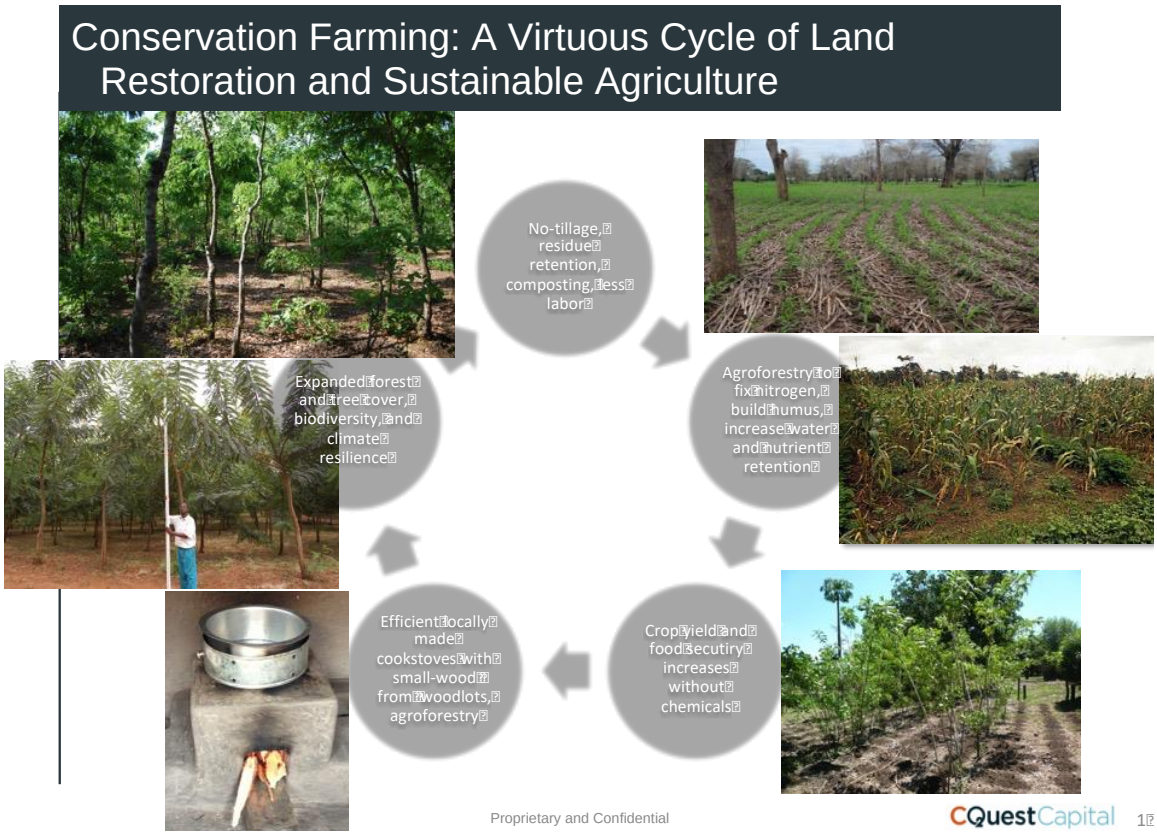
9 Forjuoh S, Gielen A. Burns. In: Peden M, Oyegbite K, Ozanne-Smith J, Hyder AA, Branche C, Fazlur Rahman AKM, Rivara F, Bartolomeos K, editors. World Report on Child Injury and Prevention. Chapter 4. Geneva: World Health Organization; 2008. pp. 79–98. Also, a systematic review of burn injuries in low- and middle-income, countries: Epidemiology in the WHO-defined African Region. Megan M. Rybarczyk, Jesse M. Schafer b, Courtney M. Elm c, Shashank Sarvepalli d, Pavan A. Vaswani e, Kamna S. Balhara f, Lucas C. Carlson g, Gabrielle A. Jacquet; African Journal of Emergency Medicine 7 (2017) 30–37.

pressure of agriculture expansion and charcoal production for urban fuel supply and naturally occurring deadwood is declining in proportion. Smaller trees and remaining larger trees in agricultural landscapes are constantly under pressure of fuelwood gathering. Large and small diameter live wood is commonly harvested and stacked to dry besides village huts or in teepee formation to dry for fuel. This is not about firewood gathering from high forests, though no doubt that occurs. It is about decimation of remaining tree cover in heavily populated agricultural landscapes, the result of which is increased exposure to heavy rain and wind, soil loss through faster run-off, impairment of water catchments, reduced soil water retention capacity, declining cropland fertility, reduced food security and increased vulnerability to climate change. Obviously, firewood gathering is not the only cause of this vicious cycle of degradation, but to dismiss it as inconsequential is irresponsible. And, in turn, to modify the calculus for estimating the proportion of non-renewable biomass (fNRB) to overstate sustainable supply undercuts one of the only sources of finance to address the problem at scale: carbon finance.



Sustainable Smallholder Agriculture: modern cookstove design favors, indeed requires, the use of small diameter wood, say 2-3 fingers thick, and enables efficient combustion of crop residues such as corn, cassava, cotton and tobacco stalks and corn cobs coming available as granaries are drawn down in the post-harvest season. Small-diameter wood is available in conservation farming systems which utilize fast growing

nitrogen fixing species coppiced or pollarded on cycles as short as 6 months to several years. These biomass fuels are not favored in open three stone fires as they burn quickly and inefficiently, requiring more of the most scarce commodity of all in these communities: a woman's time[10]. With the support of carbon finance for improved cookstoves, and effective training, fuel switching is triggered to utilize, instead, the under – or unutilized but more abundant and sustainable biomass fuels that, traditionally, are dismissed or ignored, and which traditionally are only used in extreme circumstances when trees are completely missing in production landscapes. This transition from a vicious cycle of degradation to a virtuous circle of sustainability can be supported by carbon finance to integrate cookstoves into conservation farming systems that suit the combustion of locally available sustainable biomass resources.



Unaccounted Climate Benefits of Rural Cookstoves Projects

A further irony of the punitive reduction in emissions reductions accreditable under AMS IIG Version 9 is that implementation of efficient cookstoves replacing TSF in rural solid biomass fuel burning households they generate significant additional climate benefits that

[10] Women want to be able to put pots of certain foods on the stove and leave them to simmer. Having to stay nearby and feed fast burning lightweight biomass on an open fire is not their preference.

are not counted or even addressed in the methodology. These include CH_4 and N_2O emissions, Black and Brown Carbon and other Products of Incomplete Combustion (PICs), complete fuel switching to sustainably harvested biomass fuels, and contributions to climate adaptation and climate resilience.

Non-CO2 Emissions: The IPCC[11] provides default values for Non-CO_2 greenhouse gas emissions from wood burning stoves in developing countries. The Non-CO_2 emissions include methane (CH_4) and nitrous oxide (N_2O) emissions. The IPCC provides a range of 258 – 2190 kg/TJ of CH_4 and 4 – 18.5 kg/TJ of N_2O based on results of experimental studies conducted on a number of traditional and improved stoves collected from: Cambodia, China, India, Lao PDR, Malaysia, Nepal, Philippines and Thailand.

Unlike AMS IIG, the Gold Standard Simplified Methodology for Efficient Cookstoves takes the IPCC average for each gas, 1224 kg/TJ for CH_4[12] and 11.25 kg/TJ for N_2O[13] and applies the Global Warming Potential for 100-year time horizon from the IPCC Second Assessment Report, 21 for CH_4 and 310 for N_2O, and applies a default non-CO_2 emissions factor of 0.455 tCO_2/ton of wood[14].

Black Carbon/PICs: Black carbon is a short-lived climate pollutant (SCLPs) that have widely variable but universally high GWP depending on where in the world it is emitted due to its large impact on surface albedo on snow and ice. Other PICs are also SLCPs, including traces of methane and VOCs. Research on SCLP reduction from improved cookstoves shows overall additional positive contributions from reduced SCLPs of the order of 25-50% of average CO2e reductions from the same appliances[15].

Fuel Switching: AMS IIG only accounts for CO2 emissions reductions in proportion to the amount of non-renewable biomass fuel consumption reduced by the more efficiency cookstove. More often, the introduction of improved woody biomass burning woodstoves in rural areas results in fuel switching to sustainably harvested twigs and small diameter branch wood, and diverse annual crop residues. The switch is either expressly encouraged as these fuel are well suited to the smaller well insulated combustion chambers, or forced in practice as large diameter wood simply does not fit into such combustion chambers and smaller diameter fuels are used instead of gathering and chopping larger wood.

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11 Table 2.9 of Chapter 2 of Volume 2, 2006 IPCC Guidelines for National Greenhouse Gas Inventories

12 1224 kg/TJ CH4 = (258 kg/TJ CH4 + 2190 kg/TJ CH4) / 2

13 11.25 kg/TJ N20 = (4 kg/TJ N2O + 18.5 kg/TJ N2O) / 2

14 1 ton of woody biomass x 0.0156 TJ/ton net calorific value of woody biomass x 29.1915 tCO_2/TJ [1.224 ton/TJ CH4 x 21 GWP = 25.704 tCO2e/TJ + 0.01125 ton/TJ N20 x 310 GWP = 3.3875 tCO2e/TJ) = 0.455 tCO_2/ton of woody biomass.

15 Berkeley Dafur Stove Research and Key Ramanathan Papers, plus World Bank Black Carbon Report

There is no way to account for, and benefit in terms of increased carbon credits form, a transition to entirely sustainable biomass under the methodology[16].

Adaptation and Disaster Risk Management: though a non-quantifiable benefit, use of improved cookstoves undeniably reduces the volume of woody biomass fuel and firewood harvested, leaving biomass in place, alive or dead, that serves as protective cover to soils and enhances water retention, and reduces run-off in severe storms.

Damaging Impact of Version 9 Adjustments

Changes in AMS IIG approved under version 9 which have the most devastating impacts on emissions reductions crediting from improved cookstoves and hence on carbon finance to act as a driver of low cost climate mitigation and sustainable development in the poorest communities in the developing countries are those to the emission factor of the baseline and introduction of a new fNRB tool.

Emissions Factor (EF): the emission factor as applied to all cookstoves from the first version of AMS IIG onwards has been a political construct not based on credible science and analysis in field conditions of rural communities. This has been an especially egregious burden on rural cookstoves in SSA and Asian LDCs where, quite obviously, the baseline is firewood and woody biomass consumption and not some concocted mix of LPG, kerosene and coal. If these are used at all, they are consumed in urban areas, and coal mostly in China and Mongolia. Even in rural areas, firewood and charcoal dominate across almost all SSA countries. The origin of this artificial emissions factor, of course, was the Kyoto Protocol which could not recognize avoided deforestation and hence, nor could the CDM, as its market-based instrument, admit to avoiding deforestation. The appropriate emissions factor has been established by the IPCC as 112 tCO_2/TJ for woody biomass burned. Previous versions of AMS IIG have varied this factor somewhat and version 3 to 8 applied 81.6 tCO_2/TJ. Version 9 however, reduced this powerful factor even more to 63.7 tCO_2/TJ arguing that coal is now less used and LPG more used in developing countries, hence justifying, in absurdum, the downward shift in carbon intensity of the factor, further punishing projects seeking to use carbon finance to provide more efficient cookstoves in rural areas. In the post Kyoto era of the Paris Agreement, the UNFCCC should use its own scientific body's default factor for woody biomass of 112 tCO_2/TJ removing the politically driven analytical gymnastics to accommodate a no longer applicable Protocol. In contrast, the Gold Standard Foundation's methodologies[17] that are applied to improved cookstove projects apply either the IPCC default of 112 tCO_2/TJ for woody biomass or a default CO2 emissions of firewood that is substituted or

[16] NGO partners of CQC in Malawi and Zambia promote and practice agroforestry and on farm woodlot production from fast growing nitrogen fixing trees easily coppiced and pollarded over short cycles. These fuels are idea for improved cookstoves.

[17] (1) Gold Standard Methodology Technologies and Practices to Displace Decentralized Thermal Energy Consumption and (2) The Gold Standard Simplified Methodology for Efficient Cookstoves.

reduced at 1.747 tCO_2/ton of wood[18], which is based on the IPCC default of 112 tCO_2/TJ for woody biomass.

Fraction of Non-Renewable Biomass (fNRB): changes in the fNRB tool accompanying issuance of version 9 have potentially the most devastating impact on carbon emissions reduction per stove. Default factors for fNRB per country established with FAO data have either retired, or will expire by the end of 2018 for those developing countries for which they were issued, and a new universal default factor of 30% fNRB is applied, effectively forcing cookstove project developers to apply the new fNRB tool as use of the 30% default factor renders economically unviable any investment in improved cookstoves where carbon finance is the only source of funding which is universally the case for the rural populations of SSA as well as less developed rural areas of Asian developing countries. Changes in the fNRB tool calculus were motivated by recently published academic studies asserting that across SSA countries fNRB was much less than FAO assessments, but were instead in the range of 30%-45%. By their nature these studies are country or region-wide overviews taking all forest cover into account. Adjusting the fNRB to equally assume that women and girls gathering firewood equally have access to the entire forest estate, including protected areas and managed forests, is both erroneous and especially cynical given that enforcing this policy assumption defacto removes the opportunity to positively affect the lives of rural communities through provision of improved cookstoves, and especially to address the woeful gender bias that traditional cooking and firewood gathering practices imposes. Those NGOs and their private sector social impact investors who live and work with these communities know well the cruel deception of large areas of forests tens of kilometers from densely populated villages, but which are, for all practical purposes, unavailable to women and girls whose daily range of firewood foraging is 5-7 kilometers from their homes. In that narrow range, firewood is scarce despite extensive forest cover beyond. Recent application of the new fNRB tool not taking accessibility into account making these reasonable assumptions results in low to zero fNRB factors, again eliminating any prospect of carbon-financed investment in improved cookstoves. As there is effectively no other source of financing of efficient rural cookstoves at scale, enforcement of the new fNRB tool alone take away the last opportunity to realize the transformative impact of these investments on the lives of rural communities.

Sensible, realistic and yet conservative interpretations of the application of the new fNRB tool are essential if the CDM and its successor Article 6.4 market based instrument of the Paris Agreement is not to deny a critical source of financing for climate change mitigation and sustainable development. These are as follows:

Defining remote areas: The new fNRB tool considers the mean annual incremental growth of woody biomass from all forest land as Renewable Biomass unless such forested land is non-accessible such as it being in a protected area where extraction of

[18] 1 ton of woody biomass x 0.0156 TJ/ton net calorific value of woody biomass x 112 tCO_2/TJ emissions factor of woody biomass = 1.747 tCO_2/ton of woody biomass.

wood is prohibited, or the forest land is in a geographically remote area where people do not access that land.

The FAO publishes in their Global Forest Resource Assessments the amount of forested land within protected areas for each country, so determining this data point is rather straight forward and easily referenced. Determining the amount of forest land in geographically remote areas is not a data point that FAO publishes and determining this requires costly field studies representative of the project area and/or geospatial analysis that applies assumptions supported by literature, such as the distance people travel from their homes to collect firewood.

If the amount of "Renewable Biomass" is defined as the mean annual increment (MAI) from all the total forest area minus only the MAI from forests in protected areas, then the amount of Renewable Biomass compared to Non-renewable Biomass would be high in most developing countries, resulting in negative to very low fNRB values. In turn, this calculus minimizes or entirely negates in the CDM view of the world, the climate benefit of efficient cookstoves in rural communities, eliminating carbon finance as the source of funding at scale for such high development impact projects.

In contrast, the method to determine fNRB in all previous versions of AMS II.G, and for which the CDM calculated default values with FAO data, uses a somewhat opposite approach, in that all MAI from forested land minus forest land in protected areas was considered Non-Renewable Biomass (NRB), and the MAI from the forest land in the protected areas was the only MAI determined to be Demonstrably Renewable Biomass (DRB). The new fNRB tool removes the idea of DRB whereby for the MAI from any forest land to be considered "Renewable Biomass" that land must remain a forest, and be sustainably managed, and comply with national or regional forestry and nature conservation regulations. Thus, it was accepted that only the MAI from forest land in protected areas could only be proven to be DRB. Therefore, the amount of NRB compared to DRB was much higher leading to higher fNRB values.

In applying the new CDM fNRB tool, the high bar is adopted of assuming that forests are sustainably managed unless proven otherwise instead of the more realistic assumption of the inverse, effectively eliminating carbon finance as a driver of climate-friendly sustainable rural development.

In applying the new fNRB tool, realistic rules governing exclusion or inclusion of the MAI of forests inaccessible to rural communities that gather firewood on foot is key to determining realistic fNRB values. Moreover, in the absence of credible default values, such guidelines to factor accessibility of forests to foraging rural communities need to be simple, easy to apply and transparent for project developers who otherwise run the risk of commissioning expensive studies or conducting time-consuming analyses that ultimately prove unacceptable to the CDM Executive Board or its Paris Agreement successor

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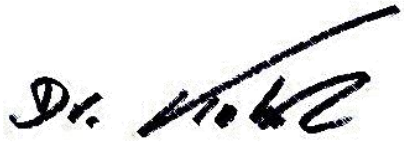
Defining more context specific mean annual increment (MAI) of woody biomass (t/ha/year): To calculate the mean annual increment (MAI) of woody biomass in any region, knowledge of the forest types, their distribution and their annual growth rates is required. The IPCC (2006) and FAO (2000), data sources referenced in the new fNRB tool, provide these data by generalizing productivity across ecological zones at a continental scale. A broad MAI estimation using these data are valuable in the absence of more detailed, region-specific information. A more representative MAI can, however, be estimated when more information is available and fewer generalizations need to be made.

Just as the IPCC (2006) and FAO (2000) data sources are more than 10 years old, older data sources to determine country or region-specific MAIs should be accepted as well, as this data is not likely to change much over time.



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(signed on behalf of the member of PD Forum – copyright of this text is with the member who contributed the text and research)