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CLIMATE FINANCING OPTIONS:

An Assessment for Columbia World Project – Ghana Household Energy

By Ama Francis

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The Sabin Center for Climate Change Law develops legal techniques to fight climate change, trains law students and lawyers in their use, and provides the legal profession and the public with up-to-date resources on key topics in climate law and regulation. It works closely with the scientists at Columbia University's Earth Institute and with a wide range of governmental, non-governmental and academic organizations.

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EXECUTIVE SUMMARY

This report was prepared for Columbia World Project: Ghana Household Energy ("the Project") in order to identify climate finance options that would provide substantial additional funding for Project implementation. The Project will advance in two major stages. Phase 1 will identify policy measures and fuel options that will effectively promote community-level adoption of clean cooking technologies. Phase 2 will then implement the intervention based on findings from Phase 1. The funding this Project seeks will cover Phase 2 operations costs and likely contribute to subsidizing the cost of fuel and hardware in order to reduce the consumer end-price of the clean cooking technology this Project promotes.

The report identifies three potential sources of climate finance: 1) Carbon Finance; 2) the NAMA Facility; and 3) the Green Climate Fund (GCF). Carbon finance would provide the greatest amount of university ownership over the Project, and support a liquefied petroleum gas (LPG)-based intervention if Phase 1 identifies LPG as one of the fuel sources most likely to achieve a transition to clean cooking. However, the Project would not be able to generate funds from carbon finance before Phase 2, since Phase 2 itself would produce carbon credits for sale. Therefore, another financing source, outside carbon trading, is necessary to support Phase 2 implementation.

The NAMA Facility and GCF both offer the Project an opportunity to leverage climate financing to drive Phase 2, and also seek funding of at least USD$5 million that could support a national-scale intervention. A proposal to both the NAMA Facility and GCF would require endorsement from the Ghanaian government. Therefore, securing buy-in from the Government of Ghana is imperative if the Project is to successfully obtain climate finance through these channels in advance of Phase 2. Both pathways would allow the Project to ensure more lasting structural change by partnering with the Government of Ghana.

This report focuses on climate finance as an innovative way to overcome barriers clean cooking enterprises typically face. The report highlights carbon finance, the NAMA Facility, and the GCF as promising mechanisms because of their alignment with the Project timeline,

past support of clean cooking interventions, and ability to provide at least USD$5M. However, funding options outside of climate finance could be explored, including support from private foundations. Regardless of the pathway, identifying innovative ways to financially back clean cooking interventions in Ghana is important, and access to large-scale, sustained financing could be transformative.

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1. INTRODUCTION

Although cooking plays a central role in cultures worldwide, food preparation can cause significant health and environmental hazards. Approximately 40% of households globally use polluting solid fuels like wood and coal to cook.[1] The World Health Organization reports that nearly four million people prematurely die from household air pollution annually due to the use of polluting cooking technologies and fuels.[2] Fifty percent of household air pollution-related deaths occur among children under the age of five.[3] Household air pollution is also associated with a range of negative health conditions, including acute respiratory infections, chronic obstructive pulmonary diseases, lung cancer, and asthma.[4]

In Ghana, solid fuels serve as the primary energy source for cooking,[5] making air pollution one of the leading causes of death and disability nationally. More than three quarters of the Ghanaian population relies on solid fuels burned in open fires for cooking, and in rural areas, 94% of households rely on polluting cooking fuels.[6] Household air pollution causes more than 18,000 deaths annually in Ghana,[7] and lower respiratory infections that are often the result of

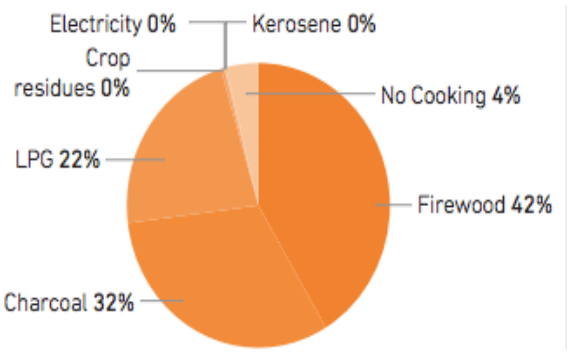

Figure 1. Cooking Fuel Sources Ghana.[5]

[1] WHO et al., *Accelerating SDG 7 Achievement: Policy Brief 2*, https://sustainabledevelopment.un.org/content/documents/17465PB2.pdf.

[2] World Health Organization (WHO), *Household Air Pollution and Health* (May 8 2018), https://www.who.int/news-room/fact-sheets/detail/household-air-pollution-and-health.

[3] *Id.*

[4] M. Desai et al., *Indoor Smoke from Solid Fuels: Assessing the Environmental Burden of Disease at National and Local Levels* (2004).

[5] WHO, *Opportunities for Transition to Clean Household Energy* (2018), https://apps.who.int/iris/bitstream/handle/10665/274281/9789241514026-eng.pdf;jsessionid=AB3635E5F33BE5AA82ECE5503E139661?sequence=1.

[6] *Id.*

[7] Clean Cooking Alliance (CCA), *Ghana*, https://www.cleancookingalliance.org/country-profiles/focus-countries/1-ghana.html.

household air pollution are the second leading cause of death nationally.[8]

Increasing access to clean cooking fuel and technologies in Ghana and other countries reliant on traditional cooking methods has life-saving health benefits; and also creates environmental and gender gains. One study suggests that the use of efficient biomass stoves can reduce household exposure to black carbon, a potent climate-warming pollutant, by 36%.[9] The Intergovernmental Panel on Climate Change estimates that the use of efficient biomass stoves can reduce up to 2.4 GtCO2eq/year while producing sustainable development benefits.[10]

Women disproportionately suffer due to polluting cooking practices, and thus clean cooking interventions also support gender equity. Women experience higher exposure to household air pollution because they are often responsible for cooking, and lose hours engaging in unpaid labor when collecting solid fuels. The journey to collect firewood can also expose women to gender-based violence. By reducing exposure to household air pollution and gender-based violence, clean cooking fuels and technologies can secure critical benefits for women. In short, clean cooking interventions have the potential to advance positive health, environment, and gender outcomes.

However, financing clean cooking interventions remains a challenge. Grants serve as the most common type of investment capital, alongside equity, but early stage and small businesses are largely unable to access debt capital.[11] Clean cooking enterprises therefore report difficulties attracting sufficient financing to scale up their businesses.[12] Sustainable Development Goal #7 (SDG7) aims for universal access to modern energy, including universal access to clean cooking fuels and technologies by 2030, but achieving SDG7 requires financial support. Securing financing for clean cooking interventions in

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[8] Institute for Health Metrics and Evaluation, *GBD Profile: Ghana* (2010), http://www.healthdata.org/sites/default/files/files/country_profiles/GBD/ihme_gbd_country_report_ghana.pdf.

[9] Omkar S. Patange et al., *Reductions in Indoor Black Carbon Concentrations from Improved Biomass Stoves in Rural India,* ENVIRON. SCI. TECHNOL. (2015). In Africa and Asia, household consumption of solid fuel accounts for 60-80% of global emissions of black carbon. WHO, *Burning Opportunity: Clean Household Energy for Health, Sustainable Development, and Wellbeing of Women and Children* (2016).

[10] Smith P. et al., 2014: Agriculture, Forestry and Other Land Use (AFOLU). In: *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

[11] CCA, *Financing Growth in the Clean Cookstoves and Fuel Market: An Analysis and Recommendations* (2018).

[12] *Id.*

Ghana would provide health, environmental, and gender benefits, and ultimately support global sustainable development goals.

2. BACKGROUND

Ghana Household Energy ("the Project"), developed through Columbia World Projects, will take a community-level approach to promote sustained, exclusive use of clean cooking technologies in Ghana. Although public sector actors have dedicated significant resources to clean cooking interventions in Ghana in the past ten years, four key elements distinguish this Project's approach. The Project will: 1) leverage behavior change research to gain insight into decision-making at the household and community level; 2) develop a stack of clean technologies that provide end-users with options in order to fully displace the use of traditional cooking methods; 3) focus on interventions targeted at entire communities to more effectively reduce air pollution; and 4) identify necessary systemic energy shifts.

The Project will proceed in two major phases. Phase 1—the behavioral assessment phase—will seek to identify policy measures that will effectively incentivize a shift at the community level to clean cooking technologies; for example, conditional cash transfers and direct consumer subsidies. This phase will also identify which "clean" energy source households prefer for cooking; for example, LPG, ethanol, electricity and/or biomass pellets. Phase 2—the intervention phase—will implement the policy measures and clean technologies identified in Phase 1 in pilot communities across Ghana. Phase 2 will include monitoring and evaluation in order to assess whether measures are effectively reducing household air pollution and meeting energy needs. This proof-of-concept phase will produce insight into the financial and logistical hurdles associated with scaling clean cooking interventions.

Phase 2 requires substantial additional funding for implementation,[13] and is scheduled to start in early 2022. This report identifies short-term financing options that could contribute to subsidizing the cost of fuel and hardware (stoves and related supplies) in Phase 2,[14] and support operations costs to ultimately reduce the consumer end-price of the clean cooking technology provided through the Project.[15] The report also identifies long-term financing options that could provide at least USD$5M and support national-scale clean cooking interventions.

This report focuses on climate finance as a novel approach to addressing funding gaps for this Project, and within the clean cooking sector more generally. Financing presents a

[13] Meeting with Darby Jack (Dec. 12, 2019).

[14] *Id.*

[15] *Id.*

challenge both for Ghanaian producers seeking to scale, and consumers wishing to buy clean cooking technologies.[16] Most Ghanaian cookstove enterprises—and indeed, most clean cooking enterprises in the region—have not built a profitable business to a scale that renders private equity investments worthwhile.[17] One private equity investor described Ghanaian clean cooking initiatives as an unattractive investment.[18] "Impact investors remain timid in the clean cooking space" in other Sub-Saharan African countries as well.[19] Small investments in small businesses, however, remain a promising possibility for concessionary investors or donors.[20] Given the constraints from a private equity perspective, donor-based financial support is critical.

High import duties on raw materials necessary for production also inhibit market growth, and prevent new actors from entering the market.[21] High import duties limit cookstove manufacturers to sourcing scrap metal locally, for example, instead of purchasing bulk quantities of sheet metal used for making locally-produced cookstoves.[22] Import duties also make testing potential products in Ghana expensive.[23] On the consumer end, the high cost of clean cooking fuels like LPG prohibits high levels of uptake.[24]

The Government of Ghana (GoG) supports clean cooking interventions in law and policy, but also faces financing challenges. For example, the Ministry of Energy's 'Ahibenso coalpot' program, which kick-started the cookstove sector in the 1990s, ceased production because of "limited funding."[25] Untargeted government subsidies may not serve as a suitable as a long-term solution because energy subsidies place pressure on the national budget.[26] Furthermore, when improved clean cooking technology and fuels are subsidized to the point where they are free, consumers may also fail to value them over time.[27] Subsidies may spur

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[16] CCA, *Ghana Market Assessment* (2012), https://www.cleancookingalliance.org/resources/162.html.

[17] *Id.*

[18] Author Interview with Investment Expert (Feb. 21, 2020).

[19] Green Climate Fund (GCF), *Concept Note: Emissions Reductions, Disease Reduction, and Landscape Restoration through Biomass Gasification Cookstoves* (Apr. 24, 2018), https://www.greenclimate.fund/sites/default/files/document/20190-emissions-reduction-disease-reduction-and-landscape-restoration-through-biomass-gasification.pdf.

[20] *Id.*

[21] *Id.*

[22] *Id.*; *see also* Ghana Alliance for Clean Cookstoves, *The Cleanstove Bottleneck*, https://www.ghacco.org/the-cleanstove-bottleneck/.

[23] *Id.*

[24] WHO, *Opportunities for Transition to Clean Household Energy* (2018).

[25] Accenture Development Partnerships, *Ghana Market Assessment Executive Summary* (2012).

[26] *Ghana to Scrap Fuel Subsidies by Sept – Oil Minister*, REUTERS (June 3, 2015), https://www.reuters.com/article/ghana-subsidies/ghana-to-scrap-fuel-subsidies-by-sept-oil-minister-idUSL5N0YP4S320150603.

[27] Author Interview with Investment Expert (Feb. 21, 2020).

initial demand that ebbs as consumers are asked to pay market price. The Rural LPG Promotion Program, launched in 2013, for example, aimed to scale up LPG use through a variety of subsidies and cost-free measures. Yet, one study showed that after receiving a free filled cylinder from the GoG, 58% of households in five rural communities had never refilled their LPG cylinders (at market price) nine months after receiving it.[28] At 1.5 years after initial delivery of a filled cylinder through the program, only 8% of households still used LPG.[29]

Nevertheless, the GoG plays an important role in fostering an enabling environment for clean cooking interventions in Ghana, and reducing barriers to clean cooking sector development through policy. The Ghana Country Action Plan for Clean Cooking identifies reducing taxes and tariffs in the clean cooking sector, advocating for lower interest rates for business owners, and launching national awareness campaigns on the health benefits of clean cooking as concrete ways the GoG can establish a more favorable environment for enhancing clean cooking energy access.[30] Targeted government subsidies could also support increased uptake of clean cooking technologies.

Identifying innovative ways to financially back clean cooking interventions in Ghana is important, and access to large-scale, sustained financing could be transformative. Climate finance provides one novel approach to increasing financial resources for clean cooking interventions because of the climate benefits associated with a transition to clean cooking technologies. Pairing climate finance and clean cooking interventions also makes sense given government priorities. More than 25% of Nationally Determined Contributions (NDCs) under the Paris Agreement identify clean cooking as a key mitigation measure, most from Sub-Saharan African countries, and including Ghana.[31] This report outlines three mechanisms through which climate finance can serve as a short- and long-term solution to the financing gap:

1) Carbon Finance;

2) NAMA Facility; and

3) Green Climate Fund (GCF).

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[28] Kwake P. Asante et al., *Ghana's Rural Liquefied Petroleum Gas Program Scale Up; A Case Study*, 46 ENERGY FOR SUSTAINABLE DEVELOPMENT 94 (Oct. 2018), https://www.sciencedirect.com/science/article/pii/S097308261830262X.

[29] *Id.*

[30] CCA, *Ghana Market Assessment* (2012).

[31] Hilda Galt & Szymon Mikolajczyk, *Climate Finance for Clean and Efficient Cookstoves* (2018), https://climatefocus.com/sites/default/files/Boiling%20Point%2069%20Galt%20%26%20Mikolajczyk.pdf

3.1 Option 1: Carbon Finance

3.1.1 Overview

Carbon trading operates through both compliance and voluntary markets. In most carbon trading schemes, credits generated by greenhouse gas (GHG) emission reduction activities are sold to participants who are required or wish to offset their own GHG emissions.[32] Many clean cooking programs have monetized the GHG emission reductions associated with switching to cleaner cooking technologies by selling credits in compliance and voluntary markets. Buyers tend to find clean cooking programs attractive because of the sustainable development co-benefits they deliver.

The Clean Development Mechanism (CDM), which is linked to the EU Emissions Trading Scheme (EU-ETS), is the major United Nations (UN) compliance scheme. Established under the Kyoto Protocol of 1997, the CDM allows emitters in developed countries to fund projects in developing countries, and obtain offset credits.[33] The price of a CDM carbon credit or Certified Emission Reduction unit (CER) is much cheaper than the price of a European Union Allowance (EUA); thus the CDM presents a low-cost alternative to EU-ETS compliance.[34] Although CERs sold for as high as USD$11.8 in 2010, the current average price per CER is USD$1.[35] The current price of CERs renders the CDM an insufficient financing source for the Project or a long-term government initiative.

A new carbon trading scheme under Article 6.4 of the Paris Agreement will replace the CDM in the near future. This new Paris mechanism will build on and improve the CDM, aiming to capture sustainable co-benefits in addition to GHG emission reductions. Unlike the CDM, the new trading scheme will be voluntary. One critical issue that remains unresolved is whether CERs from the CDM will be transferred to the new Paris framework, thereby potentially flooding the market and keeping the price of credits low. This would decrease the likelihood that the price per carbon credit will increase in the new Paris framework. Although Article 6 negotiations were scheduled to wrap up in 2018, countries have not yet been able to come to a consensus.[36] Thus the price of credits under the new UN trading scheme remains

[32] Harro van Asselt, *The Design and Implementation of Greenhouse Gas Emissions Trading*, THE OXFORD HANDBOOK OF INTERNATIONAL CLIMATE CHANGE LAW (2018).

[33] Shi-Ling Hsu, *International Market Mechanisms*, THE OXFORD HANDBOOK OF INTERNATIONAL CLIMATE CHANGE LAW (2018).

[34] European Commission, *EU ETS Handbook* (2015).

[35] Annual Report of the Executive Board of the Clean Development Mechanism to the Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol, UNFCCC (Dec. 13, 2019), https://unfccc.int/sites/default/files/resource/cmp2019_03_adv.pdf.

[36] *COP25: Key Outcomes Agreed at the UN Climate Talks in Madrid,* CARBON BRIEF (Dec. 15, 2019), https://www.carbonbrief.org/cop25-key-outcomes-agreed-at-the-un-climate-talks-in-madrid.

undetermined. The postponement of the 2020 Conference of the Parties under the United Nations Framework Convention due to COVID-19 will further delay the resolution of this issue.

Another UN trading scheme on the horizon is the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) under the International Civil Aviation Organization (ICAO). While reduction of domestic aviation emissions falls within the scope of the Paris Agreement, ICAO holds the mandate to limit emissions from international flights.[37] CORSIA aims to limit emissions from international aviation to 2020 levels going forward. The International Air Transport Association (IATA) estimates that aviation will have to offset 2.6 billion tons of CO_2 between 2021 and 2035 in order to do this, which is more than the total volume of offsets ever issued under the CDM or traded in the voluntary carbon market.[38] Airlines can voluntarily participate in CORSIA offsetting from 2021-2023. As of February 2020, 82 states declared their intention to participate in this voluntary phase.[39]

In response to COVID-19, IATA called for CORSIA to use a 2019 baseline; otherwise airlines will need to buy "a significantly higher number of offsets—in some cases nearly five times as many in the early stages of the schemes" than was expected pre-COVID-19.[40] ICAO agreed to use a 2019 baseline as a safeguard in response to the pandemic.[41] IATA forecasts that airlines will lose about 4-5 months of revenue this year,[42] but it is too early to determine COVID-19's full impact on CORSIA. Pre-COVID-19, ICAO assumed that carbon prices will range from USD$6-10/tCO2eq to USD$20-33/tCO2eq under the scheme.[43]

Selling carbon credits through the CDM or the new Paris Agreement carbon trading scheme will not likely provide USD$5M for this Project in the next two years.[44] The CDM's existence after 2020 remains highly uncertain.[45] After the second commitment period of the

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[37] International Air Transport Association (IATA), *Carbon Offsetting Scheme for International Aviation (CORSIA)*, https://www.iata.org/policy/environment/Pages/corsia.aspx.

[38] *Id.*

[39] International Civil Aviation Organization (ICAO), *CORSIA States for Chapter 3 State Pairs*, https://www.icao.int/environmental-protection/CORSIA/Pages/state-pairs.aspx.

[40] IATA *Carbon Offsetting Scheme for International Aviation.*

[41] ICAO, ICAO Council Agrees to Safeguard Adjustment for CORSIA in Light of COVID-19 Pandemic (June 30, 2020). *See also* IATA, *Impact of COVID-19 on CORSIA Baseline Calculation* (2020).

[42] European Regions Airline Association, *COVID-19 Impacts on CORSIA*, https://www.eraa.org/policy/overview-and-news/covid-19-impacts-corsia.

[43] ICAO, *What Would Be the Impact of Joining CORSIA*, https://www.icao.int/environmental-protection/Pages/A39_CORSIA_FAQ3.aspx.

[44] Joining a pre-existing CDM-registered program, however, may benefit the Project for reasons discussed in Section 3.1.2.

[45] *See* Climate Focus, *What is the Future of the CDM* (June 2017), https://www.climatefocus.com/sites/default/files/Post-2020%20CDM%20QA%20Briefing%20Note.pdf.

Kyoto Protocol ends in December 2020, CDM could be permanently replaced by the new trading mechanism under Article 6 of the Paris Agreement; but, as discussed above, the future of the Paris Agreement trading scheme has not yet been determined. CORSIA, however, could provide a meaningful source of finance.

The voluntary market serves as an alternative to mandatory trading schemes. Voluntary carbon offset markets are structured through certification processes like the Gold Standard, American Carbon Registry, and Verified Carbon Standard; and allow businesses, universities, governments, non-governmental organizations (NGOs), and individuals to voluntary offset their emissions.[46] As corporations, individuals, and other non-government actors look to increase their climate engagement and claim carbon neutrality, buying carbon credits in the voluntary market presents one way to meet sustainability targets.[47]

For example, in April 2018, Lyft went carbon neutral, using carbon credits purchased from the sustainability firm 3 Degrees to offset the carbon footprint of its rides.[48] In 2019 and 2020, a suite of airline companies—including Easy Jet, Air Canada, and Air New Zealand—committed to zero emission targets; and planned to meet their emission goals in part by purchasing carbon offsets on the voluntary market.[49] Easy Jet, for example, expects to buy 7.5 MtCO2e between November 2019 and September 2020.[50] Many companies have reiterated their commitment to those targets, even amidst the current health crisis, but developers expect COVID-19 will affect the market.[51] Notwithstanding the pandemic, selling carbon credits through CORSIA or the voluntary market may provide a source of financing for the Project.

3.1.2 Analysis

Carbon finance cannot supply Phase 2's upfront financing needs because carbon credits would themselves be generated during Phase 2. Nevertheless, revenue from carbon credit sales could be directed to a later Project phase. The Project could pursue two pathways of

[46] Stockholm Environment Institute, *Assessing the Climate Impacts of Cookstove Projects: Issues in Emissions Accounting* (2013), https://www.sei.org/mediamanager/documents/Publications/Climate/sei-wp-2013-01-cookstoves-carbon-markets.pdf.

[47] *See* We Are Still in, *Who's In*, www.wearestillin.com.

[48] Robinson Meyer, *Your Lyft Ride Is Now Carbon-Neutral. Your Uber Isn't*, ATLANTIC (Apr. 19, 2018), https://www.theatlantic.com/science/archive/2018/04/all-lyft-rides-are-carbon-neutral/558443/.

[49] Jillian Ambrose, *Can Carbon Offsets Tackle Airlines' Emissions Problem?* (Nov. 19, 2019), THE GUARDIAN, https://www.theguardian.com/environment/2019/nov/19/can-carbon-offsets-tackle-airlines-emissions-problem.

[50] Ecosystem Marketplace, *Financing Emissions Reductions for the Future: State of the Voluntary Carbon Markets 2019 – Market Dynamics* (Dec. 2019).

[51] Steve Zwick, *Will COVID-19 Help or Hinder Efforts to Develop Natural Climate Solutions?*, ECOSYSTEM MARKETPLACE (Apr. 27, 2020), https://www.ecosystemmarketplace.com/articles/how-covid-19-could-stall-efforts-to-meet-the-climate-challenge-and-what-to-do-about-it/.

accessing carbon finance within the next few years. The Project could 1) register under the voluntary market, including by joining an existing program; or 2) integrate into an existing CDM project to facilitate a results-based payment program or participation in CORSIA.

There are three major considerations in determining best next steps vis-à-vis carbon finance: the willingness of buyers, carbon credit sale price, and timing. First, buyers can be hard to secure in carbon trading schemes, and thus a critical first step in seeking carbon financing would be to find a buyer. Securing a buyer will allow the Project directors to determine which carbon financing pathway makes more sense, and invest in accreditation accordingly. If a voluntary buyer like a corporation or university is secured, then registering the Project on the voluntary market would allow the Project to generate revenue through carbon credit sales. Trading in the voluntary market would allow the Project to capture the advantage clean cooking programs enjoy in voluntary schemes; credits derived from clean cooking initiatives enjoy higher average prices because they deliver significant social development co-benefits.[52] For example, the average price of a carbon credit generated by an improved cookstove (ICS) program on the voluntary market was USD$5 in 2018, compared to a general average price of USD$3.01/credit that year.[53]

On the other hand, foreign governments or climate financiers like the World Bank may only feel comfortable investing in a project registered by the UN. Thus, if the Project builds a financing partnership with a multilateral or government buyer, then joining an existing CDM project would be beneficial. It is important to note that it is not yet clear whether CDM credits will be transferred to the new Paris Agreement trading scheme. Furthermore, under the new Paris Agreement trading scheme, internationally traded mitigation outcomes (ITMOs) are transferred between national governments. Thus, even if the Project were accredited under the new Paris scheme, the GoG could want to claim ownership of emission reductions as part of Ghana's NDC. In that case, it would be impracticable to transfer the mitigation outcomes to a buyer. Structuring sale to foreign governments or climate financiers as a results-based payment would circumvent this issue since the GoG would still be able to count credits towards its own emission reductions efforts.

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[52] Ecosystem Marketplace, *State of the Voluntary Carbon Markets 2017*, https://www.forest-trends.org/wp-content/uploads/2017/09/doc_5591.pdf. The Gold Standard is developing tools to assess climate-related projects' impact on achieving the Sustainable Development Goals. *See* Gold Standard, *Guidance for the Identification of Impacts and Indicators for Activity Level SDG Impact Reporting* (Aug. 2019), https://www.goldstandard.org/sites/default/files/2019_sdg_tool_guidance_briefing.pdf & *SDG Impact Tools Development Programme* (Sept. 2018), https://www.goldstandard.org/sites/default/files/documents/sdg_tools_programme_overview_sept_2018.pdf.

[53] Ecosystem Marketplace, *Financing Emissions Reductions for the Future: State of the Voluntary Carbon Markets 2019* (Dec. 2019).

A second consideration in seeking carbon financing is the scale of emission reductions the Project can produce and credit sale price. It is unclear which fuel source consumers will favor during Phase 1, and each option presented—LPG, ethanol, electricity, and biomass pellets—will generate varying amounts of GHG emission reductions.[54] An ICS typically generates 1-3 carbon credits/year by avoiding 1-3 tCO2e.[55] The price of an improved cookstove offset on the voluntary market was USD$5.1/tCO2e on average in 2016, USD$6.17 in 2017, and USD$5.00 in 2018.[56] Pricing under the UN compliance scheme is not yet determined; and CORSIA assumes a range of USD$6-10/tCO2e in a pessimistic scenario, and USD$20-33/tCO2e in an optimistic scenario.[57]

Emission reductions from improved cookstove projects cost USD$5-8/tCO2e, including verification and monitoring costs.[58] Thus offset prices must remain at or above approximately USD$10/tCO2e in order for cookstove projects to both recover costs and make a marginal profit for reinvestment in services such as stove maintenance.[59] Given the above, the Project could do one of the following to make carbon financing worthwhile: 1) secure a buyer willing to pay above market value for credits on the voluntary market; or 2) target a buyer through CORSIA's voluntary 2021-2023 phase. Assuming that the Project is able to sell credits for $10/tCO2e or more, the Project would need to generate at least 500,000 credits to secure USD$5M (or distribute the equivalent of approximately 170,000 improved cookstoves).

Finally, timing matters. The accreditation process in the voluntary market took approximately 1.5-2 years before the current public health crisis.[60] The first step in developing a carbon project for registration in the voluntary market is to conduct a baseline survey in order to forecast emission reductions. This survey process typically takes 6-9 months. Next, a third party generally validates the program by ensuring that the program meets the required

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[54] The use of LPG as a fuel source would not be disqualifying for participation in a carbon trading scheme. The Gold Standard, for example, has a registered LPG stove program in Darfur. Gold Standard, *Darfur Low-Smoke Stoves Project*, https://www.goldstandard.org/projects/darfur-low-smoke-stoves-project. The CDM also includes LPG-based projects. *See LP Gas Gets Clean Development Mechanism Acceptance*, WORLD LPG ASSOCIATION (2013), https://www.wlpga.org/mediaroom/lp-gas-gets-clean-development-mechanism-acceptance/.

[55] Gold Standard, *Darfur Low-Smoke Stoves Project*, https://www.goldstandard.org/projects/darfur-low-smoke-stoves-project.

[56] Ecosystem Marketplace, *Financing Emissions Reductions for the Future: State of the Voluntary Carbon Markets 2019*.

[57] ICAO, CORSIA FAQs (Aug. 9, 2018), https://www.icao.int/environmental-protection/CORSIA/Documents/CORSIA_FAQs_Update_9Aug18.pdf.

[58] Stockholm Environment Institute, *Assessing the Climate Impacts of Cookstove Projects: Issues in Emissions Accounting*.

[59] *Id.*

[60] Interview with Hilda Galt (Apr. 14, 2020).

rules and regulations of the registering standard.[61] Under the Gold Standard, this validation process runs approximately three months.[62] Thus a carbon trading project will typically be registered about one year into its development. After the program's clean cooking technology has been implemented, a third party will likely conduct a first monitoring to check how the technology is used, how often, and how much fuel is burned.[63] The monitoring process typically takes 6 months.[64] At this point, a carbon credit can be issued.[65] Therefore, it would take a proposed program at least 1.5 years to begin generating credits for sale on the voluntary market under normal conditions.

This Project could join a pre-existing verified program on the voluntary market in order to shorten the timeline from registration to sale of a carbon credit. Registering as a sub-program of an already registered program takes approximately 6 months (versus one year). There are 3 registered Gold Standard cookstove projects in Ghana that have already issued and retired credits.[66] Improved Household Charcoal Stoves in Ghana, for example, issued and retired approximately 1M credits from 2007-2017.[67] Gyapa Cook Stoves Project in Ghana ("Gyapa"), which is managed by Relief International, serves as the most promising partner because it is the only Gold Standard Ghanaian cookstove project with a crediting period that would align with the Project's timeline; Gyapa will issue credits until at least 2022, and has retired over 2M credits so far.[68] Gyapa started in the Greater Accra before expanding unevenly across Ghana.[69] The Project could add value to Relief International by helping them to deepen their reach in central Ghana.

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[61] Ecosystem Marketplace, *Carbon Markets Are Well-Positioned to Meet CORSIA Demand Projects* (Mar. 2020).

[62] Interview with Hilda Galt. For more on the Gold Standard certification process *see* https://www.goldstandard.org/take-action/certify-project.

[63] Ecosystem Marketplace, *Carbon Markets Are Well-Positioned to Meet CORSIA Demand Projects*. For an account of the Gold Standard's methodology requirements for clean cookstove projects, *see* Gold Standard, *Gold Standard Methodology: Technologies & Practices to Displace Decentralized Thermal Energy Consumption* (Aug. 2017), https://globalgoals.goldstandard.org/407-ee-ics-technologies-and-practices-to-displace-decentrilized-thermal-energy-tpddtec-consumption/. *See also* Gold Standard, *Impact Quantification Methodology Approval Procedure* (Oct. 22, 2018), https://globalgoals.goldstandard.org/401-sdgiq-methodology-approval-procedure/.

[64] Interview with Hilda Galt.

[65] Ecosystem Marketplace, *Carbon Markets Are Well-Positioned to Meet CORSIA Demand Projects.*

[66] The author was unable to access the Verra registry.

[67] *See* UNFCCC, *CDM Programme Activities PoA 10430*, https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/KQXLWC1G6IEY8OHVDFU9S27T5ZNMRP/viewCPAs.

[68] Impact Registry, *Gyapa Cook Stoves Project in Ghana,* GOLD STANDARD, https://registry.goldstandard.org/projects/details/696.

[69] *Id.*

Alternatively, this Project could join a CDM Program of Activities (PoA). Although the future of the UN market remains uncertain given the status of Article 6 negotiations under the Paris Agreement, climate financiers may still be interested in purchasing credits through the Paris market once negotiations settle (or may be interested in a results-based payment structure as discussed above). The World Bank, for example, launched the Standardized Crediting Framework in order to present a replicable model within the regulatory framework of the Paris Agreement scheme that would encourage private sector involvement.[70] However, joining a CDM program does present risks since it is unclear whether CDM PoAs will be integrated into the new mechanism under the Paris Agreement, and further, when negotiations will be concluded.

Partnering with an existing project could also allow the Project to seek funding in 2021 through CORSIA. CORSIA authorized six Emissions Unit Programs to supply credits under the scheme—including the Gold Standard and CDM.[71] Programs whose crediting period started after 2016 and achieved emission reductions on or before December 31, 2020 are eligible to sell credits in the 2021-2023 voluntary phase of CORSIA. There is one CDM project in Ghana that meets these criteria: Man and Man Enterprise Improved Cooking Stoves CDM Programme in Ghana supported by Republic of Korea (Man and Man Enterprise).[72] No Gold Standard project fits this criterion at this time.[73]

In conclusion, the fastest way to ensure that the Project can access significant financing on the carbon market in the next two years would be to first secure a buyer in order to determine whether to pursue accreditation via the voluntary market or CDM; and then join a pre-existing program—either Gyapa or Man Man Enterprise—to shorten the timeframe from distribution of clean cooking technology to sale of carbon credits. The Project could also pursue finding a buyer and joining an existing registered program simultaneously, if finding a buyer proves difficult. The current public health crisis will likely extend the timeline.

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[70] *See* World Bank Group, *A Standardized Crediting Framework for Scaling Up Energy Access Programs*, (2016) https://www.ci-dev.org/sites/cidev/files/doucments/SCF%20concept%20report.pdf.

[71] ICAO, *CORSIA Eligible Emissions Units*, https://www.icao.int/environmental-protection/CORSIA/Documents/TAB/TAB%202020/ICAO_Doc_CORSIA_Eligible_Emissions_Units_March_2020.pdf.

[72] PoA10430: Man and Man Enterprise Improved, UNFCCC (last accessed Dec. 8, 2020), https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/KQXLWC1G6IEY8OHVDFU9S27T5ZNMRP/view.

[73] There may be projects registered under the Verified Carbon Standard that would be eligible to participate in CORSIA. However, the author was unable to access this registry. The U.S.-based Climate Action Reserve would not be a suitable partner since their registered projects are all developed in North America. Lastly, there are no Ghanaian projects registered under the voluntary American Carbon Reserve (ACR) at this time; however, there could be ACR projects eligible in CORSIA cycles after 2023.

It is not yet clear which fuel source the Project will identify as most effective in Phase 1, and the proposed technologies will produce varying amounts of carbon credits that the Project can sell.[74] However, carbon financing is the only pathway this report presents that currently supports LPG-based projects.[75] Therefore, if Phase 1 reveals that an LPG-based intervention will likely produce the most favorable health outcomes, then the Project will need to find another financing source in advance of Phase 2. The Project could, however, seek to cover costs and generate revenue through carbon trading in later project stages.

3.2 Option 2: NAMA Facility

3.2.1 Overview

The NAMA Facility was set up by the German Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety; and United Kingdom Department for Business, Energy, and Industrial Strategy to fund transformative climate action in December 2012.[76] The NAMA Facility serves as one vehicle through which industrialized countries deliver on their UN commitment to mobilize USD$100B annually in mitigation and adaptation funding by 2020.[77] Thus far, the NAMA Facility has mobilized nearly EUR 600M in financial support for developing countries and emerging economies to implement Nationally Appropriate Mitigation Actions (NAMAs), an important mechanism through which NDCs are achieved under the Paris Agreement.[78]

The NAMA Facility hosts an open call process to ensure that it funds NAMA Support Projects (NSPs) that deliver ambitious and innovative results.[79] The application process occurs in three stages: 1) countries submit NSP Outlines; 2) the NAMA Facility's Technical Support Unit and an independent evaluator select NSP Outlines to receive funding to develop full NSP

[74] As previously stated, varying fuel options will generate varying amounts of carbon credits that can be sold.

[75] Both the GCF and NAMA Facility have not yet funded an LPG-based project.

[76] NAMA Facility, *NDC Partnership*, https://ndcpartnership.org/funding-and-initiatives-navigator/nama-facility. The Danish Ministry of Climate, Energy, and Utilities; the Danish Ministry of Foreign Affairs; and the European Commission became donors in 2015. NAMA Facility, *7th Call General Information Document* (2020), https://www.nama-facility.org/fileadmin/user_upload/7th_Call_General_Information_Document.pdf.

[77] NAMA Facility, *7th Call General Information Document* (2020).

[78] NAMA Facility, *NDC Partnership*, https://ndcpartnership.org/funding-and-initiatives-navigator/nama-facility.

[79] NAMA Facility, *7th Call General Information Document* (2020).

Proposals; and 3) the NAMA Facility Board selects NSP Proposals for implementation.[80] Given the facility's commitment to providing financial support to the most transformative mitigation projects, the NAMA Facility has no regional or sector focus.[81]

The NAMA Facility evaluates projects against three major criteria—eligibility; ambition; and feasibility.[82] Projects must be submitted by national ministries and other eligible legal entities, request EUR 5-20M in funding, and be additional and achievable in three to 5.5 years.[83] In terms of ambition, the NAMA Facility judges prospective projects against their ability to redirect public and private funds towards mitigation, and contribute to the country's NDC.[84] An ambitious project may institute new laws and regulations that allow for the "reallocation of finance and cash flow (e.g. subsidies)".[85] Feasible projects are those that are supported by a strong institutional framework, and have the capacity to overcome financial and regulatory barriers.[86]

Furthermore, funding cannot be used to generate tradeable carbon credits in the compliance market, including CERs, "or, if generated…should be verifiably cancelled."[87] The project must be endorsed by the national government, and align with stated national priorities, including those expressed in the country's NDC.[88]

The NAMA Facility launched the 7th Call for NSP Outlines in April 2020 with EUR 60M in available funding.[89] The deadline for submissions in response to the 7th Call was September 30, 2020. However, NAMA Facility calls typically operate on a yearly cycle; and given that donors indicated in 2018 that there will be 2-3 additional calls, the Head of the Technical Support Unit of the NAMA Facility reports there will be likely be an 8th Call.[90] Thus, the Project could also seek funding from the NAMA Facility in 2021 or 2022.

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[80] NAMA, *The NAMA Facility Launches the 7th Call for the Submission of NAMA Support Project Outlines* (Apr. 1, 2020), https://www.nama-facility.org/news/the-nama-facility-launches-the-7th-call-for-the-submission-of-nama-support-project-outlines/.

[81] NAMA Facility, *7th Call General Information Document* (2020).

[82] NAMA Facility, *The Selection Process*, https://www.nama-facility.org/call-for-projects/7th-call/the-selection-process/.

[83] *Id.*

[84] NAMA Facility, *7th Call General Information Document* (2020).

[85] *Id.*

[86] *Id.*

[87] NAMA Facility, *The Selection Process*, https://www.nama-facility.org/call-for-projects/7th-call/the-selection-process/.

[88] *Id.*

[89] NAMA, *The NAMA Facility Launches the 7th Call for the Submission of NAMA Support Project Outlines* (Apr. 1, 2020).

[90] Email. From Dr. Soren David to Ama Francis. (Apr. 29, 2020).

3.2.2 Analysis

The NAMA Facility has the potential to provide EUR 5-20M in funding to a clean cooking intervention in Ghana. However, the NSP would need to be endorsed by a Ghanaian national ministry. Therefore, the Project's ability to seek funding from the NAMA Facility in the near-term hinges on securing a partnership with the GoG.

Fortunately, promoting clean cooking measures remains a key way the GoG aims to mitigate GHG emissions and reduce negative health outcomes. For example, Ghana's Clean Energy NAMA aims to achieve three clean cooking targets by 2020: 1) supply two million households with improved cookstoves under the Strategic National Energy Plan; 2) supply 1,000 improved cookstoves for commercial use under the Strategic National Energy Plan; and 3) increase LPG household penetration to 50% under the National Policy of LPG Promotion.[91]

When Ghana developed its Clean Energy NAMA, the relationship between NAMAs and NDCs under the NAMA Facility was not entirely clear.[92] The NAMA Facility's 7th Call clarifies that NAMAs are "concrete building blocks to implement the objectives of NDCs." As such, NSP Outlines must specifically refer to a country's NDC to signal how the project will contribute to the goals of the Paris Agreement.[93] Ghana's NDC sets two clean cooking targets: 1) an increase from 5.5% to 50% in LPG use in peri-urban and rural households by 2030; and 2) adoption of two million ICSs by 2030.[94] Therefore, a Ghanaian clean cooking NSP would sufficiently align with the national priorities Ghana defined under the Paris Agreement.

If the Project and the GoG were to jointly pursue NAMA funding to continue CWP's work, the NSP would need to be structured as new, or as an independent component of the Project that demonstrates additionality.[95] Furthermore, because Columbia University is not a national ministry, its role would be limited to serving as an Applicant Support Partner (ASP) in the NSP Outline Phase and a NAMA Support Organization (NSO) in the proposal development and implementation phase. Only a national ministry or an ASP with government endorsement can submit an NSP Outline.[96] ASPs must meet a range of criteria (see below).

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[91] Ghana, *Nationally Appropriate Mitigation Action on Access to Clean Energy through Establishment of Market-Based Solutions in Ghana* (2016), https://www.undp.org/content/dam/LECB/docs/pubs-namas/undp-lecb-Ghana-Clean-Energy-NAMA-2016.pdf.

[92] *Id.*

[93] NAMA Facility, *7th Call General Information Document* (2020).

[94] Ghana, *Nationally Determined Contribution* (2015), https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Ghana%20First/GH_INDC_2392015.pdf.

[95] *See* NAMA Facility, *NAMA 7th Call for NAMA Support Projects*, https://www.nama-facility.org/fileadmin/user_upload/call-for-projects/7th-Call/7th_Call_FAQ_and_Clarification_Notes__1_published_on_01_April_2020.pdf.

[96] NAMA Facility, *7th Call General Information Document* (2020).

Table 1 Applicant Support Partner Criteria[97]

Experience in the country of implementation (at least 3 years)
Experience in the respective sector (at least 5 years)
Experience with project development and/or project management (at least 5 projects of similar funding size as the NSP)
Experience in development of investment/climate finance policies and/or programs (at least 5 projects)
Experience in working with the public sector (at least 3 years)
Annual turnover of at least EUR 1M over the last 3 years and 10% of the requested funding volume for implementation
During the in-depth assessment, the Applicant Support Partner shall provide annual budgets and supporting financial statements (preferably audit reports) of the last three years, evidence of internal and external control and reporting structures and, if applicable, information on its procurement and contract award procedures.

If an NSP Outline is approved, full NSP Proposals must then be submitted by an NSO. NSOs include national development banks, public utilities, foundations, and national nongovernmental organizations; or international development banks, multilateral development agencies, or other international organizations.[98] NSOs must meet a range of criteria (see below). The Head of the NAMA Facility's Technical Support Unit stated that Columbia University could meet these criteria,[99] but further research would be required. If Columbia University does not meet the NSO criteria, then Columbia University as an ASP could contract with an eligible NSO to submit an NSP proposal and implement the NSP.

Table 2 NAMA Support Organization Criteria[100]

Proven work experience in the country of implementation (>3 years)
Proven work experience in the respective sector (>5 years)
Proven experience with project implementation in the lead (>5 projects with a similar funding volume as requested)
Proven experience in investment/climate finance (>5 projects)

[97] *Id.*
[98] *Id.*
[99] Email. From Dr. Soren David to Ama Francis. (May 5, 2020).
[100] *Id.*

Proven experience with the implementation of ODA projects (>€ 5M)
Proven experience in working with the public sector (>3 years)
For entities other than financial institutions, average of annual turnover over the last 3 years > requested NSP volume

The NAMA Facility has funded at least one clean cooking project in the past—namely, a three-year clean cooking project in Guatemala in 2017 ("Guatemala NSP").[101] The Guatemala NSP mobilized approximately EUR 20M in funding: EUR 14M in funding from private financial institutions in the form of credits and microcredits enabled increased demand; a EUR 5.5M grant supported increased production of sustainable firewood; and EUR 1.3M in public sector funding was allocated for institutional and operational costs.[102] The Guatemala NSP is structured to increase supply and demand. A competitive, prospective clean cooking NSP Outline will similarly "serve to mobilize capital investments for carbon-neutral development pathways."[103]

The NAMA Facility's past investment in a clean cooking project, commitment to an 8th Call, and funding availability up to EUR 20M all render the NAMA Facility a promising source of financing. However, the Project would need to be embedded within a government-endorsed NSP with a program of work that aligns with national priorities.

3.3 Option 3: Green Climate Fund

3.3.1 Overview

The Green Climate Fund (GCF) was established in 2010 under the United Nations Framework Convention on Climate Change (UNFCCC) to provide financial support to developing countries for climate action.[104] The fund serves as a channel through which industrialized countries deliver climate finance, especially to Least Developed Countries (LDCs), African States, and Small Island Developing States (SIDS).[105] The GCF is the largest fund worldwide for mobilizing climate finance to developing countries for mitigation and

[101] NAMA Facility, *Guatemala – Efficient Use of Fuel and Alternative Fuels in Indigenous and Rural Communities*, https://www.nama-facility.org/projects/guatemala-efficient-use-of-fuel-and-alternative-fuels-in-indigenous-and-rural-communities/.

[102] *Id.*

[103] NAMA Facility, *7th Call General Information Document* (2020).

[104] GCF, *About GCF*, https://www.greenclimate.fund/about.

[105] *Id.*

adaptation measures.[106] After its initial resource mobilization period in 2014, the fund received pledges of USD$10.3B.[107] Post 2020, the GCF aims to support developing countries in achieving their NDCs through high-impact investment strategies and projects that ultimately carry out the Paris Agreement.[108]

The GCF takes a distinctive approach to climate finance in at least two regards. First, its direct access mechanism allows developing countries to receive climate finance directly (and not through intermediaries like a multilateral development bank), and thereby more easily align funding with national priorities.[109] More than half of GCF's accredited entities were direct access entities in 2018.[110] Throughout the GCF's operation, USD$547M has been channeled toward projects owned by direct access accredited entities.[111] The GCF Strategic Plan 2020-2023 aims to double the amount of funding that flows through direct access entities relative to the initial resource mobilization period; in other words, to increase funding channeled through direct access entities from 14% to at least 28% in order to support increased developing country ownership of climate action.[112]

Second, the GCF's model of leveraging public investment to catalyze private finance is an innovative way of stimulating investment in low-emission, climate resilient development.[113] The GCF unlocks private finance by de-risking climate-related investments..[114] By providing financial support through grants, concessional loans, subordinated debt, equity, and guarantees, the GCF is able to use funding to overcome market barriers for private investment, and is also able to match financial products to specific project needs and national investment contexts.[115] In the clean cooking sector in particular, this range of financial products is useful; financial support in the form of grants can support early-stage businesses, while concessional loans, equity, and guarantees can help enterprises that are ready to scale.[116]

The GCF considers sustainable development as one of its investment criteria when evaluating funding opportunities, making clean cooking projects and programs a good

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[106] *Id.*

[107] *Id.*

[108] GCF, *Updated Strategic Plan for the Green Climate Fund: 2020-2023* (Feb. 26, 2020), https://www.greenclimate.fund/sites/default/files/document/gcf-b25-09.pdf.

[109] GCF, GCF in Brief: Direct Access (May 1, 2018), https://www.greenclimate.fund/sites/default/files/document/gcf-brief-direct-access_0.pdf.

[110] *Id.*

[111] *Id.*

[112] GCF, *Updated Strategic Plan for the Green Climate Fund: 2020-2023*.

[113] GCF, *About GCF.*

[114] *Id.*

[115] *Id.*

[116] Galt & Mikolajczyk, *Climate Finance for Clean and Efficient Cookstoves.*

funding match.[117] Clean cooking interventions can deliver sustainable development impacts like new job opportunities, improved respiratory health conditions, and reduced fuelwood collecting time.[118] GCF Executive Director Yannick Glemarec described improved efficiency stoves as "a great opportunity to reduce greenhouse gas emissions and improve people's health."[119]

The GCF has considered two cookstove projects in Africa thus far. First, a joint project between Kenya and Senegal was successfully funded to expand the clean cooking market in both countries, and increase production and sales of improved efficiency cookstoves, especially in rural areas.[120] The joint project aims to triple annual ICS production and sales volume by the project end (after 5 years) and achieve a 6-fold increase by 2030; the scale required for both countries to substantially reach their ICS-related NDC targets and to achieve ODA-independent growth in the sector.[121] In terms of GHG emission reductions, the joint project promises 6.47 MtCO2eq in GHG emission reductions over the 5 year project period, and 24.77 MtCO2eq by 2030.[122]

Second, Rwanda's Ministry of Environment submitted a concept note for a project that aimed to cut down the country's primary source of emissions—production and use of biomass cooking fuels—by scaling up a private enterprise that delivers biomass gasification stoves.[123] The GCF has not yet approved the project.

The length of the approval process for every GCF project varies. One GCF cookstove proposal, for example, entered its implementation phase two years after the submission of a proposal.[124] In contrast, a concept note for a Ghanaian proposal focused on financing climate resilient agricultural practices among women was submitted in 2016, approved in 2019, but has still not been implemented.[125] Regardless of varying approval timelines, all GCF proposals go through the same process.

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[117] *Id.*

[118] *Id.*

[119] GCF, *GCF and World Bank Partner to Boost Cookstove Market in Bangladesh* (Aug. 26, 2019), https://www.greenclimate.fund/news/gcf-and-world-bank-partner-boost-cookstove-market-bangladesh.

[120] GCF, *Promotion of Climate-Friendly Cooking: Kenya and Senegal*, https://www.greenclimate.fund/project/fp103.

[121] GCF, *Funding Proposal: Promotion of Climate-Friendly Cooking: Kenya and Senegal* (Feb. 28, 2019), https://www.greenclimate.fund/sites/default/files/document/funding-proposal-fp103-giz-kenya-senegal.pdf.

[122] *Id.*

[123] GCF, *Concept Note: Emissions Reductions, Disease Reduction, and Landscape Restoration through Biomass Gasification Cookstoves.*

[124] *Id.*

[125] GCF, *Program on Affirmative Finance Action for Women in Africa: Financing Climate Resilient Agricultural Practices in Ghana*, https://www.greenclimate.fund/project/fp114.

First, an accredited entity submits a concept note to the GCF Secretariat in order to solicit feedback.[126] Next, an accredited entity provides a funding proposal, along with a no-objection letter signed by the National Designated Authority.[127] The GCF may also provide feedback at this stage in order to strengthen the application.[128] If the proposal is considered complete, the GCF then undertakes a more detailed assessment in which the proposal is matched against the GCF's criteria. Promising projects will be further reviewed by the Independent Technical Advisory Panel (ITAP) which assesses the proposal according to GCF's investment criteria, and may provide input on possible proposal amendments.[129]

Table 3. GCF Investment Criteria[130]

Impact potential
Paradigm shift
Sustainable development
Needs of recipients
Country ownership
Efficiency and effectiveness.

In the final stage of assessment, the GCF Board considers the proposal and all supporting documentation at one of its thrice annual meetings; and approves, conditionally approves, or rejects the proposal.[131] If a proposal is successful, the GCF then enters into a Funded Activity Agreement with the accredited entity to start implementation of the proposed project/program.[132] Projects requesting less than USD$10M dollars may be eligible for a simplified approval process.[133] The GCF especially encourages direct access entities to take advantage of this process, which requires fewer and simpler documents.[134]

[126] GCF, *Project Preparation*, https://www.greenclimate.fund/projects/process.
[127] *Id.*
[128] GCF, *Project Preparation*, https://www.greenclimate.fund/projects/process.
[129] *Id.*
[130] GCF, *Investment Criteria Indicators*, https://www.greenclimate.fund/sites/default/files/document/gcf-b20-inf14.pdf.
[131] GCF, *Project Preparation.*
[132] *Id.*
[133] GCF, *Simplified Approval Process*, https://www.greenclimate.fund/projects/sap.
[134] *Id.*

3.3.2 Analysis

Seeking financing from the GCF serves as the most promising option for national-scale financing because of the fund's past investment in clean cooking projects and the GoG's demonstrated interest in promoting clean cooking. Ghana's NDC clearly identifies expanding market-based clean cooking solutions as a policy priority. The NDC sets two clean cooking targets: 1) an increase from 5.5% to 50% in LPG use in peri-urban and rural households by 2030; and 2) adoption of two million improved cookstoves by 2030.[135] These NDC targets can sufficiently signal to the GCF national interest in developing the clean cooking sector. Kenya, which participates in one GCF-funded clean cooking project, states its clean cooking goals much more broadly in its NDC, noting a desire to promote "clean energy technologies to reduce overreliance on wood fuels".[136]

GCF's support of market-based approaches in clean cooking projects indicates that GCF financing is possible for a national-scale intervention. One hundred percent of GCF investments in cookstove projects thus far have focused on improving the marketplace for clean cooking interventions: GCF provided a USD$20M grant to a World Bank-supported project to expand the private sector market for ICSs in Bangladesh, for example.[137] GCF also granted EUR 38.36M to scale up ICS market growth in Keyna and Senegal.[138] Ghana's cookstove market—with its consortium of artisanal stove manufacturers, fuel producers, and retailers—could be ripe for a market-based intervention.[139]

There are two potential strategies for accessing GCF funding for the Project: 1) attaching to an existing GCF project; or 2) designing a new GCF project. First, CWP could aim to integrate the Project into the Global Clean Cooking Program: Bangladesh ("Bangladesh Project") in order to seek GCF finance. The Bangladesh Project operates as part of a larger program, the Global Clean Cooking Program, through which the World Bank, GIZ, and other partners have coordinated clean cooking interventions in a series of countries. GCF granted USD$20M to the Bangladeshi government to supplement a USD$20M loan from the World Bank's International Development Association.[140] A government financial institution is distributing this funding as grants to partner organizations in order to increase ICS demand

[135] Ghana, *Nationally Determined Contribution.*

[136] Kenya, *Nationally Determined Contribution* (July 23, 2015).

[137] GCF, *GCF and World Bank Partner to Boost Cookstove Market in Bangladesh*. The International Development Association provided a US$20M loan.

[138] Other entities granted EUR 18.81M. GCF *supra* note 114.

[139] *See* UNDP, *Nationwide Mapping of Stakeholders in the Clean Cook Stove Value Chain in Ghana*, https://www.undp.org/content/dam/ghana/docs/Doc/Susdev/UNDP_GH_SUSDEV_SE4ALL_Nationwide%20Mapping%20of%20Stakeholders%20in%20the%20Clean%20Cook%20Stove%20Value%20Chain%20in%20Ghana.pdf. This approach would merit further research.

[140] GCF, *GCF and World Bank Partner to Boost Cookstove Market in Bangladesh.*

through awareness campaigns, and expand supply chain capacity to improve distribution.[141] Consumers are expected to purchase the stoves at full cost in order to facilitate a transition to a completely commercial market.[142] The project aims to deliver four million stoves.[143]

The GoG could approach the Global Clean Cooking Program about joining its list of pipeline countries. Keyna, India, Lao PDR have all participated in the program. The Bangladesh Project GCF proposal states that additional countries will be identified "based on market readiness to benefit from the joint effort at the global level."[144] Therefore, a critical next step would be to assess whether Ghana meets the Global Clean Cooking Program's market readiness criteria. Other criteria include potential for scale, ability to serve as a model, and the potential for climate benefits.[145] Reaching out to the World Bank contact for the Bangladesh Project, Claudia Croce, to assess the viability of partnership would be another important step.

The World Bank is a worthwhile partner to pursue regardless of the Global Clean Cooking Program's interest including Ghana as a participant. The GCF has channeled nearly USD$3B to projects through the World Bank; USD$576.55M in GCF funding and USD$2.12B in co-financing.[146] In addition to being a trusted GCF partner, the World Bank has also demonstrated an interest in investing in clean cooking. The bank established a planned USD$500M Clean Cooking Fund to catalyze progress towards the 2030 goal of universal access to clean cooking, for example.[147] Furthermore, the first Ghanaian household cooking project was implemented in partnership with the World Bank—Ahibenso Coalpot Program.[148]

Second, the GoG could develop a new GCF project. Ghana already has the infrastructure to access GCF financing. Ecobank Ghana is a direct access accredited entity;[149] and the GCF has approved three projects in Ghana thus far.[150] Based on the model of GCF-funded Promotion of Climate-Friendly Cooking: Kenya and Senegal ("Kenya/Senegal Project"), Ghana's proposed GCF project could aim to transform a sector comprised of small

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[141] GCF, *Funding Proposal: Global Clean Cooking Program – Bangladesh* (Mar. 16, 2018), https://www.greenclimate.fund/sites/default/files/document/funding-proposal-fp070-world-bank-bangladesh.pdf.

[142] *Id.*

[143] *Id.*

[144] *Id.*

[145] *Id.*

[146] GCF, *GCF and World Bank Partner to Boost Cookstove Market in Bangladesh.*

[147] *See* World Bank, *Clean Cooking Matters* (Nov. 4, 2019), https://www.worldbank.org/en/news/feature/2019/11/04/why-clean-cooking-matters.

[148] WHO, *Opportunities for Transition to Clean Household Energy.*

[149] GCF, *Ghana,* https://www.greenclimate.fund/countries/ghana

[150] *Id.*

businesses into a marketplace where enterprises are able to access commercial capital and deliver at scale, including to rural consumers.[151]

The proposed project could also replicate the following elements from the Kenya/Senegal Project to stimulate supply and demand: 1) professionalize clean cooking technology production; expand distribution and retail chains; and facilitate access to market-based finance; and 2) raise consumer awareness; and foster an enabling market environment.[152] Ghana's proposed project could leverage the GoG's stated interest in expanding the clean cooking sector in order to build a marketplace of clean cookstove business entities.

As a first step, Ecobank Ghana or a non-Ghanaian GCF accredited entity would submit a concept note with the support of the Ministry of Finance, Ghana's National Designated Authority.[153] If the GCF expressed interest, the accredited entity would then submit a funding proposal. Given that Ecobank Ghana is a direct access entity, a project incubated by them could benefit from the simplified approval process. The proposed project would need to require less than USD$10M, demonstrate readiness for scaling up, and guarantee minimal environmental and social risks.[154]

If the Project were to pursue GCF financing, partnership with the GoG would be imperative. Therefore, a key next step would be to gauge the interest of the Ministry of Finance in developing a clean cooking proposal. The Director of Economic Strategy and Research Division, Alhassan Idrrisu, serves as the point of contact at the ministry. The Project would also need to gauge the interest of accredited entities. In addition to Ecobank Ghana, GCF projects in Ghana have been coordinated by the Africa Development Bank and Acumen Fund.

GCF financing for the Project could be attained if Columbia University is willing to partner with the GoG. Ghana's cookstove sector would benefit from a market-based intervention, which GCF favors; GCF has invested in the clean cooking sector in the past; and a national-scale clean cooking project aligns with GoG's NDC. Furthermore, the GCF may be a more appropriate financing partner than the NAMA Facility for two reasons: 1) the GoG has worked with the GCF in the past, but has not yet implemented a project with support from the NAMA Facility; and 2) the GoG has committed to funding projects until at least 2023, whereas the NAMA Facility might not fund projects past 2021. However, as stated above, neither GCF nor the NAMA Facility has yet funded an LPG-based project.

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[151] *See* GCF, *Funding Proposal: Promotion of Climate-Friendly Cooking: Kenya and Senegal*.

[152] *Id.*

[153] GCF, *Ghana.*

[154] GCF, *Simplified Approval Process*.

4. CONCLUSION

This report identifies climate finance mechanisms that would support Phase 2 of the Project, and long-term, nationally-led initiatives to increase the use of clean cooking technologies and fuels in Ghana: 1) Carbon Financing; 2) the NAMA Facility; and 3) the GCF. These three mechanisms were highlighted because of their alignment with the Project timeline, demonstrated support of clean cooking work in the past, and ability to provide at least USD$5M in financing. However, there are funding options outside of climate finance that should be explored. Private foundations, for example, although outside the scope of this report, could be interested in supporting the Project's work. Regardless of whether financing is sought from climate financiers or others, taking steps in the immediate future to ensure funding support is critical for this Project's success.

ANNEX 1 – CARBON TRADING REGISTRIES

American Carbon Registry

Clean Development Mechanism Program of Activities

CORSIA Approved Emissions Unit Programs

Gold Standard Project Registry

Verified Carbon Standard