PRACTITIONERS' DIALOGUE ON CLIMATE INVESTMENTS

PROTOTYPE - FACT SHEET

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TITLE:

Adaptation of Effective Clean Cooking Energy Technology through Human Capital Development for Mitigation of Climate Change

Mission statement

To effectively adapt clean cooking energy technology through human capital development essential in creating the last mile robust market for cookstoves and fuels, required in the mitigation of global warming and premature mortality, both due to household air pollution (HAP).

Briefly describe your prototype idea

WEET Enterprises Ltd is a human capital development social enterprise designed to mobilize poor women, through training, to actively engage in the adaptation of clean cooking energy technology. The expected outcome of this program is the creation of micro-enterprises which will stimulate a robust clean cookstoves/fuels market, while at the same time eliminating production of HAP. [WEET is an acronym for "Women in Energy & Environmental Technology"].

The WEET Enterprises business model was developed following research to answer the question: "why is it that after decades of concerted effort and the fabrication of millions of clean cookstoves, has the rate of climate change and mortality due to HAP risen?" Why has the last mile in technology dissemination not taken hold, i.e. effective technology transfer and utilization at the source of HAP?

Obtaining cooking fuel, as well as, cooking in Kenya and many developing countries is predominantly the responsibility of women. Due to poverty and lack of adequate education poor women continue to use cheap polluting fuels and cookstoves. Efforts from different agencies to transfer energy technology to women have been superficial and ineffective.

HAP Powerful Global Warming Agent

Cooking and heating using traditional stoves results in partial combustion of biomass and production of large quantities of black carbon and other short-term climate pollutants. According to UNEP's Climate & Clean Air Coalition (CCAC) black carbon contributes globally about 20 - 25 percent of carbon dioxide warming. Households produce 84% of the global black carbon emissions. Black carbon contributes to weather variations, such as changes in the monsoons with the acceleration of melting of the Himalayan and Tibetan glaciers. Black carbon also damages crops through its ability to intercept light. In Africa black carbon has led to the disruption of traditional weather patterns (CCAC 2014)[1].

Mitigation of climate change due to HAP requires that billions of individual households adapt clean cooking energy technology. As formidable as this exercise might appear, CCAC explains that the household cooking and cooling sector represents one of the best prospects in adapting the quick and significant measures necessary to reduce short-lived climate pollutants (SLCPs), and thereby meet both climate objectives and health benefits[2].

The Paris agreement requires that the rise in average global temperature be kept below 1.5°C of preindustrial levels[3]. Since the atmospheric lifetime of black carbon is only a few days, mitigation of black carbon must have an immediate effect in curbing global warming, whereas the reduction of carbon dioxide and other greenhouse gases is long-term.

HAP: Cause of Millions of Premature Deaths

Equally significant is the impact of HAP on human health and the subsequent mortality. In fact, the global premature mortality rate due to HAP more than doubled between 2004 and 2012, from 2 million/annum[4] to 4.3 million/annum[5]. To understand the magnitude of this problem, exposure to air pollution kills more people than malaria, TB and HIV combined"[6].

[1] CCAC. (2014). "Short Lived Climate Pollutants". http://new.ccacoalition.org/en/science.

[2] CCAC. ibid

WHO. (2014). *WHO indoor air quality guidelines: household fuel combustion.* Geneva: WHO

[3] UNFCCC, 2015), *Adoption of the Paris Agreement*. Paris: UNFCCC1. https://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf

[4] UNDP. (2004). Gender and Energy for Sustainable Development: A Toolkit and Resource Guide. http://www.undp.org/energy/genenergykit/)

[5] WHO. (2014). *WHO indoor air quality guidelines: household fuel combustion.* Geneva: WHO

Yumkella, K. (2014). 'Why Wait For Our Grandchildren?' http://www.se4all.org/2014_01_20_wait-grandchildren

[6] Ramanathan, N., Rehman, I. H., & Ramanathan, V. (2015) 'Credit Where it's Due' in *Our Planet*, May 2015: 1-4.

The mortality rate due to HAP in Kenya is estimated at 15,000 deaths/annum (approx. 1250 every month)[7]. HAP is also the number two killer of women in developing countries[8].

WHO recommends three interventions to decrease indoor pollution, namely, reduction of sources of HAP, improvement of the living environment, and management of user behavior[9]. The WEET model addresses these issues.

Human Capital Development:

HAP is correlated to poverty and increased poverty may explain why mortality rose. Some major international programs, such as the neoliberal structural adjustment programs, gave rise to increased poverty in many developing countries. For this reason the human capital development program designed by WEET focuses on creation of profitable microenterprises in the clean cooking energy sector and hence poverty reduction.

United Nations Development Program (UNDP) research reveals that capacity building is necessary to reinforce the involvement of women at all stages of energy projects. In particular the report points out that the "combination of technical production skills with business management training can provide a powerful boost to women's incomes and status", and that "it is usually crucial that technical training be combined with learning the skills needed to run an enterprise – including business management, accounting, financial planning, and marketing"[10]. Indeed, Kenya's NDC recognizes the need to strengthen the adaptive capacity of gender as part of the priority adaptation actions[11].

The need for human capital development is also emphasized in the Kenyan National Energy and Petroleum Policy of January 20, 2015, which states that, "The government [will] develop and implement education framework for human capital development to build knowledge and technical capacity in the energy and petroleum sectors"[12]. However, this male dominated technical sector has not targeted the women at the base of the population pyramid who, due to poverty and/or ignorance are responsible for prodution of HAP. This is the gap that WEET Enterprises is filling.

[7] GACC. (2015). http://cleancookstoves.org/country-profiles/focus-countries/4-kenya.html

[8] Yumkella, K. (2014). 'Why Wait For Our Grandchildren?' http://www.se4all.org/2014_01_20_waitgrandchildren

[9] WHO, 2016. "Interventions to reduce indoor air pollution". http://www.who.int/indoorair/interventions/en/

[10] UNDP. 2014. ibid

[11] Ministry of Environment and Natural Resources (2015). *Kenya's Intended Nationally Determined Contribution*. http://www4.unfccc.int/ndcregistry/PublishedDocuments/Kenya%20First/Kenya_NDC_20150723.pdf

[12] Ministry of Energy and Petroleum (2015). *Draft National Energy and Petroleum Policy*. http://www.energy.go.ke/index.php/resources/file/842-the-national-energy-and-petroleum-policy-2015.html. P. 119.

The government has also realized that the education system offered in Kenya, which places emphasis on higher academic education leading to tertiary education and, which targets only 1 per cent of students, has not benefitted the population as a whole. The current government dialogue is now emphasizing the importance of technical and vocational training at lower educational levels[13]. This is the model that WEET has developed.

This government policy is in keeping with The World Bank report entitled *Kenya Economic Update*, which reports that Kenya is heavily dependent on the informal sector for employment. Unfortunately, according to this report, the informal sector is very low in productivity[14]. The report emphasizes that it is imperative to increase productivity through access to skills, technology, credit and markets.

The WEET program addresses these issues through capacity building based on sustainable systems design methodology. The curicullum that we have developed comprises of mindset training, technical/vocational training and entrepreneurial training. The technical aspects include basic engineering skills, as well as, the essentials of clean cooking energy technologies.

Selection of Cooking Energy Technology

We have conducted field research on various clean cookstoves at the household level. These include microgasifiers, ethanol fuel stoves, various 'rocket' model stoves, and biogas for rural areas. Our research revealed that liquid ethanol was the cleanest fuel but availability is problematic.

Biogas (methane) is a clean cooking fuel for rural homes, but there is concern about its production. The process of anaerobic fermentation is continuous. While cooking takes only a few hours per day the actual production of methane is nonstop – meaning that some of the methane, a powerful greenhouse gas, escapes into the atmosphere. For this reason we are investigating various bio-digester designs to ensure that methane does not enter the atmosphere.

Liquefied petroleum gas (LPG) was not initially considered due to emission problems. Pressure from the energy sector for cleaner gas has resulted in the goverment taking steps to import clean LPG. Part of the argument for this step is that the cooking fuel of choice in

[13] http://www.nation.co.ke/oped/Opinion/-vocational-training-of-youth-/440808-3793172-roamgh2/index.html

[14] World Bank 2016. *Kenya Economic Update: Kazi ni Kazi: Informal Should not Be Normal*. March 2016 | 13TH Edition World Bank Group: Nairobi. http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2016/03/30/090224b084246ed9/1_0/Rendered/PDF/Kenya000Econom0should0not0be0normal.pdf

the developed countries is clean LPG. While realizing that LPG is a fossil fuel its contribution to global warming is seen to be much smaller than that from biomass fuels. The government has also lowered the cost of LPG (including the cost of the gas cylinders) as a measure to help the poorest urban population get access to it.

Emission Testing and Carbon Credit:

We are formulating a carbon reduction emission project, whose impact on emission reductions can be quantified through the number of distributed/utilized stoves. Thus mitigation of HAP will be quantified through the actual measurement of emissions. We are also in the process of reviewing the application requirements by the Gold Standard Organization. The Gold Standard requires a participatory approach in which the community is involved, meaning that WEET candidates will be included.

We have conducted emissions measurements for a few dwellings in a slum. These families were initially using charcoal but later switched to liquid denatured ethanol fuel stoves. There was significant reduction in the level of emissions.

Target group

We have conducted meetings with poor women living in the slums of Nairobi, as well as, women living in poor rural areas. The feedback has been positive. We are targeting women in investment groups, known as *chamas*, who are exploring business opportunities. Such groups are generally highly disciplined and motivated.

Potential partner(s) for implementation

The following organizations have accepted to partner with WEET Enterprises Ltd:

▪ National Industrial Vocational Training Center (NIVTC): a Government technical training agency will provide practical engineering skills important in the cookstove industry. We have developed the curriculum together. Government trade certificates will be issued. It is noteworthy that the Center Manager is a women engineer. This fact will give our candidates added confidence and reassurance.

▪ Jamii Bora Bank: a microfinance bank, which will provide free business training and then offer the WEET candidates attractive credit to establish cookstoves and fuels businesses.

▪ University of Nairobi on household air pollution emission measurements.

▪ Potential Public/Private Partnerships: Other potential partners include the Ministry of Energy and Petroleum, Ministry of Environment, and Ministry of Youth and Gender Affairs, as well as international development agencies.

Key challenges and opportunities

Challenges:

The most serious obstacle facing the target groups is lack of finances. The small amount of money the women make on a daily basis is hardly enough to feed their families. Lack of school fees is the chief reason most of them were unable to complete primary school. The technical training currently costs Ksh 25,000 (US$ 250) per candidate (for 120 hours of the complete course, i.e. one month). We are, therefore, looking for partners who can provide scholarships as part of human capital development.

After the formal training each investment group will be facilitated to enter the clean cookstove business, as a microenterprise, through a marketing campaign with WEET. Business capacity development is thus also needed for WEET Enterprises Ltd.

Opportunities:

We have introduced this model to a number groups as a way of gauging interest. The interest has been positive. The possibility of rising out of poverty and out of slums is a great motivator. The Government issued certificates for the technical training open lifelong opportunities to diversify each group's cookstove/fuel business. Certain opportunities, such as, application for advertised government tenders for similar products requires such certificates for prequalification, as proof of competence in the particular technology.

New clean cookstoves are more expensive than charcoal or kerosene stoves. However the women investment groups provide members the needed credit, through M-Pesa, a mobile telephone financing system. Microfinance banks also serve this population. Default problems are rare. The clean fuels are less expensive than charcoal.

Other benefits of the WEET model include attainment of the three pillars of sustainability, namely, that these women and their families will improve their social status (and move out of slums), help curb climate change due to HAP and advance a cleaner and healthier environment through reduction of HAP, while also improving their individual and community economic welfare.

Next steps

- Establishment of reliable financing
- Acquire air quality monitors.
- Complete setting up a viable marketing campaign (equipment, supplies, media, and other logistics)

Tentative Timeline

- Initial implementation of the WEET model in 8 slums settlements in Nairobi (already mapped out) during the first pilot year.
- Implement one project in a rural community in the peri-urban region of Nairobi.