

Ghana's Multifunctional Platform (MFP) Project

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When I received the call from Engineers Without Borders (EWB) that I was going to Africa, I was ecstatic. I had been given the opportunity to apply all my hard earned technical knowledge from mechanical engineering at The University of British Columbia (UBC) to alleviating poverty in Ghana, a poor West African country that ranks 129th out of 173 countries on the United Nations (UN) Human Development Index. This volunteer placement, I thought, would let me do what I believed all engineers should be doing – using our technical expertise to help *people*. After all, I had learned that over 800 million people in the world are hungry, 1 billion lack access to water, and more than 2 billion don't have basic sanitation services. I thought: *Couldn't technology driven by Canadian engineers provide solutions to some of these problems?*

I have now spent the past four months volunteering with EWB's partner, the Kumasi Institute of Technology and Environment (KITE). KITE is a Ghanaian non-governmental organization (NGO) with a mission to alleviate poverty through the promotion of decentralized, environmentally friendly rural energy technologies, information and communication technologies (ICTs), and on a macro-level, energy policy implementation. Over 80% of rural Ghanaians lack access to electricity, and those who are plugged into the grid suffer from frequent blackouts. In addition, Ghana's hydropower generation capacity has been maximized and the country is left in somewhat of an energy crunch – both in terms of generation and delivery.

As one possible energy alternative, KITE is championing the adaptation of the Multifunctional Platform (MFP) to Ghana. An MFP is a 10 hp diesel engine mounted on a steel chassis that can power various agro-processing machinery such as a corn mill and oil press. It can also drive an alternator to charge batteries, power a water pump, and light up to 200 bulbs. Furthermore, it can power hand tools such as saws and welders, spurring small-scale industrial development. MFPs are well established in nearby Mali as part of a decade long United Nations Development Program (UNDP) and United Nations Industrial Development Organization (UNIDO) initiative.

But the MFP is much more than just an energy tool, as it is chiefly designed to ease the burden on rural women through the mechanization of tedious agricultural tasks. In 350 Malian villages with MFPs, the average annual income per woman has tripled from US\$34 to US\$101. Women beneficiaries have saved between 2 and 6 hours of time per day, and the attendance and performance of school age girls has increased as a result of not having to stay at home to help their mothers. Men benefit from the use of electricity for hand tools and creation of jobs as operators and repair artisans. And the entire community benefits from an injection of life that follows the first light in a dark village.

In Ghana, I have just helped KITE construct and install the country's first MFP in a rural community of 2000 inhabitants near La Côte D'Ivoire border, 30 km from the nearest electricity pole. The platform has been given on loan to a female entrepreneur who runs a

cassava processing business to supply gari (a popular local food that is made by grating cassava and then frying it over a fire) to the village school. This pilot platform consists of an engine, corn mill, cassava grater, and alternator for battery charging and lighting, and can be expanded at a later date.

I have quickly learned that the sustainability challenges are very different from what you might expect in a traditional engineering sense. For technical sustainability, rural artisans, who are typically illiterate and uneducated, must be trained properly in equipment maintenance and operation, which in itself is a daunting task. In Mali, it was discovered that many MFP operators were running the engines at 50% of their rated speeds under the false perception that they were saving fuel. In Ghana's pilot MFP, finding a reliable and even sober operator in the village to train has so far proven elusive. Determining when batteries are fully charged requires verifying that the electrolyte is actually boiling, as village batteries would long be considered dead by Canadian standards. Furthermore, purchasing brand new agro-processing machinery by no means guarantees that it will work properly. A new corn mill needs to be completely disassembled and all moving parts properly aligned by trained and experienced personnel prior to its first use. In rural reality, this is not done, leading to poor quality flour and frequent breakdowns.

To achieve economic sustainability, the challenge is even harder. Management experience in rural villages is very minimal, and there have been many cases in Mali where repair funds were spent on televisions rather than spare parts. Furthermore, repair artisans would often sabotage the equipment in order to create more work for themselves, taking away from the platform's already incredibly small profit margin. In Ghana's MFP, helping the entrepreneur realize the necessity for marketing and awareness has been very difficult. In fact, she is so busy with her daily chores that the enterprise relies solely on word of mouth and customers discovering it on their own. To tackle some of these challenges, the operator's and repair artisan's wages have been linked to the MFP's profits, providing incentive to recruit customers and ensure that the equipment is properly maintained.

Social sustainability requires the community to accept the technology, and also adapt to the change in social structure created from it. The empowerment of women will be resisted by some of the men, who may also try to take over the business as its moneymaking potential becomes clear. Although a woman owns the Ghanaian MFP, her husband demands to be heavily involved in all daily activities. In addition, time *saved* by rural women beneficiaries as a result of the MFP must be put towards useful income generating or family raising activities without simply burdening the women with more tedious chores.

Finally, environmental sustainability, although an important consideration, cannot be tackled directly without some difficulty. Indirectly, the goal of the MFP is to reduce rural poverty, which is a root cause of environmental degradation in the developing world. Also, decentralized *useful* energy (i.e. energy used for more than just lighting) has many environmental benefits over large-scale dams, thermal-fired power plants, and

distribution networks that incur large power losses. More directly, the MFP can be run off of a local bio-fuel made from extracting the oil out of common *Jatropha* shrubs, replacing the dependency on diesel. Although this option is promising for the future and is being heavily emphasized, picking *Jatropha* seeds is commonly the work of rural women, which could counteract the positive poverty alleviation impacts that the MFP is designed to deliver.

In conclusion, the technical engineering contribution to the MFP project, although important, is just one small component engrained in myriad of social, economic, environmental, and even political factors. As such, technical engineering skills are useless without a firmer grasp of the complexity of development issues on micro, meso, and macro levels, requiring project engineers to be *Multifunctional People*. In international development, it is not good enough to say a project is sustainable. Sustainability requires a lot of work and a lot of time, far exceeding my placement, and the true impact of Ghana's MFP program will not likely be known for a generation or two.

I now recognize that technology driven by Canadian engineers will not solve the problems facing rural Ghanaian women because they are too complex and vary even between adjacent villages. Rather, Ghanaian engineers are the ones that need to drive the development of their country with technology appropriate to them. This is what EWB does – *promote human development through access to technology* in a thoughtful and cost-effective manner. By focusing on building the capacity of local organizations like KITE, we can assist them in tackling locally driven projects like the MFP. And we can also reach out to the Canadian engineering profession to raise awareness of the human development challenges faced by billions of the world's people everyday, because change first has to start from home.

Engineers Without Borders depends on the generous donations of engineers and firms across Canada to support projects like the MFP in Ghana. For more information on the organization and to make a donation, please visit www.ewb.ca. For more information on KITE and the MFP program in West Africa, visit www.kiteonline.net and www.ptfm.net respectively.