Alternative Technology and Mission

By Joel Chaney and Gareth Selby

The baby crawls on the mud floor playing with a machete. Mum is sitting on a small stool, cooking over an open three-stone fire. This image should shock us, but perhaps not for the first reason that comes to mind. The knife *could* cut and wound, but everyday the baby breathes smoke, causing long-term damage to her lungs. Smoke is a silent killer.

This scene is not unusual. More than 2.6 billion people in the world continue to rely on solid biomass fuel (wood, agricultural residues, straw, dung) for cooking, lighting and/or heating.[1] Often, they cook on open fires or with traditional stoves in poorly ventilated spaces, living in high levels of air pollution. Smoke contains carcinogenic components, fine particulate matter, and other chemicals that go deep into the lungs when breathed. Women and children who often spend considerable time at home around the hearth are the ones who suffer. High exposure seriously impacts health. Smoke can interfere with normal lung development in children, leading to higher risk of acute respiratory infections. In adults, exposure is strongly associated with an increased risk of chronic obstructive pulmonary disease and eye problems.[2] For example, in Nepal, around 86% of the people rely on wood fuel for daily cooking[3] and every year around 8700 deaths have been attributed to indoor air pollution. This makes smoke the second largest health risk factor after water, sanitation, and hygiene.[4] Worldwide, nearly two million deaths occur annually from pneumonia, chronic lung disease, and lung cancer attributed to cooking with biomass solid fuels; 99% of these occur in developing countries.[5]



Lady with Firewood

In some areas there is also huge pressure on forest resources, not only because of wood fuel collection but also charcoal production and other forestry industries. It is the poor who suffer most; they have to trek further to find enough fuel to cook each day. The effort is considerable so that there is less time for other tasks and opportunities. The environment also suffers through erosion and destruction of natural habitats, especially in areas where demand is greater than the rate of regrowth. Sometimes chronic fuel shortages drive impoverished families to use lower quality biomass fuels such as dung residues, which generate more smoke and might be better used as fertilizers to support food production.[6] People can get caught in a cycle where they do not have the resources to obtain cleaner, more efficient fuels.

Cooking is not the only kind of energy-use that causes the poor to struggle. Families with limited access to energy suffer from not having enough light for educational purposes, income-generating opportunities, or other activities that many of us take for granted. Where cooking and lighting is limited to open flames, there are also safety risks. Developing countries have a high incidence of burn injuries, most of which are sustained by women.[7] We have heard numerous stories of kerosene lamps used in inflammable buildings causing fires and burns. And even when people do have access to cleaner energy, there can be other serious hazards due to poor maintenance or knowledge of how to operate systems safely. In one slum we were told that a girl had run back into her burning home to retrieve $20, only to be killed by an exploding gas canister. In another situation in Nepal we sadly witnessed a young boy who died from electrocution due to poor insulation.
The people in these situations are suffering from what is often called "energy poverty". It is defined by the International Energy Agency as "the lack of access to modern energy services."[8] Essentially this refers to well maintained electricity supplies and safe, clean cooking facilities. Energy poverty is a real issue for millions of the poor and those who live in areas with no grid infrastructure. Modern energy services bring with them great health benefits and improved well-being. They are also crucial for a country's social and economic development. Lack of energy is disabling and stops people fully participating in society.

Clearly there are major issues in the world with regard to access to safe, clean, and sustainable energy for the poor. So what is an appropriate response for the church and why should we care?

A CALL TO LOVE THE POOR

Poverty is not a new phenomenon and is not a side issue in the gospel. Jesus loves the poor, including the energy poor. He has come to set them free, to heal broken lives, and bring redemption (Lk 4:17–21). Colossians 1:20 describes God's goal to reconcile to himself all things through Christ's blood shed on the cross. This includes reconciling four damaged but fundamental relationships in our lives: with ourselves, with each other, with the rest of creation, and ultimately with God the Creator. It is only through Christ that all these broken relationships can be restored and people can be released to know "life in all its fullness" (Jn 10:10). We know that energy poverty and its consequences are symptomatic of a deeper problem: they are part of the flawed growth from a damaged root. Energy poverty may be just one part of poverty, but it has often been overlooked by the church.

Fundamentally, community energy development begins with people. It focuses on the community and seeks to leverage the natural resources and abilities of individuals and the whole community to facilitate energy development. It invests with the poor to grow and harness local resources and create new opportunities, perhaps even fostering entrepreneurship. But it begins with what the community has, not what it lacks.

A CALL TO BE STEWARDS OF GOD'S CREATION

Recently we took the train south from Beijing. We gazed at the dawn sun, watching the deep orange-red ball rise through haze. A Chinese friend remarked: "the pollution is so bad that you can look directly at the sun." The haze was smog, familiar to anyone who has lived in one of the large industrial cities in China. Energy is key to development in Asia, but it often comes at a high cost to people and the environment.

We are to treat the earth as if it mattered. God repeatedly called his creation "good", so who are we to make it bad? Rather we are to work it and protect it (Gen 2:15). What does this mean practically for the resources and amount of energy we use? Energy issues provide immense opportunities for Christians to demonstrate and speak the gospel in love.

OPPORTUNITIES FOR INDIVIDUALS, FAMILIES, AND ORGANIZATIONS

As with all areas of discipleship, the first response has to be in the way we live. Many developed countries use many times their fair share of the planet's resources.[9] Arguably this is driven to a large degree by consumerism, which indirectly drives an increase in energy use. We need to become more aware of the impact of our actions on our neighbors and the planet, and seek to reduce our consumption to sustainable levels, as individuals, in our family, our team, organization, or church. Everything we buy has an energy cost associated with it. Each of us should take responsibility for the size of our energy footprint. Stewardship of God's creation includes the use of resources so that they will be available for future generations, while not causing harm to our neighbors and to God's creation.

OPPORTUNITIES TO RAISE THE ISSUE OF ENERGY POVERTY IN THE GLOBAL POLITICAL ARENA

The lifestyle changes we make as individuals are important, but so are high-level policy decisions by governments. As with the issue of global slavery, the church has an opportunity to address energy poverty and injustice, and the suffering they cause, at a political level. With world energy demand growing rapidly year after year, the global energy outlook of the next fifty years hinges critically on government policy and action. Decisions will affect the development of technology and national energy programs, and how industries and individuals use energy.

OPPORTUNITIES TO BLESS THE POOR

Many communities suffer from several forms of poverty, including energy poverty. Working with them to find appropriate sustainable solutions can provide practical opportunities to show love. However, before we run in with interventions and solutions, we must take heed of the lessons learned by others.

With energy development we must work to avoid a "design and dump" approach, where the foreign expert is flown into a project for a far more limited time than would be typical for a similar professional project back "home", to work in a climate that they are not familiar with, and with a people group they neither have the time nor language to consult. The resulting intervention can then be climatically deficient, may exhibit inappropriate foreign values, and may not be within the capacity of the people group to maintain. The situation can be compounded by the recipients who often don't want to say no, and assume that the outsiders' suggestions will be beneficial.

We have been involved in water projects where there has been insufficient community consultation before money was raised and a solution installed. Yet a year or two later the resulting water pump has been left broken and unused. Visitors wonder why the community has reverted to walking to the old muddy water source and has not maintained the pump. This story is all too common. The lack of community involvement has had a detrimental effect on the project's long-term sustainability. Arriving and immediately offering solutions is known in the field as a top down approach, and can project to the community an attitude of superiority. This can undermine the development of good reciprocal relationships and result in building more needs-based ones. This is not good for the success of a development program and for long-term witness in the community.

Happily, we have also witnessed extremely positive examples of sustainable development being used very effectively as part of mission. In the Philippines, OMF teams working with communities in the south have identified, through long-term engagement, that environmental problems are some of their most important felt needs. The particular need in two communities was access to clean drinking water. The team's approach was not just to provide a technical solution to the problem, but to equip the community with the skills that they needed to manage their own solution. Specialist expertise was still brought in to deal with water-engineering tasks but this was all done under the management of the community in a long-term project and with effective communication aided by the OMF team. The result has been genuine self-actualization of the community and an appropriate solution that it has ownership of. This has led to relationship-building and witness to Jesus in an area where this would have been otherwise very difficult. It is hoped that this approach can be applied to the energy poverty experienced by these and other communities.

OPPORTUNITIES FOR MISSIONAL BUSINESS

There is huge scope for missional community energy businesses. The following are some of the successful small-scale energy businesses that we have seen in different areas of the developing world: manufacture and distribution of improved cook stoves which use wood more efficiently and give a cleaner burn with less harmful smoke;[10] manufacturing and selling briquettes; upgrading waste crop residues to make them an effective replacement for wood fuel; biogas construction;[11] solar energy installation; community-scale electricity production from biomass; and community wind turbine manufacture. As well as providing opportunities to share the gospel, a missional energy business has the potential to offer sustainable and affordable energy options to the poor, thus improving energy access and enabling other kinds of social and economic development.

OPPORTUNITIES FOR LONG-TERM CAPACITY BUILDING

We have been inspired by John the Baptist's teaching: "whoever has two tunics should share with him who has none" (Lk 3:11). A simplistic application would be to donate energy (e.g. fuel).

This might be appropriate in situations like disaster relief. A more powerful response might be to donate teaching as well as material investment. The "tunics" that are often most lacking in development contexts are skills, training, removal of legal barriers, and long-term indigenous capacity building. These all require long-term commitment, but have the potential for lasting benefits, including effective gospel witness.

The OMF teams we visited in the Philippines and Cambodia were taking this approach. In Cambodia it involved university teaching and building capacity within other indigenous institutions in areas such as health-care and urban design. In the university there was an evident demand for good teaching on sustainable energy.

REFLECTIONS FROM THE JOURNEY OF CREATIVENERGIE

Our exploration of a missional approach to energy justice, in the run up to establishing CREATIVenergie, has had mixed results. Whilst we have focused on sustainability, our projects have not always been delivered in beneficial ways, forcing us to learn many lessons.

Fundamentally, community energy development begins with people. It focuses on the community and seeks to leverage the natural resources and abilities of individuals and the whole community to facilitate energy development. It invests with the poor to grow and harness local resources and create new opportunities, perhaps even fostering entrepreneurship. But it *begins* with what the community has, not what it lacks. Natural resources and community strengths can be very diverse. There is never a one-size-fits-all energy solution.

One key thing is that the community should be in control of its development, so that it owns the outcomes. We aim to take time to listen and to learn, to work alongside as enablers, and then seek to build indigenous capacity. But energy services in themselves do not build a community. A long-term approach can help build relationships in the communities, leading to opportunities for discipleship and for sharing the gospel with those who do not know Christ. Indeed, sustainable development can offer access to places we might have struggled to reach with the gospel.

A number of years ago in Ghana we were working on briquetting technology, a way of processing and upgrading waste crop residues to replace wood-fuel. We were new to the development world and having read many success stories of creating briquetting micro-enterprises, we were keen to implement a program in a particular community in Ghana. After long discussions with the community's chief, it became clear that the problem was not lack of wood-fuel, but smoke. We then consulted with the community and this led to redesigning their cook stoves, using local clay—a design which is still being used to this day. However, in hindsight, we did not give enough time to listening, but came with our own energy agenda. The result was a poor adoption rate for the new stove. Importantly though, our relationship with the organization working in this community continues to be strong and we are learning from our mistakes how to better partner and support their ministry.

AN EXAMPLE FROM KENYA

A positive experience for us has been involvement with a church sponsored program for the Cheptebo Rural Development Centre in the Kerio Valley, Kenya.[12] It began in 1986 when drought and famine, malnutrition and illness were rife among the communities in the valley. The area was poorly developed and frequently experienced the devastating effects of drought and famine, malnutrition and illness. Successive governments regarded the whole area as having "low potential" and very little practical assistance was ever provided. The local people were discouraged and despondent, believing that there was little prospect of change. Yet today, Cheptebo is a thriving community with flowing water and local people producing high quality livestock, vegetables, and fruit in increasing quantities. More than ten churches serve the area and an estimated 50% of the population is in regular attendance. How did the transformation happen? It began with an invitation from the community to the church to move in and provide practical help—and their allocation of fifty acres of land to the church for this purpose. A missionary came with a long-term commitment to see the area transformed both physically and spiritually. Much time was given to discussing and listening to the community before the vision for Cheptebo was born. It would begin with a demonstration farm to introduce better farming practices and allow the community to take informed decisions on ways to improve their own situations. One guiding principle was that any farming practice or technique would be technically and socially appropriate for that community. Farmers were encouraged to observe and question the methods being demonstrated at the centre and it was only when they were convinced by the evidence that they decided to adopt the new methods.

From the outset, the program was shaped by the felt needs of the local people. Working with local knowledge, water was piped to the valley from sources in the hills that did not run dry. It took time, but people who once lived in dependency, waiting for famine relief, began developing their own farms. Involvement in the daily lives and challenges of people led to opportunities to share the gospel. Over the years the impact of the work has begun to spread throughout the community as farmers who adopted new techniques were seen to have more productive animals and were obtaining good yields of food and cash crops. One thing that is noticeable in Cheptebo today is that the people leading and encouraging the transformation in the valley are very often those who have become Christians. They have experienced the transforming power of the gospel in their lives and are living it out in the growing church and in the community.

While the program had a significant impact on farming output, the situation regarding energy for cooking and other uses was largely neglected. Local people relied almost totally on wood fuel, which is a diminishing resource as the population increases and the land is used increasingly for agriculture. In 2011, we assisted Cheptebo to establish a biogas demonstration at the farm. It was set up to supply the church pastor's home, which is located on the Cheptebo site, making it a working demonstration. Recently I received an encouraging update from the centre manager, Joseph Kimeli.

> About the biogas here at the centre, I am glad to inform you, as earlier reported, that it is working very well and has been of great benefit to pastor Walter and his family. Since then, they have continued to use it in cooking of all their meals, hence saving time, reducing costs, and helping environmental conservation. We still have plans to extend the project to benefit the conference centre.
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> It is also encouraging to report to you that the biogas has created many gospel opportunities as many farmer groups and individuals go the pastor's house to see how it works and when doing so the gospel is shared with them. It has also helped the centre as far as the requirements of the national environment management authority is concerned. Recently we were carrying out an environmental audit at the centre and the biogas was highly commended.



Cheptebo biogas plant opening cermony demonstration

> The scarcity of firewood, which is now becoming a challenge both in the valley and the highlands of Kenya, increases the future potential for biogas use. Many local farmers have shown interest and their current challenge is finances, but they have committed that they will undertake the project. One of the immediate benefits to people of the Kerio valley is its continued training opportunity especially in the area of environmental conservation.

We are currently working with Cheptebo to put together training material for students for a new teaching program they will launch next year. While the course material will teach students to build and run a biogas plant, we are aiming for the course to offer opportunities to both inspire the students to practice better creation care, and for the gospel to be shared through the teaching sessions.

There is an important lesson from the story of Cheptebo. One day the founder, Bill Rettie, showed us a plaque on a church in the valley. It commemorated the name of Margaret Armstrong, an AIM missionary from Northern Ireland, who, in the 1950s, came and lived among the people to share the gospel with them. She prayed that a church would be established in the valley. So the work at Cheptebo began with prayer.

OUR PRAYER FOR THE FUTURE OF ENERGY IN MISSION

We pray that the global church might awaken to the challenges and injustices of energy poverty and that we might see the opportunities in our own lives, communities and organizations to be a witness in this area. We pray that eyes might be opened, and if it is good, that the Lord might use energy ministries to open new doors to unreached regions of the world to share the good news of Jesus Christ and to disciple new believers.

CREATIVenergy is an energy consultancy with a heart to support churches and mission organizations which have long-term involvements with communities, and are exploring appropriate sustainable energy projects. You can contact us at: info@creativenergie.co.uk. Website: www.creativenergie.co.uk. We believe we should learn from each other. So please share your energy related stories with us, however they have turned out.



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Gareth Selby is a director of CREATIVenergie and a trustee of Mat-to-Fore, a small Christian NGO; he is employed as an Architect and Passivhaus Designer for Architype. Gareth is married to Lucy who shares his passion for mission and international development.

NOTES

[1] International Energy Agency, *World Energy Outlook 2013: Executive Summary* (Paris: OECD/IEA, 2013), 1, http://www.iea.org/Textbase/npsum/WEO2013SUM.pdf (accessed 3 April 2014).

[2] L. P. Naeher, et al., "Woodsmoke Health Effects: A Review," *Inhalation Toxicology* 19 (2007): 98, http://www.uvm.edu/~susagctr/Documents/Woodsmoke.pdf (accessed 3 April 2014).

[3] K. C. Surendra, Samir Kumar Khanal, Prachand Shrestha, and Buddhi Lamsal, "Current Status of Renewable Energy in Nepal: Opportunities and Challenges," *Renewable and Sustainable Energy Reviews* 15 (2011): 4109, http://manoa.hawaii.edu/reis/wp-content/files_mf/paperkcsurendra.pdf (accessed 4 April 2014).

[4] Sophie Bonjour, Annette Prüss-Üstün, and Eva Rehfuess, "Indoor Air Pollution: National Burden of Disease Estimates" (Geneva: World Health Organization, 2007).

[5] Gwénaëlle Legros, Ines Havet, Nigel Bruce, and Sophie Bonjour, *The Energy Access Situation in Developing Countries: A Review Focusing on the Least Developed Countries and Sub-Saharan Africa* (New York: UNDP and World Heath Organization, 2009), 2, http://www.undpcc.org/undpcc/files/docs/publications/Energy_Access_Situation_in_DCs-Final%20Report.pdf (accessed 4 April 2014).

[6] Even when wood is available for fuel, dung is often burned due to strong cultural factors. Improved stoves, however, have been shown to significantly increase the use of dung as a fertilizer. Gunnar Köhlin, Erin O. Sills, Subhrendu K. Pattanayak, and Christopher Wilfong, "Energy, Gender and Development: What are the Linkages? Where is the Evidence?" (Washington, DC: The World Bank, 2011), http://elibrary.worldbank.org/doi/pdf/10.1596/1813-9450-5800 (accessed 4 April 2014).

[7] A. E. Van der Merwe and W. C. Steenkamp, "Prevention of Burns in Developing Countries," *Annals of Burns and Fire Disasters* 25 (December 2012): 1. See also Rajeev B. Ahuja and Sameek Bhattacharya, "Burns in the Developing World and Burn Disasters," *BMJ* 329 (2004): 447-449.

[8] *World Energy Outlook*, 1.

[9] Monique Grooten, ed., *Living Planet Report: Biodiversity, Biocapacity and Better Choices* (Gland, Switzerland: WWF, 2012), 6, http://www.wwf.org.uk/what_we_do/about_us/living_planet_report_2012/ (accessed 14 February 2014).

[10] Ashish Singh, Bhushan Tuladhar, Karuna Bajracharya, and Ajay Pillarisetti, "Assessment of Effectiveness of Improved Cook Stoves in Reducing Indoor Air Pollution and Improving Health in Nepal," *Energy for Sustainable Development* 16 (December 2012), 413.

[11] Biogas is a method of converting organic wastes (including crop, cooking, and dung "wastes") into gas and high quality fertilizer. The process takes place using anaerobic digestion of the materials and produces a gas that has a similar composition to natural gas except with a higher CO_2 content. The fertilizer produced is of a much higher grade than could be produced if the wastes were allowed to aerobically compost, as would be the norm.

[12] Cheptebo Rural Development Centre, http://www.cheptebo.org/ (accessed 16 April 2014).