

Africa has enormous potential for renewable energy and energy-efficiency technologies. Energy resources, such as biomass, geothermal and hydropower, are abundant. On the other hand, the vast majority of African people have no access to clean, modern energy. There is a huge market and human demand for sustainable energy, especially in the poorer communities. These resources and technologies, however, remain largely unexploited due to financial, capacity, market and political barriers.

Almost half of Africa's countries could profitably produce hydropower, but only a fraction of that potential has been reached to date because of poor infrastructure and high costs of initial investments. The continent accounts for only 1.3 per cent of the world's solar energy facilities, and only 4 of its 53 countries have started exploring underground heat sources.⁵⁴ At the same time, a huge proportion of the population is surviving without power or clean fuels. Over three-quarters of Sub-Saharan Africans have no access to electricity, compared to fewer than 14 per cent of people living in Latin America and East Asia.⁵⁵ Most of Sub-Saharan Africa depends on biomass fuels taken from wood and agricultural waste. Families in rural and semi-rural areas are left little choice but to increasingly exploit fragile ecosystems to meet their energy needs, ultimately undermining both the fuel source upon which they depend and the rich diversity of plants and animals that live there.

The challenge is how to create access to clean, affordable energy sources, which allow Africa to avoid the 'dirty' energy path that others have gone down, while meeting real development needs. These energy options also offer employment and economic development opportunities and help liberate countries from the energy ball-and-chain of oil-dependency.

Various initiatives have been established to support sustainable energy, including the Johannesburg Renewable Energy Coalition (JREC) and the Renewable Energy and Energy Efficiency Partnership (REEEP). Two others are the European Union Energy Initiative and the Global Village Energy Partnership and there is a current proposal to set up an EU Energy Facility for Africa worth €250 million. However, a coherent strategy needs to be developed by leading industrialised countries to re-orient global investment away from fossil-fuel-intensive energy infrastructure and into low-carbon and carbon-neutral technologies, which can power poverty reduction. As recently as 2003, fossil fuel projects represented 86 per cent of the World Bank's spending on energy, compared to funding for renewables at just 14 per cent.⁵⁶ It's necessary now to ensure that sustainable energy initiatives result in measurable commitments, be better integrated and far better resourced.

These considerations would apply to all the initiatives listed above, and the outcomes of Renewables 2004, the World Bank's Extractive Industries Review (EIR) and the G8 Renewables Task Force.

The G8 countries, at the very least, should work with African and other developing countries to promote a meaningful follow-up process to the Renewables 2004 conference to ensure that technology transfer and development approaches are better co-ordinated, and that voluntary commitments made at the Bonn renewable energy conference are implemented. At present, the credibility of these programs in delivering meaningful outcomes is open to question.⁵⁷ Worse than that, the face of the fossil fuel industries in Africa is smeared with exploitation, pollution and bad development practice.

African people want greater access to energy. The continent has abundant natural resources but these are often either under-used, badly exploited or exported to richer countries. Africa needs the means to develop local solutions using local resources to meet local needs, and increased access to clean, sustainable energy to support health and education services, households and enterprise.

Feeling the heat: gas flaring in Nigeria⁵⁸

Nigeria is the world's largest gas flarer and Nigerian flaring has contributed more greenhouse gases than all other Sub-Saharan sources combined. And, despite national and international condemnation, the practice of flaring gas in the Niger Delta remains widespread. It has been carried out on a massive scale in Nigeria for nearly 50 years, violating the rights of local populations, not least the right to health and the right to a healthy environment. Flames and fumes are produced 24 hours a day, seven days a week, year after year, affecting people's health, polluting the local environment and destroying livelihoods. Nowhere else in the world are communities subjected to it on such a large scale.

In the mid-1990s, daily oil production in Nigeria amounted to approximately two million barrels. In the region of 17 billion m³ of associated natural gas was estimated to be flared annually, generating an estimated 2,700 tons of particulates, 160 tons of sulphur oxides, 5,400 tons of carbon monoxide, 12 million tons of methane, and 3.5 million tons of carbon dioxide. Because of poor regulatory framework, Nigeria flares 75 per cent of the gas it produces. In absolute terms, this is the highest amount in any OPEC member nation and accounts for about 19 per cent of the total amount flared globally. Information on the amount of associated gas currently flared can be contradictory as well as difficult to obtain.

The flares contain widely recognised toxins, such as benzene, and carcinogens, such as dioxin. Particles from the flares fill the air, covering everything with a fine level of soot.

Exposed to this cocktail of toxins, local people, who live and work alongside the flares with no protection, complain of respiratory problems, such as asthma and bronchitis, and of the distress caused by the constant roaring noise and the intense heat from the flares. Assessments made in the vicinity of Izombe Flow station, one of the numerous oil installations in the Niger Delta, showed that gas flaring had led to the complete destruction of crops within 200 meters from the station. The loss was 45 per cent at 600 meters and even as far as 1Km from the station, a 10 per cent loss in crop yields occurred. While a number of factors may contribute to declining crop yields, many villagers across the delta region believe that decreasing productivity is linked to the gas flaring, adding to their frustration with the oil companies.

Acid rain caused by the flaring is also reported to corrode roofs and buildings in the area. Neither the oil companies nor the Nigerian Government appear to have investigated the psychological and physical impact of the gas flaring on local communities. Nor have they provided local inhabitants with information on the hazards to which they are exposed.

Few Nigerians have benefited from the wealth generated by Nigeria's oil industry. Many of the riverine communities of the Delta live in poverty, without access to clean water, basic healthcare, electricity or education, due to a combination of factors including environmental despoliation. In addition to constant flaring, oil spills are common, frequently contaminating farmland, watercourses, and fish supplies.

Gas flaring is visible and damaging. It is also a terrible and expensive waste of resources costing Nigeria – where 70 per cent of people live on less than a dollar a day and commonly cook on open fires – an estimated \$2.5 billion annually in lost potential income. It is also preventable. In Western Europe, about 99 per cent of similar, so-called 'associated' gas is used or re-injected into the ground. The double standard has led to accusations of environmental racism directed at the oil companies.

The Nigerian Government's commitment to end flaring (reportedly by 2008) is ambiguous, reflected in otherwise lax environmental legislation and confusion over the supposed end date, initially reported to be 2004, subsequently deferred to 2008 and sometimes reported to be 2010. The multinational oil company, Shell, indicated in January 2005 that it might have difficulty in meeting the target blaming a number of factors including insecurity.



Photo: Jim Loring/Tearfund

Gas flaring not only affects the health and livelihoods of Delta inhabitants, it also contributes to climate change, thus affecting communities all over world. Gas flaring emits carbon dioxide. Venting of the gas without burning, a practice also often referred to as flaring, releases methane, the second main greenhouse gas. Together these gases contribute about 80 per cent of global warming problem.

Livelihoods piped away – the Chad-Cameroon pipeline⁵⁹

The Chad-Cameroon pipeline project, worth \$3.7 billion, is the biggest private investment in Sub-Saharan Africa today, as well as one of the most controversial. It involved the drilling of 300 oil wells in the Doba region in the south of Chad and the construction of a 1070Km pipeline to transport the oil from Chad through Cameroon to an offshore loading facility on the Atlantic Coast. Along the way, the pipeline passes through rainforest, Pygmy territories and major food- and cotton-producing areas.

Two of the companies originally involved, Shell and TotalFinalElf, dropped out of the consortium, reportedly partly due to local opposition and opposition from environmental groups. However, project leader ExxonMobil carried on with the project, and is supported by US-based Chevron and Malaysia's Petronas. The World Bank Group and European Investment Bank provided \$200 million and \$120 million respectively for the project, presenting the project as an opportunity for Chad to come out of its acute poverty while generating much-needed revenue for Cameroon.

But, by mid-2002 it was already clear that the project was piping great amounts of misery and devastation into the area. The World Bank's official project monitoring bodies, the International Advisory Group and the External Compliance Monitoring Group document many of the project's serious problems in some detail. Thousands of people have had their lands expropriated, crops and other plants destroyed, and water sources polluted without adequate compensation. Some victims have received no compensation whatsoever.

The pipeline cuts across sensitive and valuable ecosystems, particularly in Cameroon's coastal rainforest. Project-related upgrading of existing seasonal roads has led to logging and illegal poaching in otherwise inaccessible areas. The pipeline traverses several major rivers, and construction has already caused oil spills and polluted the water system.

The influx of a migrant work force, the exponential growth of prostitution, and the poor sanitary conditions have led to the spread of communicable diseases, including HIV/AIDS. According to the World Health Organisation, "...it appeared that in this project decisions were based largely on cost and profit considerations, giving only passing attention to environmental and social aspects, and little or no decision-making power to the affected populations."⁶⁰

The World Bank continues to claim that the project is being implemented with community support and NGO input. In fact, Transparency International rated Chad the fourth, most corrupt country in the world in 2004, a fact that significantly hampers participation in decision-making. The Chadian human rights situation is also highly problematic; the Chad Government has still not investigated the massacres of hundreds of unarmed civilians that took place in 1997 and 1998 in the country's oil-producing region. It was revealed that the President of Chad used \$4.5 million of the signing bonus paid by the oil consortium to buy weapons, rather than investing in public health, education and vital infrastructure.

Since the official inauguration of the pipeline in October 2003, the situation in Chad has deteriorated further. The authorities prohibited a peaceful demonstration planned by human rights groups, and the Government, in violation of the constitution, closed the country's only independent radio station. In both 2001 and 2002, local groups in Chad and Cameroon filed claims with the World Bank's Inspection Panel, charging that the Bank had violated its own policies in the implementation of the project. The Panel confirmed numerous trespasses of its environmental assessment policy, and in the case of Chad, violations of its operational directives on poverty alleviation and economic evaluation. "The World Bank touts the Chad-Cameroon oil pipeline as a model project that will reduce poverty while compensating for environmental impacts. Practice has however demonstrated the failure of World Bank rhetoric to match reality," said Samuel Nguiffo of Friends of the Earth Cameroon. Now, instead of drawing lessons from the experience, additional oil exploration and development is already taking place in Chad.

A recent report implied that UK Government support for the oil industry was driven more by Foreign Office endeavours to secure energy demand than true sustainable development.⁶¹ The World Bank's Extractive Industries Review concluded last year that the industry too often exacerbates poverty. But the key recommendation of the review to phase out funding of fossil fuel projects in a set timeframe was brushed aside by the Bank. Now it is time for a radical rethink in aid, development and energy.

Energy loss? The Commission for Africa's approach⁶²

The approach of Prime Minister Tony Blair's Commission for Africa to energy is concentrated on funding "larger power projects" rather than local access to energy or clean, renewable energy. The Commission supports hydro- and gas-powered energy as potential drivers of growth. Hydro resources in some African countries, notably the Democratic Republic of Congo, are noted to be huge, but largely unexploited. Mozambique, it comments, has become a major exporter of electricity. "Mega-projects" in the gas industry are planned in southern and West Africa. Work is already underway on the development of the Grand Inga hydropower project, supported by the Commission, with a new development company. This project



alone would absorb several billion dollars of investment and development funds. More than \$4 billion is earmarked for the first phase, the building of Inga-3 and transmission lines to southern Africa. To develop the full potential of Inga, 40,000 megawatts, would cost £50 billion,⁶³ focused on one high risk and highly contentious project.

But mega hydro- and gas-power schemes, together with grid expansion, puts all the energy eggs in one basket, soaking up the available aid and investment, leaving little to deliver access to energy services for the poorest. Large power projects also tend to rely on international technologies, consultants and contractors, meaning that the funds invested will leak out of Africa and very little capacity building will take place where the projects are built. Even so, the report itself states that it should “should avoid funding prestige projects that have so often turned into white elephants in the past”.

The Commission’s approach to clean energy is to hope that rich countries will develop new markets that eventually open to Africa. It misses, as a result, the huge potential for indigenous technology development. Yet there is great potential

for local manufacture of technologies used in other parts of the developing world – for example: micro-hydro, biogas, small-scale wind power, solar thermal water heaters, and so on – to meet local needs now. Investment is needed in African technology for African people. All of the Commission’s other priorities for Africa – such as agriculture, promoting local enterprise, and access to water – require appropriate clean energy services delivered in a way that is accessible and appropriate. Implementation of the Commission’s energy strategy, therefore, requires a bottom-up approach, built around people’s needs, rather than the current top-down strategy. Without new thinking, a huge opportunity for development could be lost.

Dilemmas and escape routes in the energy trap⁶⁴

Demand for energy, coupled with the lack of livelihood options in many parts of Africa, can force people in poverty to both destroy their own environment and health, and miss finding a clean energy development path.

Along almost any stretch of road in rural Malawi you will find bulging sacks of charcoal and neat stacks of firewood for sale. It is a cottage industry that provides one of the few opportunities for poor households to make a little money, but it is also environmentally unsustainable, and in the long term impoverishes everyone. “Charcoal production is a very serious issue, and is one of the major causes of deforestation in Malawi,” the director of the Government’s forestry department, Kenneth Nyasulu, said in January 2005. “The damage to trees is causing soil erosion, which in turn causes food insecurity because the fertile soil is lost.” Acknowledging the growing problem of deforestation, President Bingu wa Mutharika inaugurated a national tree-planting month in January 2005. Sustainable forest management will secure livelihoods in the long term. Until a major supply of renewables is widely available to poor communities, cleaner fossil fuels such as LPG, offers an affordable fuel for many people in Africa that removes pressure on the forests and reduces GHG emissions. Also, 96 per cent of Malawi’s 12 million population has no access to electricity – restricting what they can do at home or work – while alternative sources of income are needed for rural people.

Fuel efficient small stoves in Mozambique

In neighbouring Mozambique, around 91 per cent of energy use depends on fuelwood and charcoal. When biomass – including firewood and charcoal – is used inefficiently, it produces high levels of smoke, which damage health within households and the environment. Efficient combustion can reduce the amount of wood needed and with improved ventilation reduce smoke emissions, both when the charcoal is produced and also when it gets used for fuel, in improved stoves.

An improved-efficiency stove, can produce a dramatic reduction in women’s workload in fetching fuelwood. Some designs, such as the rocket stove, can also dramatically reduce emissions.

Mozambique is rich in renewable energy resources. Some of Africa's great rivers flow through the country. In the mountains in the northern and eastern provinces, there are many sites suitable for micro-hydro, which is free of carbon or any other pollutants and can be community managed. Currently large hydropower in Mozambique is transmitted over great distances to South Africa, with little gain to the local people where the power is generated.

There is abundant sunshine. Solar energy powers photovoltaic cells for electrification. Solar stoves for cooking have potential for those households for whom the technology is appropriate.⁶⁵

Energy which doesn't cost the Earth⁶⁶

Demand for indigenous tree species from Kenya's Kakamega Forest for timber, firewood, carving wood, charcoal production, and poles is so great that up to 100,000 m³ of timber and charcoal may be illegally extracted every year. To preserve the forest, the Kakamega Integrated Conservation Project, in partnership with ITDG, has introduced firewood-saving stoves, which are acceptable and affordable to local communities. The people are made aware of the energy-saving opportunities through discussions, participatory technical training and demonstrations, exchange visits, and information. Local community entrepreneurs have also been trained to commercialise the energy stoves.

By the end of 2001, communities adjacent to the forest had installed nearly 4,000 fuelwood energy-saving stoves. A production unit for the stoves is in operation, managed by the local community. Ten fuelwood energy-saving stoves have been installed in schools, institutions, hotels and hospitals around Kakamega Forest. The Upesi stove is made of clay and fired in a kiln. The design allows it to burn agricultural residues, such as waste from sugar cane, as well as wood. It can halve the amount of fuelwood needed by a household, which reduces drudgery and improves the sustainability of fuelwood resources. It provides employment and reduces smoke and carbon emissions. ITDG also introduced a new design of kiln, which substantially reduced the fuel needed to make the stoves.

But these issues need comprehensive and systematic support. For example, International Financial Institutions could immediately target 20 per cent of energy sector lending and support towards renewable energy development and energy efficiency programmes. The international community could also call for one billion people to be provided with improved, clean stoves by 2015.⁶⁷



The Five Star Group, from the informal settlement of Epworth, on the fringes of Harare, with the stabilised soil blocks they have made (around 7,000 bricks).

Low-energy building materials: soil stabilised blocks

There are many examples of African solutions to the energy crisis that need support. In Kenya and Zimbabwe low-cost and low-energy building blocks are being made from stabilised soil.⁶⁸ Sun-dried, they can be made on or close to the building site, so no energy is used in transport. The other advantage is that the people engaged in production gain a livelihood, and can afford to build decent homes and community buildings. The technology is simple. Soil dug on-site, if suitable, is mixed with a small amount of cement. People are trained in soil-testing techniques to determine the best mix. Water is added and the mixture is placed in block press. The bricks require cement, which often has to be imported, so there is an external energy input cost. However, the bricks offer an alternative to locally made baked-earth bricks, which are fired over 2–3 days in kilns burning fuelwood; this local industry has contributed to deforestation and is inefficient in energy use. The approach has helped to provide legal affordable housing in low-income neighbourhoods because the stabilised soil blocks compete favourably on cost with commercially made clay bricks. The technology uses little water, and produces no waste.

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