

Reducing Energy Poverty through Cooperation & Partnership

Background Paper for IEF Symposium on Energy Poverty 8-9 December 2009, Johannesburg, South Africa

The 11th International Energy Forum (Rome, 20-22 April 2008) noted that “over two billion people do not yet have access to modern energy services. This perpetuates the poverty cycle and inhibits economic development, availability of clean water and food, while preventing training and acceptable health standards.” Ministers at the Forum called for the solidarity of IEF countries and a step change in the collective efforts of all relevant international organizations to help achieve the Millennium Development Goals by halving poverty rates by 2015. The same message was echoed at the Jeddah Energy Meeting (22 June 2008), where Ministers noted that “oil price rises and the underlying volatility, will have an impact on the economies of the consuming and producing countries alike, especially in the least-developed countries.” The Jeddah Joint Statement recommended that “development assistance from national, regional and international finance and aid institutions be intensified to alleviate the consequences of higher oil prices on the least-developed countries.” Further still, participants at the London Energy Meeting (19 December 2008) noted that “high or volatile prices for oil and other energy sources had a serious impact on low-income countries” and agreed on the importance of multilateral measures to mitigate this effect.

Following the concern illustrated by Energy Ministers worldwide, the International Energy Forum will convene a symposium on energy poverty in Johannesburg on the 8th and 9th of December 2009. The symposium will bring experts from finance, development, and energy together to discuss and explore the most effective means to reduce energy poverty worldwide.

Recommendations drawn from the symposium and an action plan on how best to eradicate energy poverty will be presented to Energy Ministers at the 12th International Energy Forum in Cancun, Mexico on March 30-31, 2010.

1. Characterization & Consequences

Energy poverty is broadly defined as the lack of access to modern energy services—be they electricity, heating or cooking fuels—necessary for human development. Fuel poverty is a related but distinct concept in which users of energy have access to—but are unable to afford—the energy they require.

In the field, energy poverty is best viewed as a diverse set of symptoms rather than a singularly defined issue. For example, in much of Africa, the high cost of electricity grid extensions are a large factor in the continuation of energy poverty, but this is not the case in the poor urban communities in South America where the grid exists, but utilities are rarely paid for their service. The cause of energy poverty varies by region but the effects of zero electricity are common to all. Unfortunately, electricity is only one part of the problem. Access to efficient and affordable cooking and heating fuels, like liquefied petroleum gas (LPG) or kerosene, are equally if not more vital to alleviating the effects of energy poverty. 2.5 billion people rely on biomass for their daily fuel needs and would greatly benefit from cleaner, affordable and more efficient fuel for cooking and heating their homes.

For the “bottom billion” living on less than \$1 USD a day, basic energy services are prohibitively expensive and onerous to access. As a result, they rely on grossly inefficient fuels, like biomass and charcoal, whose collection or purchase absorb a disproportionate amount of their time and limited finances. These fuels also exact a serious health cost through the heavy carbonates they emit during

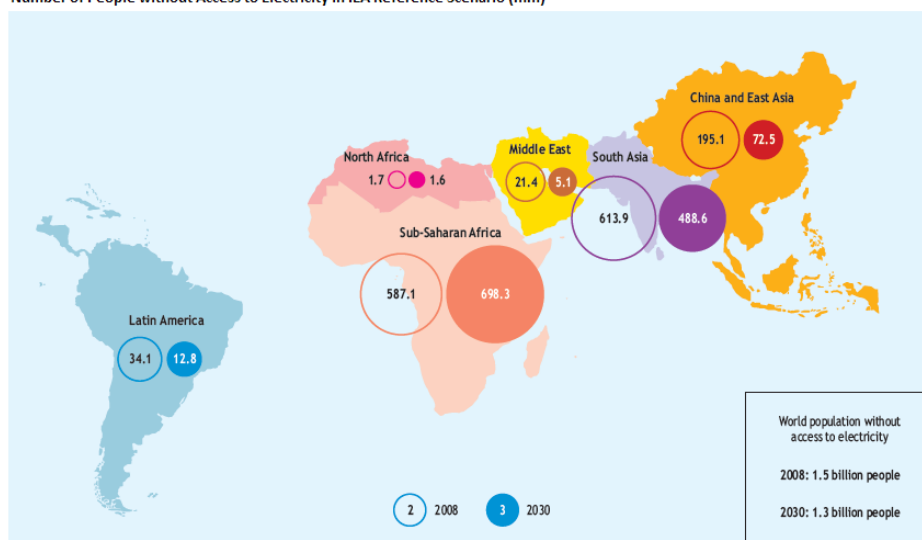
usage. The cycle of poverty then repeats itself; inefficient use of dirty fuels retards growth and moors communities in continued poverty and poor health. For rural communities that also lack access to electricity, their health problems are compounded by their inability to receive appropriate medical care as modern health facilities usually require power of some measure.

2. Regional Bias and Causes

Energy poverty affects nearly every corner of the globe in some capacity, but the predicament is particularly prevalent in sub-Saharan Africa and South Asia. Energy poverty also occurs in regions that are otherwise rich in energy resources, as demonstrated in Western Africa and parts of Latin America. Energy resources do not guarantee energy infrastructure will be in place, nor do they ward against the larger issues of poverty, in which energy poverty is an integral actor.

In 2009, the International Energy Agency (IEA) found that 1.5 billion people had zero access to electricity.¹ When the IEA first examined the issue in 2002, they estimated that figure to be around 1.6 billion.² Despite seven years of laudable and concerted efforts to bring electricity to those that

Number of People without Access to Electricity in IEA Reference Scenario (mm)



Sources: IEA, 2009 WEO

and that this figure would *increase* to 2.6 billion by 2020 under a business as usual scenario.⁴ Those 2.5 billion people, more than a third of the world's population, depend on biomass (primarily wood), dung and charcoal for their heating and cooking.

Distance from modern energy services is a significant factor in energy poverty. For example, in much of sub-Saharan Africa, the infrastructure required to carry electricity from urban population centres (where power generation is most often focused) to remote villages is vast and unwieldy. The private sector sees little incentive in bringing electricity to small communities that cannot pay for power and local governments are often unable to do the same, be it for political or economic reasons. In South Asia, the remoteness of location is also a factor but the difficulty of the terrain adds to the cost of building electricity distribution. **Of the 1.5 billion people who lack access to electricity, 85% are in rural areas.**⁵

¹ 2009 World Energy Outlook (WEO), International Energy Agency, Chapter 2

² 2002 WEO, IEA, Chapter 13

³ Jamal Saghir, "Energy and Poverty: Myths, Links and Policy Issues, ENERGY Working Notes," The World Bank Group, May 2005

⁴ 2009 WEO, Chapter 2

⁵ 2009 WEO, p. 128

need it most, the zero-access figure has remained largely static because populations have grown fastest in the regions most afflicted by energy poverty.³ The picture for fuels is even bleaker. In 2009, the IEA found that 2.5 billion people lack access to modern fuels for cooking and heating

Despite energy poverty's rural bias, the issue is not solely a rural one. Lack of urban electricity access, seen in megacities like Rio de Janeiro and Mumbai, have different causes, solutions and consequences. Intelligent solutions incorporate this distinction. While only a small part of the problem today, urban energy poverty is set to be energy poverty's obstacle of tomorrow as the developing world continues to urbanize.

Governance is another significant factor. For many countries, the government is unable to provide the services its citizens require because they lack the resources to do so. For other countries, finances may be available, but the political incentive to provide access to electricity is either unclear or of limited value. There are also regulatory hurdles and obstacles of excessive patronage that stand before reliable and distributive energy infrastructure in many countries. While better governance will aid in the fight against energy poverty, governments may not always have the tools they need to successfully combat energy poverty. Internationally coordinated efforts can help provide them with those tools.

Beyond location and domestic policy, the causes of energy poverty cannot be easily divorced from the causes of general poverty. The two are intertwined. The poor cannot afford to purchase the energy they need and their governments are often just as unable to purchase the infrastructure necessary to provide them with that energy. **The correlation between energy and general poverty is unmistakable; for countries in which the per capita income is less than \$1 USD a day, 90% of the population use biomass or dung for their cooking.**⁶ The cycle of energy poverty then continues as the health effects of dirty fuels reduce longevity and reduce the productive capacity of entire communities. The same dynamic operates in those populations who lack access to electricity.

3. Energy Poverty and General Poverty

Energy poverty and general poverty relate in the following ways:

Productivity. Energy poverty gravely impairs a community's ability to prosper financially. Lack of electricity significantly reduces a community's ability to start, operate and expand commercial enterprises. Work stops or slows after sundown and productivity dips. While rural communities may not need access to the Internet to develop, even intermittent access to electricity would enable them to embrace leap-frog technologies, like mobile phones for agricultural coordination, that require only limited amounts of power.

On the fuel side, the paucity of modern fuels can reduce agricultural productivity in a number of ways. For example, the dung used for heating or cooking could alternatively be used as fertilizer. A report by The Energy and Resources Institute (TERI) valued the dung used as fuel in India alone at \$800 million.⁷ The opportunity cost is not only financial but operates on a much more personal level. **In much of the developing world, women can spend more than six hours a day collecting lumber for cooking,** a tiresome process which, while essential, leaves women unavailable for other, and perhaps more fruitful tasks. Issues associated with biomass collection, like land degradation, also contribute to the hidden costs of the fuel by leaving soil infertile and of limited value for future use.

Education. Energy poverty makes education more difficult. Without light after sundown, students find studying overly burdensome. **Lack of electricity reduces the education level, limits the opportunities available to rural students, and may even encourage students to attend less school.**

⁶ Poverty, Energy and Society, The Energy-Poverty Problem, The Baker Institute Energy Forum, <http://www.bakerinstitute.org/programs/energy-forum/research/poverty-energy/index.html>

⁷ 2002 WEO, Chapter 13

A recent study of students in Nicaragua found that 72% of children who lived in homes with electricity regularly attended school, while only 50% of students who did not have electricity attended school.⁸

Health. Energy poverty poses a severe health risk and impedes the administration of modern health care. In 2004, the World Health Organization found that indoor pollution prematurely kills 1.6 million people a year.⁹ Indoor pollution occurs when biomass and charcoal are burned for cooking in confined quarters. When lumber is burned, it releases respirable particulates and carbon monoxide into the air. These pollutants lead to Acute Respiratory Infections and strike women and children most seriously. **Other complications from indoor pollution include chronic obstructive pulmonary disease, lung cancer, cataracts, tuberculosis, asthma attacks, low birth weights and early infant death.**¹⁰ Additionally, without access to electricity, it becomes exceptionally difficult to operate health clinics with modern services; many medications require refrigeration and even simple items, like clocks to time HIV medication, are unavailable without ready power.

Women. Energy poverty disproportionately impacts women. In the regions and communities most affected by energy poverty, cultural and social mores often relegate women to the collection of fuel and the preparation of food. The gathering of wood is both time consuming and energy intensive. In addition to being worn from a day of collecting firewood, young women are then usually asked to prepare grain-based meals, a task which is time consuming in itself. Together these leave many young women unable to attend school. In addition to the educational limits imposed by energy poverty, the preparation of food can be extremely harmful to women's health, as explored above.

While the alleviation of energy poverty is not a panacea to global poverty, no nation has reduced its poverty levels without increasing their energy usage.

⁸ Energy Working Notes, May 2005, p7

⁹ <http://www.who.int/indoorair/info/iabriefing1rev.pdf>,

¹⁰ Indoor air pollution in developing countries: recommendations for research, K.R. Smith, Indoor Air, 2002, http://ehs.sph.berkeley.edu/krsmith/publications/02_smith_1.pdf

4. Energy Poverty & the Millennium Development Goals (MDG)

In 2000, the UN adopted the MDGs with two key metrics, one of which was a reduction of the number of people living on less than \$1 a day by 50% by 2015. As explored above, income and access to modern energy are highly correlated. In order to achieve the MDGs, energy poverty must be reduced, and reduced quickly if the 2015 goals are to be met. Of course, a reduction in energy poverty alone will not accomplish the MDGs but the MDGs are unlikely to be met without addressing energy poverty.

Millennium Development Goals & Energy Poverty

MDG 1. Eradicate extreme poverty and hunger.

Modern energy services and fuels improve productivity and add to agricultural output.

MDG 2. Achieve universal primary education.

Light bulbs allow students to study in the evening and electricity could power educational tools like computers and projectors.

MDG 3. Promote gender equality and empower women.

LPG and kerosene would reduce the physical burden on women and, free from fuel collection duties, allow them to earn an education.

MDG 4. Reduce child mortality.

The health effects of energy poverty affect children disproportionately. Modern fuels extend the lives of children and reduce the likelihood of illness.

MDG 5. Improve maternal health.

Low birth weights are reduced and prenatal care improved when indoor pollution, caused by cheap primary fuels, is improved.

MDG 6. Combat HIV/AIDS, malaria and other diseases.

Electricity powers health clinics and clocks that allow HIV patients to administer ARVs on the schedule they require to be effective. Additionally, many medications require refrigeration.

MDG 7. Ensure environmental sustainability.

Renewable energy can be decentralized and power rural communities that are unable to connect to the larger electricity grid. Modern fuels can reduce land degradation caused by wood for fuel efforts.

MDG 8. Develop a global partnership for development.

Energy poverty cannot be achieved unilaterally by any nation. Bringing access and modern fuels to communities will be the product of international cooperation and coordination.

5. Energy Poverty & Subsidies

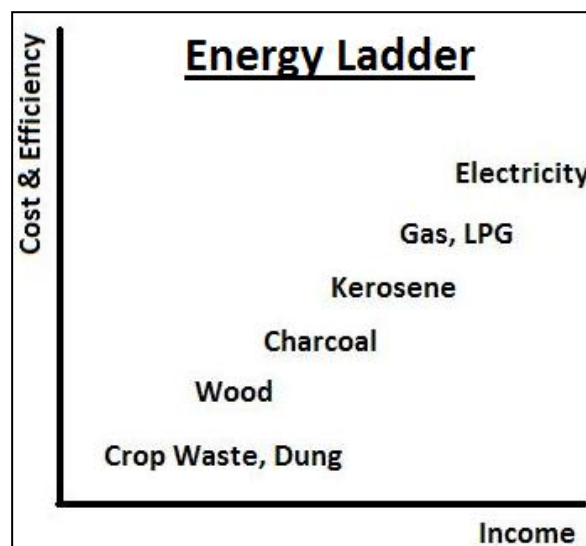
Subsidies are often applied to remedy energy poverty. As a policy tool, subsidies have received their share of press recently, namely for their distortion of energy consumption, but subsidies have an important if not essential role to play in reducing energy poverty. The difficulty in crafting an effective subsidy scheme is in reaching the intended demographic. Blanket subsidies for fuel or electricity do not assist the poor any more than they do the wealthy; to be truly cost-effective and efficient, subsidies must benefit only those who need them most.

Some countries have applied a “cross subsidy” in which the price of energy (electricity, fuel or otherwise) is reduced for a defined fraction of the consumer set. For example, in Yemen, customers who use less than 200 kilowatt-hours per month are charged at a different rate than those who use more. In theory, this distinction favours the poor and can be effective if implemented appropriately. In practice, however, it is very difficult to achieve the perfect definition of who should receive a

reduced tariff. Returning to the Yemeni example, nearly all consumers in Yemen use less than 200 kilowatt-hours per month.¹¹ That does not make the subsidy completely ineffective, as it certainly is reaching the poor, but it does make it less cost-effective by allowing too many users to qualify.

Douglas Barnes, an advisor to the World Bank and an expert on energy poverty, advises evaluating subsidy programs for their efficacy, sector efficiency and cost-effectiveness, while bearing the essential who, what, how and how much questions in mind.¹² The “who” question is usually the easiest to answer: the poor and any segment of the population that lacks access to, or cannot afford, modern energy fuels and services. They should be targeted first. The question of what to subsidize is usually more difficult to answer. If electricity, which element of the electricity supply chain? The upfront capital costs are usually the largest obstacle to expanding access and applying subsidies

there is often beneficial. Applying subsidies to rate payers individually can work as well, but as demonstrated in Yemen, reaching the intended audience can be tricky. For fuels, the question becomes which fuels? Subsidies should help consumers climb the “energy ladder” toward more efficient fuels, like LPG. Subsidizing the upfront costs to fuel consumers, such as the bottle charge for LPG, could lower the access bar and allow more of the population to use the fuel. Subsidies for fuels like gasoline, a fuel higher on the “energy ladder,” are often ineffective as poverty reduction programs and operate on a different policy plane. In determining how much to subsidize, governments should prioritize sustainability. Subsidies should be implemented



if and when they can reach the poorest consumers, but be designed to assist those consumers away from the effects of energy poverty over the long term. If subsidy programs stop and start, or put undue strain on markets or the government applying them, they will be ineffective. Sustained support for a subsidy sends an important signal to the market and users. That said, finding the appropriate level of subsidy is an admittedly arduous task but only achievable through careful study and analysis of the subsidy’s effect once implemented.

In short, subsidies require care. Inefficient programs can bankrupt governments while achieving few results for the poor, but carefully implemented programs can extend access and improve the health, finances and morale of the poor. The transition up the “energy ladder” generally occurs in step with income levels; subsidies should be designed to secure the sustainability of this transition. Effective subsidies are those that are closely tailored to their market and avoid the pitfalls of waste and unwarranted cost.

¹¹ Douglas F. Barnes and Jonathan Halpern, *Energy Services for the World’s Poor*,” ESMAP Energy and Development Report, 2000, p. 62

¹² Ibid

6. International Cooperation on Energy Poverty

Despite the alarming figures for energy poverty worldwide, significant efforts are underway to reduce the number of people suffering from a lack of access to modern energy services.

Although a decidedly international problem, energy poverty can be improved through domestic energy policy reform. For example, Mexico identified energy poverty as an obstacle to its development in the 1990s and made access to electricity a budget priority. Through the 1990s, Mexico put over \$2 billion toward electrification, drawing heavily on international capital and donor markets. As part of a larger initiative to reform and redraw its energy sector, from oil to power lines, Mexico managed to eradicate much of its energy poverty. As of 2006, over 95% of Mexico's population was enjoying regular access to electricity.¹³ The Mexican example demonstrates that access can be achieved through comprehensive reform and dedicated funding.

Additionally, a number of international efforts are underway to leverage the economics of scale to reach the largest number of energy consumers:

The New Economic Partnership for Africa's Development (NEPAD) has championed Africa's burgeoning network cooperation among electricity providers and distributors throughout Africa. Regional electricity network dialogue improves grid stability, expands access and lowers rates for users by reducing the marginal cost to distributors.¹⁴ Through NEPAD and other cooperatives, like the regional power pools throughout Africa (E.g., SAPP, EAPP, WAPP, CAPP), Africa's national grids that were once fire rung are now beginning to share transmission across borders. Significant obstacles, like political risk, grid maintenance and interconnectivity certainly remain, but the seeds of international and regional cooperation have begun to bud.

International cooperation on energy poverty is not only occurring in Africa. The Venezuelan national oil company, PDVSA, introduced the "Proposal for a Solidarity-Based Energy Cooperation" designed to combat energy poverty in the 49 poorest countries in the world, as determined by the Human Development Index (HDI). The proposal has several options that allow energy producing countries to assist the poorest energy consuming countries and is one example of how intergovernmental cooperation could assist in the reduction of energy poverty.

Cooperation is also occurring in and with the private sector. In 2005, at the World Economic Forum's annual meeting, Canada's British Columbia Hydro and Power Authority, South Africa's Eskom and Sweden's Vattenfall joined up with the World Business Council for Sustainable Development, the World Energy Council and the World Economic Forum to form the Energy Poverty Action (EPA) initiative aimed at reducing energy poverty through local, targeted energy projects. The EPA uses donor capital to fund upfront costs and invites local partners and management to run its projects, increasing the sustainability and local interest in each project. EPA began with electrification projects in Lesotho and the Democratic Republic of Congo and has sought to blend international industrial expertise with local management and implementation. In 2007, the EPA joined with the Development Bank of Southern Africa to create the EPA Management Unit whose objective, as described in their literature, "is to build its institutional capacity to act as a matchmaker between leading companies, governments, local entrepreneurs and communities, as well as national and international finance institutions and donors to enable project financing and execution to address the challenges of energy poverty."¹⁵

¹³ "Energy Poverty Issues," The World Bank, Washington, DC, 2006, p. 23

¹⁴ Gilbert Mbeshherubusa, "Acting Against Energy Poverty in Africa, African Development Bank, Background Paper prepared for the G8 Energy Ministers Meeting, Rome, May 25-25, 2009"

¹⁵ <http://www.weforum.org/en/initiatives/EnergyPovertyAction/index.htm>

7. Financial Efforts

As important as it may be, **policy is only one part of the picture; funding the reduction of energy poverty is as essential** and certain to be a difficult task. In 2009, the IEA estimated the cost of universal electricity access to be \$35 billion a year between 2008 and 2030, nearly \$800 billion in total.¹⁶ In 2008, the IEA examined ten oil and gas exporting countries in sub-Saharan Africa and found that, despite their natural resource wealth, 65% of their populations had no access to electricity and 75% rely on wood for cooking. The problem extends well beyond Africa but its focus in the developing world is particularly damaging. According to Jamal Saghir, the World Bank's Director of Energy and Water in 2006, investment in the developing world's power sector fell from \$47 billion in 1997 to \$14 billion in 2006.¹⁷ Fortunately for the world's energy poor, new models to finance an end to energy poverty are in development.

Two examples noted here, REED and SEFI, are among countless efforts underway worldwide.

Rural Energy Enterprise Development (REED)

REED was established by the UNEP to "provide early-stage funding and enterprise development services to entrepreneurs" in rural and semi-rural communities. In addition to the seed money offered to promising enterprises, REED also provides energy project development and general business training to interested entrepreneurs. The program coordinates with NGOs for funding, offers workshops to financial institutions unfamiliar with rural energy projects and identifies rural business opportunities. While the seed capital provided by REED is generally small, ranging from \$50,000 to \$250,000, the local effect can be significant. In Ghana alone, AREED, the African REED program, has 53 projects in development with over \$400,000 invested. REED has demonstrated its capacity to aid in energy project development beyond Africa, with programs in Brazil (BREED) and China (CREED) finding success as well.

Sustainable Energy Finance Initiative (SEFI)

SEFI was established with the coordination of UNEP and the Basel Agency for Sustainable Development (BASE) and exists to inform financiers of the opportunities available in sustainable energy projects. Recognizing the investment does not always flow where it is most needed, SEFI aims to smooth the path between capital and energy projects focused on a social good. The Initiative's project focus is primarily on renewable projects for communities that lack access or the funding for development. The Initiative is joined by the SEF Alliance, which has organized public and private organisations involved in sustainable energy to "exchange best practices, pool resources, launch joint projects, and assist governments in establishing new or similar financing models." SEFI combats energy poverty by breaking down informational barriers and perceived risks to allow capital to flow where it can be most efficiently applied. It has aided in project development throughout Africa and Latin America.

¹⁶ 2009 WEO, Chapter 2

¹⁷ "Energy Access, Security, Key to Reducing Poverty," The World Bank, May 28, 2006

8. Conclusion

Of course, there is no silver bullet for energy poverty. Energy poverty reduction is a constantly moving target and, while we know much about who suffers from energy poverty and how they do so, we know less about how to successfully eradicate the problem. Certain models have been successful in certain areas, but given the issue's global reach, it demands a better understanding of why those models work where they do, as well as a more concerted global effort. What is the appropriate level of intervention from governments? From multilateral organizations? How should each structure and improve their involvement? Which mechanisms work for rural energy poverty but not for urban energy poverty? How much funding is needed and how should it be applied?

Efforts like the Symposium on Energy Poverty can hopefully help answer these questions and the 12th International Energy Forum in Cancun, through direct review and discussion by Energy Ministers, can aid in the implementation of policies that address energy poverty.

Energy poverty is not an issue that recognizes national borders and stronger and more concerted international cooperation will be needed to significantly reduce energy poverty in the next decade.