Light a Billion Lives Through the Power of Solar Lanterns

By Dr. R. K. PACHAURI

Understanding Poverty

The detrimental impacts of poverty have affected segments of all our societies since the beginning of human civilization. However, what has made this problem far more serious than ever before is the fact that over the last 200 years or so some parts of the world have prospered rapidly while several others have been left behind. The existence of poverty, therefore, is not only an issue that causes concern in and of itself, but is one that poses intense societal challenges as a result of the growing reality of stark contrasts between rich and poor. The existence of prosperity and the opportunities for achieving it, which, unfortunately, several impoverished societies do not have access to, brings out this issue prominently in a world that still has hundreds of millions of people living in deep deprivation.

There have been a number of committees and commissions at the international level which have gone into the issue of poverty and the means by which development could be promoted to benefit the most underprivileged. Perhaps the most important of these was the Brandt Commission that framed the central issues affecting relationships between north and south, and the means by which poverty could be eliminated. One major element of the recommendations of the Brandt Commission was the need to bring about stability in commodity prices. Historically, the earnings of a number of developing countries have come from the export of commodities, and their economic fortunes have fluctuated with fluctuations in commodity prices – in particular, their generally low levels over time. There were several other issues that the Brandt Commission raised, including international monetary reform, for which the commission favored a much larger role for special drawing rights (SDRs) since it viewed these as the only stable and permanent currency.

Access to Energy a Key Developmental Goal

The issue of eliminating poverty really reached a peak in global attention in 2002. The Millennium Development Goals (MDGs) were accepted and endorsed by all the countries of the world. One unfortunate omission in the MDGs was the complete neglect of energy as an important determinant of poverty as well as a critical indicator of poverty. It is inconceivable that a society which has not been able to develop infrastructure and set up arrangements for supply of modern forms of energy can really eliminate poverty in today's world. If we look at the whole process of industrialization, it was triggered initially by the invention of the steam engine that allowed human and animal power to be substituted with mechanical power through the use of fuels like coal to begin with and then subsequently oil and natural gas among fossil fuels. The large-scale production of energy using these fuels has enabled households to alleviate the drudgery that was experienced for centuries before, when fuel wood and other forms of biomass had to be collected and transported by human beings.

There is today a substantial difference in energy supply and consumption between developed and developing countries; yet we continue to see human populations totaling over two billion people who still cook their meals in devices using fuels that are no different from what was available hundreds of years ago. Indeed, in several cases today these fuels are much scarcer compared to previous availability, and are of poorer quality, as a result of large-scale depletion. At base, it is also pertinent to note that there are 1.6 billion people who have no access to electricity and have, therefore, never seen or benefited from a single light bulb in homes where they live.

In the lead-up to the World Summit on Sustainable Development at Johannesburg in 2002, there was a concerted effort by several countries to see that the provision of energy would be accepted as a specific and distinct MDG. Unfortunately, a small number of other countries blocked this fundamentally valid proposal on the grounds that energy supply was an issue that the market would take care of. This represented a cynical neglect of a reality that is well known to development specialists and energy professionals, namely that lack of access to energy is a clear indication of poverty, and that there is an important role for public policy interventions and specific programs at the international and national levels to meet the challenge to alleviate the problem.

If those who are poor need to be lifted out of this condition then it is essential for policymakers and decision makers to provide choices by which very basic energy needs can be met in a manner that is secure and environmentally clean. The eight MDGs now accepted universally are shown in *Table 1*.

It is ironic that while very important goals such as reducing child mortality, ensuring environmental sustainability and developing global partnerships for development have been included in the MDGs, there is no articulation of goals, for instance, to ensure clean and safe supply of energy. It is virtually impossible to reduce child mortality adequately if women and children are to sit around a fire using poor-quality biomass burnt in primitive and ill-designed stoves which produce harmful pollution to which women and children in particular get extended exposure. Similarly, environmental sustainability is not possible if poor households use kerosene lamps or candles, emitting high quantities of harmful gases and at the same time live in small homes without proper ventilation and illumination.

Clearly a number of MDGs, including the achievement of universal primary education, are entirely dependent on the provision of good-quality and adequate energy for very basic end uses such as lighting and cooking. It is also apparent that if no specific policy interventions are made, a very large part of humanity all over the globe would continue to live in darkness and would also all suffer the ill effects of air pollution and adverse health on account of the unacceptable forms of cooking energy supply and use seen currently. There are important opportunity costs involved in using traditional

TABLE 1

Millennium Development Goals

1. Eradicate extreme poverty and hunger

- Reduce by half the proportion of people whose income is less than $1 a day
- Achieve full and productive employment and decent work for all, including women and young people
- Reduce by half the proportion of people who suffer from hunger

2. Achieve universal primary education

- Ensure that all boys and girls complete a full course of primary schooling

3. Promote gender equality and empower women

- Eliminate gender disparity in primary and secondary education, preferably by 2005, and in all levels of education no later than 2015

4. Reduce child mortality

- Reduce by two-thirds the mortality of children under 5

5. Improve maternal health

- Reduce maternal mortality by three quarters
- Achieve universal access to reproductive health

6. Combat HIV/AIDS, malaria and other diseases

- Halt and reverse the spread of HIV/AIDS
- Achieve, by 2010, universal access to treatment for HIV/AIDS for all those who need it
- Halt and reverse the incidence of malaria and other major diseases

7. Ensure environmental sustainability

- Integrate principles of sustainable development into country policies and programs; reverse the loss of environmental resources
- Reduce biodiversity loss, achieving, by 2010, a significant reduction in the rate of loss
- Halve the proportion of people without access to safe drinking water and basic sanitation
- Improve the lives of at least 100 million slum dwellers by 2020

8. Develop a global partnership for development

- Develop further an open, rule-based, predictable, nondiscriminatory trading and financial system
- Address special needs of the least developed countries, landlocked countries and small-island developing states
- Deal comprehensively with developing countries' debt
- In cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries
- In cooperation with the private sector, make available the benefits of new technologies, especially information and communications technologies

Source: Millennium Development Goals Report 2009, United Nations

cooking methods particularly for women who spend hours collecting the biomass that feeds their cooking stoves. Clean energy offers millions of people the ability to put this time to more productive economic use, and is therefore an important tool in any poverty reduction strategy. It really would be unfortunate if a large part of humanity, almost 25% of the total world population, continued to live in complete or partial darkness once the sun went down every evening.

Poverty Alleviation through LaBL Program

It is with this in view that The Energy and Resources Institute (TERI) in New Delhi launched the "Lighting a Billion Lives (LaBL)" program for very basic humanitarian reasons. I felt a deep sense of anguish, which is shared by my colleagues at TERI, that in this day and age we do not have proper solutions for those without access to electricity. Two major factors were responsible for the launch of the LaBL campaign. Firstly, in a project that TERI carried out in several parts of India (but most predominantly in the desert state of Rajasthan), it was found that villagers were very enthusiastic about the opportunity to use photovoltaic cells for a number of applications such as powering small table fans for a simple device for churning buttermilk in villages, and domestic lighting within homes. This enthusiasm extended to a willingness to pay for devices with this technology to a substantial extent. The second factor was the large-scale production of reliable and good-quality photovoltaic cells which are now in the market in different parts of India. We, therefore, felt that the timing would be right for launching a program that really benefited a significant number of people.

TERI began with the modest goal of lighting a million lives. However, realizing the scale of the global problem and the attractiveness of solar lanterns for providing clean, affordable and sustainable energy for lighting in homes, we decided to set our sights much higher. In 2007, LaBL was entered as a project representing sustainable solutions on a global scale to the Clinton Global Initiative. At that event LaBL was selected as one of the few initiatives endorsed by the Clinton Global Initiative. The LaBL campaign was formally launched in January 2008 in the presence of India's prime minister, Manmohan Singh. Subsequently, a major effort has been made by TERI to raise financial resources to launch this program on a significant scale. The program really has a long way to go, but it has made a promising beginning. The current progress with this effort has been inspiring and satisfying. The experience with the program, which is currently centered around villages in India, is shown in *Table 2*.

The intention is to take the LaBL campaign to other countries as well, apart from India. Some modest effort has already been made by providing solar lanterns to some of the villages that were devastated by Cyclone Nargis in Myanmar in 2008. However, the need for this program in African countries is so large that its extension to Africa holds enormous promise. TERI is, therefore, planning to take this activity to Africa in partnership with organizations on that continent. The various states of India in which the program has been implemented so far have revealed some very useful and valuable insights. The impact of the LaBL program is not simply the provision of lighting purely in a physical sense, but it is actually an instrument by which lives can be transformed and hopes and aspirations generated on a plane that clearly enhances human welfare substantially. TERI carries

TABLE 2

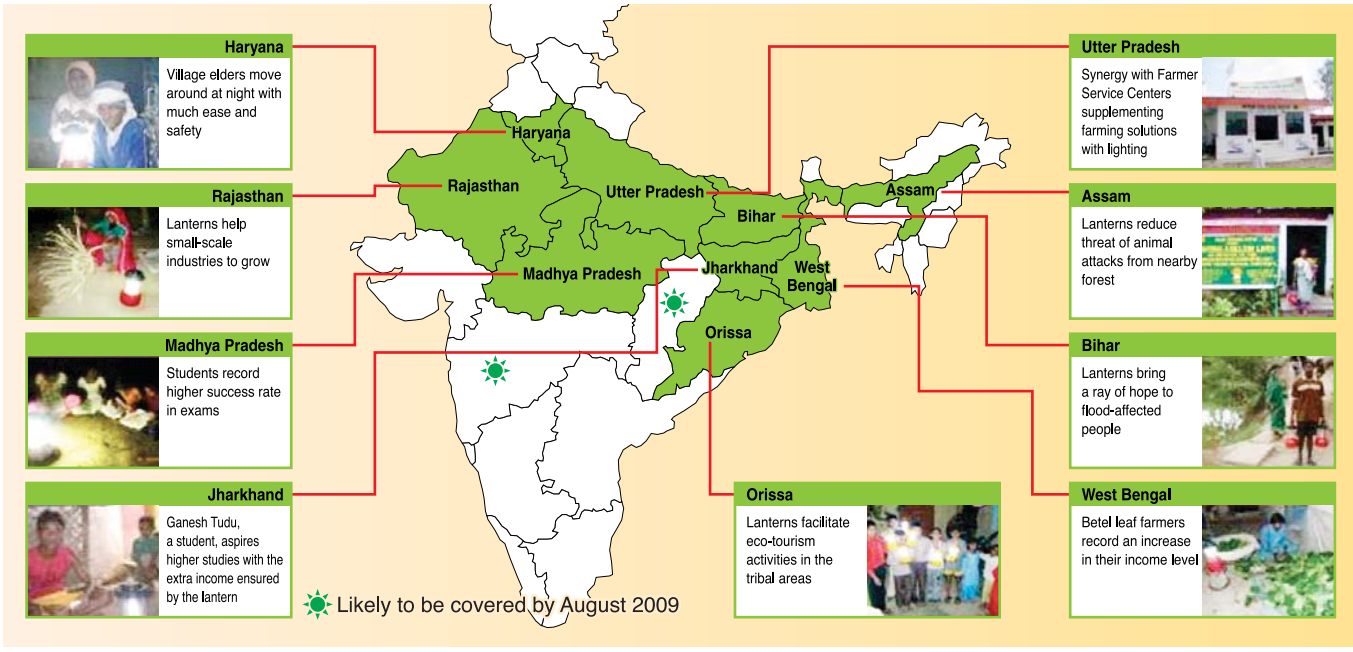
Experience so far in India's "Light a Billion Lives" project

- Villages covered: 103 across 9 states
- Lives benefited: > 25000
- 4 designs of lanterns in the field
- Typical rent: 3-8 rupees/day/lantern
- Utilization: 35-50 lanterns daily
- Average income: 4500 rupees per month
- Training programs
  - 30 programs conducted so far
  - Across 6 states
  - For entrepreneurs/users/associates

Source: The Energy and Resources Institute (TERI)

CHART

Case studies on "Light a Billion Lives" campaign



Source: The Energy and Resources Institute (TERI)

out extensive follow-up and monitoring of the implementation of the program and the benefits thus produced. Some of these are summarized in the *chart* provided on the next page showing case studies that have been carried out in different parts of the country with very brief descriptions in the form of captions of the results achieved.

The merit of the LaBL campaign is that it is not an act of charity or philanthropy. LaBL is essentially an economically viable program which provides quantifiable economic benefits far beyond the costs incurred. However, the non-quantifiable benefits in terms of social, community and human benefits transcend the direct economic value of the program. Some of the characteristics involving a comparison between a kerosene lantern with a solar lantern are shown in very simple terms in *Table 3*.

The cost of using a kerosene lantern in a village household is 330 rupees ($6.6 at an exchange rate of 50 rupees to the dollar) per month whereas for a solar lantern the cost is in the range of 150-240 rupees per month. The big constraint in scaling up this effort and ensuring its market viability lies in the absence of proper financial mechanisms at affordable rates of interest by which entrepreneurs in villages could possibly mount this effort entirely on their own. If a comparison was to be made between the provision of electricity in rural homes through the conventional route of, say, coal-based power generation at costs of financing of conventional power systems versus LaBL investments at the same rates of interest, then clearly LaBL would yield far more attractive results even in narrow financial terms.

TABLE 3

Kerosene lantern vs. solar lantern

Characteristic	Kerosene lantern	Solar lantern
Capital cost	Low	High
Cost of fuel	Depends on usage	Nil
Replacement cost	Low (replaceable items being glass chimney, cotton wick)	Moderate (150 rupees every 18 months for battery replacement)
Flexibility to reduce illumination	Possible, by lowering the wick	Dimming option possible in LED-based lanterns
Lumen output	Low	Relatively 4-5 times higher
Safety aspects	Fire and health hazards due to smoke and spillage	Safe to use
Subsidy burden	Recurring burden of fuel subsidy	One-time burden of capital subsidy (if provided)
Operating cost	330 rupees per month per household (national average; NSSO 2007)	150-240 rupees per month depending upon LaBL rental charges

Source: LaBL Secretariat, TERI

The Way Forward

One major lesson that can be learnt from programs of this kind is the lack of institutional capacity and human capital at the grassroots level on the one hand and the absence of financing at reasonable rates of interest on the other. The growth of LaBL would, therefore, depend critically on the development and creation of institutional and financial mechanisms that would ensure its spread and sustainability. Initially, however, it is important to develop models even on a limited scale by which the program can then be scaled up, possibly by involving a large number of partners in different parts of the world and financing through conventional channels. One big benefit of what the program has achieved so far results from the proactive efforts at innovation pursued by TERI in partnership with industry and lowering of costs per unit of solar lantern for this program. Once these costs come down and designs of lanterns become far superior to what we have today, the economic merit of the scheme will also be enhanced substantially. That would set the stage when a major effort can be made to involve the banking sector and development organizations in expanding the program in different parts of the world which need lighting in the home on a large scale. At that stage the goal of LaBL, which seems very distant today, would certainly come within practical reach. JS

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