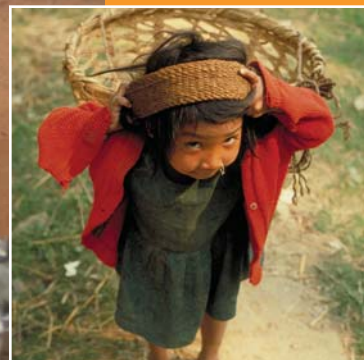
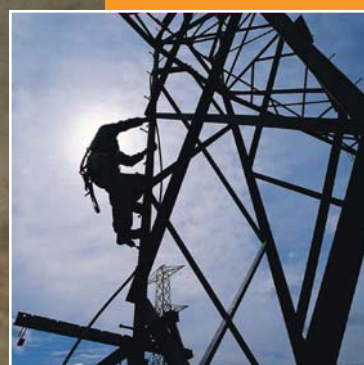


# The Energy Challenge for Achieving the Millennium Development Goals



UNITED NATIONS



**UN-Energy**

# Energy and the MDGs

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## 1 Eradicate extreme poverty and hunger

Energy inputs such as electricity and fuels are essential to generate jobs, industrial activities, transportation, commerce, micro-enterprises and agriculture outputs.

Most staple foods must be processed, conserved and cooked, requiring heat from various fuels.

## 2 Achieve universal primary education

To attract teachers to rural areas electricity is needed for homes and schools. After dusk study requires illumination. Many children, especially girls, do not attend primary schools in order to carry wood and water to meet family subsistence needs.

## 3 Promote gender equality and empower women

Lack of access to modern fuels and electricity contributes to gender inequality. Women are responsible for most household cooking and water boiling activities. This takes time away from other productive activities as well as from educational and social participation. Access to modern fuels eases women's domestic burden and allows them to pursue educational, economic and other opportunities.

## 4 Reduce child mortality

Diseases caused by unboiled water, and respiratory illness caused by the effects of indoor air pollution from traditional fuels and stoves, directly contribute to infant and child disease and mortality.

## 5 Improve maternal health

Women are disproportionately affected by indoor air pollution and water- and food-borne illnesses. Lack of electricity in health clinics, illumination for nighttime deliveries, and the daily drudgery and physical burden of fuel collection and transport all contribute to poor maternal health conditions, especially in rural areas.

## 6 Combat HIV/AIDS, malaria and other diseases

Electricity for communication such as radio and television can spread important public health information to combat deadly diseases. Health care facilities, doctors and nurses, all require electricity and the services that it provides (illumination, refrigeration, sterilization, etc) to deliver effective health services.

## 7 Ensure environmental sustainability

Energy production, distribution and consumption has many adverse effects on the local, regional and global environment including indoor, local and regional air pollution, local particulates, land degradation, acidification of land and water, and climate change. Cleaner energy systems are needed to address all of these effects and to contribute to environmental sustainability.

## 8 Develop a global partnership for development

The World Summit for Sustainable Development called for partnerships between public entities, development agencies, civil society and the private sector to support sustainable development, including the delivery of affordable, reliable and environmentally sustainable energy services.

# Preface

**E**nergy must play a more prominent role in strategies to achieve the Millennium Development Goals (MDGs). Consumption of modern energy services by the poor falls far short of needs – and potential. Today's situation, this report argues, "entrenches poverty, constrains the delivery of social services, limits opportunities for women, and erodes environmental sustainability at the local, national and global levels." International experience gives guidance as to what can successfully be done to provide much wider access to energy services for poor people. This report entitled "The Energy Challenge for Achieving the Millennium Development Goals" is the first by UN-Energy, and presents specific recommendations for linking production and access to energy services to poverty reduction programmes and national MDG strategies and campaigns.

The World Summit on Sustainable Development (WSSD) requested in its Johannesburg Plan of Implementation that a new collaborative mechanism between United Nations agencies, programmes and institutions be formed. In response, UN-Energy was created in 2004 as the principal interagency mechanism in the field of energy. Its purpose is to help ensure coherence in the UN system's multi-disciplinary response to WSSD and to collectively engage non-UN stakeholders. This innovation in the way the UN system works is still in its infancy. We will build a solid basis to realize cooperative approaches, synergies in implementation and efficiency of effort in achieving the objectives as laid out by the UN intergovernmental bodies and as committed to in the recently published UN system report to the 2005 World Summit, "One United Nations-Catalyst for Progress and Change". In this way, we will do our part to improve the management of global issues. We recognize our responsibility to work with accountability across institutional boundaries.

The September 2005 World Summit in New York will give further guidance to enhance the work of the UN system. Following the summit,

UN-Energy will focus on its collective contribution to the Commission on Sustainable Development, which in 2006 and 2007 will have energy on its agenda. Our work program presently addresses energy access, particularly in Africa, renewable energy including biomass fuels, energy efficiency, and instruments for policy integration, capacity building and awareness raising at the country level. Taking the opportunity to meet at other events, such as the Energy for Development conference in Noordwijk, the Netherlands, in December 2004, the World Bank Energy Week in March 2005, and the Global Forum on Sustainable Energy in Vienna in May 2005, we will in future develop our engagement with stakeholders.

This report was chosen as our first because of the centrality of providing energy services in the pursuit of the MDGs; a key topic for the international community in this year. The report reflects the insights and experience of participating UN organizations. It was drafted by a team from the World Bank and UNDP, and extensively discussed and commented upon by UN-Energy members before being finalized. We offer it to inform and vitalize dialogue on national and global policy choice, and to support public and private sector investment in energy services to meet the Millennium Development Goals.



Mats Karlsson  
Chair, UN-Energy

July 22, 2005



# The Energy Challenge for Achieving the Millennium Development Goals

**T**his UN-Energy paper on the importance of energy for achieving the Millennium Development Goals (MDGs)<sup>1</sup> was drafted collectively by the United Nations (UN) agencies, programmes and organizations working in the area of energy, reflecting their insights and expertise.

Currently, the available energy services fail to meet the needs of the poor. Worldwide, 2.4 billion people rely on traditional biomass for cooking and 1.6 billion people do not have access to electricity. This situation entrenches poverty, constrains the delivery of social services, limits opportunities for women, and erodes environmental sustainability at the local, national and global levels. Much greater access to energy services is essential to address this situation and to support the achievement of the MDGs.

The World Summit on Sustainable Development (WSSD) recognized the explicit link between access to energy services and poverty reduction. The Johannesburg Plan of Implementation (JPOI) called for the international community to work together at all levels to improve access to reliable and affordable energy services for sustainable development sufficient to facilitate the achievement of the MDGs<sup>2</sup>. However, governments face serious challenges for improving energy services for the poor, and they need the full financial and institutional support of other stakeholders to produce and deliver more energy.

## Main messages

- Energy services such as lighting, heating, cooking, motive power, mechanical power, transport and telecommunications are essential for socio-economic development, since they yield social benefits and support income and employment generation.
- The poor obtain energy services by gaining access to modern fuels, electricity and mechanical power. This access is particular-

ly important for women and girls since they are often the most affected by inadequate energy services.

- Reforms to the energy sector should protect the poor, especially the 1.1 billion people who live on less than \$1 per day, and take gender inequalities into account in recognizing that the majority of the poor are women.
- The environmental sustainability of energy supply and consumption should be enhanced to reduce environmental and health hazards. This requires measures that increase energy efficiency, introduce modern technologies for energy production and use, substitute cleaner fuels for polluting fuels, and introduce renewable energy.
- Large amounts of financial resources need to be mobilized for expanding energy investments and services in developing countries. They account for a much larger share of gross domestic product compared to OECD countries. Public sector resources will remain crucial for investing in energy service delivery for the poor due to the private sector's limited appetite for risk in emerging markets.
- The role of energy and the costs of energy services should be factored into overall national economic and social development strategies, including poverty reduction strategies and MDG campaigns, as well as to donor programmes in order to reach development goals. Energy planning must be linked to goals and priorities in other sectors.

<sup>1</sup> The links between energy services and the MDGs are summarized in the inside front cover.

<sup>2</sup> Johannesburg Plan of Implementation, paragraph 9.

# 1 Purpose of the paper

**This UN-Energy paper on the importance of energy for achieving the Millennium Development Goals (MDGs)<sup>3</sup> was drafted collectively by the United Nations (UN) agencies, programmes and organizations working in the area of energy, reflecting their insights and expertise.** It forms a contribution to the international discourse surrounding the review of progress made towards the MDGs by representatives of business, government and civil society.

The paper presents messages based on technical analysis from the perspective of the economic and social services that energy helps provide, particularly the services covered by the MDGs. It presents specific recommendations for linking production and access to energy services to poverty reduction programmes and national MDG strategies and campaigns. This builds upon the agreement reached in 2002 at the World Summit on Sustainable Development (WSSD) reflecting the linkages between energy the MDGs that were included in the Johannesburg Plan of Implementation (JPOI).

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The term 'energy services' refers to the benefits produced by using energy supplies. These services can be generated from a variety of primary energy sources – oil, gas, coal, renewables. They can be delivered by different energy carriers and systems for the transformation and transportation of energy, ending with the delivery of energy services within the operation and regulation of energy markets. Energy services include lighting, heating, cooking, motive power, mechanical power, transport and telecommunications.

The benefits from providing energy services matter from the viewpoint of human and economic development. Poor people require affordable, accessible and reliable energy services to support their household, economic and social welfare activities. Fuels used traditionally by the poor<sup>4</sup> provide few and low quality energy services – such as basic heating for cooking and limited quality light-

ing. By contrast good quality heating and lighting, modern fuels<sup>5</sup> and electricity<sup>6</sup> provide mechanical power for agro-processing, refrigeration for clinics, motive power for transport and telecommunications for education and public awareness. These benefits are the reason why providing access by the poor to modern fuels and electricity are important for achieving the MDGs, and they are therefore covered extensively in this paper.

The paper adopts the following outline. Section 2 shows that current levels of energy services fail to support the socioeconomic development of the poor. Section 3 shows that energy has strong links with poverty reduction – through household income, health, education, gender, and the environment. Section 4 describes the various ways in which access to energy services helps achieve the MDGs. Section 5 outlines ways to overcome the challenges for improving energy services for the poor and recommends priority actions to meet these challenges. Section 6 concludes that energy should continue to be discussed at the international level.

## 2 Current energy services fail to meet the needs of the poor

**Worldwide, 2.4 billion people rely on traditional biomass fuels<sup>7</sup> for cooking because they do not have access to modern fuels.** Access to cooking fuel is essential for good health. Hundreds of millions of people – mainly women and children – spend several hours daily gathering fuelwood and water, often from considerable distances, for household needs. Because of these demands on their time and energy, women and children are denied opportunities for other endeavours such as economic activities and school attendance, respectively. They also suffer considerable damage to their health, especially respiratory diseases from indoor air pollution, by having to cook indoors on poorly vented stoves.

<sup>3</sup> The links between energy services and the MDGs are summarized in the inside front cover.

<sup>4</sup> Fuels used traditionally by the poor are fuelwood, charcoal, local coal and kerosene in urban areas, and fuelwood, crop residues and dung in rural areas.

<sup>5</sup> Modern fuels include natural gas, liquefied petroleum gas and modern biomass fuels such as ethanol, biodiesel and methanol.

<sup>6</sup> Electricity is generated from depletable energy resources (coal, natural gas, petroleum fuels and geothermal energy) and renewable energy resources (solar, wind, hydropower, biomass).

<sup>7</sup> International Energy Agency. World Energy Outlook 2002. OECD/IEA 2002. Paris

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**Currently, at least 1.6 billion people do not have access to electricity<sup>8</sup> for lighting, refrigeration, mechanical power, telecommunications and other beneficial uses.**

So many people lack access even though more than 1 billion people gained access to electricity during the past 25 years. Four out of five people without access to electricity live in rural areas of the developing world, mainly in South Asia and Sub-Saharan Africa (Figure 1). In Sub-Saharan Africa only 8 percent of the rural population has access to electricity, compared with 51 percent of the urban population. Likewise in South Asia, only 30 percent of the rural population has access compared with 68 percent of the urban population. Moreover, under today's policies and investment trends in energy infrastructure, 1.5 billion people will still lack access to electricity in 2030.<sup>9</sup> Hence a major expansion of electricity supply is needed in both the urban and rural areas of these regions.

**Poor urban people spend a much greater share of their household income on energy than the share spent by higher income groups.** This is because they have smaller and less predictable incomes than higher

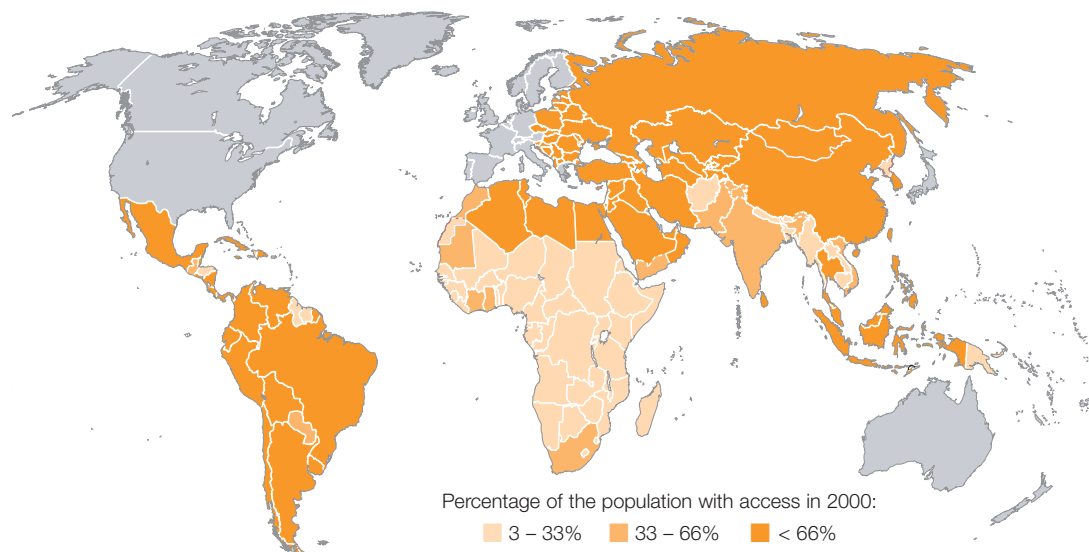
income groups, and their appliances use fuels much less efficiently. This situation applies particularly to poor households headed by women. Global evidence shows that most expenditure on energy services by poor people is on fuels for cooking, while the remainder is spent on fuels or batteries for light, typically in an 80/20 percent ratio. In general, fuelwood provides heating and cooking for the urban poor at a higher cost than liquified petroleum gas (LPG) used by higher income groups. Likewise, kerosene provides lighting for the urban poor at a higher cost than electricity used by higher income groups. The poor's cost of acquiring energy is increased by having to buy fuelwood, charcoal and kerosene in small amounts because they lack cash resources needed to buy these fuels in larger quantities. Ways to reduce the costs of these services to the poor need to be developed.

**Poor rural people also incur a high cost for using energy services.**

In rural areas where wood is scarce, poor people may pay for fuelwood or shift to less efficient and convenient energy sources such as crop residues or dung for cooking. In resource depleted areas in Sub-Saharan Africa, people spend up to five hours

*This map was produced by the Map Design Unit of The World Bank. The boundaries, colors, denominations and any other information shown on this map do not imply, on the part of The World Bank Group, any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries.*

IBRD 31300 MAY 2001



**Figure 1. Many People in Developing Countries Lack Electricity.**

<sup>8</sup> idem

<sup>9</sup> idem

per day on gathering fuelwood. So the traditional fuels used by poor people are not free; instead, they come at a high cost in time and labour. These costs should be recognized in developing policies and priorities for helping the poor.

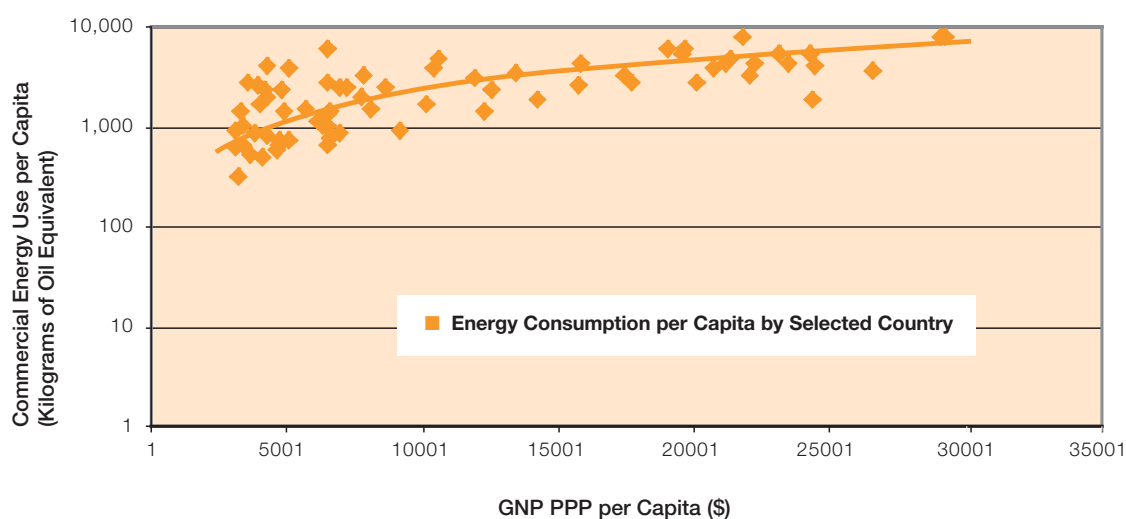
### 3 Energy has strong links with poverty reduction – through household income, health, education, gender, and the environment

**Energy's links with other sectors are crucial for the economic growth that is central to sustained poverty reduction.** This is because energy is central to practically all aspects of sustainable development, including access to water, agricultural and industrial productivity, health care, educational attainment, job creation and climate change impacts. Some 1.1 billion people in the developing world live on less than \$1 per day<sup>10</sup>. Affordable, accessible and reliable energy sup-

ply is critical for reducing this number of poor people as well as for economic growth. The WSSD recognized the explicit link between access to energy services, poverty reduction and sustainable development.

**Energy services are an essential means to support overall development, rather than an end in itself.** The demand for energy services, and thus for energy, is derived from the output of other goods and services. Most economic activity is not possible without energy, and no country in modern times has substantially reduced poverty without massively increasing its use of energy. Economic growth creates jobs and raises incomes, even for the small and medium-scale enterprises that are the main source of jobs for the poor. Figure 2 reflects the strong correlation between commercial energy consumption (when expressed in log normal terms) and national income, whereby countries with higher income are also those with higher energy consumption.<sup>11</sup>

**By providing energy services from modern fuels and electricity, efforts to improve economic and social develop-**



**Figure 2. Energy Consumption Has a Strong Link with National Income.**

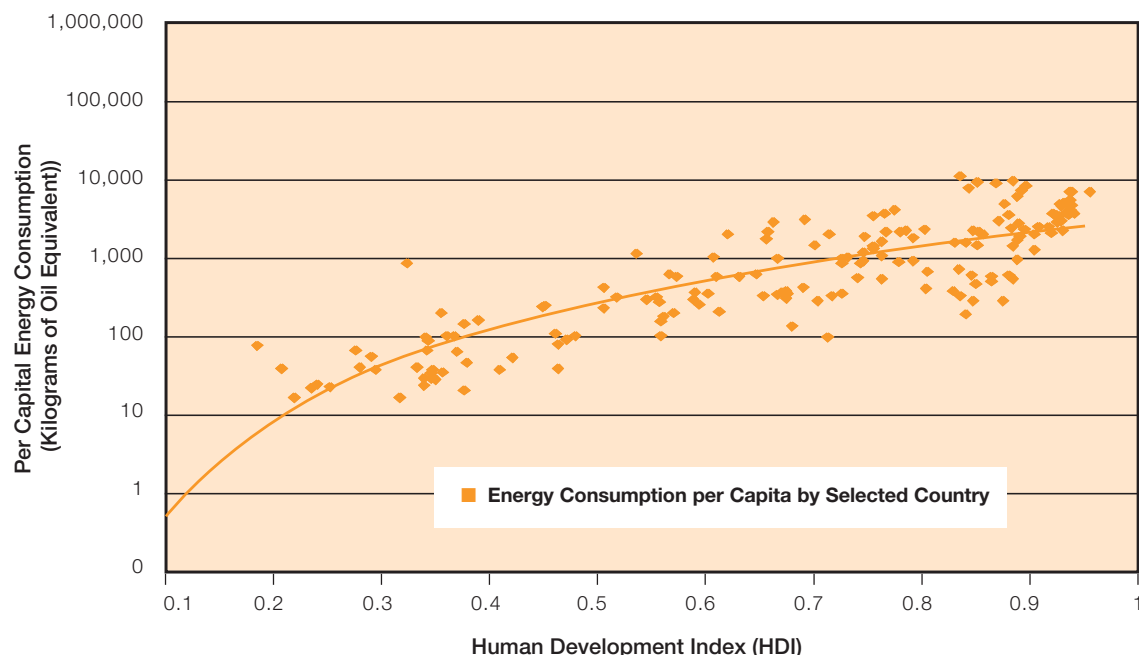
Source: World Bank, World Development Indicators database

<sup>10</sup> Chen, Shaohua and Martin Ravallion. *How have the world's poorest fared since the early 1980s?*. World Bank Policy Research Working Paper 3341. World Bank. 2005. Washington DC.

<sup>11</sup> These are not the only variables that influence each other. Other factors influence each variable.

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Source: UNDP Human Development Report 2004 Database



**Figure 3. Energy Consumption Has a Strong Link with Human Development.**

**ment are mutually reinforcing.** The use of energy in economic production can improve social welfare, since people are more able to afford health and other social services when they have better paying jobs. In particular, enhanced access to energy services is important for improving agricultural productivity, not just in term of volume of crops grown, but also in post harvest value added activities such as drying, processing, conservation and transport, all of which require energy.

**The importance of energy services for social development is reflected in the association between energy consumption and human development.** Figure 3 shows the strong correlation between commercial energy consumption (when expressed in log normal terms) and UNDP's Human Development Index.<sup>12</sup> This index is composed of human development indicators that reflect achievements in the most basic human capabilities – leading a long life (life expectancy), being knowledgeable (educational achievement), and enjoying a decent

standard of living (income, measured in purchasing power parity terms).

**Access to energy services is particularly important for women, given that energy services and technologies are not gender neutral.** The lack of modern fuels and electricity reinforce gender inequalities. Most of the poorest households are headed by women. Women and girls are disproportionately burdened by lack of access to modern fuels and electricity since they are responsible for fuel gathering, cooking and food preparation. In addition to the time spent gathering fuels, most traditional staple foods involve a large amount of threshing, dehulling or grinding, which is mostly done through female labour in the poorest households and regions due to lack of access to mechanical power. Many girls are withdrawn from school to attend to such domestic chores with lifelong harm to their literacy and economic opportunities. Energy services such as heat for cooking and power for food processing are therefore particularly important for women and girls.

<sup>12</sup> These are not the only variables that influence each other. Other factors influence each variable.



## 4 Energy helps achieve the MDGs in various ways

**Although there is no specific MDG relating to energy, the MDGs cannot be met without affordable, accessible and reliable energy services.** Higher quality and larger quantities of energy services than current approaches provide are required to meet the MDG challenge. The MDGs emphasize poverty reduction in terms of income and highlight the importance of improved health, universal primary education, women's empowerment and gender equality, and environmental sustainability. Thus, the contribution of energy services to meeting the MDGs consists of both the direct impact of energy on raising incomes and the indirect impacts on education, health, environment and gender issues. The JPOI called for the international community to work together at all levels to improve access to reliable and affordable energy services for sustainable development sufficient to facilitate the achievement of the MDGs. This section expands on how these energy services help achieve each MDG.

### Goal 1

**Eradicate extreme poverty and hunger by reducing the proportion of people whose income is less than \$1 a day**

**Access to modern fuels and electricity helps achieve this goal by increasing household incomes through economic development and reducing the burden of time-consuming domestic labour.** Eradicating hunger requires much greater access to modern fuels and stoves to cook food and access to energy for modern irrigation technologies to improve agricultural output. Energy services greatly enhance food security, increase labour productivity and create employment. Fossil and biomass fuels power motorized transportation of

goods between outlying areas and markets – and power agricultural activities that expand crop production. Electricity supply enables poor households to engage in activities that generate income – by providing lighting that extends the workday and by powering machines that increase output. Electricity supply can increase these incomes by providing telecommunications that help farmers and industrial workers order inputs, market products, and keep track of prices for both. The JPOI affirmed that in developing countries, sharp increases in energy services are required to improve the standards of living and have positive impacts on poverty eradication.<sup>13</sup>

### Goal 2 and 3

**Achieve universal primary education and promote gender equality and empowerment of women**

**For poor people everywhere, access to modern fuels and electricity frees time for education—time that would otherwise be spent collecting traditional fuels, fetching water, processing food or in other physical work.** Motive power can free women and girls from hours of food grinding and threshing to meet basic subsistence requirements. Energy services can help free children to attend school by boosting the productivity of adult labour to substitute for child labour.

**Access to electricity contributes to the empowerment of women.** Electric lighting in homes enables both adults and children to study after their daytime activities, and thereby increases the likelihood that women will read and children will attend school regardless of their income class. Electricity supply in schools enables the use of educational media and communications, including information and communication technologies. In rural areas modern fuels and electricity help retain teachers by improving their quality of life. Women in households with electricity are

<sup>13</sup> Johannesburg Plan of Implementation, paragraph 9(g).

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more likely to have access to information about gender issues from radio and television than women in households without electricity.

**Increasing access to energy brings major benefits for women and girls – in health, education, and productive activities.** Modern cooking fuels free women from the physical stresses of carrying large loads of fuelwood and from exposure to debilitating fumes from traditional cooking stoves. Modern fuels and electricity for lighting and motive power enable women to develop productive activities that increase their incomes. Finally, the tendency for women and men to use different energy services should be recognized in the design of policies and programmes, to ensure that both groups obtain benefits from access to modern fuels and electricity. Better health, higher income and improved literacy all help to empower women.

## Goals 4, 5 and 6 Reduce child and maternal mortality and reduce diseases

**Modern fuels and electricity help improve health in many ways.** By powering equipment for pumping and treating water, these services contribute to a clean water supply which reduces the incidence of waterborne diseases, especially in slums. Providing heat to boil water also reduces these diseases – the leading cause of child mortality. By boosting agricultural production and household incomes, modern fuels and electricity help reduce the malnutrition that is such a big factor in child mortality. By helping households to switch from stoves that burn wood and dung to modern appliances that burn kerosene, liquefied petroleum gas or modern biomass fuels, the poor can avoid emissions that cause respiratory ailments which are the fourth leading health risk in developing countries. This switch would reduce the number of women and children that die from indoor air pollution, estimated to be around 1.6 million annually<sup>14</sup>.

**Modern fuels and electricity help improve health indirectly.** They enable health clinics to refrigerate vaccines, operate and sterilize medical equipment, and provide lighting so that clinical services can be provided after sunset. They allow the use of modern tools of mass communication needed to fight the spread of HIV/AIDS and other preventable diseases. By creating productive opportunities in homes and businesses that raise incomes, they also improve people's health through higher living standards and increased disposable income to pay for health services and medicines. Access to electricity helps attract and retain health and social workers in rural areas by improving their living conditions. Access to electricity also contributes indirectly to better health for children when it helps educate mothers to read medicine instructions and engage in the health care system.

## Goal 7 Ensure environmental sustainability

**The essential beneficial role of energy as an input to achieving this MDG is not reflected in the MDG framework. Energy use and production, however, affect local, regional and global environments.** Fuelwood and charcoal use in households and industries is unsustainable when it leads to land degradation from fuelwood gathering and to indoor air pollution from biomass combustion. Likewise, combustion of fossil fuels can lead to outdoor air pollution, acidification of land and water and emissions of greenhouse gases. In all these cases, the environmental damage and its harmful effects can be reduced by increasing energy efficiency, introducing modern technologies for energy production and use, substituting cleaner fuels for polluting fuels, and introducing renewable energy.

<sup>14</sup> World Health Organization. 2002. *The World Health Report 2002*. Geneva.

## 5 Overcoming the challenges for improving energy services for the poor

**Developing countries face major challenges for improving the performance of their energy suppliers in ways that benefit energy users. The energy challenges affect developing countries differently according to their income levels, and they impact income groups differently within these countries.** These challenges have social, economic, financial, institutional, and environmental dimensions.

- Some developing countries have met these challenges with some success since the 1990s, partly by attracting private investment. These countries have an extensive energy infrastructure, basic service coverage and are increasing their energy efficiency over time in relation to gross domestic product (GDP).
- The least-developed countries, such as those in Sub-Saharan Africa, face low and stagnant growth in access to modern fuels and electricity. The share of households with access has sometimes even declined as the population has grown faster than energy supply. The challenges faced by low-income countries are particularly daunting. The majority of all primary energy comes from traditional fuels and biomass, and typically less than 10 percent of the population in these countries is electrified, mostly limited to urban areas.

These challenges fall into four main groups:

- (i) **Widening access to energy services for the poor as a means of supporting development overall.** Improving and extending

access to energy services, especially those generated from electricity and household fuels, for the urban and rural poor is one of the most urgent tasks that lie ahead.

- (ii) **Enhancing environmental performance of energy supply and consumption.** Adequate, timely measures can reduce the present environmental and health hazards related to energy supply and use.
- (iii) **Mobilizing financial resources to expand energy investments and services.** The required levels of investments needed to meet the future energy demand in developing countries are much higher than current annual outlays. They also account for a much larger share of GDP compared to industrialized countries.
- (iv) **Linking energy planning to goals and priorities in other sectors and sustaining political commitment to sound energy sector management and governance.** This commitment is a prerequisite for a well-performing energy sector equipped to address pressing economic, social and environmental needs.

### 5.1 Widening access to energy services for the poor

**Most developing countries have formidable institutional and regulatory barriers that prevent energy companies from delivering modern fuels and electricity to the poor.** Many lack comprehensive energy strategies or have not prioritized access for the poor in them. The main reasons include both public utilities that are inefficient and private sector companies that see no incentive or profit to serve these groups. Overcoming the barriers for both private and public service providers requires policies aimed at serving the poor by viable, well

# The Energy Challenge for Achieving the Millennium Development Goals

run service companies,<sup>15</sup> but without distorting other policies for the energy sector. The design of these policies depends on the country context, but there is strong evidence that financing or subsidies without institutional and regulatory development does not solve the problem.

**The barriers to providing energy services to the poor affect rural and urban areas alike, but the policy solutions differ between rural and urban areas.**

In rural areas, policy solutions include:

- **Increase the efficiency of biomass fuel use and promote the use of modern fuels** such as kerosene and LPG for meeting the cooking needs of the poor.
- **Increase access to efficient stoves for both biomass and modern fuels**, depending on fuel availability and affordability, as a means to save resources, reduce pollution, increase food availability and improve overall health.
- **Subsidize capital costs for rural grid electrification and develop off-grid solutions for providing energy services**, since the low density of demand for services such as lighting, refrigeration, information and telecommunications would otherwise raise tariffs for recovering the costs of electrification to unaffordable levels for the rural poor.
- **Target subsidies to access – not consumption**, or in other words target ways to bring down the one-off fixed costs associated with energy use such as stoves, lanterns and other appliances, rather than the recurring costs of fuels and electricity. General subsidies for energy use would impose unsustainable burdens on public financial resources.

In urban areas, policy solutions include:

- **Remove market barriers to trade in kerosene, LPG, biomass fuels and charcoal for meeting the cooking needs of the poor**, especially barriers to entry by new service providers, so that competitive forces reduce the possibility of high prices and poor service quality by energy suppliers.
- **Provide supportive regulatory policies for meeting the need for energy services other than cooking, in particular to make expansion of access to electricity by poor households financially sustainable.** Relatively little investment in strengthening the infrastructure already in place is needed for this purpose, except for some capital expenditure for extending the power grid to new peri-urban areas occupied by the poor. But even with the lower capital costs and higher incomes in urban areas relative to rural areas, many urban poor often cannot afford the connection fees or monthly charges for electricity.

**Low cost services should be emphasized in policies for meeting the poor's energy needs.** These policies should support a wide range of technologies including improved cooking stoves, low cost electricity distribution, smaller gas cylinders, and use of renewable energy for replacing kerosene for cooking in isolated areas including reliable biogas systems in rural areas rich in livestock. They should allow some flexibility in regulated service standards, since the levels of service applied to the main energy markets (such as LPG supplied in large consignments, urban standards of electricity service, and high quality stoves) are generally unaffordable for the poor. Special programmes for service delivery can be developed to cater to the needs of the poor, by adopting lower construction and supply reliability standards to reduce the costs of extending access and delivering services to the poor, but without

<sup>15</sup> There are many good examples around the world of rural electrification and companies that provide kerosene and LPG to a broad part of the population.



compromising safety and environmental standards. These programmes should ensure that both women and men understand and are able to benefit from new products, services and technologies.

**Removing obstacles to interfuel substitution is important for widening access to energy services for the poor.**

Urban households, as their incomes grow, tend to substitute more efficient modern energy carriers (such as LPG and electricity) for traditional fuels (such as wood). Apart from higher efficiency, this interfuel substitution can bring important welfare benefits by reducing indoor air pollution and alleviating pressure on wood resources around urban areas. Taxes on modern fuels and energy appliances should be avoided if they deter better-off users from switching to modern fuels from fuelwood, and thereby indirectly leading to higher prices for fuelwood that hurt the poor.

**Reforms to energy markets should focus on removing obstacles to the efficient functioning of these markets.**

These reforms include providing for efficient entry and exit to these markets for energy suppliers and users, eliminating restrictions or bottlenecks on the import and distribution of modern fuels and electricity, removing market distortions that unfairly favour one supply source over another, and pricing energy to cover the cost of both operations and investments incurred in the delivery of energy services. They should establish sound regulation of these markets with specific provisions for rural and off-grid areas, various types of private providers of energy services, and promotion of regional energy production and supply cooperation under market conditions. The reforms should separate institutionally the responsibilities for policy formulation and market regulation.

## 5.2

### **Enhancing environmental performance of energy supply and consumption**

**Enhancing environmental performance of energy supply and consumption helps the poor greatly since the poor suffer most from environmental degradation.**

Widespread damage to the health of the urban poor is caused by outdoor pollution from fossil fuel combustion in power generation plants, industrial facilities and motorized vehicles. The poor are particularly vulnerable to land degradation, water pollution, local and regional air pollution and emissions of heavy metals arising from extraction, production and use of fossil fuels.

**The poorest countries are generally acknowledged to be among the most vulnerable to the impacts of climate change.**

Everybody is potentially at risk from climate change effects caused by burning fossil fuels as well as agricultural practices, industrial processes and deforestation. Meeting the energy needs of the poorest countries will most probably involve increased use of fossil fuels, but in insufficient quantities to significantly increase global emissions of greenhouse gases. These countries could mitigate their emissions over the long term by using non-fossil energy technologies to meet their demand for energy services.

**Policies and programmes are needed to facilitate the widespread development and adoption of environmentally friendly technologies for energy production and use, including low-carbon technologies.**

They can significantly mitigate the increase in emissions in the rapidly industrializing developing countries from their large investments in power generation for example, and their overall economic growth. Priorities include pricing energy to account for environmental costs, removing subsidies that increase harmful emissions, adopting incentives for beneficial new technologies during

# The Energy Challenge for Achieving the Millennium Development Goals

their market scale up stage, and promulgating regulatory standards for energy efficiency. They require the participation of all stakeholders – governments, the private sector, civil society, non-governmental organizations, the donor community and international programmes such as the Global Environment Facility and various carbon funds and environmental financing mechanisms.

**Improved stoves that burn traditional fuels more efficiently, give off less smoke, and vent smoke outside the home are important means for reducing indoor air pollution and its harmful health effects on the poor.**

More than half the population in developing countries still relies on fuelwood, crop residues and dung for cooking and heating and is thus exposed to indoor air pollution that causes illness and even death. Relatively simple and inexpensive stoves can reduce the fuel needed for cooking by as much as 30 percent. In cities where people rely heavily on purchased wood and charcoal and where energy prices are relatively high, fuel-efficient stoves can reduce the aggregate demand for wood, easing pressure on the surrounding land and conserving poor households' scarce cash income. In rural areas, more efficient stoves can release some of the time spent gathering fuelwood and reduce pressure on local biomass resources. Efficient fuelwood stoves are more affordable for poor people than switching to new stoves that burn kerosene or LPG.

**Principles for implementing successful improved stoves programmes have been developed over the past twenty five years.**

They include focusing efforts on regions with biomass fuel shortages or, where such fuels were commercially available, providing subsidies for supporting services such as development, manufacture and distribution of improved cooking stoves rather than for purchasing the stoves themselves. Ensuring significant interaction between those designing the stoves and those using them, relying on mass-produced stove

components to reduce costs, and basing programmes on a long-term government commitment rather than on short-term international donor interests are also important principles. These programmes should harness private entrepreneurship.<sup>16</sup> They should also specifically target women as the primary users of stoves, taking into account that many women may not be literate.

## 5.3

### **Mobilizing financial resources to expand energy investments and services**

**Developing and transition countries face huge investments to meet their overall energy needs.**

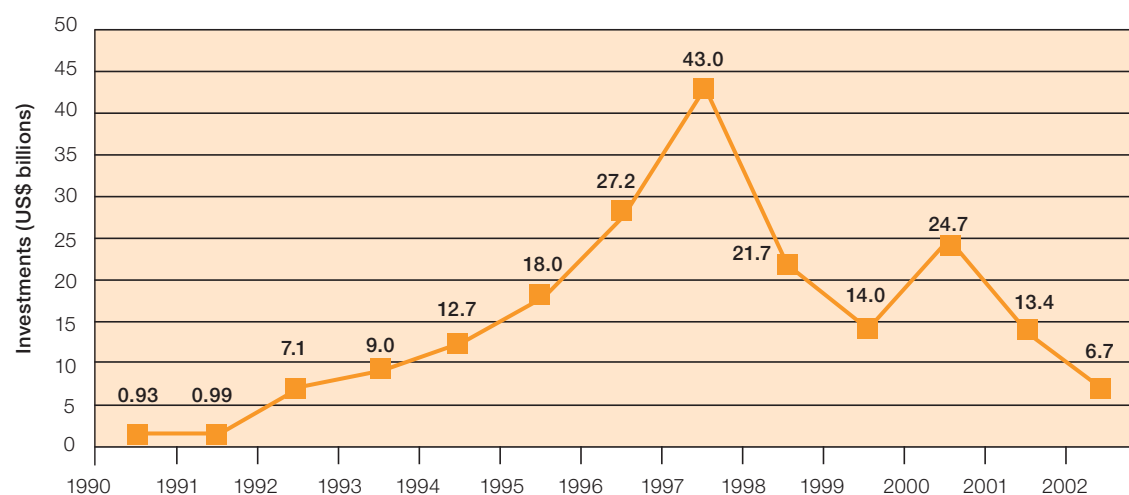
These needs include the poor's needs, since the least-cost way of supplying much of the modern fuels and electricity needed by the poor is by means of the main energy production and delivery systems. These investments are required to support the economic growth that is central to sustained poverty reduction, as well as to help meet MDGs directly.

- The International Energy Agency (IEA) estimates that developing and transition countries as a group face the following cumulative investment requirements in their energy sectors (oil, natural gas, coal, electricity): US\$2.4 trillion (in 2000 year dollars) in the period 2001 to 2010, US\$3.2 trillion in the period 2011 to 2020, and US\$4 trillion the period 2021 to 2030.<sup>17</sup> These amounts reflect IEA's view that nearly 70 percent of the increase in global primary energy demand will occur in these countries. They account for a much larger share of gross domestic product compared to OECD countries.

- US\$7.9 trillion of this amount is needed for investment to meet growth in domestic demand for energy, and the remaining US\$1.7 trillion of this total is for investment to

<sup>16</sup> When improved stove programmes simply gave away the cook-stoves, the programmes faltered, but when the programmes involved local private manufacturers and dealers, they became sustainable.

<sup>17</sup> Source: International Energy Agency. 2003 *Insights. World Energy Investment Outlook*. Paris.



Source: PPI Database  
World Bank

Rise and Fall in Private Power Investments in Developing Countries 1990 – 2002

**Figure 4. Trends in Private Investments in Electricity in Developing Countries 1990-2002 (US\$ billions)**

export oil and natural gas to OECD countries. Investment in electricity supply accounts for 73 percent of this total (US\$5.8 trillion).

- Under this investment scenario, IEA estimates that access to electricity is extended between 2000 and 2030 to about 2 billion people in developing countries. The electrification rate increases steadily from 64 percent in 2000 to 78 percent in 2030, with population increasing from 4.6 billion to 6.6 billion. The number of people without access therefore declines slightly under this scenario, from 1.6 billion in 2000 to 1.5 billion in 2030.
- In order to achieve universal electricity access (100 percent) by 2030 in developing countries, IEA estimate that an additional investment of US\$665 million would be required to the US\$5.8 trillion under the reference scenario.

**Foreign private investors perceive little market opportunity and great risk in most developing countries.** They have

largely withdrawn from the power sector since 1998 because projected cash flows based on affordable energy prices and sales levels are too low to balance their perceived risks from investing in these markets. Figure 4 shows the rise and fall in total private investment in electricity in developing countries. This total covers both investments in new power supply capacity (“greenfield” projects) and investments in ownership stakes in power suppliers. These components account for roughly equal proportions of the total, and their trends are similar to the total trend.

**Public financing from both domestic resources and official development assistance, combined with private entrepreneurship and investment, are needed to develop energy services for the poor.**

The public sector will remain an important – and often the main – source of financing for investment over the medium term for the energy sector where the country or regulatory risk deters private investors. Public sector resources will remain crucial for investing in energy service delivery for the poorest groups and marginal areas due to private

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sector perception of risk, even within reformed markets. Governments should create fiscal space for these investments, so that other publicly financed programmes that benefit the poor are not displaced by them under the general scarcity of public financial resources.

**Public service providers need incentives to operate efficiently through sound corporate governance and sector regulation.**

These incentives should be applied through transparent price-setting mechanisms that recover the full costs of service. They are also important for encouraging local investors to enter into energy sector investments. Public service obligations placed on these providers to help the poor should not undermine the providers' ability to generate cash internally for maintaining a sound capital structure.

**Domestic financial resources should be developed since they are becoming important for investments in energy services, including for the poor.**

They provide micro-credit for small and medium enterprises that supply energy and energy efficiency services, as well as consumer credit for meeting the costs of household energy connections and appliances.

**New forms of risk sharing between the private and the public sectors should be developed under public-private partnerships,**

to enable governments attract the private sector to provide energy services for sustainable development. This type of risk sharing could focus on areas where the private sector is reluctant to take on substantial risks of economically worthwhile developments.

**Official development assistance should be used strategically to help fill the gap between financing needs and availability for investments in energy supply capacity.**

One way is to improve the terms on which foreign direct investment flows to the ener-

gy sector by refining and accelerating the use of political risk guarantees for energy investments. Another way is to revive dedicated energy programmes in the framework of development assistance programmes, such as by targeting export credits towards financing sustainable energy initiatives in developing countries.

## 5.4

### **Linking energy planning to goals and priorities in other sectors and sustaining political commitment to sound energy sector management and governance**

**To ensure that the poor benefit fully from greater access to energy, energy development programmes should be coordinated with social and economic development programmes.**

Introducing affordable energy services is not enough by itself to ensure socio-economic progress. Other factors are also crucial. Improving electricity supply for agro-industrial production alone will have little effect on local welfare, for example, when development efforts fail because of poor crop pricing and marketing policies. When policymakers assess the prospects for policies focused on improving energy supplies, they also need to pay attention to the distinct energy needs of women as well as men, sources of energy demand, health and education programmes, macroeconomic and pricing policies, and complementary infrastructure such as roads, water supplies, and sanitation.

**WSSD called on governments to develop national energy policies and regulatory frameworks necessary to help create the economic, social and institutional conditions in the energy sector to improve access to energy services in rural, peri-urban and urban areas.**

In many countries comprehensive energy planning is not carried out. Much energy policy remains restricted to electricity or to urban areas, and in some



cases to on-grid applications only. There has already been international agreement on the need to integrate energy considerations such as energy efficiency, affordability and accessibility into the policies of major energy consuming sectors (eg, industry, transport, agriculture, education and health)<sup>18</sup>. Tools and methodologies to support this cross-sectoral and integrated approach to energy planning are needed to evaluate the short and long term costs of energy options to ensure that those interventions most directly related to the achievement of the MDGs are prioritized in national planning exercises.

**Well-targeted subsidy and taxation policies are needed to help bring affordable energy services to the poor and to enhance their energy security.**

Subsidies should focus on the 'public good'/social safety net component of energy services, using transfer mechanisms that are targeted, predictable and transparent to benefit the poor, and they should be fully funded. They should also take into account gender differences and inequalities in access and use of energy resources. In countries that impose high taxes on imported petroleum fuels, lowering these taxes when oil prices are high and volatile is a way to protect the poor. Helping and protecting poor households requires governments to balance short term support in terms of subsidies with the longer term need to let market forces influence the choice of fuels and energy practices, and also to let sound fiscal policies influence government funding of subsidies.

**Governments could also use subsidies to encourage the development of affordable energy services for the poor under good business practices,** yet avoid distorting energy markets by taxing or subsidizing some fuels much more than others. This can be achieved by financing the development of ways to deliver affordable services (cooking stoves, gas bottles, power lines to houses, etc.), and setting user charges to cover supply costs net of subsidies.

**Meeting the major specific challenges of expanding energy services to rural areas usually requires dedicated institutional arrangements.**

A common problem for the rural poor is dispersion of responsibilities for rural energy among numerous ministries and agencies, to the extent that rural energy needs receive too little attention among the demands of mainstream energy sectors. Hence an interministerial and/or interdisciplinary mechanism supported by a dedicated agency is required that can tackle the essentially local nature of many challenges for delivering rural energy. This institutional arrangement would be important for formulating policies concerning energy and the MDGs in rural areas, such as for the roles of public and private sectors, incentives and subsidies, appropriate quality standards and prioritizing the areas covered by these policies. This arrangement is suitable for ensuring co-operation with agencies in other sectors such as health and education that are working in this field, as well as with the main energy agencies dealing with rural energy services.

**Efforts to decentralize decision-making and energy investments may improve delivery of local energy services in peri-urban and rural areas.**

Local communities should participate in the design and execution of programmes to extend access to energy services. Their participation is necessary for ensuring sustainable management of local renewable energy resources, such as biomass, in coordination with other energy forms suitable for meeting the energy needs of rural communities at least cost. Local entrepreneurs should be helped to develop roles in providing energy services under new business models. Women's groups should participate in identifying needs and priorities to address gender inequalities and differences in access to and use of energy resources.

**The poor also need to be protected during reforms to the energy sector.** Without enough local involvement in designing and imple-

<sup>18</sup> Johannesburg Plan of Implementation, paragraphs 9 (e) and 20 (b).

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menting energy reforms, reformers run the risk of failing to protect the interests of the poor as well as meet public expectations for reform. Even well-meaning energy reforms can cause difficulties for the poor in the short run because energy accounts for an important share of their cash expenditures. Similarly, privatization of energy service companies should include provisions to improve access to service for the poor, since otherwise the benefits of reform may not reach them,<sup>19</sup> which would weaken public support for privatization. Recognizing that women form the majority among the poor, these reforms should take gender inequalities into account.

**Governments therefore face tough public policy choices.** The situation in the energy sector calls for tough choices and sustained commitment to public policies for removing institutional and regulatory barriers, designing and applying subsidies, ensuring local involvement in the design and delivery of energy services, and protecting the poor during reforms. Energy sector development and performance has progressed only in countries that have had sustained political commitment to sound sector policies over the years. Reform of energy markets and the commitment of fiscal resources to expand access to the rural areas often have to be successfully pursued for several decades.

**The role of energy and the costs of energy services should be factored into overall national development strategies including poverty reduction strategies (PRSS) and MDG strategies and campaigns for achieving development goals.**

Achieving the MDGs requires explicit costing of energy inputs required to reach each goal. A number of countries have started to factor energy considerations and service delivery strategies into national development frameworks, due to the critical importance of energy as a facilitator of sustainable development. These issues are conspicuously absent, however, from the strategies prepared to date. Moreover, the limited reference

to energy issues in the PRSSs focus on large infrastructural developments, and they tend to neglect rural energy and the small-scale developments that are critical for widening access to modern fuels and electricity for the poor.

## 6 Conclusion

The international community will discuss energy issues in the upcoming two year cycle of the Commission for Sustainable Development (CSD) in 2006 and 2007. Energy issues are high on the agendas of international business, civil society, multilateral development banks as well as the programmes and agencies of the United Nations system. As this paper has illustrated, key actions are needed at the global, regional and national levels to use energy as an instrument to support sustainable development and poverty reduction objectives, and in particular, to support the achievement of the MDGs.

<sup>19</sup> Policy options for protecting the poor during reform include lifeline tariffs for a small amount of monthly consumption, zonal subsidies for low income neighborhoods, service obligations in concession agreements and in the regulatory framework, and phasing tariffs increases over time instead of in a large step.

# UN-Energy

UN-Energy is the principal interagency mechanism in the field of energy that helps ensure (a) coherence in the UN system's multi-disciplinary response to WSSD; and (b) collective engagement on non-UN stakeholders.

The following agencies, programmes and organizations constitute the membership of UN-Energy:

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Economic Commission for Europe	<a href="http://www.unece.org">www.unece.org</a>
Economic Commission for Latin America and the Caribbean	<a href="http://www.eclac.cl">www.eclac.cl</a>
Economic and Social Commission for Asia and the Pacific	<a href="http://www.unescap.org">www.unescap.org</a>
Economic and Social Commission for Western Asia	<a href="http://www.escwa.org.lb">www.escwa.org.lb</a>
Food and Agriculture Organization	<a href="http://www.fao.org">www.fao.org</a>
International Atomic Energy Agency	<a href="http://www.iaea.org">www.iaea.org</a>
United Nations Human Settlements Programme (HABITAT)	<a href="http://www.unhabitat.org">www.unhabitat.org</a>
United Nations Conference on Trade and Development	<a href="http://www.unctad.org">www.unctad.org</a>
United Nations Development Programme	<a href="http://www.undp.org">www.undp.org</a>
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United Nations Environment Programme	<a href="http://www.unep.org">www.unep.org</a>
United Nations Framework Convention on Climate Change	<a href="http://www.unfccc.int">www.unfccc.int</a>
United Nations Industrial Development Organization	<a href="http://www.unido.org">www.unido.org</a>
United Nations International Research and Training Institute for the Advancement of Women (INSTRAW)	<a href="http://www.un-instraw.org">www.un-instraw.org</a>
World Health Organization	<a href="http://www.who.org">www.who.org</a>
World Meteorological Organization	<a href="http://www.wmo.ch">www.wmo.ch</a>
World Bank	<a href="http://www.worldbank.org">www.worldbank.org</a>
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# The Energy Challenge for Achieving the Millennium Development Goals

## Main messages

- Energy services such as lighting, heating, cooking, motive power, mechanical power, transport and telecommunications are essential for socio-economic development, since they yield social benefits and support income and employment generation.
- The poor obtain energy services by gaining access to modern fuels, electricity and mechanical power. This access is particularly important for women and girls since they are often the most affected by inadequate energy services.
- Reforms to the energy sector should protect the poor, especially the 1.1 billion people who live on less than \$1 per day, and take gender inequalities into account in recognizing that the majority of the poor are women.
- The environmental sustainability of energy supply and consumption should be enhanced to reduce environmental and health hazards. This requires measures that increase energy efficiency, introduce modern technologies for energy production and use, substitute cleaner fuels for polluting fuels, and introduce renewable energy.
- Large amounts of financial resources need to be mobilized for expanding energy investments and services in developing countries. They account for a much larger share of gross domestic product compared to OECD countries. Public sector resources will remain crucial for investing in energy service delivery for the poor due to the private sector's limited appetite for risk in emerging markets.
- The role of energy and the costs of energy services should be factored into overall national economic and social development strategies, including poverty reduction strategies and MDG campaigns, as well as to donor programmes in order to reach development goals. Energy planning must be linked to goals and priorities in other sectors.