

Section 2



**Household
Energy and
the Millennium
Development
Goals**

Energizing the Millennium Development Goals

"We will spare no effort to free our fellow men, women and children from the abject and dehumanizing conditions of extreme poverty, to which more than a billion of them are currently subjected."

United Nations Millennium Declaration

In September 2000, the largest-ever gathering of Heads of State committed themselves to making the right to development a reality for everyone. The Millennium Declaration promotes a comprehensive approach that tackles a broad range of problems simultaneously. By 2015, the world aims to have achieved eight goals for combating poverty, hunger, disease, illiteracy, environmental degradation and discrimination against women.

There is no Millennium Development Goal on energy. Yet, energy poverty is one of the many manifestations of poverty and a prevailing feature of deprived rural and urban households in developing countries (Figure 6). Lack of energy, in particular lack of access to modern cooking fuels and electricity, already represents a bottleneck, holding back progress towards achieving the goals. Rather than squeezing through the bottleneck, the United Nations Millennium Project proposes to confront the energy issue directly (see The need for a quantum leap). Improved energy services can reduce child mortality rates, improve maternal health, reduce the time and transport burden on women and young girls, and lessen the pressure on fragile ecosystems (Table 2).

Halving the number of people without effective access to modern cooking fuels by 2015 and making improved cooking stoves widely available represents a stepping stone towards achieving the Millennium Development Goals.

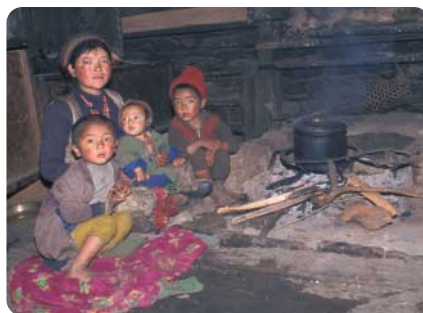


Figure 6: Poverty and energy poverty go hand in hand
Percentage of population using solid fuels in some of the world's largest countries, by income quintiles in urban (top) and rural (bottom) locations, 2003

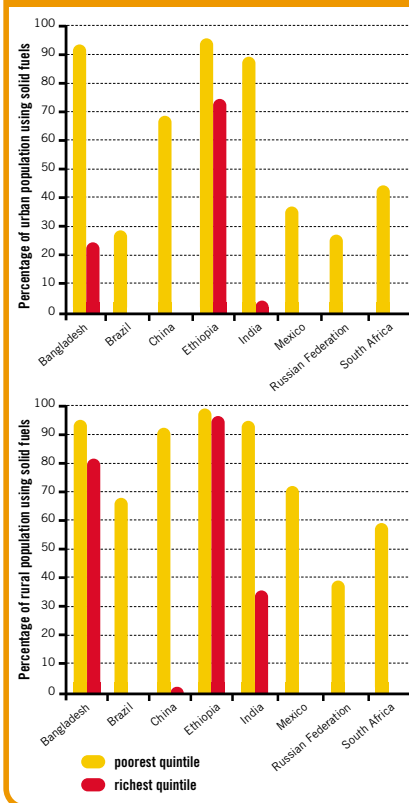


Table 2: Cracking the energy code

Millennium Development Goals	Contribution of improved household energy practices
Goal 1: Eradicate extreme poverty and hunger	<ul style="list-style-type: none"> Saving time spent being ill or having to care for sick children will cut health care expenses and increase earning capacities. Where fuels are purchased, increasing fuel efficiency and thus cutting down on the quantity of fuel needed will ease constraints on already tight household budgets. Improved household energy technologies and practices will open up opportunities for income generation. Access to electricity will provide a source of light for economic activities in the evening and a source of energy for operating, for example, a sewing-machine or refrigerator.
Goal 2: Achieve universal primary education	<ul style="list-style-type: none"> With less time lost in collecting fuel and due to ill health, children will have more time available for school attendance and homework. Better lighting will allow children to study outside of daylight hours and without putting their eyesight at risk.
Goal 3: Promote gender equality and empower women	<ul style="list-style-type: none"> Alleviating the drudgery of fuel collection and reducing cooking time will free women's time for productive endeavours, education and child care. Reducing the time and distance that women and girls need to travel to collect fuel will reduce the risk of assault and injury, particularly in conflict situations. Involving women in household energy decisions will promote gender equality and raise women's prestige.
Goal 4: Reduce child mortality	<ul style="list-style-type: none"> Reducing indoor air pollution will prevent child morbidity and mortality from pneumonia. Protecting the developing embryo from indoor air pollution can help avert stillbirth, perinatal mortality and low birth weight. Getting rid of open fires and kerosene wick lamps in the home can prevent infants and toddlers being burned and scalded.
Goal 5: Improve maternal health	<ul style="list-style-type: none"> Curbing indoor air pollution will alleviate chronic respiratory problems among women. A less polluted home can improve the health of new mothers who spend time close to the fire after having given birth. A more accessible source of fuel can reduce women's labour burdens and associated health risks, such as prolapse due to carrying heavy loads.
Goal 6: Combat HIV/AIDS, malaria and other diseases	<ul style="list-style-type: none"> Lowering levels of indoor air pollution levels can help prevent 1.6 million deaths from tuberculosis annually.
Goal 7: Ensure environmental sustainability	<ul style="list-style-type: none"> Where biomass is scarce, easing the reliance on wood for fuel through more efficient cooking practices will lessen pressures on forests. Moving up the energy ladder and using improved stoves can increase energy efficiency and decrease greenhouse gas emissions.
Goal 8: Develop a global partnership for development	<ul style="list-style-type: none"> Recognition in development agendas and by partnerships of the fundamental role that household energy plays in economic and social development will help achieve the Millennium Development Goals by 2015.

Trapped by energy poverty

Extreme poverty remains a daily reality for more than 1 billion people who survive on less than 1\$ per day¹. Being poor means getting up hungry in the morning, anxious where to find enough food to make it through to the evening (Box 2). Being poor means being forced to accept any work there is and being denied a good school education. Being poor means living in an overcrowded smoky dwelling that lacks sufficient water for drinking, hand-washing and personal hygiene. Being poor means not having the freedom to make choices.

Millennium Development Goal 1, to eradicate extreme poverty and hunger, represents the essence of the Millennium Declaration. Dependence on polluting inefficient household energy practices stops people from breaking out of the vicious cycle of poverty.

Good health is crucial as household livelihoods rely on the health of family members. Being ill as a result of indoor smoke or having to care for sick children reduces earnings and leads to additional expenses for health care and medication. Broken bones, backache and snake bites endured during fuel collection add to the problem. Reports from war zones and refugee camps provide sad testimony of girls and women being assaulted when they leave the relative safety of their homes to collect fuel.

Where fuel is purchased, for example in urban slums in Africa and Asia, spending money on large quantities of inefficient fuels places severe constraints on household budgets. Poor households tend to spend a larger percentage of their income on energy than well-off households (Figure 7). Where fuel is collected, women and children lose many hours a week searching for wood branches and twigs (Figure 8). Fuel collection is not necessarily a daily task, as the duration and frequency of collection varies depending on the availability of wood for use as a fuel. In rural India,

Box 2: Too little wood for too many people: household energy and hunger

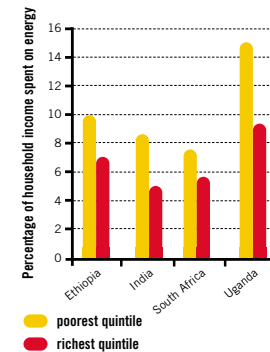
Where wood supplies are scarce, unsustainable harvesting of fuel endangers agricultural production and threatens a stable supply of crops. Deforestation and ensuing erosion damage formerly fertile fields; this is particularly true where trees are felled for charcoal production to supply urbanizing areas of Africa with fuel. Resorting to dung as a lower-grade fuel interrupts the normal composting process and diverts the dung from being used as a natural soil fertilizer. In the absence of any chemical fertilizers, this will ultimately reduce field productivity.

For these reasons, improving household energy practices will also boost agricultural productivity and food security. By restoring natural soil fertility, they reduce expenditure on chemical fertilizers. Higher fuel efficiency frees women's time for growing food and tending animals.

for example, daily fuel collection time ranges from only 20 minutes per day in Andhra Pradesh to more than one hour per day in Rajasthan, which is mostly covered by desert. Cooking, serving foods and washing the soot-laden pots adds to this time burden, eating up about three hours of women's time every day.

Alleviating the drudgery of collecting fuel far from home and easing the task of cooking through ownership of more efficient devices can free women's time for productive endeavours, education, child care and relaxation. With less time wasted on collecting wood and being ill, children will have more time available to attend school, do their homework and enjoy childhood. Finally, involving women in household energy decisions promotes gender equality and empowers women. Owning a less-polluting stove raises a woman's prestige – both by being a sign of wealth and, indirectly, through providing a soot-free kitchen environment.

Figure 7: Energy – a major expenditure for poor households

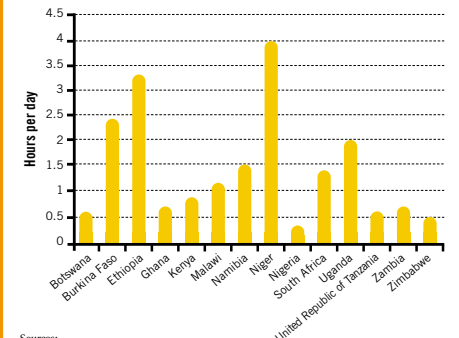


Adapted with permission from: International Energy Agency, OECD, *World Energy Outlook 2002*. Paris, International Energy Agency and OECD, 2002. Table 13.1.



Figure 8: Time ticking away

Daily hours that women spend collecting fuel in different African geographical settings, by country, 1990–2003



Sources:
Dutta S. Energy as a key variable in eradicating extreme poverty and hunger: A gender and energy perspective on empirical evidence on MDG 1. In: *Gender as a key variable in energy interventions*. Draft background paper for ENERGIA/DIRD/KaR Research Project R8346. 2005. Available at: <http://www.energia.org/>
Hutton G, Rehfuess E, Tediosi F, Weiss S. *Evaluation of the costs and benefits of household energy and health interventions at global and regional levels*. Geneva, World Health Organization, in press.

¹ \$ Purchasing power parities (PPPs): These conversion rates equalize the purchasing power of different currencies by eliminating the differences in price levels between countries.

Women and children overlooked



"Her three children were blinking at me in the darkness from behind her skirt. The woman was extremely ill and had a racking cough, and I remember the blackness inside the home and the stench of wood smoke which was overpowering."

Hilary Benn, currently Secretary of State for International Development, United Kingdom, reminiscing about a visit to Northern Ethiopia

Over 10 million children aged under five years die every year – 99% of them in developing countries. "To reduce by two-thirds the under-five mortality rate between 1990 and 2015" may be the most ambitious of the Millennium Development Goals.

Globally, pneumonia remains the single most important child killer and is responsible for 2 million deaths every year (Figure 9). Newborns and infants are often carried on their mother's back while she is cooking, or kept close to the warm hearth. Consequently, they spend many hours breathing polluted air during their first year of life when their developing airways and their immature immune systems make them particularly vulnerable. Indoor smoke is one of the underlying causes and to blame for nearly 800 000 child deaths annually. These deaths are not equally distributed throughout the world: more than one third of the child deaths due to indoor smoke, that is 358 000 deaths, occur on the African continent, and another 288 000 child deaths occur in South-East Asia (Figure 10).

In most societies, women are in charge of cooking. Day after day, and often throughout the course of a lifetime, they spend many hours in the vicinity of the fire or stove. The acrid smoke depositing soot in their lungs is responsible for 511 000 of the 1.3 million deaths due to COPD among women worldwide per year. In contrast, only 173 000 of a total of 1.4 million deaths from COPD among men are due to indoor smoke (Figure 11). Inefficient household energy practices may be of particular significance to the health of pregnant women: carrying heavy loads during fuel collection may bring about prolapse during pregnancy, and exposure of the developing embryo to harmful pollutants may lead to low birth weight as well as stillbirth.

Users of solid fuels in developing countries tend to be poor and, especially in rural areas, are unlikely to live in the vicinity of health care facilities. Their ability to afford medical treatment and to seek medical care for themselves and their sick children is limited. Consequently, trying to reduce the number of deaths from pneumonia through treatment may not benefit the poorest of the poor.

And, even if a child is successfully treated for pneumonia, he or she will have to return to a home where high levels of indoor air pollution prevail in combination with other threats to health, such as overcrowding and an inadequate diet.

In contrast, switching to cleaner fuels and increasing fuel efficiency through better stoves can reduce health risks for all family members. Beyond curbing respiratory problems, a more secure household energy situation enables water to be boiled and thus helps reduce the incidence of water-borne diseases. It can also increase the number of hot meals consumed per day and thus improve food safety and nutrition. A closed, raised stove prevents infants and toddlers falling into the fire or knocking over pots of hot liquid and being burned or scalded.

Closing the household energy gap can therefore be a springboard for achieving the health-related Millennium Development Goals.

Figure 9: Pneumonia is a major child killer
Percentage of deaths in children under five years of age, by cause, 2000–2003

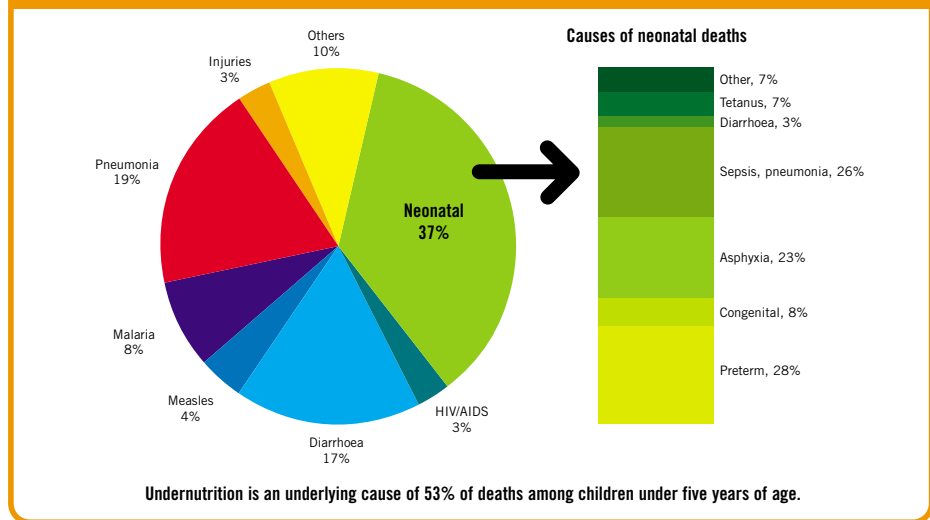
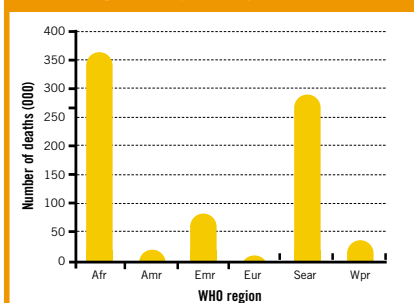


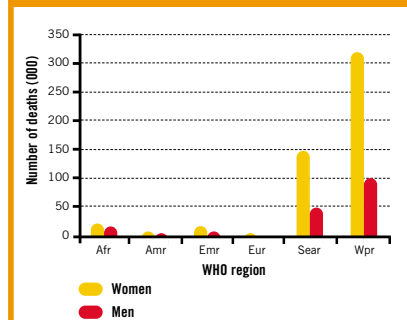
Figure 10: African and South-East Asian children suffer disproportionately

Deaths in children aged under five years from pneumonia and other acute infections of the lower respiratory tract due to indoor air pollution, by WHO region, 2002



WHO distinguishes between the following geographical regions: African Region (Afr); Region of the Americas (Amr); Eastern Mediterranean Region (Emr); European Region (Eur); South-East Asia Region (Sear); Western Pacific Region (Wpr).

Figure 11: Women most at risk
Deaths from chronic obstructive pulmonary disease due to indoor air pollution, by gender and WHO region, 2002



WHO distinguishes between the following geographical regions: African Region (Afr); Region of the Americas (Amr); Eastern Mediterranean Region (Emr); European Region (Eur); South-East Asia Region (Sear); Western Pacific Region (Wpr).



Stripping our forests, heating our planet



"Over the last 50 years, humans have changed ... ecosystems more rapidly and extensively than in any comparable period of time in human history, largely to meet rapidly growing demands for food, fresh water, timber, fibre and fuel ... The degradation of ecosystem services could grow significantly worse during the first half of this century and is a barrier to achieving the Millennium Development Goals."

Millennium Ecosystem Assessment, 2005

Human survival and prosperity are critically dependent on the environment. Complex ecosystems ensure a continuous supply of food and fresh water and provide wood and other natural resources for our use. They regulate our climate and protect us from floods and other natural disasters. Ecosystems have shown a remarkable capacity to accommodate more and more of our needs, yet, this very foundation of our existence is now threatened by population growth and the unsustainable use of natural resources.

2.4 billion people burn biomass fuels on a daily basis to boil water and to cook food. As a result 2 million tonnes of biomass are going up in smoke every day. This may not pose a problem where the growth of new trees outpaces human demand. Yet, where wood is scarce and the population is dense, wood collection can put considerable pressure on forests. During the 1990s, forest plantations rendered unproductive due to illegal cutting of wood for fuel were a common sight in China and provided the main motivation for the establishment of the Chinese National Improved Stoves Programme (see Rolling out household energy programmes: learning from the past). In geographical hotspots in parts of Latin America and South-East Asia, alarming rates of deforestation are leading to land degradation and desertification. Many countries in sub-Saharan Africa have witnessed the depletion of more than three quarters of their forest cover (Figure 12).

As plants, soils and oceans struggle to absorb rising emissions, carbon dioxide (CO₂) is building up in the atmosphere. This greenhouse gas is beginning to change our climate, leading to increased temperatures, changes in rainfall patterns and more frequent extreme weather events. The use of biomass fuels and coal for cooking and heating accounts for between 10% and 15% of global energy use. Yet household use of these fuels does not feature prominently in discussions on global warming and climate change. Moreover, because they are classified as renewable sources of energy, it is mistakenly assumed that biomass fuels are always harvested and used in a sustainable way.

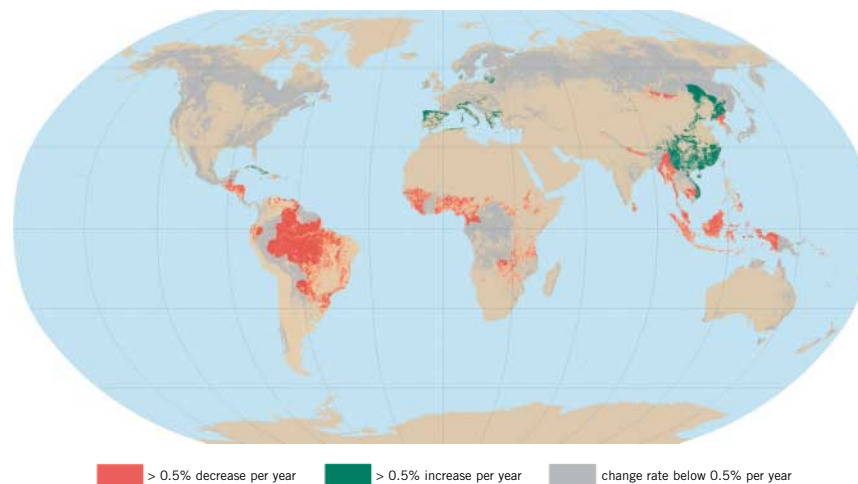
The burning of biomass fuels in poor homes in the developing world does not convert all fuel carbon into CO₂ and water. Open fires and traditional stoves tend to be highly inefficient and lose a large

percentage of the fuel energy as so-called products of incomplete combustion. These include the potent greenhouse gas methane (CH₄), which stays in the atmosphere for decades. When combining the emissions of CO₂ and other greenhouse gases in a single index, wood, crop residues and dung score much higher than fossil fuels, such as kerosene and liquefied petroleum gas (LPG) (Figure 13). This holds true, even where biomass fuels are renewably harvested. Notably, to deliver the same amount of energy, dung used in a biogas digester produces only 1% of the greenhouse gas emissions of those produced by dung burnt in a traditional stove (see Box 6).

Introducing household energy practices that, in addition to decreasing levels of indoor smoke, save fuel and reduce greenhouse gas emissions can make an important contribution to achieving Millennium Development Goal 7. This is why the proportion of the population using solid fuels is one of the indicators used to assess progress towards reversing the loss of environmental resources (see Figure 1).

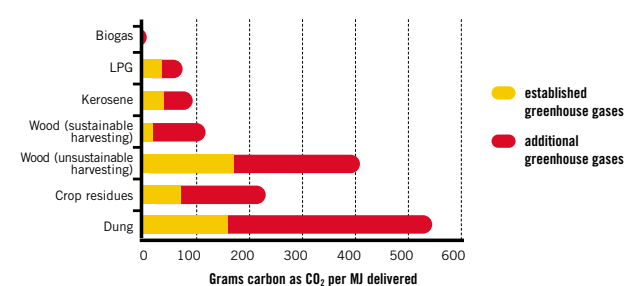


Figure 12: World's forests on the decline
Percentage change in forest cover per year, 2000–2005



Reproduced with permission from:
Food and Agricultural Organization. *Global Forest Resources Assessment 2005*. Available at: <http://www.fao.org/forestry/ifa2005>

Figure 13: Household energy and global warming



20-year greenhouse gas emissions in grams carbon as CO₂ emitted per megajoule (MJ)
 • based on established greenhouse gases, carbon dioxide (CO₂), methane (CH₄) and nitrogen dioxide (N₂O);
 • based on established and additional greenhouse gases, carbon monoxide (CO) and non-methane hydrocarbons (NMHC). Emissions from different fuel/stove combinations in India were systematically assessed using a standardized cooking test.

Adapted with permission from:
Smith KR, et al. Greenhouse implications of household stoves: an analysis for India. *Annual Review of Energy and the Environment*, 2000, 25:741–763

The need for a quantum leap



Energy enables basic human needs to be met: cooking food, providing light and hauling water from a well. Energy underlies all economic activity, such as growing crops, selling agricultural products in a shop and delivering them to consumers.

The United Nations Millennium Project highlights the role of energy services, in particular, modern cooking fuels, as a prerequisite for development (see Energizing the Millennium Development Goals). It calls on countries to adopt the following energy target to pave the way for achieving the Millennium Development Goals: "By 2015, to reduce the number of people without effective access to modern cooking fuels by 50%, and make improved cooking stoves widely available". For this target to become a reality, 1.7 billion people will need to gain access to LPG, natural gas, biogas and other modern fuels (Figure 14). In other words, every day, between now and 2015, these energy services will need to be extended to 485 000 people. Reaching the target would still leave 1.5 billion people cooking with solid fuels.

An ever-changing world adds to the challenge. Globally, 840 000 more people were using cleaner fuels in 2003 than in 1990, corresponding to a drop in solid fuel use from 58% to 52% of the population. Yet, because of population growth, the actual number of people using solid fuels has not gone down but rather gone up by 170 000. Energy poverty goes hand in hand with lack of energy infrastructure, such as a distribution network for LPG or an electricity grid. And lack of energy infrastructure is a common feature of isolated rural communities and rapidly growing urban slums. Achieving the energy target requires outpacing population growth and reaching those hardest to reach.

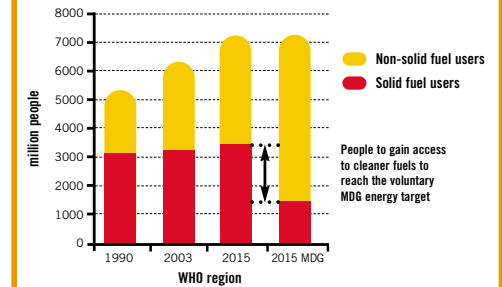
A way to escape energy poverty, a way to escape poverty. According to the International Energy Agency (IEA), we can only halve poverty by 2015 if the number of people relying on traditional biomass for cooking and heating is reduced to less than 1.85 billion. According to the IEA's reference scenario, however, this number will increase to 2.55 billion in 2015 (Figure 15). Electricity is



unlikely to become an important cooking fuel in most developing countries in the foreseeable future. Yet, access to electricity has a profound impact on people's lives, and represents a necessary precondition to moving up the development ladder. Nevertheless the number of people without electricity in 2015 will remain practically unchanged and a long way from the 1 billion required to halve the proportion of people living on less than 1\$ per day (Figure 15).

A rigorous acceleration of energy provision is needed to break the vicious cycle of energy poverty and lack of development in the world's poorest countries.

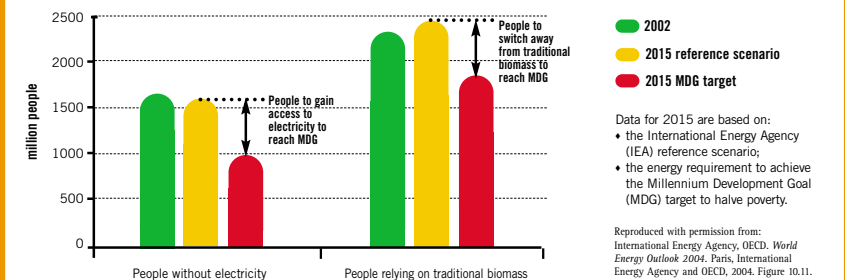
Figure 14: Trends in solid fuel use
Population using solid fuels (millions), 1990, 2003 (mid-point) and 2015



Data for 2015 are based on:

- a business-as-usual scenario that applies the observed annual increase in the number of people with access to cleaner fuels from 1990 to 2003 to the period 2003 to 2015;
- the voluntary Millennium Development Goal (MDG) target proposed by the UN Millennium Project to halve the number of people without access to modern cooking fuels between 1990 and 2015.

Figure 15: Better access to household energy can lift people out of poverty
Million people in developing countries without electricity and relying on traditional biomass, 2002 and 2015



Data for 2015 are based on:

- the International Energy Agency (IEA) reference scenario;
- the energy requirement to achieve the Millennium Development Goal (MDG) target to halve poverty.

Reproduced with permission from: International Energy Agency, OECD, World Energy Outlook 2004, Paris, International Energy Agency and OECD, 2004. Figure 10.11.