

Investment needs for universal access to electricity and clean cooking fuels

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Energy poverty and the World Energy Outlook

The International Energy Agency (IEA) has assessed the issue of energy poverty in its flagship publication, the *World Energy Outlook*, since 2002 (www.worldenergyoutlook.org). This year's edition, which will be published in November, will include a special focus on the role of energy in development, including the identification of a possible sustainable path towards universal access to modern energy services. The study, carried out by IEA jointly with UNDP and UNIDO, will provide updated cost estimates and investment requirements for universal access to modern energy services to 2015 and 2030. The analysis is aimed at informing national policy design and discussions at the MDG Review Summit to be held in September 2010 on the occasion of the 65th session of the General Assembly of the United Nations. The chapter will be released on 22nd September.

The link between energy and the Millennium Development Goals

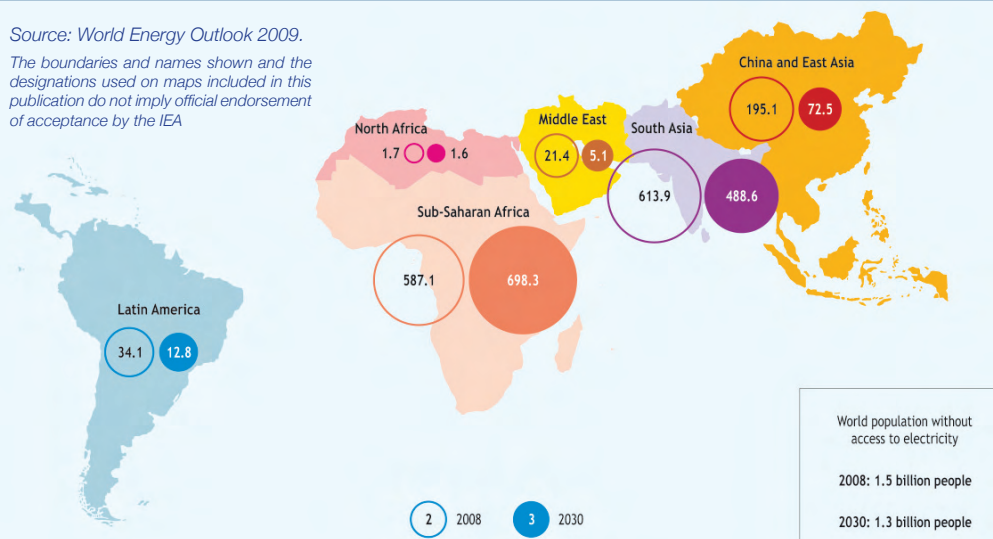
The international community has long been aware that access to energy is crucial to meeting the Millennium Development Goals (MDGs). But there is not a goal specifically related to energy, and there are no targets or indicators associated with the MDGs that would enable governments and the

international community to monitor progress in expanding access to modern energy services over time. The only indicator related to energy is for CO₂ emissions: total, per capita and per US\$1 GDP (PPP)¹. Expanding access to modern energy is a necessary condition for each of the economic, social and environmental dimensions of human development. Modern energy services help reduce poverty, improve educational opportunities for children and promote gender equality.

There are important development benefits to be gained from expanding access to modern energy services. Modern energy services help reduce poverty (MDG 1) and can play a critical role in improving educational opportunities for children, empowering women and promoting gender equality (MDGs 2 and 3). The availability of adequate clean energy is important in reducing child mortality (MDG 4). Reducing the carrying of heavy loads of fuelwood improves maternal health (MDG 5). Inefficient combustion of fuelwood exacerbates respiratory illnesses and other diseases (MDG 6). Fuel substitution and improved stove efficiencies would help alleviate the environmental damage of biomass use (MDG 7). Finally, widespread substitution of modern energy for traditional biomass can be a rallying point for global partnerships (MDG 8).

Figure 1: Number of people without access to electricity 2008-2030 (millions)

Source: *World Energy Outlook 2009*.
The boundaries and names shown and the designations used on maps included in this publication do not imply official endorsement of acceptance by the IEA



Access to electricity and modern cooking technologies and fuels

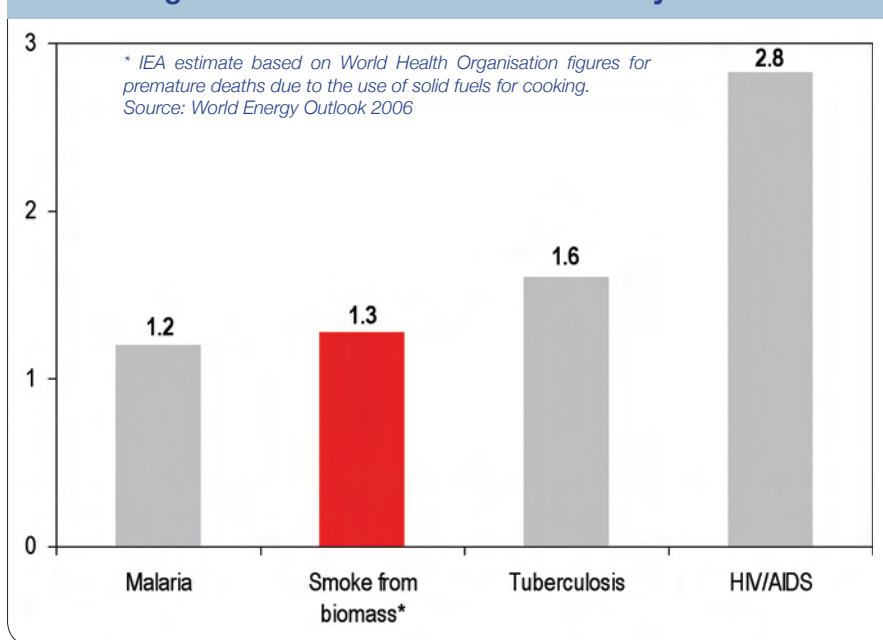
The IEA assesses two indicators of energy poverty: the lack of access to electricity and the reliance on the traditional use of biomass for cooking. Based on a detailed country-by-country database, the IEA estimates that, in 2008, the number of people without access to electricity was 1.5 billion, or 22 per cent of the world's population (Figure 1). 85 per cent of those people live in rural areas. In the Reference Scenario in the *World Energy Outlook 2009*, 1.3 billion people, or 16 per cent of the world's

population, still lack access to electricity in 2030. On the Reference Scenario figures, the electrification rate at the global level reaches 84 per cent in 2030, from 78 per cent in 2008. This represents a reduction in the number of people without access to electricity of 176 million compared to today, despite the substantial projected rise in global population.

Cooking a meal, a daily and routine task, can be a difficult chore and a danger to human health in some parts of the world. Today 2.5 billion people, or 37 per cent of the world's population rely on biomass as their primary fuel for cooking. Over half of those people live either in India or Sub-Saharan Africa. Use of biomass is not in itself a cause for concern. However, when resources are harvested unsustainably and energy conversion technologies are inefficient, there are serious adverse consequences for health, the environment and economic development. Reliance on biomass often results in regular exposure to harmful emissions of carbon monoxide, hydrocarbons and particulate matter. About 1.3 million people – mostly women and children – die prematurely every year because of exposure to household air pollution from biomass (Figure 2). Also in regions reliant on biomass, woman and children are typically responsible for fuel collection, an exhausting task that can result in long-term physical damage. Valuable time and effort is devoted to fuel collection instead of education or income generation. Environmental damage can also result, such as land degradation and regional air pollution.

In the Reference Scenario in the *World Energy Outlook 2009*, the number of people depending on biomass for cooking is expected to rise to around 2.7 billion in 2030. However, these global trends mask significant changes at the country/regional level. The number of people depending on biomass increases steadily in Sub-Saharan Africa, from 608 million today to 765 million in 2030, by which time 30 per cent of the people using biomass worldwide live in the region. In developing Asia, the number of people using biomass increases from 678 million today to 731 million in 2030. In contrast, in China the number of people reliant on biomass has already peaked and continues to decline

Figure 2: Annual Deaths Worldwide by Cause



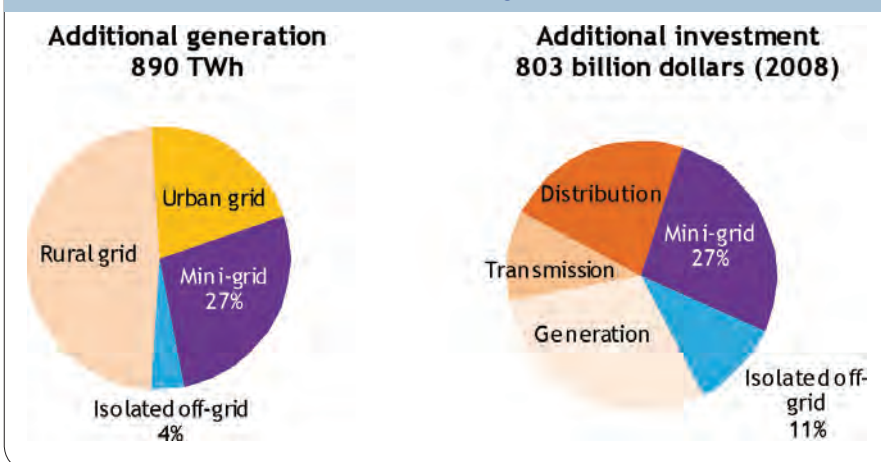
through to 2030. In India the number of people depending on biomass declines after 2020 as the country (like China) experiences a gradual transition towards modern fuels.

Investment needs for universal access to electricity and clean cooking fuels

The Millennium Development Goals include halving the proportion of the world's people living on less than US\$1 a day by 2015. In the 2004 edition of the *World Energy Outlook*, we estimate that, in the Reference Scenario, the number of people without electricity in 2015 will be only fractionally smaller than in 2002. Thus, it is highly unlikely that the UN poverty-reduction target will be achieved unless access to electricity can be provided to another half-a-billion of the people we expect will still lack it in 2015. This would cost about US\$200 billion. Meeting the target also implies a need to extend the use of modern cooking and heating fuels to 700 million more people by 2015.

In the 2009 *World Energy Outlook*, the Universal Electricity Access Case (UEAC) quantifies investment needs for universal access to electricity². The UEAC is based on the assumption that new policies are introduced that result in a progressive increase in electrification rates to 100 per cent

Figure 3: Incremental electricity generation and investment in the Universal Electricity Access Case



Source: World Energy Outlook 2009

of the world's population by 2030. Relative to the Reference Scenario, global electricity generation in the UEAC is 3 per cent higher in 2030, an increase of 890 terawatt hours (TWh). Around 70 per cent of the additional supply is projected to be based on grid extensions, which remain the cheapest option in all countries, while development of mini-grids accounts for 27 per cent and isolated off-grid generation for 4 per cent (Figure 3). Compared to the Reference Scenario, in the UEAC there is an increase in global energy-related CO₂ emissions of just 1.3 per cent by 2030 — less than the current emissions of the United Kingdom.

Almost 90 per cent of the incremental supply is required in just two regions, Sub-Saharan Africa (448 TWh) and South Asia (315 TWh). Additional power-sector investment worldwide of US\$35 billion per year on average is required in the UEAC in 2008-2030. This increase is equivalent to just 5 per cent of the annual average global investment in the power sector in the Reference Scenario, or around one-quarter of the annual investment required in China's power sector in the Outlook period. Almost 80 per cent of the incremental investment to meet the UEAC is needed in Sub-Saharan Africa and South Asia. Compared to the Reference Scenario, there is an increase in global energy-related emissions of just 1.3 per cent in 2030 in the UEAC.

In the *World Energy Outlook 2006*, the IEA estimates the investment needs for universal access to clean cooking fuels, using LPG as a proxy for all liquid fuels. The Reference

Scenario projections imply that the Millennium Development Goals (MDGs) of eradicating poverty would not be achieved, as the number of people relying on traditional biomass for cooking would be higher than achievement of that goal would suggest. Combined with start-up capital costs, the total bill (capital plus fuel costs) for households switching to LPG would then be US\$8 billion per year in the period to 2015 and US\$18 billion per year from now to 2030. Although these costs are not negligible, they are small compared with allocations of resources elsewhere in the world economy. For example, the annualised capital and operating costs through to 2030 represent 10.6 per cent of what OECD countries spent on Official Development Assistance (ODA) in 2004,

3 per cent of the estimated US\$278 billion that developing and transition economies spent on energy price subsidies in 2005 and 1 per cent of the US\$808 billion that will need to be spent annually on global energy infrastructure in the Reference Scenario. □

1 See <http://www.un.org/special-rep/ohrls/ldc/MDGs.pdf> for a complete list of the MDG goals, targets and indicators.

2 In the forthcoming *World Energy Outlook*, this scenario is updated and expanded to include access to modern cooking services.

Cooking meals can be a danger to health in many parts of the world

