



# Policy Insights No. 8

## Energy and Poverty in Africa

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Access to energy is essential for economic, social and political development. It encourages individual development via an improvement in educational and sanitary conditions. It makes economic development possible through the mechanisation and modernisation of communications. It plays a role in improving the economic environment by opening the way to more efficient public sector intervention, greater respect for the environment and a strengthening of democracy. Despite its enormous potential in fossil and renewable energy sources, however, Africa suffers from major energy deficits. The continent's resources are under-exploited or exported in raw form or wasted in the course of extraction or transport. As a result, supplies available for local populations are largely insufficient and energy consumption is essentially reliant on biomass.

All African countries are not in the same situation, however. The continent's energy resources are divided into distinct zones. Oil and gas are essentially located in North Africa and in countries bordering on the Gulf of Guinea; Southern Africa possesses virtually all the continent's coal potential; geothermal capacities are concentrated in East Africa and hydraulic basins in Central Africa; sunshine is strongest in the Sahel countries. Coupled with this heterogeneity of potential, exploitation capacities also vary largely. North Africa has less wastage in gas and oil exploitation than Gulf of Guinea countries. It also has greater refinery capacity than its sub-Saharan African neighbours. In this way, half of locally produced oil figures in available supply, compared with 11 per cent for Nigeria, 7.5 per cent for Central African countries and barely 5 per cent for Angola.

### A Vast Energy Potential...Largely Unexploited

Renewable energy sources are numerous in Africa. The hydraulic basins of central Africa, the Rift Valley fault and the sunshine from which the continent in general benefits provide sources of hydraulic, geothermal and solar energy which are rarely equalled elsewhere in the world. At present, however, only a tiny part of this potential is exploited: 7 per cent of hydraulic capacity and less than 1 per cent of geothermal capacity, while photovoltaic development is embryonic. Fossil energy is exploited more intensively than renewable energy in Africa, but domestic consumption remains extremely limited. Three quarters of the continent's oil production is destined for export. When they are not under-exploited or exported, the continent's energy resources are wasted, as is the case, notably, of gas, because of largely deficient infrastructures.

### Very Low Consumption, Dominated by the Use of Biomass

In the absence of satisfactory supply, energy consumption per inhabitant is very low in Africa. The average is 0.5 tonnes oil equivalent per inhabitant, compared with 1.2 tonnes worldwide. Consumption is composed essentially of exploitation of biomass, oil products and electricity, a secondary energy source produced by fossil and renewable energy sources. Modern energy sources — oil products and electrical energy — are essentially destined for industrial use and transport, however. Domestic energy consumption in Africa, therefore, consists largely of biomass use.

Wood and its derivatives constitute the energy source most used by African households, especially in the countryside, by virtue of their availability and the absence of private property rights over forest resources, which make them a virtually free resource at individual level. The availability

## Energy Potential and Supply in Africa in Figures

### **Renewable energy**

- ◆ 21 countries out of 53 could profitably exploit hydraulic energy in Africa but only 7 per cent of this potential is exploited, essentially in Egypt, Mozambique, Zambia, Nigeria and Ghana.
- ◆ The Rift Valley offers access to geothermal energy potential of about 6.5 gigawatts, of which just 121MW are exploited in Kenya.
- ◆ Average solar radiation in Africa ranges from 5 to 7 kWh/m<sup>2</sup> per day, on a par with the Arab peninsula, northern Australia and northern Chile. At the same time, Africa has only 1.3 per cent of world photovoltaic production capacity.

### **Biomass**

- ◆ 9 out of 10 people in sub-Saharan Africa use biomass, such as wood or left-overs, for lighting, cooking and heating.
- ◆ 6 out of 10 African women living in rural areas have to deal with the scarcity of supply of firewood, compared with 8 in Asia and 4 in Latin America.

### **Oil**

- ◆ Africa possesses 7.3 per cent of known world oil reserves and accounts for 10.2 per cent of world production, but possesses only 3.6 per cent of world refinery capacity.
- ◆ Africa represents only 3 per cent of world energy consumption.

### **Coal**

- ◆ 90 per cent of Africa's coal reserves, or 5 per cent of world reserves, are in South Africa.

### **Electricity**

- ◆ With 35.5 per cent of the population with access to electricity in 2002, Africa has the lowest level of electrification in the developing world. In Asia, the level is 42.8 per cent, in Latin America 89.2 per cent, in East Asia 88.1 per cent and in the Middle East 91.8 per cent.
- ◆ There are major disparities in levels of electrification between North Africa (93.6 per cent) and sub-Saharan Africa (23.6 per cent).
- ◆ The IEA reckons that developing countries should be at least 95 per cent electrified by 2030, except for Southern Asia (66 per cent) and sub-Saharan Africa (51 per cent).
- ◆ In sub-Saharan Africa, rural populations are the least well served since just 8.4 per cent have access to electricity.
- ◆ 11.3 per cent of electricity generated in Africa is wasted in the course of production and transportation, compared with 9.2 per cent in the world as a whole. This wastage exceeds 20 per cent in Senegal, Kenya and Tanzania and 40 per cent in Nigeria and Congo.

Source: African Development Bank and OECD Development Centre *African Economic Outlook (2003/2004)*, updated 2005.

of this fuel is diminishing fast in certain zones, however, as a result of over-exploitation, obliging women and children to cover ever greater distances to gather it. In addition, biomass's low calorific yield greatly increases the cost of using it per calorie consumed. Poor conditions of combustion result not only in poor heat yield but also constitute a health hazard, contributing notably to indoor pollution, a source of serious respiratory disease.

The low level of energy consumption is paralleled by limited use of electricity. The African continent has the lowest level of electrification in the world, lower than in southern Asia, Latin America and the Middle East. Low population density, combined with the preponderance of the rural population, is a major constraint since it makes the development of electricity infrastructures very costly and limits economies of scale. In addition, because of lack of maintenance, illegal supply tapping and inadequate investment, supply is not very reliable as is evidenced by the heavy losses in transport and distribution. The small size of the network and its poor general state are problems all the more difficult to overcome owing to the fact that African countries are subject to major budget restrictions.

### Combining Local, National and Regional Efforts to Improve Final Energy Supply

Faced with the alarming reality of the absence of a satisfactory energy supply, African countries have in the course of the last decade sought to reform the ownership modes, organisation and regulation of the energy sector. More than 30 African countries have, notably, embarked on programmes to open the energy sector to private operators. Although it is too soon to make a satisfactory evaluation, it would seem that these reforms have had limited results for the moment. In certain countries, the existence of reliable regulations has made it possible to attract investors and improve services to the population. In many others, incomplete processes have compromised the chances of success, bringing to the fore the crucial importance of the regulatory framework for the facilitation of transfers to the private sector.

Past experiences underline the essential role of the initial stages of reform, which is to say the clear formulation of electricity policy setting out the guiding principles of reform programmes and the establishment of a transparent and independent body to oversee the market. The regulatory authority's job is to ensure that terms and conditions are kept to, so that the firm operates effectively and widens access to electricity. This involves strategic price-setting both to protect consumers and to enable the company to make the investment needed to extend the grid. Only in this case has expansion of the electricity network been observed, as in Côte d'Ivoire.

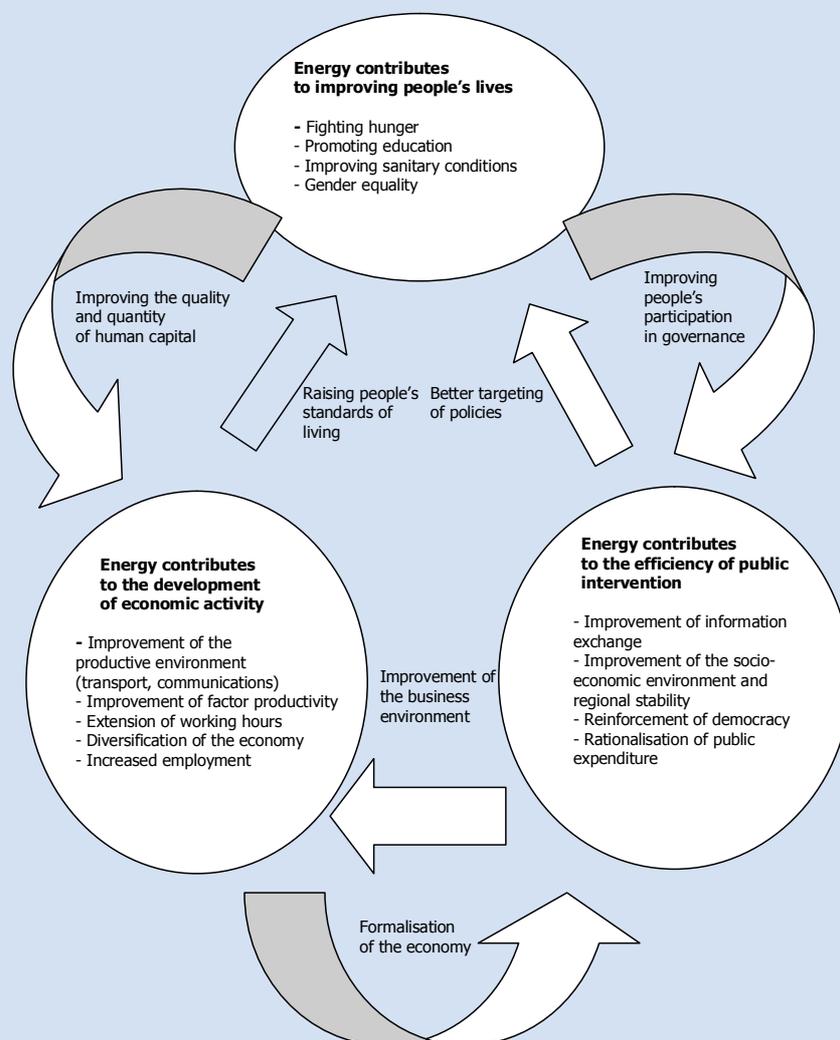
National reform should also be accompanied by a cross-border approach. The nature of electricity projects, notably their size and the possibility of economies of scale they bring, give good reason to extend networks beyond national boundaries. A network interconnection is already effective in North Africa and under way in Southern Africa (Southern African Power Pool). Another is in the process of being finalised in West Africa (West African Power Pool). However, Central and East Africa are still very isolated. The encouragement of regional initiatives aimed at improving access to electricity is justifiably one of the fundamental propositions of the Nepad energy initiative, which looks to the INGA project to provide interconnectivity. Here again, the creation of an adequate common regulator is a crucial condition of success.

The adoption of national reform aimed at rationalising the activity of the historic operators and the organisation of regional concertation for the development of large-scale projects are necessary conditions for improving and extending existing networks. However, if the high population density of the cities makes it probable that they will have priority for future electrification programmes, nearly half the African population can still be expected to continue to live in rural areas in 2025, with little or no access to national electricity networks. Making available to these populations reliable and efficient energy modes requires a search for flexible and innovative local solutions. This is a necessary condition for improving the lives of these populations but also for exploiting in a sustainable and durable manner the forest resources of the countries. This will certainly mean more efficient use of biomass, notably through less polluting technologies but also through the use of new energy sources such as LPG (liquid petroleum gas) for households. In the agricultural domain, lightweight, off-network or micro-network production systems could be used such as micro hydraulic irrigation projects, pumping systems powered by solar or wind energy and the use of agricultural residues for the energy generation. Some of this could be done by Small and Medium Enterprises, which would boost the local private sector.

The success of these approaches requires the creation by the authorities of integrated energy policies which encourage improvement of existing structures and infrastructures, promotion of new initiatives in favour of the most deprived populations and regional co-operation. Huge investment is needed to increase energy supply. The use of private initiative when the benefits to be had are mutual is certainly one dimension of the solution. But it will not be enough to make up for sparse local resources, especially to pay for major infrastructure projects and extending rural electricity supply. Reducing poverty is the international community's declared priority, so it is vital that boosting energy supply once again becomes a priority for bilateral and multilateral funding agencies.

Figure 1. **Access to Energy, the Keystone of Economic, Social and Political Development**

Access to a high-quality energy supply makes it possible to improve living conditions substantially, in that it facilitates the fight against hunger and malnutrition through the preservation of food by refrigeration, through higher productivity in the food chain and the development of modern agricultural production modes. It constitutes an essential feature of sanitary improvement via improved food hygiene and more advanced medical equipment.



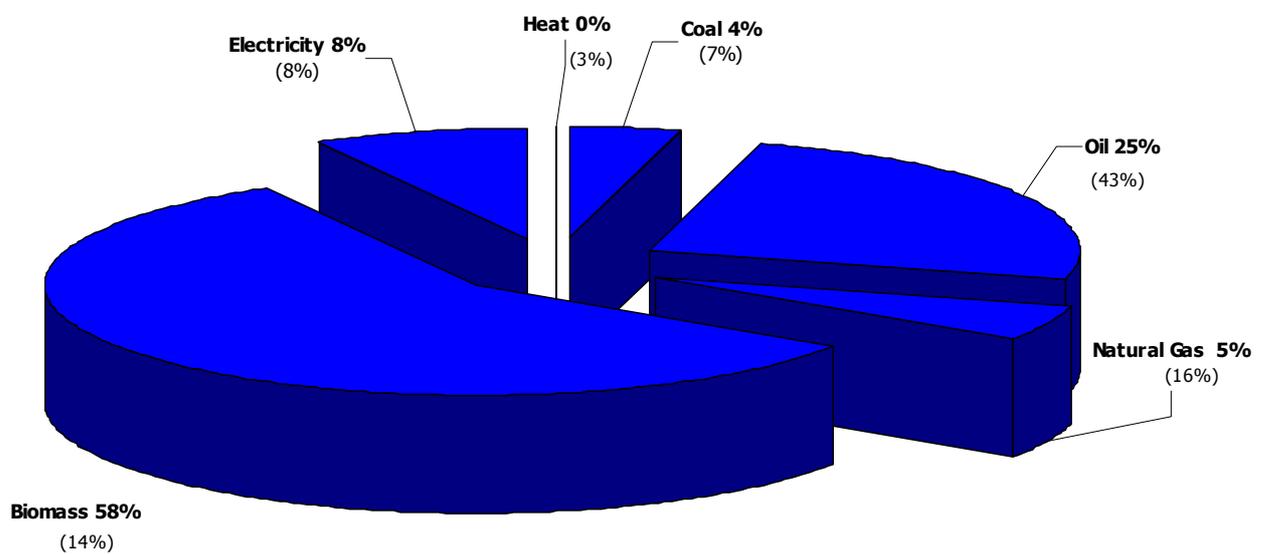
Modern energy sources are less dangerous, moreover, and their use limits the need to gather wood and seek water from distant sources – tasks which are often physically trying and time-consuming for the populations concerned. Finally, the availability of modern energy sources opens the way to general schooling by freeing time for children to go to school and by facilitating the development of classes and home study in the evening.

Improved living conditions have in their turn a direct impact on the development of economic activity through the quantitative — longer life expectancy and better health — and qualitative — better training — upgrading of the labour force. Better energy supply also opens the way to longer working hours and, where electricity is concerned, to a reduction in periods of forced inactivity resulting from power cuts. The use of reliable energy sources makes possible a better use of the other components of production, notably machines, and is an absolute condition for the adoption of new technologies capable of promoting diversification. Finally, the business environment benefits directly from the improvements registered in such key sectors as transport and communication, which are heavily dependent on energy supply.

Better energy supply also enables the state to offer education, health and communication services at lower cost and in greater quantity. It also encourages the circulation of information, an essential factor in political decision making. It makes it possible in this way to target populations in need and make an enlightened choice of the policy best suited to the local and national context. Conversely, the circulation of information and improved living conditions promote the development of greater participation on the part of the population in national choices, opening the way to a greater democratisation of the institutions. In this way, the authorities are pushed towards greater transparency and responsibility in their decision making.

Source: African Development Bank and OECD Development Centre *African Economic Outlook (2003/2004)*. Figure 12 in Overview.

Figure 2. **Energy Consumption in Africa and in the World in 2002 by Source**  
(world figures)



Source: International Energy Agency.

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