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Promoting Sustainable Energy Development in Africa: the potential role of decision-support tools for the incorporation of socio-environmental considerations into the power sector investment analysis and decision-making process

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Abstract

Africa has a population of some 728 million (12.6% of world total), and an estimated energy consumption of 238 toe (only 2.92 % of world total). Of the 48 countries in the world considered 'least developed', 36 are found in Africa. Over 75% of Africans live in rural areas. In some countries, such as Malawi, over 90% of the population has no access to electricity-often as a result of the high cost of extending grid-lines from centralised power stations to remote villages. Hence, the vast majority of Africa's rural populations depend heavily on crude biomass and animal waste to meet their basic energy needs and, subsequently, many are driven by poverty to the over-exploitation of available natural resources to attain some form of energy service. This leads, inevitably, to the degradation and destruction of the environment and, moreover, the utilisation of such crude fuels in confined spaces has negative effects on health, often resulting in chronic respiratory problems and premature death.

In order to deal with these issues, many African governments have directed attention to the development of national policies, agendas and strategic management plans for energy and the environment. However, available information suggests that current energy patterns in Africa continue to be unsustainable, and that a decisive transition to sustainable energy systems (requiring commitment from government and energy companies) must be put into place. Promoting a sustainable development path in Africa could be said to comprise several aspects, amongst them: (a) ensuring that populations have access to energy services, (b) maximising the use of indigenous natural resources-sustainably-for energy services provision, and, on a more practical level (c) the use of decision-support tools which incorporate consideration of the external socio-environmental factors related to energy production systems. This last point, (c), is crucial in order to ensure the sustainability of new power sector investments. However, it is also important in supporting the first two issues (a and b) given that, presently, decisions on

whether or not to invest in new facilities in the first place is generally only made upon the basis of financial cost.

If we are to follow a global sustainable development path, and if Africa, in particular, is to address many of its energy-related concerns-which include ensuring increased access to energy services, minimising environmental degradation, reducing dependence on imports and the balance of payments deficits arising from the importation of conventional energy resources, and improving the security of resource supply-it is essential that new investment alternatives which (i) are suitable for providing energy services access to small, dispersed rural populations, and (ii) make the most of available natural resources, be considered in the overall investment decision-making process.

Suitable energy systems-typically small-scale, decentralised, renewable energy-based facilities-are often viewed as disproportionately more costly than conventional electricity systems, and are hence considered non-viable options (a trend which is far from limited to Africa) from a financial perspective, given their relatively high capital costs. That said, promoting investments in more sustainable power systems could be facilitated through the application of an investment decision-support approach which considers social, ecological, technical and economic factors simultaneously. This approach would increase the value of socio-environmental benefits versus incremental financial costs of non-conventional, but more sustainable. energy systems (which address the energy needs of populations with little hope of grid connection in the near future), and make them more attractive options for investment.

The development of an approach to promote more sustainable power sector investment analysis and decision-support, is the focus of the author's doctoral research. Some of the issues which have been examined to date in the research-including energy consumption and production patterns, environmental decision-making concepts, and a review of some of the existing tools for environmentally-oriented energy sector decision-support-are presented in the paper.