

ADB FINESSE Africa newsletter



Financing Energy Services for Small-Scale Energy Users-ADB FINESSE AFRICA NEWSLETTER 1.2, MAY 2004

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From the Editor's desk

Please find herewith the second edition of the ADB FINESSE Africa program newsletter. We sincerely hope that you will find it quite informative.

Our first newsletter aroused a lot of interest from all over the world and we are grateful for all the responses we received. The number of recipients on our mailing list has dramatically increased; we have received several articles to consider for publication, as well as a lot of enquiries about the program. The overwhelming response we received, clearly demonstrates the potential role the FINESSE Africa program can play in promoting the dissemination of renewable energy and energy efficient technologies in Africa. We look forward to continued support and mutually beneficial collaboration with the various stakeholders for this program.

As part of its efforts to ensure the mainstreaming of sustainable energy issues in developmental initiatives, the FINESSE Africa Program team participated at the launch of the Thematic Programme Network on Renewable Sources of Energy and Environmentally Sound Technologies (TPN5) within the context of the regional Programme of Action to Combat Desertification in Africa, 5-6 May in Nairobi, Kenya. TPN5 is part of the United Nations Convention to Combat Desertification (UNCCD) activities in Africa. The deliberations during the launch of TPN5 and those of the African energy experts meeting held on 7 May 2004, fed into the African Ministerial meeting that was held on 8 May 2004. The ministerial meeting was held in preparation for the International Conference for Renewables Bonn, Germany, 1-4 June 2004 (<http://www.renewables2004.de>). African ministers attending this ministerial meeting adopted a common position on renewable energy. A brief report on the position of African ministers is included in this edition.

Our feature article in this issue is on the 'energy and water nexus'. The article outlines the linkages between energy and water in development work. The water and energy link is particularly important this month as the African Development Bank (ADB) will be organising its first water week from 1 to 3 July in Tunis, Tunisia. Some of the objectives of the ADB water week include; the promotion of water resources development in Africa to meet the Millennium Development Goals (MDG) by fostering partnerships around major initiatives of the African Development Bank; the provision of a venue for the exchange of ideas, experiences and best practices for attaining the MDG targets and to chart the most appropriate means for achieving the common objective of accelerating access to water and sanitation services for the African population. More information on the water week can be found on the following website address http://www.afdb.org/water/water_week.htm. From the FINESSE Africa program perspective, we embrace this event and take it as an opportunity to demonstrate that renewable energy and energy efficiency technologies can and should be integrated into initiatives to provide water and vice-versa wherever possible.

The FINESSE Africa program team will be part of the ADB's delegation at the Renewables2004 Conference in Bonn, Germany. The ADB in collaboration with other regional development banks will be organising a side event to share experiences and explore opportunities for collaboration. We promise our readers a report on the outcomes of the Bonn Conference in our next newsletter.

Integrated resources management, the energy and water nexus.

By Y. Vyas and A.P. Mhlanga

Introduction

Energy and water are required for most human activities and for the survival of all other forms of life. People use water for agricultural, domestic, industrial and recreational activities. Energy, on the other hand, drives all activities that are central to the survival of human beings. These two elixirs of life are also inextricably linked. Energy is central to addressing water security issues since it is required to extract, transport, treat, and distribute water as well as the transportation, treatment and disposal of wastewater. Natural water bodies and the various man-made water storage, transportation and treatment infrastructure like dams, lakes, canals also present opportunities to generate electricity. The energy and water nexus becomes a major developmental issue, particularly in Africa where efforts to provide either energy or water can be integrated to effectively combat high levels of poverty. This integrated approach ensures efficient and sustainable utilisation of natural resources.

Energy and water situation in Africa

The box below shows some of Africa's socio-economic statistics that relate to water and energy.

Population (million)	812
Rate of natural population increase (%)	2.37
% with access to improved safe water supply	62
% with access to electricity	15
% of population considered Urban	38
Infant mortality rate per 1000	78

Sources: ADB, UNEP, WB websites

With a population of about 812 million people and a rate of natural population growth of 2.37%, the majority of the population in Africa is living in abject poverty. On average only 12% of the population has access to electricity while it is also reported that some 62% have access to improved safe water supply. Poor water supply and hence sanitation leads to high incidences of water related diseases such as ascariasis, cholera, diarrhoea, dracunculiasis, dysentery, eye infections, hookworm, scabies, schistosomiasis and trachoma, which on an annual basis kill over 3 million people in Africa. While, on average, only 38% of the population is in urban areas, the rate of rural to urban migration is more than the natural population growth. The high rates of rural to urban migration are closely linked to problems of informal urban settlements and prevalence of women-headed households in rural areas. In a continent whose services supply infrastructure is either undeveloped, substandard or has been ravaged by protracted civil wars, lack of access to water and energy and their uneven distribution between urban and rural communities has led to the following problems:

- * Constrained economic opportunities and choices in most rural areas leading to high levels of rural to urban migration.
- * Rapid sprouting of informal urban settlements that are not connected to water, energy and sanitary services and the associated diseases profile.
- * High mortality for children under the age of 5 due to easily preventable diarrhoeal diseases.
- * High dependence on unsustainable exploitation of natural resources like forests.

Energy requirements for water supply

For people to make use of water, energy is required to lift, move, process and treat water at each stage of the extraction, distribution and use. Large water pumps that consume substantial amount of electrical power have to be installed each time a large-scale water supply installation is made. In remote areas that do not have access to grid electricity, mostly human

and animal power and, to a limited extent, diesel powered engines are still the main means of water provision. Unreliable energy services greatly compromise water security and lead to coping behaviors that waste both water and energy. Such behaviors include, use of oversized motors in water pumping to avoid burnout from poor quality electricity services, operating pumps during peak-demand periods to compensate for irregular service and the operation of high-cost fossil-fuel powered generators. Industrialists and households without reliable water invest heavily in backup water and energy systems that further increase the cost of water supply. For the majority of poor households that are in rural areas but have access to piped water, erratic supplies in energy and therefore water simply means resorting to unsafe water from streams, dams and open wells thereby exacerbating the risk of diseases.

The energy component in the cost of water in cities in Africa is quite significant ranging from 40% to over 80%. Given that conventional energy is normally subsidised and also excludes the environmental cost, it therefore implies that the true cost of the energy component in the cost of water is quite significant.

Lack of emphasis on water pollution prevention in Africa is causing increased energy and chemicals demand in the treatment of surface and underground water for human consumption. More complicated and more energy consuming treatment processes are now required to treat water. For example, a new water treatment station with new equipment needs 56 kWh to treat a cubic meter of water by osmosis on average, while distillation, a more complex process, requires as much as 23-29 kWh per cubic meter on average. By the time the water reaches the end-user, the energy used will have significantly increased. Water losses in the water supply infrastructure due to leakages and losses, imply losses in energy and in most cases these costs are passed on to the end-user.

Renewable energy technologies like wind pumps and solar water pumps can be used to provide water. These applications are very vital to areas that are not connected to the grid, which are mainly rural areas, informal settlements and large-scale farms where animals roam large pieces of land freely.



Solar water pump in use. Source : DOE/NREL , Credit: Ullal, Harin - Central Electronics, Ltd.

Integrated resources management, the energy and water nexus... *continued*



Windmill being used to pump water for livestock.
Source:DoE/NREL, Credit: Green Jim

low cost technology that can be adopted for water pumping stations.

Water use in energy generation

All turbine-produced electricity uses water either in its liquid or gaseous state. In the case of hydropower and geothermal energy, water is a direct input of the generation process. However in thermal power plants, water is used at various intermediate stages of electricity generation. Water is also used to prepare the fuels like in clean coal technologies, where the coal is first washed before use. In oil, gas or coal fired plants; water is also used for cooling purposes and is sometimes disposed while still hot, thereby disrupting the ecosystems of natural water bodies. Huge amounts of water are also used in nuclear power plants around the world.

The treatment and disposal of municipal liquid waste or wastewater is now posing opportunities for generating power and embarking on energy efficiency initiatives. The transportation and treatment of wastewater and its subsequent disposal requires a lot of energy. Biogas, a flammable gas that has about 70% of the energy content of natural gas, is generated from anaerobic decomposition of



Thermal power station make use of huge amounts of water

wastewater. This gas, which in most cases is vented into the atmosphere, contains high levels of methane that has huge global climate change impacts. This gas can be used as fuel for gas engines there by generating heat and electricity. Studies done to date have shown significant potential to generate power from dams that were built for supplying water for municipal or agricultural purposes only. In most cases, the dams were built to supply water for irrigation purposes and are located in very remote areas where there is no electricity supply. Generating electricity in such areas will have high

Large water pumps are used to pump water at various stages in the delivering and disposal of water. Heavy duty motors that draw a lot of electricity from the grid drive these pumps. Such load can however be reduced by over 30% through power factor correction. Power factor correction is a

impact on local communities.

Concluding remarks

Water and energy are inextricably linked. In a project that seeks to supply water, energy should not be an aftermath or a peripheral issue and vice-versa. Wherever possible, an integrated approach should be adopted.

There is need to foster system-level, integrated approach to planning of water resources at the basin scale and energy resources at the grid scale, that includes special consideration of the cross-cutting implications of various management choices.

Security in energy supply does effectively imply improved reliability and quality of water services, thereby reducing the need for wasteful coping behaviors that have negative local and global environmental impacts.

Vicious cycles of inefficiency in the management of either water or energy resources exacerbate shortages, waste and unsustainable patterns of use in the other. There is considerable potential of achieving more effective services in water and energy sectors through integrated efforts and providing inter-linked resource management systems.

Inefficient water use in thermal power plants and inappropriate effluent disposal practices contribute significantly to surface water shortages and pollution. These in turn result in more energy being used to extract underground water and the purification required to prepare the water for human consumption. The planning of thermal power plants should therefore integrate measures to mitigate the anticipated problems of water supply and in turn energy supply mechanisms.

Curtailling the demand of either water or energy through encouraging effective demand-side management initiatives that feed into greater resource conservation drives would ensure long-term sustainability of resources. Such an integrated approach will provide policy makers with room to plan for natural demand growth.

To ensure sustainable use of both energy and water, there is need to have proper pricing structures that send correct signals on the real cost of inputs and resources. This can only be achieved through conducive policy and regulatory frameworks as well the involvement of the private sector in delivering these services.

Events

1. The African Development Bank Group's First Water Week, 1-3 July 2004, Tunis, Tunisia. Internet http://www.afdb.org/water/water_week.htm .
2. HydroVision 2004, 16-20 August 2004, Montreal, Quebec, Canada, Internet: <http://www.hcipub.com/hydrovision/program.asp>
3. The World Renewable Energy Congress VIII and Expo, 28 August to 3 September 2004, Denver, Colorado, USA, Internet: <http://www.nrel.gov/wrec/>
4. World Energy Congress and Exhibition, 5-9 September 2004, Sydney Australia. Internet <http://www.tourhosts.com.au/energy2004/>

Lancement du TPN5/UNCCD en Afrique.

Réunion de lancement du Réseau thématique sur les énergies renouvelables et les technologies de l'environnement dans le cadre du Programme d'action régional de lutte contre la désertification en Afrique (TPN 5)

Nairobi (Kenya), 5-6 mai 2004

Dans le cadre de la mise en œuvre du Programme d'Action Régional Africain de la Convention des Nations Unies sur la lutte contre la Désertification (UNCCD), une réunion de lancement des activités du réseau relatif aux énergies renouvelables et aux technologies de l'environnement (TPN5) s'est tenue au siège du PNUE à Nairobi (Kenya) du 5 au 6 mai 2004.

Ont participé à cette rencontre des experts nationaux de plusieurs pays, les représentants des institutions sous-régionales et régionales concernées, les ONG compétentes, le secteur privé, les représentants des Centres de liaison de la CCD en Afrique, ainsi que diverses institutions internationales telles que la BAD, l'UA, la CEA, le PNUD/DDC, le PNUE, l'IEPF, et des partenaires bilatéraux.

Les principales recommandations de la réunion revêtent l'importance que les décideurs africains accordent à la promotion des énergies renouvelables (ENR) en tant qu'élément concourant à la lutte contre la désertification et, de façon générale, à la lutte contre la pauvreté en Afrique. Il faudrait souligner à cet égard, que les ministres africains chargés de l'énergie ont entériné les dites recommandations lors de leur réunion des 7 et 8 mai 2004 préparatoire à la Conférence Internationale sur les énergies renouvelables et le Développement Durable prévue à Bonn en Allemagne du 1 au 4 Juin 2004. Ces recommandations concernent :

- 1) L'insertion des activités et actions en faveur des énergies renouvelables dans les politiques et stratégies nationales, sous-régionales et régionales de lutte contre la pauvreté;
- 2) Le développement du marché des énergies renouvelables et de l'efficacité énergétique à travers une meilleure utilisation des mécanismes financiers existants;
- 3) Le renforcement des politiques d'utilisation des énergies renouvelables dans les activités génératrices de revenus;
- 4) Le renforcement en priorité des mesures visant l'élargissement de l'accès des services énergétiques en milieu rural;
- 5) Le développement des infrastructures de production d'équipements et d'offre de services énergétiques;
- 6) La promotion des politiques nationales, sous-régionales et régionales visant à généraliser l'accès des populations démunies aux énergies renouvelables;
- 7) La traduction en actions politiques des enseignements tirés des projets;

- 8) La généralisation des résultats probants obtenus des projets pilotes (changement d'échelle);
- 9) L'inscription en priorité des énergies renouvelables dans les Programmes d'action sous-régionaux de lutte contre la désertification;
- 10) La mise en place des mécanismes financiers pour la promotion des énergies renouvelables, notamment à travers des fonds issus des accords multilatéraux sur l'environnement;
- 11) L'inscription de la promotion des énergies renouvelables en relation avec la lutte contre la désertification à l'ordre du jour des consultations entre les pays africains et leurs partenaires bilatéraux et multilatéraux du développement;
- 12) La promotion à travers le réseau TPN5 les différentes formes de coopération Sud-Sud, Nord-Sud, favorisant le développement des énergies renouvelables et prenant en compte les plateformes de coopération inter-régionales initiées dans le contexte de la mise en œuvre de la Convention sur la lutte contre la désertification;
- 13) La création au sein du réseau les conditions de renforcement du travail en réseautage à travers la mise en place et le développement de programmes conjoints d'activités ENR/Désertification;
- 14) La valorisation de toutes les opportunités de développer les ressources énergétiques renouvelables en relation avec la lutte contre la désertification qui dérivent des initiatives régionales (NEPAD) et internationales (Plan d'application du Sommet de Johannesburg, Conférence internationale sur les énergies renouvelables de Bonn, Commission du développement durable, Objectifs de développement du Millénaire).

Pour plus d'informations, sur le TPN5, prière contacter : Naceur HAMMAMI, ANER Tunisie, Tel: 216 71787700, E mail : nhammami@aner.nat.tn.
Pour plus d'informations, sur les activités de l'UNCCD prière visiter : <http://www.unccd.int>.

Statement by African ministers for Renewables2004 conference.

During a meeting in Nairobi, the African energy ministers adopted an African statement on the role of renewable energy on the continent. This statement has been forwarded to the organisers of the Renewables2004 conference in Bonn, as the official contribution from Africa.

Delegates from 25 countries and organizations in Africa discussed and adopted the statement during a meeting at the UNEP headquarters in Nairobi on the 8th of May. The ministers acknowledged that Africa is endowed with substantial renewable energy resources that can make a significant contribution to meeting the continents' energy needs for sustainable development. The challenge is to develop the energy sources of the continent fully in order to deliver affordable energy services to all economic and social sectors. It was recognized that biomass does play an important role on the continent and will remain doing so over the coming decades. African ministers also want to emphasize to the international community that large-scale hydropower needs to play a more significant role in the African energy picture through sustainable development of hydro sites. The energy ministers are awaiting the possibilities the Clean Development Mechanism has promised to offer and do urge all nations worldwide to ratify the Kyoto protocol. The full text of the African energy ministers' statement is as following.

Within the context of the New Partnership of Development (NEPAD) Energy Infrastructure Initiative and on the basis of the different deliberations held at the technical level (5 to 7 May 2004), we the participants of the Africa Preparatory Meeting agree to:

1. Support the principal objectives of the International Conference on Renewable Energy 2004 which are to:
 - a. Forge ahead the process launched in Johannesburg for the global development of renewables; and,
 - b. Engender worldwide consensus on the Johannesburg Renewable Energy Coalition.
2. Promote sustainable production of biomass and its efficient utilization in all sectors, given its current and foreseeable future predominance in the overall energy supply of most African countries.
3. Promote research to assess and analyse renewable energy resources, as well as appropriate benchmarks to evaluate progress on renewable energy development.
4. Promote the incorporation of renewables in existing and planned energy master plans (inclusive of power/electricity master plans), and associated investment programmes.
5. Ensure the establishment and the strengthening of enabling institutional, legal and regulatory frameworks for the renewable energy sector, and especially in the area of public-private sector partnerships.
6. Urge donors and financial institutions of all types to provide appropriately structured financing and support to regional funding and technical facilities for the development and implementation of renewable energy projects
7. Request donors and financial institutions to support technology development, transfer, adaptation and capacity building for renewables at all levels aimed at lowering the

cost, encouraging local manufacture and wider use of renewables.

8. *Promote increased community public and private sector participation in renewable energy development and dissemination for poverty alleviation, empowering women, income generation and enterprise creation.*
9. *Promote the development of renewables as a measure of enhancing energy security.*
10. *Document for wider dissemination, renewable energy initiatives and case studies that demonstrate options for overcoming barriers to renewable energy development in Africa.*
11. *Incorporate renewable energy education and public awareness in educational curricula at all levels but with specific attention to the African context.*
12. *Enhance the development of renewables as a way to enable successful implementation of the UNCCD and contribute to achieving sustainable development in Africa.*
13. *Incorporate renewable energies in the agenda of the consultative processes between African countries and their major cooperating partners.*
14. *Develop the necessary infrastructure for renewable energy service supply equipment.*
15. *Support Africa-based renewable energy programmes of global initiatives such as Renewable Energy and Energy Efficiency Partnership (REEEP), Global Network on Energy for Sustainable Development (GNESD), European Union Energy Initiative for Poverty Alleviation and Sustainable Development (EUEI), Mediterranean Renewable Energy Programme (MEDREP), Thematic Programme Network on renewable energies and environmentally sound eco-technologies to combat desertification (UNCCD/TPN5) and the Global Village Energy Partnership (GVEP).*
16. *Increase cooperation across countries in the Africa region and also with other developing countries, for removing barriers, sharing lessons and increasing the uptake of renewable energy technologies.*
17. *Request our development partners to work with our respective governments in designing guidelines for the development of large hydropower projects in a sustainable manner and also to invest in these projects.*
18. *Request all nations to ratify the Kyoto Protocol and use CDM as tools to access additional support for renewable energies.*
19. *Request the United Nations system agencies in accordance with their respective mandates to mobilize resources for supporting countries of the region in the follow-up and implementation of agreements reached at the International Conference for Renewable Energies.*

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