

TECHNOLOGY

Renewable energy technologies **An African perspective**

by Karien Slabbert



Africa has substantial new and renewable energy resources, which could contribute significantly to the development of the continent's energy sector. It is estimated that the region has 1,1 Gigawatts of hydropower capacity, 9 000 Megawatt of geothermal potential, as well as abundant biomass, solar and significant wind energy potential.

Renewable energy technologies (RETs) provide attractive, environmentally sound technology options for Africa's electricity industry. RETs could counterbalance a significant proportion of foreign exchange that is used for importing oil to generate electricity.

The low investment levels make renewable energy particularly suitable for capital-constrained African countries. However, the renewable energy resource potential in Africa is under-exploited – mainly due to the limited policy interest and investment levels.

Current status

Africa's energy sector can be divided into three distinct regions. North Africa, which depends heavily on oil and gas; South Africa, which depends on coal; and the rest of sub-Saharan Africa, which relies on biomass energy to meet the bulk of its household energy requirements.

Figures for eastern and southern Africa indicate that a high proportion of total national energy supply is derived from biomass energy. This type of energy encompasses a wide range of natural organic fuels such as wood, charcoal, agricultural residues and animal waste. These resources are often used in their traditional unprocessed forms.

Consumption of modern energy in sub-Saharan Africa – excluding South Africa – is very low. Between 1980 and 2000, the *per capita* consumption of modern energy in eastern and southern Africa has remained small and stagnant.

Sub-Saharan Africa experiences very low levels of access to electricity. Electricity consumption is confined to commercial and industrial enterprises as well as high-income households. However, it

would seem that power utilities in Africa have failed to provide adequate levels of electricity services to the majority of the region's population – especially the rural communities and the urban poor.

The conventional energy sector – and the electricity sector in particular – are mainly characterised by unreliable power supply; low access levels; low capacity utilisation and availability; deficient maintenance; poor procurement of spare parts and high transmission and distribution losses.

Renewable energy potential

Large-scale biomass energy utilisation encompasses direct combustion for process heat, ethanol production, gasification, heat cogeneration, biogas production and briquetting. The best-known large-scale biomass energy systems with relatively sound economic track records, include cogeneration-using biomass as a fuel stock and the production of ethanol as a substitute for petroleum fuel. Renewables such as bio-ethanol would assist in mitigating the negative impact of high fossil fuel imports.

Geothermal energy is the natural heat from the earth's interior stored in rocks and water within the earth's crust. This heat creates the molten rock, or magma, beneath the surface crust. This energy can be extracted by drilling wells to tap concentrations of steam at high pressures and at depths shallow enough to be economically justifiable.

The steam is then led by pipes to drive electricity-generating turbines. At an international level, approximately 8 100 MW of geothermal power is generated, out of a global potential of 60 000 MW.

Large-scale hydropower is said to be a viable option as Africa has massive hydropower capacity. However, only a small percentage of Africa's enormous hydro potential has been harnessed.

Small-scale renewables

In terms of energy used, small-scale traditional bio-energy systems appear marginal, but their importance lies in the very large number of end-users that these systems serve. Bio-fuelled stoves can meet the bulk of cooking, heating and lighting requirements of most rural households in Africa.

Charcoal is an important household fuel. It is mainly used in the urban areas and is the primary fuel for the urban poor. Traditional charcoal production, a major source of employment for the rural poor, relies on the traditional and rudimentary earth kiln which is considered to be a contributor to land degradation in many peri-urban regions.

In the last 20 years, a substantial effort has been directed towards the modernisation of small-scale biomass energy systems.

Solar energy

This energy can broadly be categorised into solar photovoltaic (PV) technologies, which convert the sun's energy into electrical energy; and solar thermal technologies, which use the sun's energy directly for heating, cooking and drying.

Solar energy has for a long time been used for drying animal skins and clothes, preserving meat, drying crops and evaporating seawater to extract salt.

Wind energy

Much of Africa straddles Earth's tropical equatorial zones. Only the southern and northern regions overlap with the wind regime of temperate westerly winds. Therefore, low wind speeds prevail in many sub-Saharan African countries.

In sub-Saharan Africa, South Africa has been named as the country with the highest wind potential in the region.

Small-scale hydropower

Small-scale hydropower is often categorised into mini- and micro-hydro, and refers to the harnessing power from water at a small scale (capacity of less than 10 MW). Small-scale hydropower can be used for energy generation, irrigation and water supply. In addition, small-scale hydropower has a solid track record and is very reliable.

Much of the unexploited potential for small-

scale hydropower is in remote areas of Africa. Eastern and southern Africa is endowed with a large number of permanent streams, rivers and tributaries that provide excellent hydropower development potential. However, there is limited information on small-hydro sites in the region.

Limitations

Although national and international resources allocated to developing, adapting and disseminating RETs in the last two decades may appear substantial, the total amount is still insignificant compared to that allocated to the conventional energy sector.

The success of RETs in the region has been limited by a combination of factors which include poor institutional frameworks and infrastructure, inadequate RET planning policies and high initial capital costs.

Policies

The following policy options could contribute to developing successful RET-programmes in Africa:

- ▶ Long-term RET policy programmes within each country's government
- ▶ Carefully selecting RETs that are appropriate to Africa
- ▶ Implementing sustained capacity building programmes
- ▶ Instituting innovative financing mechanisms and tapping into available financing opportunities.

Possibilities

While it is recognised that RETs cannot solve all of Africa's energy problems, it is still seen as having a significant unexploited potential to enable African countries to meet growing energy requirements.

Renewable energy in the form of biomass energy, is already the dominant source of energy in many African households. If properly harnessed, it could meet a significant proportion of energy demand from the industrial, agricultural, transport and commercial sub-sectors.

(Source: *Renewable Energy in Africa: Prospects and Limits*, Republic of Senegal, United Nations Renewable Energy Development, by Stephen Karekezi, Director of African Energy Policy Research Network (Afrepren) and Waeni Kithyoma, also from Afrepren) **DMA**

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Optimise feed utilisation with the Keenan Hi-Fibre System

by Professor David Beaver

Efficient feed utilisation requires healthy animals and optimally functioning rumens. But ration composition or the way it is fed, can compromise both rumen function and animal health, and reduce feed utilisation.

The Keenan Hi-Fibre System, a unique combination of the Klassik mixer and dedicated nutrition, allows incorporation of adequate levels of structural fibre into the ration and promotes the use of home-grown feeds. Total mixed rations for housed cows or partial mixed rations for cows at pasture promote cud chewing, increase saliva production, stabilise rumen pH and allow the intrinsic value of the ration to be realised.

This results in improved feed conversion efficiency, with more milk for the same feed inputs (FCE; kg milk/kg feed DM). The average response is 2 litres per cow per day with no

extra feed – and that is for Keenan mixer owners shifting to the Hi-Fibre System.

Better FCEs can be achieved with 90 days following adoption of the Keenan System with typical gains of 10-15% after 12 months. This can reduce annual feed costs by as much as 15%. Importantly, it allows the farmer to regain greater control of feed costs, his single largest input cost of producing milk.

The Keenan Hi-fibre System is proven to improve rumen function and avoid the problems of sub-optimal rumen function. This overcomes the need for specific feed additives that are invariably used to solve problems rather than enhance the intrinsic value of the ration.

For more details, contact www.keenansystem.com. **DMA**

Shopping basket for African dairy

The All Africa Dairy Expo (AADE) will be held on 12-13 February 2008 at the Afri-Dome in Parys in the Free State, South Africa. This expo is a joint project of CenDel, the Centre for Producer Development of the South African Milk Producers' Organisation (MPO). Its main aim is to develop trade relations among the various African countries and any other milk-producing countries that wish to attend the Expo.

The Dairy Mail, South Africa's premium and only magazine aimed at communicating exclusively with the dairy industry, is the media sponsor while Standard Bank is the lead corporate and financial sponsor in this venture.

The Expo's theme is "The shopping basket for

dairy in Africa". In keeping with the theme, the Expo will emphasise dairy in Africa and will be promoted throughout the African continent.

Representatives from input suppliers, government institutions, non-governmental organisations and producers' organisations from countries across the African continent, will grace the show, providing visitors and exhibitors with a comprehensive look at the dairy industry.

Being a dairy expo, there will be sufficient opportunity for lovers of cattle to view their favourite breeds, while the best of the best will be on show during the crowning of the fifth "Queen of the Expo". The MPO's affiliates such as AgriConnect and AgriBonus, will also exhibit at the Expo. Visitors will also be able to meet

The Afri-Dome in Parys in South Africa's Free State province, will act as host to the 2008 All Africa Dairy Expo

with their milk buyers as well as their counterparts. Exhibitors will include a wide range of industry representatives as well as educational institutions, feed suppliers, equipment agents and pharmaceutical companies.

Exhibitors at the Expo will receive benefits that include coverage in *The Dairy Mail*, early bird discount packages, on-site technical and other assistance provided at stalls, an Expo starter pack containing relevant documentation, goodies and give-aways, access to a wide array of other stakeholders, excellent media exposure in all mediums, live entertainment, a beer tent with wine and beer tasting and promotions.

However, the Expo is not limited to role players in the dairy industry and everyone is welcome to

visit the Expo. An entrance fee of R40 (SA) per person per day will be payable at the gate.

To book stalls and negotiate package deals that also include media coverage, contact Mabel Schmahl at 082 563 4427, 012 843 5694 or e-mail mabel@agricconnect.co.za or Karin Duffy at 082 376 6396 / 012 843 5697 or karin@agricconnect.co.za.

A list of sponsorship opportunities can be found on the website on www.dairyexpo.co.za. Should you wish to act as a sponsor in some other way, please contact Julie McLachlan, Expo Manager, on tel +27 (0)12 843 5745, cell +27 (0)83 740 2720, fax +27 (0)12 804 5376 / +27 (0)86 523 4652 or e-mail julie@cendel.co.za. Check the website regularly for updates on the Expo. **DMA**

It's all about **passion**

by **Fidelis Zvomuya**

The South African Milk Producers' Organisation (MPO) said it is encouraged by the potential that Zimbabwean dairy farmers are showing, despite the economic and production challenges that the country's agricultural sector is facing.

Addressing the National Association of Dairy Farmers of Zimbabwe's (NADF) AGM recently, MPO national chairman, Nelius van Greunen, said that they need to look at how they can best produce milk economically, making use of all the available resources.

"The world is facing huge dairy products shortages, which as developing countries we need to exploit through supporting each other in times of crisis. This world shortage is due to shortages in agricultural resources, energy, world politics, low grain stocks as well as changing consumption patterns," Van Greunen said.

"We are best qualified to set the price of our produce. Both farmers and processors have production models to monitor pricing"

Hit by a national economic meltdown, lack of land tenure, a stock feed hyperinflation of more than 18 000%, power cuts and the unavailability of inputs and vaccines, Zimbabwean dairy farmers are hanging on, driven by the passion they have for the industry and its survival, NADF chairperson, Ajs Kirk said.

Addressing their AGM held in Nyanga recently, Kirk said that as dairy farmers, they know that if the country's dairy industry collapses, it will never rise again. "If we kill our cows that have evolved after generations of area-specific breeding and adaptation, they can never be replaced.

Kirk said what they are asking is for government to remove controls on the dairy industry. "We are best qualified to set the price of our produce.



Dawie Maree (MPO), Ajs Kirk, NADF chairperson, Dr Timothy Stamps, special health advisor to Robert Mugabe, Paul van Wyk (MPO Northern Cape), Nelius van Greunen (chairman of the MPO National), Dèan Kleynhans (MPO Western Cape) and Koos Pienaar (MPO Free State)

Both farmers and processors have production models to monitor pricing," he said.

Addressing the same gathering, Dairy Processors' Association of Zimbabwe (DPAZ) chairperson, Benson Samudzimu, who is also Dairibord Zimbabwe Limited managing director, said the Zimbabwean dairy industry was in the midst of an economic crisis. In 2007 alone, the milk price went up by 3 746% from Z\$650 per litre in January to Z\$1 400 in February, Z\$3 200 in March, Z\$11 000 in April to the current Z\$25 000.

He said exports have collapsed due to poor quality raw milk and problems in securing exports permits. Kirk called for the industry to identify cost-effective milk production processes, the development of policies and actionable strategic plans to address constraints such as farmers' viability, the high cost of stock feed. **DMA**