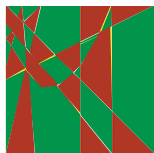


Powering Africa

The Nuclear Option



An Executive Meeting

Hôtel Le Vendôme

27 and 28 November, 2006

Powering Africa: The Nuclear Option (PANO) is an executive meeting of decision makers who will discuss the policies and practicalities of using nuclear power to meet Africa's electricity needs. The decision to call the meeting is timely, and reflects the growing maturity of Africa's power sector. Nigeria's recent announcement that it plans to build a nuclear-power plant will certainly generate interest in the nuclear option in other African countries. Nigeria's decision reflects the view of the International Ministerial Conference on nuclear power (Paris 2005) that "a diverse portfolio of energy sources will be needed in the 21st century to allow access to sustainable energy and electricity resources in all regions of the world. Efforts will be needed to improve energy efficiency, while limiting air pollution and greenhouse gas emissions."

EnergyNet Executive Meetings are designed to give executives access to essential information through expert briefings and peer discussions. PANO is a knowledge-based meeting that will provide an understanding of the issues and options. Executives are invited to participate, and the meeting will be small enough to allow for productive interaction. Each topic will be introduced by an authority on the subject, who will provide the stimulus for the group discussion that follows. The discussions will be taped and each participant will receive a recording. An executive networking facility will be available on the EnergyNet website.

The meeting will be held in the Hôtel Le Vendôme, a five-star, French-style hotel situated just off Cape Town's attractive Sea Point Promenade, and close to the city centre and the V&A Waterfront. The two-day meeting will include a welcome dinner at the beautiful Parliament Buildings, a visit to the Koeberg power station on the afternoon of the second day, and a farewell dinner at the gastronomic Rive Gauche Restaurant. An optional trip to a Cape wine estate will be available on the third day.



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Powering Africa: The Nuclear Option

The present

Of the 442 nuclear power plants in operation in 31 countries, just two are in Africa: Koeberg-1 and Koeberg-2 in South Africa. Both are 900 MW(e) PWRs. Of the 28 currently under construction none is in Africa. However, one of the promising new reactor designs reaching the prototype stage is African—South Africa's Pebble Bed Modular Reactor (PBMR).

The future

Nuclear power is projected to grow fastest in developing Asian countries where annual electricity consumption per capita is currently small, specifically China, India and Pakistan. 28 new nuclear power plants are currently under construction, equivalent to 6% of existing capacity. Some 38 plants are firmly planned, equivalent to 10% of capacity. Of the last 31 reactors connected to the grid, 21 are in the Far East and South Asia.

PBMR, or some other innovative nuclear power system, could provide Africa with the opportunity to make a technological leap-frog, thereby avoiding the intermediate steps that industrialized countries with long-established nuclear power programmes had to take.

Energy policy

To achieve sustainable development, one of the first tasks for Africa is to bring energy, particularly electricity, to the millions of people without it. Both electricity consumption and production will have to increase significantly.

Off-grid renewable energy is often seen as the best option for bringing power to the rural poor. But rural electrification can complement these technologies. To meet the growing urban and peri-urban demand for electricity, large centralized power generation is needed. Under the scenario of sustainable development, a role for nuclear power in Africa should be considered.

The economics

The question "Is nuclear power economic?" depends on the indigenous energy resources of a country, on the infrastructure and human resources, on the cost of the alternatives to nuclear power, on the environmental constraints, and on the country's energy security policies. Because new nuclear power plants are relatively expensive to build but relatively inexpensive to operate, it also depends on whether the investment environment requires short- or long-term returns. Where governments are direct investors, they can generally take a longer-term view than private firms in a liberalized market. Governments can also directly incorporate into their energy investment choices non-market considerations like energy security or environmental impact.

For the increased use of nuclear power in Africa, it will be necessary to bridge the gap between the economies of scale that favour large nuclear plants and the smaller electrical grids and capital capabilities of many African countries. Possibilities are, first, new small and medium-size reactor designs and, second, integration of the electricity grids of neighbouring countries.

Small & medium reactors (SMRs) and off-site refuelling

Several advanced SMR designs that could be more cost-effective for Africa are moving towards implementation. Combining SMRs with off-site refuelling could further improve the economics. The unloading of spent nuclear fuel and loading of fresh fuel would be done in a supplier country with a full fuel cycle. The spent fuel would, therefore, remain the responsibility of the supplier country. This would remove the need for a developing country to build a final repository for high-level nuclear waste. Such a scenario is likely to make a reactor more proliferation resistant and encourage support for the developing country's nuclear programme.

A related alternative is that of straightforward fuel leasing. In this case refuelling occurs on-site, but the fuel is owned by the supplier country, and the spent fuel is the supplier country's responsibility. Again this would remove the need for each developing country to build a final repository for high-level nuclear waste. It may even be possible to lease a SMR itself. The leasing concept could also be extended to leasing services, where, for example, a barge-mounted SMR is used to supply electricity, heat and/or desalinated seawater, while the supplier retains responsibility, not just for the fuel and reactor, but also for the full operation of the plant.

Powering Africa: The Nuclear Option

Regionalization & integration

The larger the nuclear plant the greater the economies of scale. But many African countries do not have the necessary capital and electricity demand to support a large plant. Regionalization and integration could provide a solution.

Also the greater the number of nuclear plants supported by the national infrastructure, the lower is the per unit (or per kilowatt-hour) cost of that infrastructure. Nuclear power infrastructure includes the institutional framework and legislation within which nuclear facilities operate, and the industrial, economic, social, technical and scientific capabilities to enable the secure and efficient development, management and operation of nuclear power facilities. These up-front infrastructure investments present a substantial requirement, particularly if a country initially needs only a relatively small amount of power from nuclear energy. Cooperation can mitigate the cost of these requirements.

International cooperation

Besides regional cooperation, international cooperation is essential for the development of an African nuclear industry. Although developing countries may well dominate future markets for nuclear power plants, it is developed countries that currently have the most R&D resources and expertise. One of their goals should be to share their resources and expertise for the future needs of developing countries through international cooperation. Providing systems of access to the global nuclear communities' knowledge pool will be a major factor in the promotion of nuclear energy in Africa.

Programme Outline

The topics proposed for the executive discussions will be introduced by an authority on the subject. (Where possible, background material will be provided before the meeting.) Each discussion will be followed by a short break for refreshments. The proceedings will be recorded, and copies of the recordings will be available.

Monday, November 27, 2006

Welcome Address

A nuclear World

- Nuclear power—a science for all: the international nuclear community should promote its benign use in developing countries.
- Geopolitics and the role of nuclear power: the interplay of economic growth, energy availability, and national strategic energy planning both globally and regionally.
- The South African experience: a future based on past successes.
- The Indian experience: the passion and pain of building a nuclear power plant.

Lunch at Hôtel Le Vendôme

Available Options

- A summary: the options for nuclear power in Africa.
- Nuclear technologies: which would suit an African market.
- Managing the fuel cycle: the options.
- Nuclear capability: what is required in terms of infrastructure, technology transfer, and plant operation and maintenance.

Welcome dinner hosted by the Department of Public Enterprises

Tuesday, November 28, 2006

Qualifying Criteria

- A perspective from the ground: assess the practicality of nuclear power for Africa.
- Market size: what is the likelihood of creating an integration of national electricity markets that could support a nuclear plant? And how to drive the policy of integration forward?
- Regulatory and legal framework: its scope, its design, its implementation.
- Finance: how essential is donor money? who else would finance a nuclear plant?

Lunch at Hôtel Le Vendôme

Visit to the Koeberg Nuclear Power Station hosted by Eskom

Farewell dinner hosted by the Department of Minerals and Energy

Powering Africa: The Nuclear Option

Registration

Please register the following to attend the "Powering Africa: The Nuclear Option" executive meeting at a cost of **£995**.

Full name: _____

Position: _____

Company/Organization: _____

Address: _____

Tel: _____ Fax: _____

Email: _____

Company activity: _____

Signature: _____ Date: _____

Please debit my **credit card**

Credit card number. _____

Security No. (Usually on the signature strip) _____

Expiry Date: _____

The card is in the name of: _____

Visa/Master/Euro Diners

Credit card billing address: _____

Payment by **Bank Transfer** (attach copy or supply full details of transfer). Payment should be made through the **Royal Bank of Scotland plc**, quoting (1) account number **70545244**; (2) sort code **15-30-00**; and (3) swift(BIC) code **RBOS GB2L**, noting "Africa Energy Forum", delegate name & company.

All transfer costs to be paid by sender; alternatively add £16 to your total fee.

Payment by **Cheque** drawn on a **UK Bank**, payable to **EnergyNet Ltd.**

Please return your completed form to:

Evelyne Cargill • EnergyNet Limited • 110 Elm Road • Kingston upon Thames • Surrey KT2 6HU • United Kingdom • Tel +44 (0)20-85 47 06 98 • Fax +44 (0)20-85 41 32 44 • info@energynet.co.uk

In addition to the above, there is also the facility to register online at www.energynet.co.uk

The fee covers:

- Access to the "Power Africa: The Nuclear Option" executive meeting
- Lunches and dinners
- Documentation
- A recording of the meeting
- Executive networking facilities on the website
- Site visit to the Koeberg nuclear plant

Cancellation: The fee is non-refundable if cancellation is received after October 23, 2006. For a cancellation before this date the fee will be refunded, less a handling charge of £50.

Venue: Hôtel Le Vendôme, 20 London Road, Sea Point, Cape Town 8050, South Africa—www.le-vendome.co.za

Hotel accommodation: It is recommended that participants stay at the Hôtel Le Vendôme, which is situated close to the Sea Point promenade, the city centre, and the V&A Waterfront. A rate of R1,565 per standard room per night has been negotiated. (The rake rate is R2,460.) Besides all the facilities provided by a five-star hotel, Le Vendôme provides a 3-bottle wine pack on the last night of stay. The hotel offers a shuttle service every hour to the city centre, V&A Waterfront, and Camps Bay beaches. EnergyNet will provide a booking form on demand.

Conference programme: EnergyNet reserves the right to alter the timing, content, and speakers of Powering Africa: The Nuclear Option.